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ANNUAL REPORT ON STRONG-MOTION EARTHQUAKE RECORDS IN JAPANESE PORTS (1994)

港湾地域強震観測年報（1994）

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Abbreviations used above:

AR: Analog Records of Reproduced Accelerograms

IR : Integated Velocities and displacements

RS: Response Spectra

FS: Fourier Spectra

LO: Loci of Accelerations, Velocities and displacements

港湾地域強震観測年報（1994）

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要　旨

1962年より実施されている港湾地域強震観測網においては，1994年12月31日現在，4840個の強震記録が蓄積されるに至っている。この内，1994年中には 194個の強震記録が得られている。強震計の台数としては，1994年12月31日現在，89台の強震計が56港に設置されており，設置状況としては，63台が地盤上に，12台が地中に、14台が構造物上となっている。本強震観測網では，機械式アナログ記録方式の SMAC-B2型強震計，電気式アナログ記録方式の ERS-B,-C,-D型強震計および電気式デジタル記録方式のERS-F,-G型強震計の６種類の強震計が使用されている。ただし，SMAC-B2型強震計については，数地点の例外を除いて最新型の ERS-G型強震計に数年の内に更新される予定となっている。

本報告は，1994年に港湾地域強震観測網で得られた記録について報告するものである。本観測網で得られた記録は，地震毎に分類され，地震諸元，観測地点，記録番号，最大加速度等とともに，本報告に掲載されている強震観測表(Strong-Motion Earthquake Observation Results)にまとめられている。強震観測表の地震諸元は，気象庁地震津波監視課発行の「地震月報」および「地震火山概況」に基づいている。また，強震記録の記録番号は，各観測地点から記録が送られてきた順番に付けられており，記録の分類として、頭文字「Ｓ」で始まる記録は SMAC-B2型強震計で得られた記録，「Ｍ」は ERS-B,-C,-D型強震計で得られた記録、「Ｆ」はERS-F,-G型強震計で得られた記録をそれぞれ示している。強震観測表にまとめられている記録の中で，最大加速度が 20Galを越える記録については，観測結果として再生した加速度記録波形を示している。また，最大加速度が 50Galを越える比較的大きな記録については，さらに，補正加速度記録波形，速度波形，変位波形，応答スペクトル，フーリエスペクトル，水平面内の加速度・速度・変位の軌跡も併せて示している。

1994年中には，10月4日22時22分に北海道東方沖地震（M＝8.1），12月28日21時19分に三陸はるか沖地震（M＝7.5）の被害地震がそれぞれ発生し，港湾地域強震観測網においても多くの記録を得ることができた。これらの２地震から得られた記録については，強震観測表にその結果を掲載するが，記録波形等については，別報の「1994年北海道東方沖地震の港湾地域における強震記録」，「1994年三陸はるか沖地震の港湾地域における強震記録」にて詳細に報告する。

1994年における港湾地域強震観測は，以下に示す諸機関の協力の下に実施された。

運輸省港湾局　運輸省港湾建設局　北海道開発局港湾部　沖縄開発庁沖縄総合事務局
東京都港湾局　静岡県港湾課　宮崎県港湾課　大阪市港湾局

また，本年報の作成には，各観測地点での強震観測担当者の努力に負うところが非常に大きい。担当者各位に敬意と謝意を表すとともに，各観測地点で実際に強震計の点検ならびに記録の取扱いに携わった方々の氏名を次頁以降に掲載する。

キーワード：　地震、港湾、強震観測、数値化加速度記録、応答スペクトル

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強震観測担当者（1994年 1月～12月）

第一港湾建設局

秋田港	工事事務所		玉内 克一	遠藤 源	伴 孝宏	
酒田港	〃		川村 浩	小野寺悌介		
新潟港	〃		橋本 正夫	松村 高司	清水 毅	
伏木富山港	〃		佐々木豊喜	川見 健二		
金沢港	〃		竹田 信一	辻 浩幸		
敦賀港	〃		寺崎 賢次	渡辺 淳一		

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宮古港	〃		黒沢 忠男	及川 勝朋	後藤 寿	
宮古港	〃	釜石工場	似内 敏行	斗沢 照夫		
塩釜港	〃		片寄 誠	田村 勇	中野渡秀一	
小名浜港	〃		菅原 豊明	山内 尚		
小名浜港	〃	相馬工場	木田 幸一	佐藤 匡		
鹿島港	〃		渡辺 祐治	住吉 康男	福川 順	
鹿島港	〃	常陸那珂工場	鳥畑 孝志	平野 孝雄		
千葉港	〃		三浦 匠	前田 敏幸		
京浜港	〃		仙田 孝一	遠藤 一幸	及川 隆	今野 頼夫
			西谷 和人	川住 武之		

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神戸港	〃	尼崎工場	佐々木高雄	津田 行男		
広島港	〃		中平 浩之	山崎 広美	高木 悌二	
小松島港	〃		久本 忠則	山本 幹夫		
松山港	〃		松崎 忠彦	堺 健作		
高知港	〃		渡部 隆雄	小銭貴一郎		
境港	〃		奥名 孝行	辻村 幸弘		

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			吉田 豊成			
志布志港	〃		永島田 剛	横手 敏弘	樋口 晃	渡瀬 真一
鹿児島港	〃		上谷 修	木村 長正		

第五港湾建設局

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清水港	〃　下田工場	小椋　進	堀池　昌生	渋谷　和之	
三河港	〃	伊藤　正人	石見　剛		
名古屋港	〃	中山　務	中津川哲司		
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十勝港	〃	藤由　幸大	佐藤　良雄		
浦河港	〃	石井　克英	東館　正樹		
苫小牧港	〃	新岡　博文	松良　精三	渥美　洋一	神谷　昌文
室蘭港	〃	高際　一男	桜井　博	福士　昌哉	
小樽港	〃	鈴木　一行	新井田勝男	北川　國廣	
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ANNUAL REPORT ON STRONG-MOTION EARTHQUAKE RECORDS IN JAPANESE PORTS (1994)

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Synopsis

Since 1962, strong-motion earthquakes and earthquake responses of structures have been observed in the major ports in Japan. By the end of December 1994, 4840 accelerograms had been accumulated and analyzed at the Geotechnical Earthquake Engineering Laboratory of the Port and Harbour Research Institute.

The strong-motion earthquake observation network in port areas in Japan consists of 89 strong-motion accelerographs installed at 56 ports as of December 1994. 63 accelerographs out of 89 are installed at ground surface, 12 accelerographs are in ground by using bore-hole and the rest (14) are on structures such as quay walls. In the network, two types of accelerographs have been used; one is the SMAC-B2 accelerograph and the other is the ERS accelerograph. The SMAC-B2 accelerograph is of a mechanical type and the ERS accelerograph is of an electrical type equipped with either analogue or digital recorder.

This report presents results of observation and preliminary analysis of records obtained in 1994, which are listed in the tables of Strong-Motion Earthquake Observation Results with their maximum accelerations, being classified in accordance with earthquakes. For the records of ground motions with maximum accelerations exceeding 20 Gals (=cm/sec^2), computer plots of reproduced acceleration are presented. For the records of ground motions with maximum acceleration exceeding 50 Gals, computer plots of corrected acceleration, integrated velocity and displacement, response spectra, Fourier spectra, and loci of accelerations, velocities and displacements in horizontal plane are presented.

In 1994, two great earthquakes occurred in northern part of Japan; one is the 1994 Hokkaido-Toho-Oki Earthquake on October 4 and another is the 1994 Sanriku-Haruka-Oki Earthquake on December 28, and many after shocks were followed. Many records were observed from these earthquakes in the network. The records obtained from these earthquakes are compiled into reports entitled 'Strong-Motion Earthquake Records on the 1994 Hokkaido-Toho-Oki Earthquake in Port Areas' and 'Strong-Motion Earthquake Records on the 1994 Sanriku-Haruka-Oki Earthquake in Port Areas' besides this annual report.

KEY WORDS: Earthquake, Port, Strong-Motion Earthquake Observation, Digitized Acceleration Records, Response Spectra

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1. Introduction

The observation of the strong-motion earthquake in major ports in Japan was started in 1962 by the Geotechnical Earthquake Engineering Laboratory of the Port and Harbour Research Institute. The observation network was expanded year by year and 89 accelerographs had been installed in 56 ports as of December 1994. 4840 accelerograms had been obtained in the network by the end of 1994. The number of accelerograms obtained in 1994 was 194. Two types of accelerographs have been used in the network, namely the SMAC-B2 accelerograph and the ERS accelerograph. As of December 1994, 2584 accelerograms out of 4840 had been obtained by the SMAC-B2 accelerograph and 2256 accelerograms by the ERS accelerograph.

The records had been published as annual reports after preliminary processing and analyses which will be explained later. The records from 1963 to 1975 had been published in the preceding annual reports which had similar format to the present one[1)-11)]. Because digitized data of vertical components of the records from 1963 to 1975 were not included in those reports, the data were reported separately[12)]. After the annual report for the records of 1976 and 1977, a new data processing procedure was introduced, and accelerations with instrument correction, integrated velocities and displacements, fourier spectra and response spectra had been reported in the annual reports[13)-27)]. When disastrous earthquakes occurred, special reports had been published for the earthquake records besides annual reports[28)-36)].

In 1968, there occurred an earthquake of JMA Magnitude 7.9 in south-east off Hokkaido island. This earthquake was named the 1968 Tokachi-Oki Earthquake, and large number of after shocks followed. Many damage took place to buildings, roads, port facilities and many other types of structures, and many accelerograms were obtained in the network. In particular, an accelerogram with the maximum acceleration of 259 Gals (=cm/sec^2) was recorded at Hachinohe Port in northern part of Honshu island. Because of the large magnitude of the earthquake and the damage to structures, the records were of great interest and importance, and a special report was published for the records[28)]. In 1978, Japan was hit by two great earthquakes which were the 1978 Izu-Oshima-Kinkai Earthquake of JMA Magnitude 7.0 in south-central off Honshu island and the 1978 Miyagi-Ken-Oki Earthquake of JMA Magnitude 7.4 in north-east off Honshu island. Records of these earthquakes were compiled into two special reports[29), 30)]. In 1982, port structures were damaged by the 1982 Urakawa-Oki Earthquake of JMA Magnitude 7.1 in south-east off Hokkaido island, and records of the earthquake were also compiled into a special report[31)]. In 1983, serious damage was brought about in the Japan Sea side of northwest off Honshu island by the 1983 Nipponkai-Chubu Earthquake of JMA Magnitude 7.7, and records of the earthquake were compiled into a special report[32)]. In 1984, an earthquake of JMA Magnitude 7.1 occurred off east coast of Kyushu island in Hyuga-nada, and brought slight damage to port facilities. Records of the earthquake were compiled into a special report[33)]. In 1987, an earthquake of JMA Magnitude 6.7 hit the metropolitan area. The earthquake caused some damages to structures and reclaimed lands area also liquefied slightly by this earthquake. Records of the earthquake are compiled into a special report[34)]. In 1993, two great earthquakes occurred in Hokkaido island, which were the 1993 Kushiro-Oki Earthquake of JMA Magnitude 7.8 in east off Hokkaido on January 15 and the 1993 Hokkaido-Nansei-Oki Earthquake of JMA Magnitude 7.8 in south-west off Hokkaido on July 12. Serious damage was brought about in Hokkaido and many accelerograms were recorded in the network. The records obtained from these two great earthquakes were compiled into special reports[35), 36)].

In 1994, two great earthquakes occurred in Hokkaido island, which were the 1994 Hokkaido-Toho-Oki Earthquake of JMA Magnitude 8.1 in east off Hokkaido island on October 4 and the 1994 Sanriku-Haruka-Oki Earthquake of JMA Magnitude 7.5 in east off Honshu island on December 28. Many accelerograms were recorded in the network.

This report presents the strong-motion earthquake records observed in 1994. The records obtained in the network in 1994 are listed in tables of Strong-Motion Earthquake Observation Results with their maximum accelerations, being classified by earthquakes. For the ground acceleration records with maximum accelerations exceeding 20 Gals, computer plots of reproduced accelerograms are prepared. For the records with maximum acceleration exceeding 50 Gals, computer plots of reproduced accelerograms, integrated velocities and displacements, response spectra, fourier spectra and loci of accelerations, velocities and displacements in horizontal plane are prepared. Digitized data table of accelerograms and calculated data table of response spectra had been listed in the preceding annual reports but those data are not included in this report because those printed digital data tables are not often used any more.

Following organizations cooperated with the Port and Harbour Research Institute in the strong-motion earthquake observation in port area;

(a) The Bureau for Ports and Harbours of the Ministry of Transport
(b) The Regional Bureaus for Port Construction of the Ministry of Transport
(c) The Port and Harbour Division, Hokkaido Development Bureau of the Hokkaido Development Agency
(d) The Okinawa General Office of the Okinawa Development Agency
(e) The Harbour Bureaus of Tokyo Metropolitan Governments
(f) The Harbour Bureaus of Osaka Municipal Governments
(g) The Harbour Sections of Shizuoka Prefectural Governments
(h) The Harbour Sections of Miyazaki Prefectural Governments

2. Network and Instruments

(1) Network

The network of the Port and Harbour Research Institute covered the whole coast line of Japan with 89 strong-motion accelerographs in 56 ports at the end of 1994 . The locations of ports where accelerographs were installed as of December 1994 are shown in Figure 1. The numbers attached to the ports in Figure 1 correspond to the numbers of ports in Table 1.

The stations in the network are listed in Table 1 with the type of accelerograph and the installation condition, being classified by ports. The detailed information of the stations is described in the reports on the site characteristics[37)–41)]. At the end of 1994, the accelerographs at 25 stations out of 89 stations were the SMAC-B2 accelerographs and the rest (64) were the ERS accelerographs.

(2) Servicing

Installation and servicing of the accelerographs have been made by the port construction offices of the previously described organizations under the guidance of the Geotechnical Earthquake Engineering Laboratory. It is directed that accelerographs should be checked at least once a month and after an earthquake larger than the JMA seismic intensity scale II shown in **Table 2**. Immediately after earthquakes, the accelerograms are sent to the Laboratory by mail without any treatment or reading to avoid possible damage to the records.

The Geotechnical Earthquake Engineering Laboratory has also been offering a training course of about 5 days every year to the engineers who are in charge of the accelerographs at the stations. During the training course, the Laboratory offers lectures on procedure to maintain the accelerograph and to handle the accelerogram. The Laboratory also offers introductory lectures on earthquake engineering.

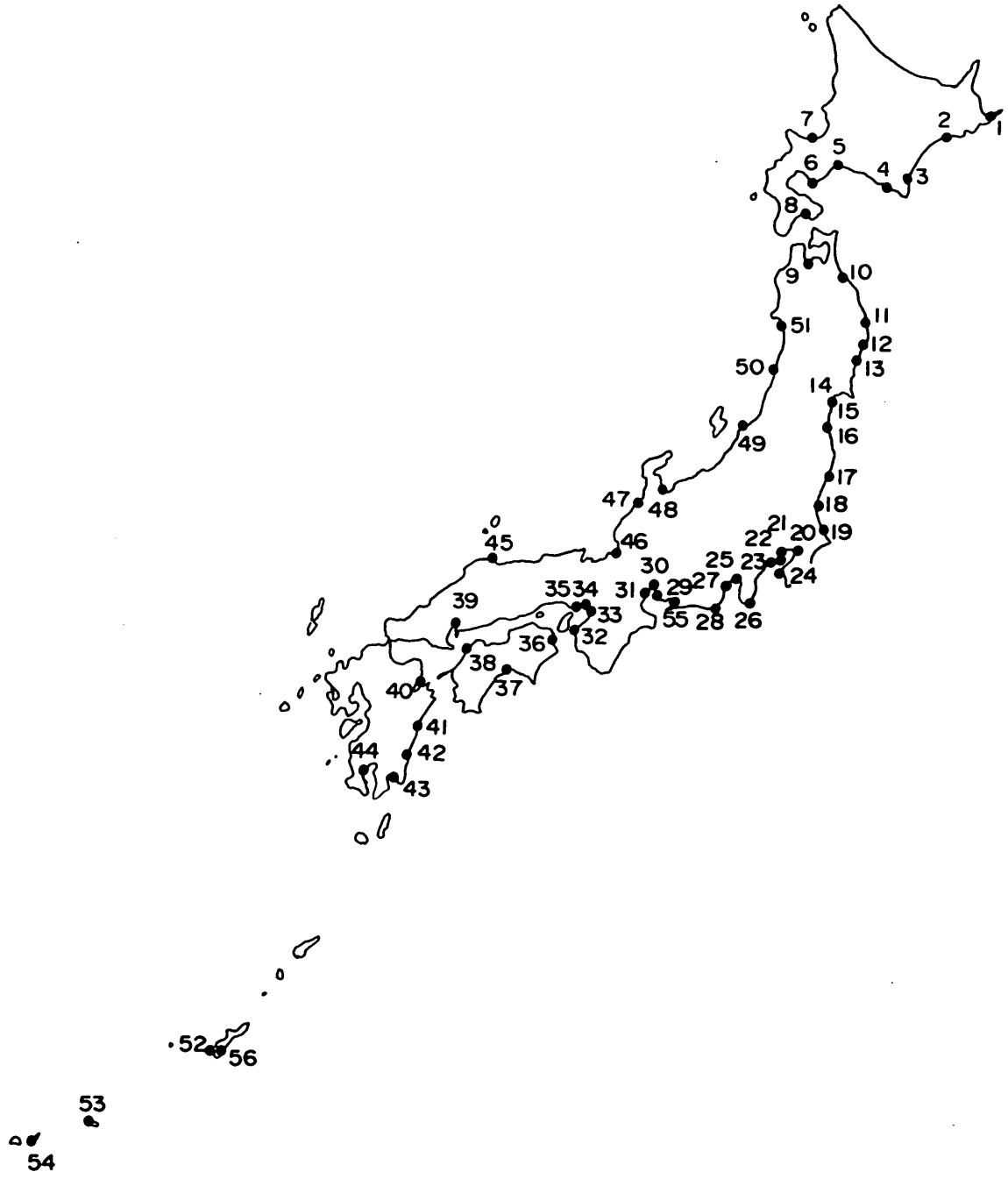


Fig.1 Location of ports where accelerographs are installed as of December 1994

Table 1 List of Strong-Motion Earthquake Stations of the Port and Harbour Research Institute

(December 1994)

No. of port*	Name of port		Name of station	Type of accelerograph	Intallation condition	Ref. No. **
1	Hanasaki	1	Hanasaki-F	ERS-F	on ground	
2	Kushiro	2	Kushiro-G	ERS-G	on ground	
		3	Kushiro-GB	ERS-G	in ground	
3	Tokachi	4	Tokachi-M	ERS-C	on ground	298
4	Urakawa	5	Urakawa-S	SMAC-B2	on ground	
5	Tomakomai	6	Tomakomai-S	SMAC-B2	on ground	107
6	Muroran	7	Muroran-G	ERS-G	on ground	34, 107
7	Otaru	8	Otaru-G	ERS-G	on ground	107
8	Hakodate	9	Hakodate-M	ERS-C	on ground	298
		10	Hakodate-FB	ERS-F	in ground	
		11	Hakodate-F	ERS-F	on ground	
		12	Hakodate-FR	ERS-F	on structure	
9	Aomori	13	Aomori-G	ERS-G	on ground	107, 156, 298
10	Hachinohe	14	Hachinohe-ji-S	SMAC-B2	on ground	34, 107
11	Miyako	15	Miyako-G	ERS-G	on ground	34, 107
12	Kamaishi	16	Kamaishi-M	ERS-C	on ground	351
		17	Kamaishi-MB	ERS-D	in ground	351
13	Ofunato	18	Ofunato-bochi-S	SMAC-B2	on ground	34, 107
		19	Ofunato-bo-S	SMAC-B2	on structure	34, 107
		20	Ofunato-mound-M	ERS-C	on structure	
14	Shiogama	21	Shiogama-kojyo-S	SMAC-B2	on ground	34, 107,156
15	Sendai	22	Sendai-M	ERS-C	on ground	351
		23	Sendai-MB	ERS-D	in ground	351
16	Soma	24	Soma-S	SMAC-B2	on ground	
17	Onahama	25	Onahama-ji-S	SMAC-B2	on ground	351
18	Hitachinaka	26	Hitachinaka–F	ERS-F	on ground	
19	Kashima	27	Kashima-zokan–S	SMAC-B2	on ground	156
20	Chiba	28	Chiba-S	SMAC-B2	on ground	107
21	Tokyo	29	Shinagawa-G	ERS-G	on ground	34, 107
		30	Shinagawa-GB	ERS-G	in ground	
22	Kawasaki	31	Kawasaki-FB	ERS-F	in ground	
		32	Kawasaki-F	ERS-F	on ground	
		33	Kawasaki-FR	ERS-F	on structure	
23	Yokohama	34	Keihin-ji-S	SMAC-B2	on ground	34
		35	Yamashita-FB	ERS-F	in ground	
		36	Yamashita-F	ERS-F	on ground	
		37	Yamashita-FR	ERS-F	on structure	
24	Yokosuka	38	Koken-G	ERS-G	on ground	34
		39	Koken-S	SMAC-B2	on ground	34
25	Tagonoura	40	Tagonoura-S	SMAC-B2	on ground	107
26	Shimoda	41	Shimoda-F	ERS-F	on ground	
27	Shimizu	42	Shimizu-kojyo-S	SMAC-B2	on ground	34, 156
		43	Okitsu-S	SMAC-B2	on ground	34, 156
		44	Shimizu-miho-S	SMAC-B2	on ground	298

(to be continued)

(Table 1 Continued)

No. of port*	Name of port		Name of station	Type of accelerograph	Intallation condition	Ref. No. **
28	Omaezaki	45	Omaezaki-M	ERS-C	on ground	351
29	Kinuura	46	Kinuura-ji-S	SMAC-B2	on ground	298
30	Nagoya	47	Nagoya-zokan-s	SMAC-B2	on ground	34, 156
		48	Nagoya-inae-s	SMAC-B2	on structure	34
		49	Inae-sanbashi-M	ERS-B	on structure	34
		50	Inae-yaita-M	ERS-B	on structure	34
31	Yokkaichi	51	Yokka-chitose-S	SMAC-B2	on ground	107
		52	Yokka-sekitan-M	ERS-B	on structure	34
		53	Yokka-dai2-M	ERS-B	on structure	34
32	Wakayama	54	Wakayama-G	ERS-G	on ground	298
33	Osaka	55	Osaka-ji-S	SMAC-B2	on ground	34
		56	Osaka-minami-S	SMAC-B2	on ground	34
34	Amagasaki	57	Amagasaki-G	ERS-G	on ground	156
35	Kobe	58	Kobe-ji-S	SMAC-B2	on ground	34
		59	Kobe-dai6-S	SMAC-B2	on structure	34
		60	Kobe-dai8-G	ERS-G	on structure	34
		61	Kobe-maya-M	ERS-C	on ground	298
		62	Maya-dail-M	ERS-B	on structure	34
		63	Maya-dai2-M	ERS-B	on structure	34
36	Komatsujima	64	Komatsujima-G	ERS-G	on ground	107
37	Kochi	65	Kochi-G	ERS-G	on ground	298
38	Matsuyama	66	Matsuyama-G	ERS-G	on ground	156
39	Hiroshima	67	Hiroshima-G	ERS-G	on ground	34
40	Oita	68	Oita-G	ERS-G	on ground	156
41	Hososhima	69	Hososhima-F	ERS-F	on ground	
42	Miyazaki	70	Miyazaki-G	ERS-G	on ground	298
		71	Miyazaki-GB	ERS-G	in ground	
43	Shibushi	72	Shibushi-G	ERS-G	on ground	
44	Kagoshima	73	Kagoshima-G	ERS-G	on ground	34
45	Sakaiminato	74	Sakaiminato-G	ERS-G	on ground	298
46	Tsuruga	75	Tsuruga-G	ERS-G	on ground	34
47	Kanazawa	76	Kanazawa-G	ERS-G	on ground	107
48	Toyama	77	Toyma-G	ERS-G	on ground	34
		78	Toyama-GB	ERS-G	in ground	
49	Niigata	79	Niigata-G	ERS-G	on ground	298
50	Sakata	80	Sakata-S	SMAC-B2	on ground	34
51	Akita	81	Akita-G	ERS-G	on ground	34, 351
		82	Akita-GB	ERS-G	in ground	
52	Naha	83	Naha-G	ERS-G	on ground	298
		84	Naha-GB	ERS-G	in ground	298
53	Hirara	85	Hirara-G	ERS-G	on ground	298
54	Ishigaki	86	Ishigaki-G	ERS-G	on ground	298
55	Mikawa	87	Mikawa-G	ERS-G	on ground	
		88	Mikawa-GB	ERS-G	in ground	
56	Nakagusuku	89	Nakagusuku-G	ERS-G	on ground	

* The numbers correspond to those in Figure 1.

** The numbers correspond to those of the Technical Note of the Port and Harbour Research Institute, in which site characteristics of the stations are given.

Table 2 JMA Seismic Intensity Scale

0 : No FEELING
Shocks too weak to cause human feelings and registered only by a seismograph.

I : SLIGHT
Extremely feeble shocks only felt by persons at rest or by those who are observant to an earthquake.

II : WEAK
Shocks felt by most persons, slight shaking of doors and Japanese latticed sliding doors (shoji).

III : RATHER STRONG
Slight shaking of houses and buildings, rattling of doors and Japanese latticed sliding doors (shoji), swinging of hanging objects like electric lamps, moving of liquids in vessels.

IV : STRONG
Strong shaking of houses and buildings, overturning of unstable objects, spilling of liquids out of vessels.

V : VERY STRONG
Cracks in the walls, overturning of gravestones, stone lanterns, etc., damage to chimneys and mud-and-plaster warehouses.

VI : DISASTROUS
Demolition of houses by less than 30% in total number, landslips, fissures in the ground, etc.

VII : VERY DISASTROUS
Demolition of houses by more than 30%, intense landslips, large fissures in the ground, faults.

(3) Station

There are three kinds of stations in the network. The first is to record accelerations at ground surface, the second is in ground by using bore-hole and the third is to record earthquake response of structures. The station which records earthquake response of structures is always accompanied with another station which records ground acceleration in its vicinity.

In the stations which record the ground acceleration, one of the horizontal components of the accelerograph is directed to the due north except a few accelerographs. Some of the accelerographs are installed in parallel with the structures because most of port facilities such as quay walls or piers have two-dimensional-structure and it is desirable to record the components of the ground acceleration parallel and perpendicular to the principal axe of the structure. In the stations which record structural response and the accompanying stations which record the ground acceleration in its vicinity, accelerographs are installed parallel to the structure in which earthquake response is needed.

Two horizontal components of the accelerograph are usually corresponding to North-South (NS) and East-West (EW) direction, respectively. However, if the direction of the component of the accelerograph is different from the geometric direction, the deviation angle in degree is used to represent components direction. For example, N10E component means that the direction deviates 10 degrees eastward from the due north.

Each station in the network has its own abbreviated name listed in **Table 1**. The name consists of the location, the type of the accelerograph and the installation condition. For instance, the stations in Kushiro port in Hokkaido island are named Kushiro-G and Kushiro-GB, respectively. 'Kushiro' means

the location of the station. The suffix 'G' represents type of acceleration and means that the ERS-G type accelerograph is installed at Kushiro port. If the SMAC-B2 accelerograph is installed, this suffix becomes 'S', if the ERS-B, -C and -D type accelerograph, 'M', and if the ERS-F type accelerograph, 'F'. The suffix 'B' after 'G' in Kushiro-GB represents installation condition and means that the accelerograph is installed in ground using bore-hole. If there is no suffix representing installation condition such as Kushiro-G, that means the accelerograph is being installed at ground surface. If the suffix representing installation condition becomes 'R', that means the accelerograph is being installed on the structure.

(4) Accelerograph

(a) SMAC-B2 accelerograph

The SMAC-B2 accelerograph was developed by the Committee for the Standard Strong Motion Accelerograph. It is a three component mechanical type accelerograph which scratches records on a rolled waxed paper. The specifications of the SMAC-B2 accelerograph are shown in **Table 3**. Inside view and theoretical frequency characteristics are also shown in **Figure 2** and **Figure 3**, respectively.

The SMAC-B2 accelerograph has been one of the standard accelerographs in the network of the Port and Harbour Research Institute. At the earlier stage of the strong-motion observation, the SMAC-B2 accelerograph was one of the standard models and suitable for the observation condition in port areas. After the SMAC-B2 accelerograph, several types of accelerograph were developed by the Committee. In the network, however, the SMAC-B2 accelerograph has only been used as a mechanical type accelerograph because it was inconvenient to use many types of accelerographs from the view point of instrument correction procedure and maintenance. As of December 1994, total number of SMAC-B2 accelerograph being used is 25.

5 Gals (=cm/sec^2) is adopted as a triggering level of the accelerograph in places where ground noise is small, and 8 Gals in places where ground noise is relatively large because of heavy motor trucks

Table 3 Specifications of the SMAC-B2 accelerograph

Component	2 horizontal and 1 vertical
Natural period	0.14 sec.
Sensitivity	12.5 Gal/mm
Damping	Critical
Damping mechanism	Air piston
Maximum recording acceleration	500 Gal
Recording speed	10 mm/sec.
Recording medium	Waxed paper
Driving mechanism for recorder	Hand-wound spring motor
Recording duration	3 min.
Recording capacity	5 earthquakes/roll
Starter	Electric contact made by vertical motion
Period of starter pendulum	0.3 sec.
Starter threshold	5 Gal
Auxiliary starter	Mechanical, works at 100 gal
Time marking	1 sec.
Power supply	4 dry cells
Size	54×54×37 in cm
Net weight	100 kg

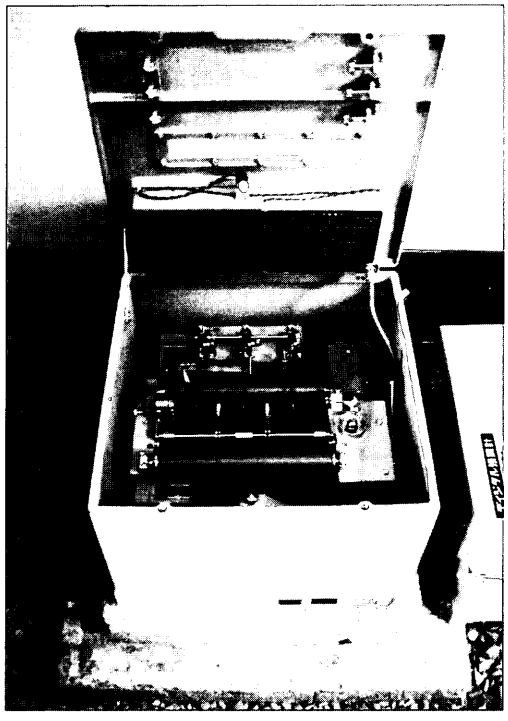


Fig.2 Inside view of the SMAC-B2 accelerograph

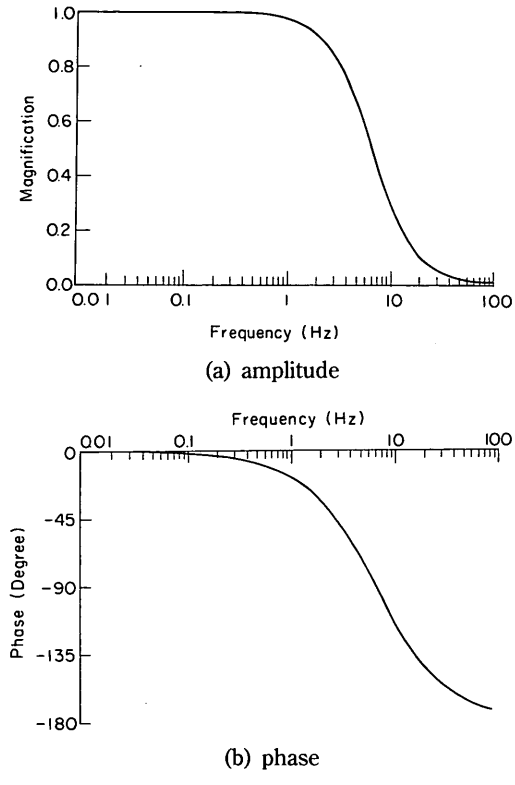


Fig.3 Frequency characteristics of the SMAC-B2 accelerograph

for construction work or cargo transportation. A few number of the accelerographs located beside roads carrying very heavy traffic are triggered at 11 Gals.

At present, an action program is going on to replace the SMAC-B2 accelerographs with digital type accelerographs.

(b) ERS accelerograph

The SMAC-B2 accelerograph has been very widely used in the network. However, there exist some places where the SMAC-B2 accelerograph can not be installed, such as on structures or in ground. For that reason, the ERS accelerograph was developed by the Geotechnical Earthquake Engineering Laboratory to observe earthquake motions in a specific condition. Transducers and a recorder of the ERS accelerograph are separately installed for the observation.

First, the accelerograph with magnetic tape data recorders was developed. This accelerograph was called the ERS-A accelerograph. After some period of operation, the magnetic tape data recorders were replaced by an oscillograph. The model with an oscillograph was named as the ERS-B accelerograph. The ERS-A and -B accelerograph records only two horizontal components of acceleration. The specifications of the ERS-B accelerograph are shown in **Table 4** and the transducer of the ERS-A and -B are shown in **Figure 4**. The ERS-B accelerographs are used at 6 stations at present as shown in **Table 1**.

After that, the ERS-C accelerograph was developed and installed. While the ERS-B accelerograph records accelerations in two horizontal components, the ERS-C accelerograph records acceleration of

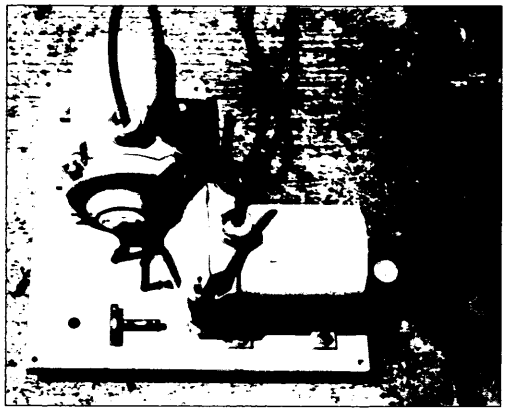


Fig.4 Transducers of the ERS-A and -B accelerograph

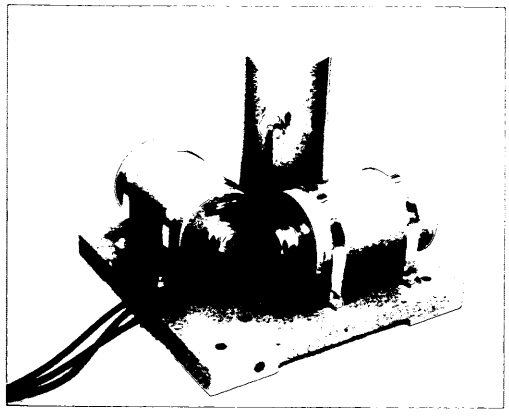


Fig.5 Transducers of the ERS-C accelerograph

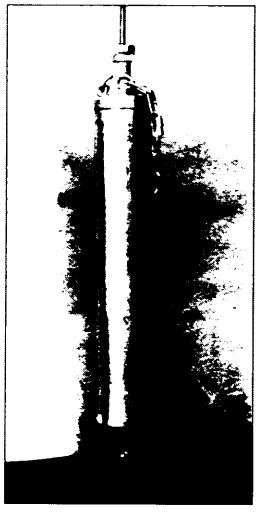


Fig.6 Transducers of the ERS-D accelerograph

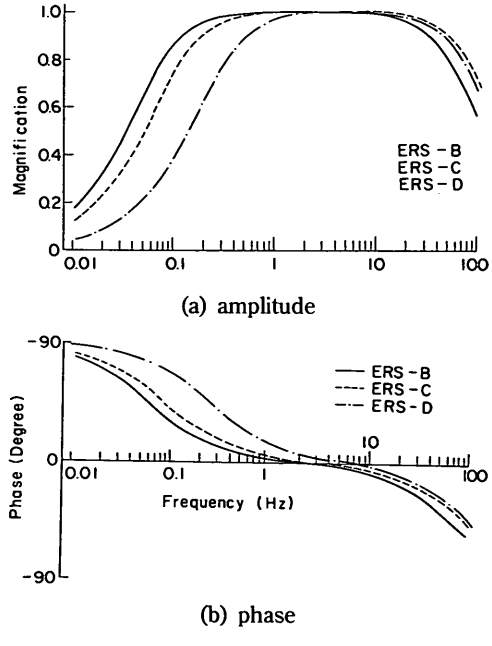


Fig.7 Frequency characteristics of the ERS-B, -C and -D accelerograph

vertical component as well as two horizontal ones. The transducer of the ERS-C accelerograph is shown in **Figure 5**. The ERS-C accelerographs are working at 7 stations at present as shown in **Table 1**.

The ERS-D accelerograph was also developed for recording acceleration in ground. Accelerographs of this type had been installed at 2 stations in the network as shown in **Table 1**. The transducers of the ERS-D accelerograph are installed in bore-hole and they have the same specifications as those of the ERS-C accelerograph. The specifications of the ERS-C and -D accelerographs are shown in Table 5. The transducers of the ERS-D accelerograph are shown in **Figure 6**.

In the ERS-B, -C and -D accelerographs, the transducers are almost directly connected with galvanometers in the oscillograph. There exist only resistor circuits to adjust sensitivity and impedance

Table 4 Specifications of the ERS-B accelerograph

Transducer	
Type	Moving coil type
Component	2 horizontal
Natural period	0.5 sec.
Damping factor	17
Damping mechanism	Electro-magnetic
Capacity	250 Gal
Coil impedance	320 ohm
Sensitivity	about 2 mv/Gal (circuit open)
Water tightness	over 200 kg/cm^2
Recorder	
Type	Electro magnetic oscillograph
Natural frequency of galvanometer	100 Hz
Sensitivity	166 mm/mA
Recording paper	92 mm (width) ×30 m (length) (visible without processing)
Paper speed	2 cm/sec.
Time mark	0.1 sec.
Powe supply ····· Rechargeable battery, Charged automatically when it is necessary.	

Table 5 Specifications of the ERS-C (D) accelerograph

Transducer	
Type	Moving coil type
Component	2 horizontal and 1 vertical
Natural frequency	3 Hz (5 Hz)
Damping factor	17(10)
Damping mechanism	Electro-magnetic
Capacity	500 Gal
Water tightness	over 200 kg/cm^2
Recorder	
Type	Electro magnetic oscillograph
Natural frequency of galvanometer	270 Hz
Recording paper	198 mm (width) ×30 m (length) (visible without processing)
Paper speed	4 cm/sec.
Time mark	0.1 sec.
Sensitivity (overall)	2 Gal/mm, or 10 Gal/mm
Powe supply ····· Rechargeable battery, Charged automatically when it is necessary.	

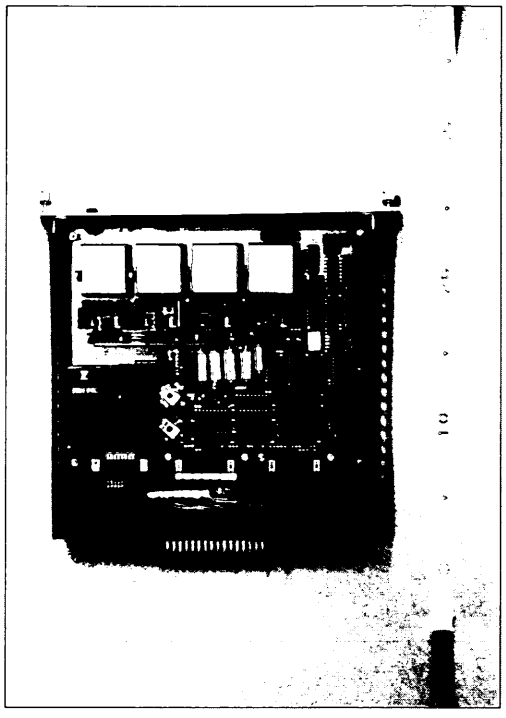


Fig.8 Inside view of the memory of the ERS-F accelerograph

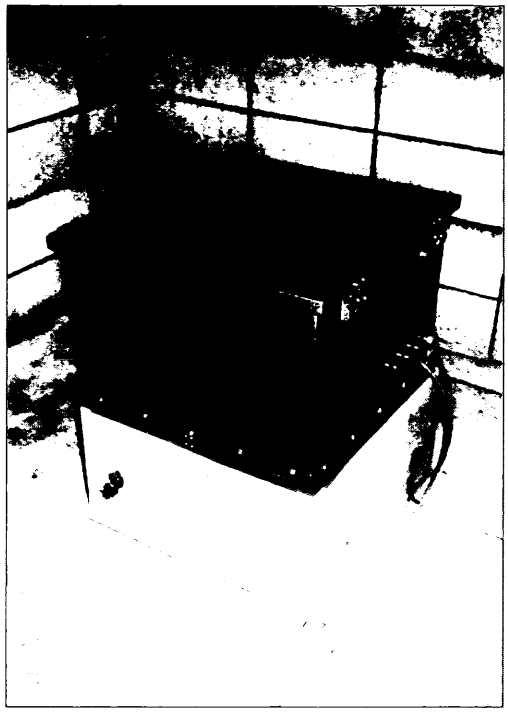


Fig.9 Standard type of the ERS-F accelerograph

matching between them. No electronic amplifier is used to attain maximum reliability of the instrument. The overall sensitivity is more than 10 mm per Gals (=cm/sec^2) and it is easily adjusted by changing resistors of the circuit. Therefore, the ERS-B, -C and -D accelerograph have advantage to start the observation in its maximum sensitivity and to readjust the sensitivity into the appropriate one for the strong-motion after obtaining some records. The frequency characteristics of these accelerographs are shown in **Figure 7**. The triggering levels of these ERS accelerographs are similar to those of the SMAC-B2 accelerographs. If the ERS-B, -C and -D accelerographs are installed at the station, the suffix which represents type of accelerograph becomes 'M' in the name of the station. For instance, the name of the station at Tokachi port becomes Tokachi-M because the ERS-C accelerograph is installed.

(c) ERS-F accelerograph

The ERS-F accelerograph is a digital type strong-motion accelerograph equipped with non-volatile, solid state magnetic bubble memories. The main unit of the recording system, shown in **Figure 8**, consists of four non-volatile, solid-state magnetic bubble memories of the total memory size of 1 Mbytes and the controlling parts, of which dimensions are 240 × 240 × 35 mm, weighing about 1 kg. Double units can be installed in a recording system, but single unit is installed for the recording system at Hakodate Port and Hitachinaka Port. Time signal is recorded by using one channel in this system and the recording time of three components of acceleration and one time signal is about 40 minutes in double bubble memories.

There are several types of the ERS-F accelerographs. The standard type shown in **Figure 9** is a self-contained box type which contains transducers and a recorder with magnetic bubble memories all

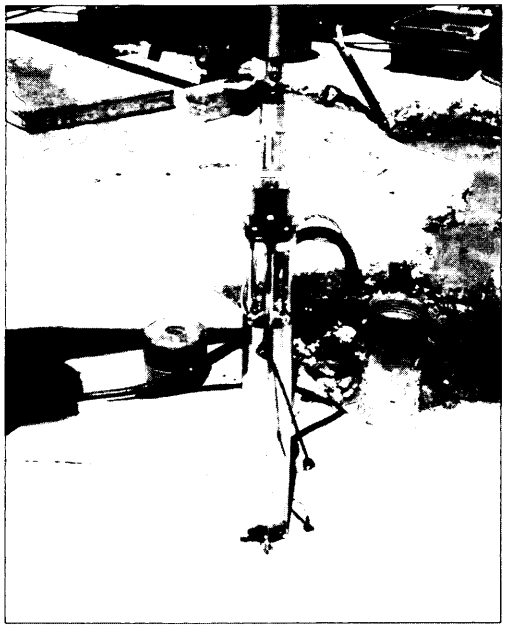


Fig.10 Transducers of the ERS-F and -G accelerograph installed in groud

Fig.11 Thransducers of the ERS-F and -G accelerograph attached to structures

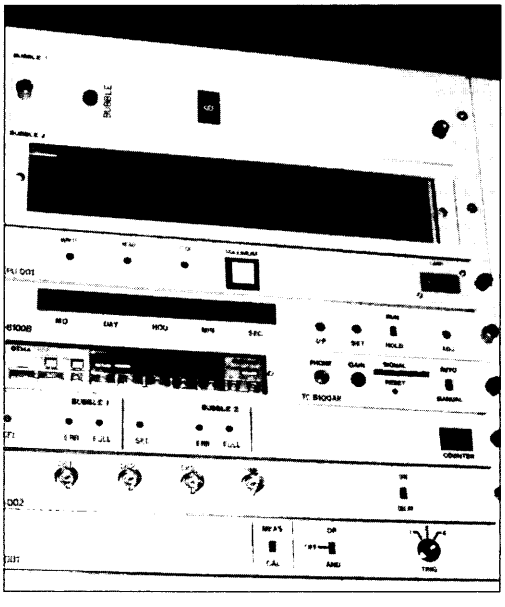


Fig.12 Front view of the recording system of the ERS-F accelerograph

in one. The other is a separated type in which transducers and a recorder are separated with each other. **Figure 10** shows the transducers which is to be installed in ground by using borehole and to observe earthquake motions at base or in ground. The transducers shown in **Figure 11** is to be attached to structures. The front view of the recording system of the ERS-F accelerograph including the magnetic bubble memories is shown in **Figure 12**. Total number of the ERS-F accelerograph is 13 at present as shown in **Table 1**.

The ERS-F accelerograph has a system shown by a block-diagram in **Figure 13**, and satisfies the specification shown in **Table 6**. The frequency characteristics of the transducers are shown in **Figure 14**. Recording duration of an earthquake motions is one minute at minimum, and the duration can be extended up to 10 minute at a step of one minute by monitoring the level of the acceleration. The recording duration is extended if the level of the monitored acceleration after each 40 seconds from the trigger or extension is higher than the trigger level of the acceleration. The

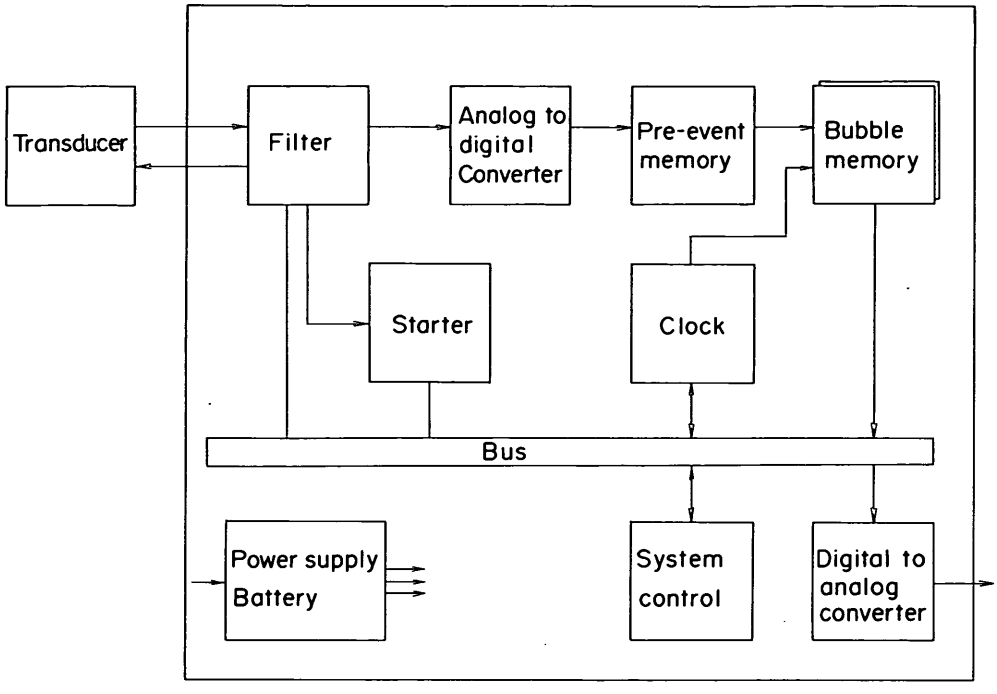
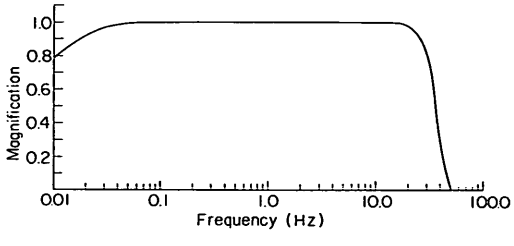
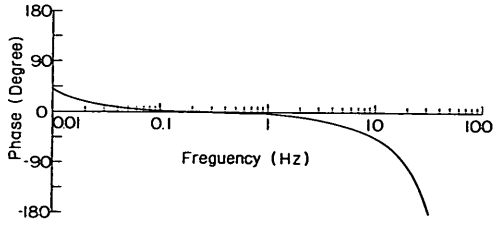


Fig.13 Block-diagram of the ERS-F acclerograph



(a) amplitude



(b) phase

Fig.14 Frequency characteristics of the ERS-F and -G accelerograph

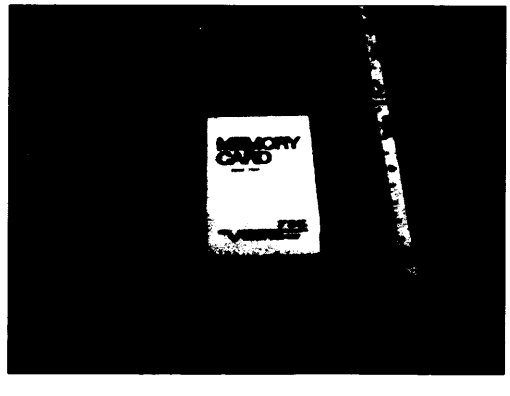


Fig.15 Memory (IC-CARD) of the ERS-G accelerograph

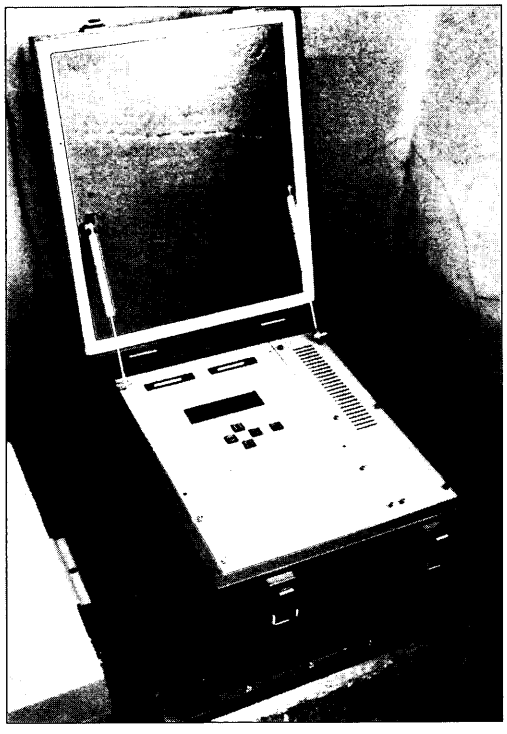


Fig.16 Inside view of the ERS-G accelerograph

main unit of the recording system can record ten earthquake motions by 60 seconds of three components at the maximum. If earthquakes occur successively and the earthquake motion data should over flow the recording system, records of the greatest maximum accelerations are retained. As exception to this, however, records of 180 seconds are stored in the first-come first-serve basis.

(d) ERS-G accelerograph

The ERS-G accelerograph is an improved version over the ERS-F accelerograph. Transducers of the accelerographs are almost the same to those of the ERS-F accelerograph. In the ERS-G accelerograph, IC-CARD memory as shown in **Figure 15** is used for the recording system and some improvements are done for the controlling system. The memory size of the IC-CARD is 2 Mbytes. The recording time of three components of acceleration is about 52 minutes in one card. The triggering level of acceleration can be set at several steps. The capacity of accelerograph is 2G, and the level of maximum acceleration (sensitivity) can be set at appropriate value from 0.008G to 2G. Total number of the ERS-G accelerograph is 36 at present.

The specification of the ERS-G acceleration is shown in **Table 6** with the specifications of the ERS-F accelerograph and frequency characteristics of the transducers which are the same as the transducers of ERS-F accelerograph are shown in **Figure 14**. Standard type of the ERS-G accelerograph is shown in **Figure 16** in which transducers and recording system with IC-CARD are contained all in one. The type of the transducer of the ERS-F and -G accelerograph installed at ground surface is usually force-balance type. However, the velocity-balance type is recently adopted for the transducers installed in ground because of the safety against lightning.

After recording earthquakes, the main unit (memory) of the recording system is pulled out from the recording system of the ERS-F and -G accelerograph and replaced by the another memory ready for recording the coming earthquakes. The pulled out unit, bubble memory with a static eliminator on the connector to the unit of the ERS-F accelerograph and IC-CARD of the ERS-G accelerograph, is packed in a case and sent to the Laboratory. The unit is set on the reproducer which is connected to a computer and digital time histories of earthquake motions are reproduced in the Laboratory. Absolute time at the trigger of the record is also obtained from the record of the internal clock of the accelerograph. As shown in **Table 6**, these recording system have digital delay memory for 10 seconds. If the recording started before the first motion of the earthquake, some of the portion of the record preceding the first motion is omitted.

(5) Foundation and House

As most of the harbour structures have shallow foundations and do not rest on bed rock, spread foundations for the accelerographs are being used. All the SMAC-B2 accelerographs in the network are installed on simple spread foundations which are made of reinforced concrete shown in **Figure 17**.

Table 6 Specifications of the ERS-F and -G accelerograph

Overall Capabilities	Maximum acceleration capacity (-F) 2G (-G) 0.008G～2G, variable Frequency characteristics 0.01 Hz ～35 Hz Dynamic range 86 dB over
Transducer	Accelerometer Component 2 horizontal, 1 vertical Mazimum capacity (-F) 2G (-G) 0.008G～2G, variable Sensitivity 10^{-5} Type Force-ballance servo or Velocity-ballance servo
Filter	High pass 0.007 Hz -6 dB/octave Low pass 35 Hz -18 dB/octave
A/D conversion	Resolution 16 bits Convesion rate 100 Hz
Pre-Event Memory	10 seconds.
Clock	Accuracy of internal clock 1/100 seconds corrected every an hour by NHK time signal
Starter	Trigger levels : 0.5, 1, 2% of maximum acceleration
Recorder	No. of channel (-F) 4～10 channel (1 time signal) (-G) 3～12 channel (-F) Bubble Memory : 1 MKbytes× 2 (-G) IC-CARD Memory : 2 Mbytes Record length 1～10 minutes/record Maximum Recording Length (-F) 40 minutes/4ch. (-G) 52 minutes/3ch. Record of greatest maximum acceleration secured
Relataed Informations	Observation station, Number of records, Start time of each data, Maximum accelerations of each component
Calibration	Overall calibration are possible
Buckup Power Supply	2 hour after power storage
Container	Alluminum box, Water-Proof, Size (-F) : 54(L), 54(W), 38(H) cm (-G) : 54(L), 54(W), 33(H) cm

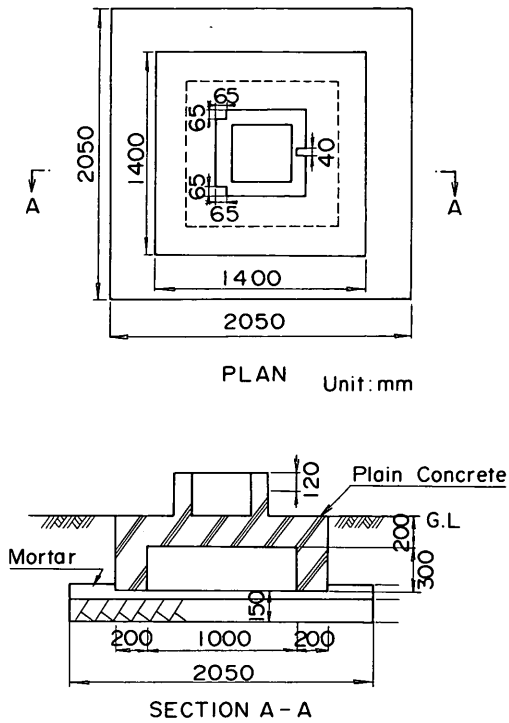


Fig.17 Foundation for the SMAC-B2 accelerograph

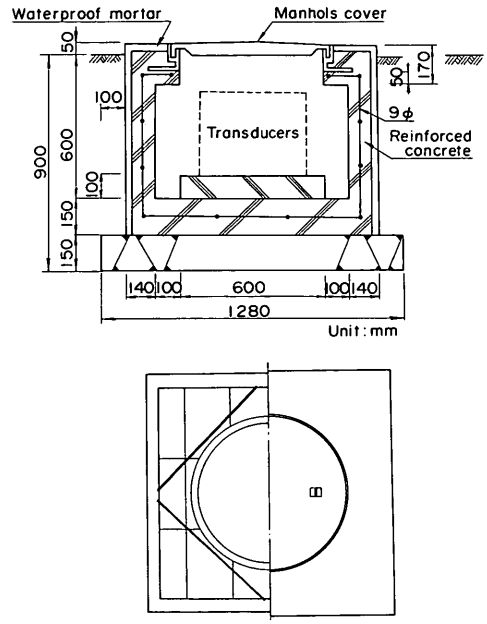


Fig.18 Foundation for the ERS-C accelerograph

The hollow space under the foundation is allocated to make the bulk density of the foundation equal to that of the soil, so that the disturbance to the records due to the foundation can be minimized. The foundations are also used for the ERS-F and -G accelerographs which were installed after the SMAC-B2 accelerograph for replacement.

The standard foundation for the ERS-B and -C accelerograph has not been established. Shape and size of a foundation for transducers of the ERS-C accelerograph are illustrated in **Figure 18**.

Usually, no pile is used to support the accelerograph and its foundation, but in the stations on very soft soil or very loose sand, concrete piles or wooden piles are used. For example, the foundation at the Niigata-G station is supported by piles. All the foundations are isolated from houses covering the accelerographs.

Most of the accelerographs are covered with houses which were built for the accelerographs. Some of the accelerographs are installed in houses which were built for other purposes. The houses built for covering accelerographs are made of reinforced concrete or concrete blocks, and some are prefabricated houses. The house of the Onahama-G,GB station is shown in **Figure 19** as an example.

3. Preliminary Processing

All the accelerograms collected at the Geotechnical Earthquake Engineering Laboratory of the Port and Harbour Research Institute are listed in the tables on Strong-Motion Earthquake Observation Results, which are classified by earthquakes and listed in the later part of this report. They undergo

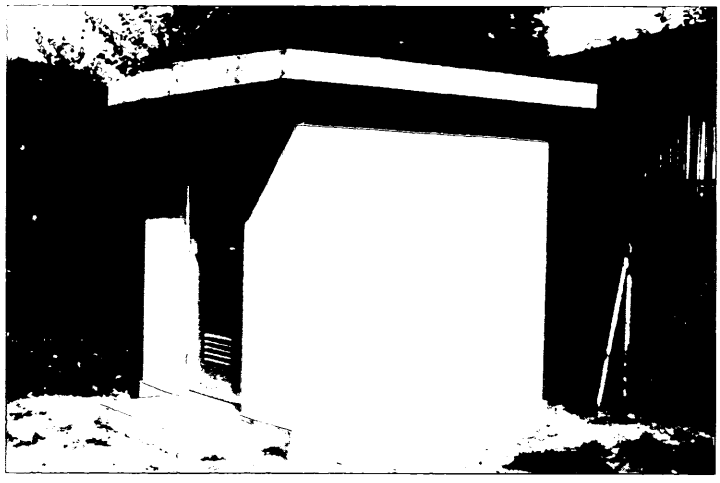


Fig.19 House of the Station (Onahama-G,GB Station)

the following preliminary processing.

At first, each accelerogram is given a record number according to the order of its arrival at the Laboratory. The record number for the accelerogram by the SMAC-B2 accelerograph begins with the capital letter 'S', that by the ERS-B, -C and -D accelerograph, with the capital letter 'M' and that by the ERS-F and ERS-G, with the capital letter 'F'.

Then, an earthquake which corresponds to each accelerogram is confirmed or determined. There is no time information in the accelerograms obtained by the SMAC-B2 accelerograph and the ERS-B, -C and -D accelerograph because those accelerographs are not equipped with an internal clock. Therefore, most of the accelerograms are sent to the Laboratory with the earthquake information from the stations. However, there are a few of the accelerograms without such information because the accelerograms were found in the regular servicing and it was difficult to find the corresponding earthquake at the station. For such accelerograms without time information, the earthquake is determined by considering both the possible period of the recording and the earthquake occurred in that area at that period.

The determination or the confirmation of the corresponding earthquake is based on the Seismological Bulletin by the Japan Meteorological Agency (JMA)[42), 43)]. If the Seismological Bulletins on the earthquakes are not available because of time lag of the publication after earthquakes, the preliminary reports on earthquakes by the JMA are used to determine the earthquakes. Some of the accelerograms, however, remain without matching earthquakes. In this case, those earthquakes are treated as earthquake unknown. The accelerogram whose earthquake is unknown is not listed in the tables if both of its maximum horizontal accelerations are smaller than 20 Gals. It will be noted that the reliability of the earthquake determination based on such procedure for accelerograms with small acceleration is limited in the case that accelerograms do not have accurate time information.

Accelerograms by the SMAC-B2 accelerograph are recorded on a rolled waxed paper which has dark red background. The recording by scratching the waxed paper with a stylus leaves the semi-translucent trace on the waxed paper. Because the waxed paper is not stable against scratching and is not appropriate to be used for the digitization, the photographic contact print of the original accelerogram is made on a special photographic sheet. This sheet is made of mylar film and stable against temperature change, humidity, and mechanical distortion. The sizes of the sheet are 55 cm in length

and 30 cm in width. If the significant portion of the record is longer than 30 to 45 cm, the copy will be made on two sheets or more and the portion of about 10 cm at the end of each sheet is overlapped with each other for confirming data continuity in the successive sheets. After this processing, the record becomes black traces and semi-translucent background in the copy sheet and they are in good contrast for the digitization. The record by the ERS-B, -C and -D accelerograph is only chemically stabilized by sensitization before being used for digitization.

From the photographic copy or the stabilized original record, the maximum acceleration of each component is read by using a magnifying glass. In this reading, the base-line setting is not so accurate as that made in digitizing the accelerogram and these maximum accelerations are not so accurate and different from those processed through digitization, standard data processing and preliminary analyses which will be explained later. The maximum accelerations, which are listed in the tables of Strong-Motion Earthquake Observation Results and are not processed through preliminary analyses, are those determined by this preliminary processing. For the records by the ERS-F and -G accelerograph, acceleration data are directly read by a computer and the time information is included in the record. Therefore, the maximum acceleration and the time of triggering are obtained accurately, and the corresponding earthquakes of records are easily determined.

In the tables of Strong-Motion Earthquake Observation Results, the time in the earthquake data refers to the Japan Standard Time which is earlier than GMT by 9 hours, the magnitude is the JMA Magnitude which is determined by the JMA and the seismic intensity of the shock is estimated by the JMA according to the scale shown in **Table 2**.

4. Digitization

(1) Digitizer

Two types of digitizers are used in the Laboratory. One is for digitization of records by the SMAC-B2 accelerograph and the other is for digitization of records by the ERS-B, -C and -D accelerograph.

The digitizer for the accelerograms obtained by the SMAC-B2 accelerograph is a semi-automatic instrument. The view and the specifications of the digitizer are shown in **Figure 20** and **Table 7**,

Fig.20 Digitizer for records by the SMAC-B2 accelerograph

Table 7 Specifications of the digitizer for records by the SMAC-B2 accelerograph

Digitizer Table	
Size of table	750 mm (X) × 660 mm (Y)
Effective area	430 mm (X) × 300 mm (Y)
Magnifying glass	5x, with a cross hair and illumination
Translation of magnifying glass	
Y-axis (vertical)	manual by rotating a wheel
X-axis (horizontal)	automatic, at inervals of 0.1 mm
Analog to Digital Converter and Control	
Resolution (overall)	1000 counts per a millimeter
Indication	
Y-axis (vertical)	sign and 4 digits
X-axis (horizontal)	4 digits

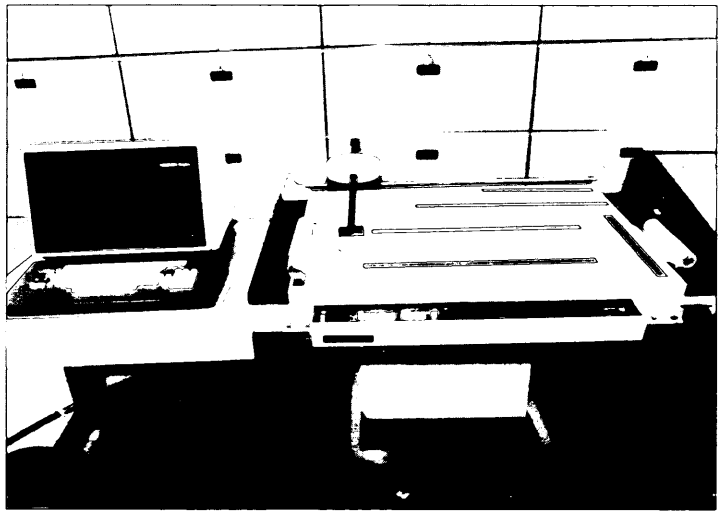


Fig.21 Digitizer for records by the ERS-B, -C and -D accelerograph

respectively. The digitizer works in the following way.

On the digitizer table, there is a magnifying glass which can be moved along the transverse (vertical) axis by rotating a small wheel near the glass. A magnescale is connected to the wheel, and the electric digital output corresponding to the position of the magnifying glass is produced from the magnescale. The magnifying glass has a cross-hair and a lamp to illuminate the accelerogram within its range. The operator places the cross-hair on the trace of an acceleration record and pushes a button, then the digital output from the magnescale is displayed on the panel and is stored in the memories of the computer. After this step, the magnifying glass is automatically shifted along the longitudinal (horizontal) axis by 0.1 mm.

The records obtained by the ERS-B, -C and -D accelerographs are processed with an on-line oscil-

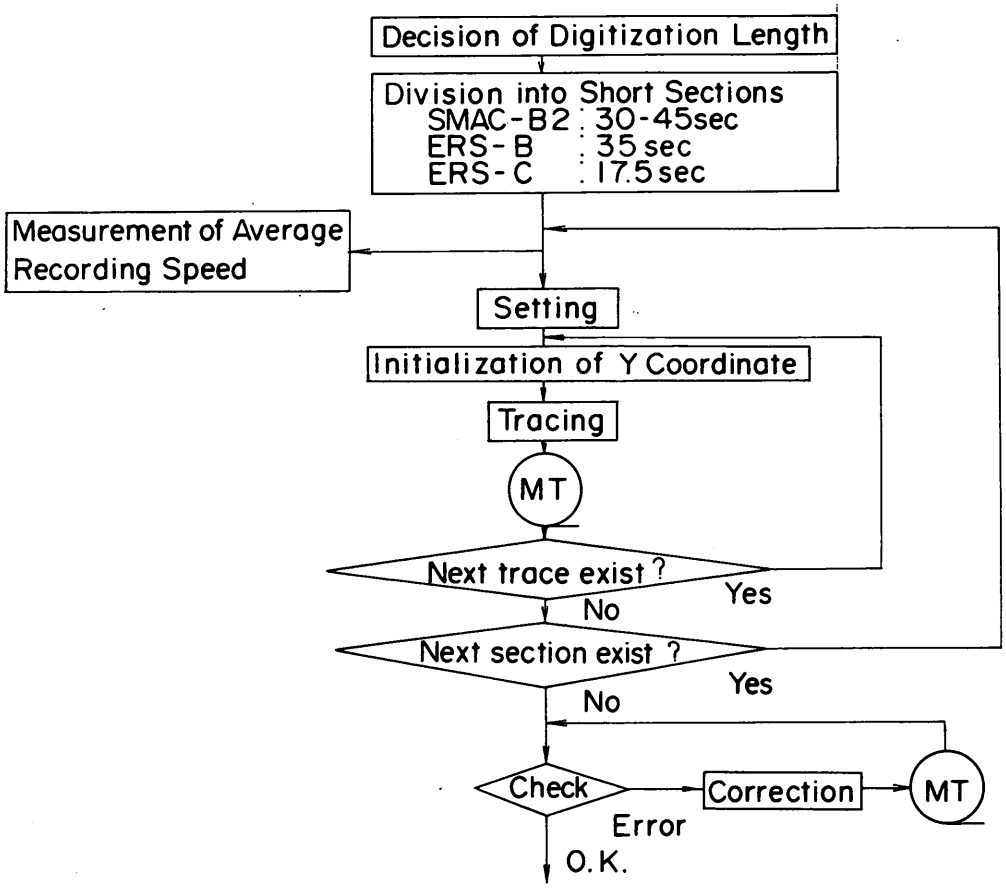


Fig. 22 Digitization procedure

logram digitizer connected to a computer which is shown in **Figure 21**. A record is placed on the digitizer table and an operator traces earthquake wave forms with a cursor of the digitizer. The travels of the cursor along horizontal and vertical axis are digitally counted and the coordinates of the cursor are transferred into memories of the computer at a step of 0.1 mm along the horizontal axis.

After the necessary portions of the record are digitized, digitized values in the memories are processed by computer programs. According to the directions given to the computer through the keyboard, printed list, magnetic tape and analog reproduction etc. are obtained as outputs of the digitized records in the memories.

(2) Digitization

The digitization procedure, which is shown in **Figure 22** and described here, has been applied for records obtained since 1976.

(a) SMAC-B2 accelerograph

The records by the SMAC-B2 accelerograph consist of acceleration records, fixed traces, timing marks, arc traces and free vibration traces for calibration of the characteristic periods and damping factors of the accelerograph. Among them, traces to be digitized are the recorded accelerations, the fixed

traces and the arc traces. Digitized fixed traces and digitized arc traces are used for the standard data processing described later.

The fixed traces are recorded by the pens fixed to the accelerograph frame. The arc traces are recorded manually with the recording pens supported by pivots while the paper drive mechanism is stopped. The arc traces show offset of the pens from the normal position where the pens are parallel to the direction of paper driving. The timing marks are pulses at intervals of one second. The timing marks are used only to obtain the average recording speed because fluctuation of the timing marks are estimated as small as the digital unit of the digitizer (0.1 mm) according to the results of the tests of the SMAC-B2 accelerographs[41]. The average error in the time marking is expected to be less than 1 % and the fluctuation is less than 0.5 % according to the results of the tests of the SMAC-B2 accelerographs. In order to obtain the average paper speed, intervals of 30 pulses is measured by the digitizer for a record by the ERS-B, -C and -D accelerographs.

A record is digitized from the starting point of recording. Portion of the record to be digitized is determined so as to include discernible acceleration on the paper. This determination is done by observation of a record to be digitized. The portion of the record to be digitized is divided into some sections because of the limitation of the digitizer table. Length of each section is about 30 to 45 cm which is almost equivalent to 30 to 45 seconds. Digitization unit in the amplitude is 0.008 mm which is equivalent to 0.1 Gal. Contact prints are made for each section as described previously. Digitization procedure is summarized as follows;

- Setting of the copy

A photographic copy of a record to be digitized is fixed on the table of the digitizer with tape. The table is rotated by an adjusting screw so that the fixed trace on the copy is parallel to horizontal axis of the digitizer. Two points on the fixed trace located on both ends of section are used for this adjustment and vertical coordinate value of the two points are made to coincide with each other.

- Initialization of transverse coordinate

The origin of vertical coordinate of each sheet is tentatively set in the digitization procedure because Sectional Base-Line Location described later is to be applied in the standard data processing. Transverse coordinate of a first point to be digitized is usually set to zero.

- Tracing

The traces are digitized by an operator in the way described in the preceding section. Three components of accelerations, two fixed traces, and three arc traces are digitized at the intervals of 0.1 mm along horizontal axis. The intervals are almost equivalent to 0.001 second. Because accelerations are recorded in a cylindrical coordinate system, the digitized amplitude values do not correspond to equal time intervals.

- Recording of Digitized Data

Digitized data in the memory of the computer are recorded in the magnetic disk with such data as record number, component, station, date and time of the earthquake, time intervals, etc.

(b) ERS-B, -C and -D accelerograph

The records by the ERS-B, -C and -D accelerograph consist of recorded accelerations, fixed traces and timing marks. The fixed traces are recorded by light beams reflected from fixed mirrors attached to the oscillograph frame. They are parallel lines at intervals of 2 mm drawn in the whole breadth of the recording paper. The recorded accelerations and one of the fixed traces located in the center of the oscillogram are digitized. The record to be digitized is divided into some sections because of the

limitation of the digitizer table. Length of each section is about 70 cm, which corresponds to about 35 seconds on a record by the ERS-B accelerograph and about 17.5 seconds on a record by the ERS-C and -D accelerograph.

Procedure of setting of a record by the ERS-B, -C and -D accelerograph and the initialization of transverse (vertical) coordinate is similar to that for a record by the SMAC-B2 accelerograph. The record is digitized by an operator in the way described in the preceding section. The accelerations are digitized at intervals of 0.1 mm, which corresponds to 0.005 second on a record by the ERS-B accelerograph and about 0.0025 second on a record by the ERS-C and D accelerograph. The fixed trace is digitized at intervals of about 5 cm, which corresponds to 2.5 seconds on a record by the ERS-B accelerograph and 1.25 seconds on a record by the ERS-C and -D accelerograph. Then the digitized data of the fixed trace are obtained by linear interpolation at intervals of 0.1 mm. The digital unit in the amplitude is 0.1 mm, which corresponds to about 0.1 Gal (=cm/sec^2) on a record by the ERS-B accelerograph and about 0.2 Gal or about 1.0 Gal on a record by the ERS-C and -D accelerograph. In the case of the ERS-C and -D accelerographs, sensitivities of the galvano meters are calibrated for each recording with a calibration signal before resetting paper drive.

Timing marks of the records by the ERS-C and -D accelerograph, which are pulses at intervals of 0.1 second generated by a crystal timer, are used only to measure the average recording speed because fluctuation of the timing marks is expected as small as that of the digital unit of the digitizer (0.1 mm) according to the results of the tests of the ERS-C and -D accelerographs[41]. In the case of a record by the ERS-B accelerograph, timing marks are not used because accuracy of the timer depends on that of the frequency of the power supply which consists of batteries and a DC-AC invertor.

5. Standard Data Processing

The procedure for the standard data processing, which is shown in **Figure 23** and described here, has been applied for records obtained since 1976, although the correction for start up of recording paper drive of the SMAC-B2 accelerograph was slightly modified for the improvement of the accelerograph[41]. The acceleration processed through the standard data processing will be called '**Original Acceleration**' hereafter.

Standard data processing for a record by the SMAC-B2 accelerograph is performed under following procedures;

(1) Fixed Trace Subtraction
(2) Sectional Base-line Location
(3) Linearization of Coordinate
(4) Correction for Start up of Recording Paper Drive
(6) Equal Spacing

Standard data processing for a record by the ERS-B, -C and -D accelerograph is performed under following procedures;

(1) Fixed Trace Subtraction
(2) Sectional Base-line Location
(5) Smoothing
(6) Equal Spacing

Standard data processing for the records by the ERS-F and -G accelerograph are described in item (7). Each correction procedure is described briefly as follows.

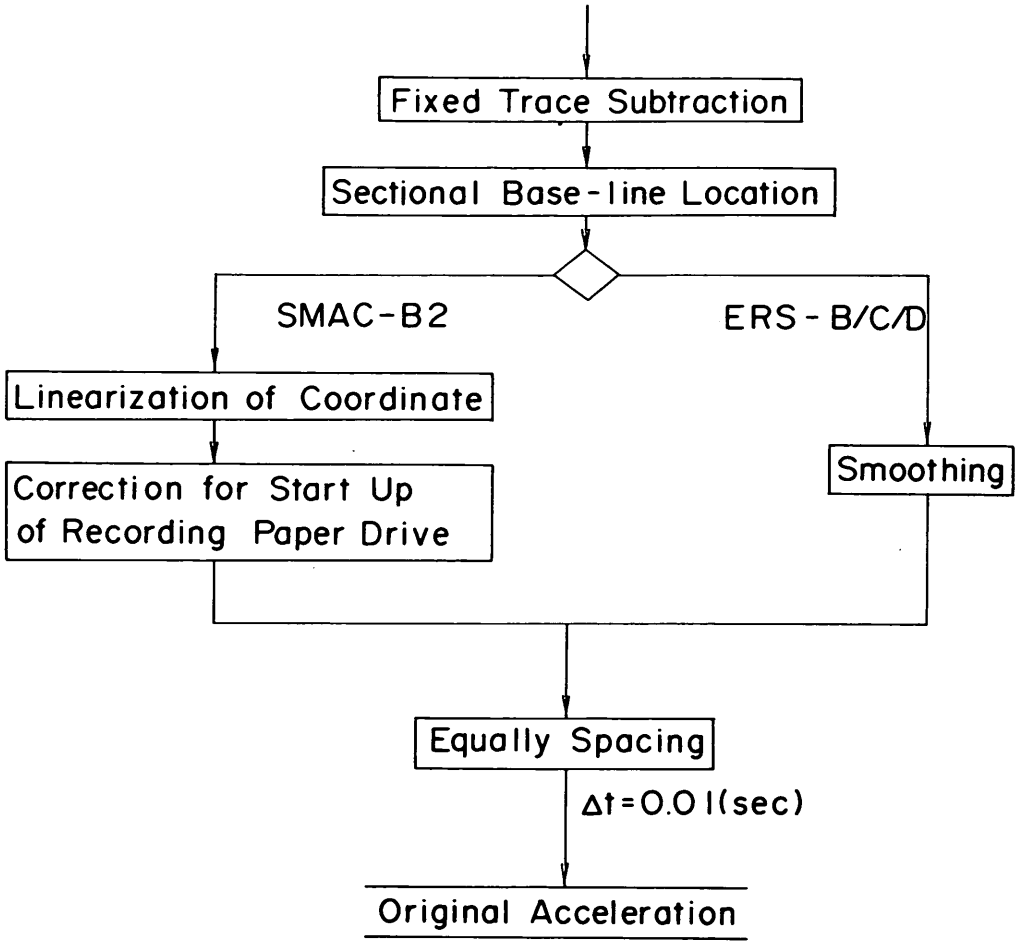


Fig.23 Procedure of standard data processing

(1) Fixed Trace Subtraction

This correction is applied in order to eliminate the following errors.

i) errors caused by the transverse motion of recording paper in the drive mechanism of the accelerograph

ii) systematic errors caused by an imperfect transverse moving mechanism of the digitizer cross-hair system

iii) errors of sectional rotation of the record on the digitizer table at the setting

The systematic errors of the digitizer cross-hair system were found to be negligible according to the tests with a straight line made of a stretched steel wire and a stretched gut.

Digitized fixed traces are smoothed by a weighted running average scheme before subtracted from the accelerogram. The weight function is defined as follows;

$$\omega(t)=\begin{cases}\Delta t\sqrt{\alpha/\pi}\,exp(-\alpha t^2) & if\ |t|\leqq t_0\\ 0 & \text{otherwise}\end{cases} \quad \cdots\cdots (1)$$

where Δt is time interval, $\alpha=(\pi/2)^2$ and $t_0=\sqrt{5/\alpha}=1.42$ (s)

At both ends of a section for digitization, α and t_0 in Eq.(1) are redefined by $\alpha=5/S^2$ and $t_0=S$, where $S(s)$ is the distance from the end of a section. This weighted running average corresponds to low pass filter of the cut off frequency of about 0.5 Hz. The smoothed fixed traces are subtracted from the accelerogram. In the case of a record by the SMAC-B2 accelerographs, subtraction is made as follows;

- An upper trace is corrected by an upper fixed trace,
- A lower trace is corrected by a lower fixed trace and
- A center trace is corrected by an average of an upper and a lower fixed traces.

In the case of records by the ERS-B, -C and D accelerograph, one fixed trace is subtracted from all the components of an accelerogram.

(2) Sectional Base-line Location

As described previously, base-line is arbitrarily inserted for each section by the initialization of transverse coordinate. Sectional translation brings mainly low frequency errors into the accelerogram and produces an natural response of a low cut filter for integration around a point of junction of digitized sections. Base-line is located so as to make an ideal average of acceleration over almost infinite length zero. On the sectional base-line location, the authors assume that low frequency components up to about 1/T, where T is the minimum length of sections, is almost none if calculation of spectrum is done over the infinite length for the accelerogram which have been corrected by the fixed trace subtraction and which have an ideal true base-line for each section. Based on the detailed study of the base-line location in the frequency space, the base-line is located sectionally so as to make a weighted average of each sectional acceleration zero. The weight function is defined by

$$u(t)=\Delta t\sqrt{\beta/\pi}\,exp(-\beta t^2) \quad \cdots\cdots (2)$$

where Δt is time interval, $\beta=20/T^2$ and $T(s)$ is length of each section

The expected error of the location is almost proportional to the quantities of low frequency components up to about $1/T(Hz)$. Because the authors do not have enough space to describe the detailed study, the authors introduce an example calculation to illustrate the difference between the proposed base-line location and the base-line location of least square fit scheme for each section. A sine wave generated by a computer of 100 Gal, 5 Hz and 5000 data with time intervals of 0.01 second is divided into two sections; one section is the first 2510 data and the other is the last 2490 data, which are looked upon as a sectionally digitized accelerogram. Sectional base-lines are located by the two method. Displacements are calculated from the two accelerations by the fixed filter method described later and a portion of the results including the junction of two sections are shown in **Figure 24** and **Figure 25**, respectively. The time of 10.1 seconds is the junction in these figures. These figures indicate that the proposed base-line location is much better in this case because true displacement is a sine wave.

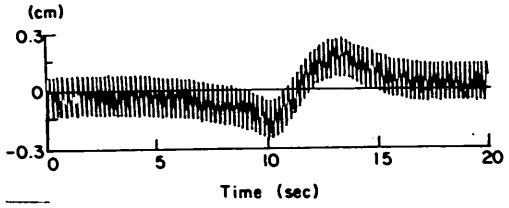


Fig.24 Integrated displacement from the acceleration record with sectionally base-line by a least square fit scheme

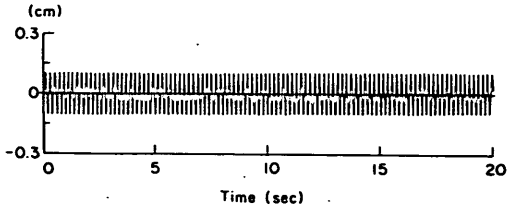


Fig.25 Integrated displacement from the acceleration record with sectionally located base-lines by the proposed method

(3) Linearization of Coordinate

This correction is applied to a record by the SMAC-B2 accelerograph to obtain a corrected longitudinal (X) coordinate of each datum. Transverse (Y) coordinate of the pivot of the recording pen is calculated from the digitized arc trace as shown in **Figure 26**. Let $r(mm)$ denotes the radius of the arc which is the length of the arm of the recording pen, $y(mm)$ denotes Y coordinate of a point whose X coordinate is to be corrected, $a(mm)$ denotes Y coordinate of the center of the arc which is the pivot of the pen and e denotes error of X coordinate of the point to be corrected, then we have the following equation.

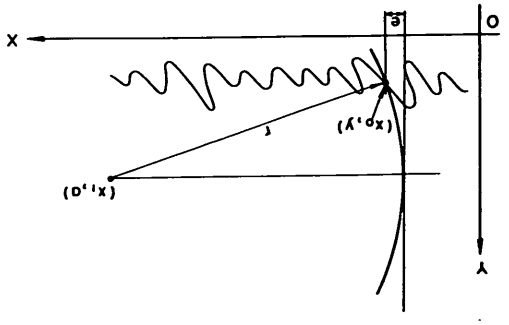


Fig.26 Linearization of coordinate

$$e = r - \sqrt{r^2 - (y-a)^2} \qquad (3)$$

Although the arc trace is digitized with arbitrarily determined base-line, the linearization of coordinate is uniformly performed because $(y\text{-}a)$ in the equation remains constant for any base-line. $a(mm)$ in the equation will be set to zero if arc traces are accidentally not drawn or length of the arc trace is short which means the case the maximum difference of X coordinates of the arc trace is less than 0.5 mm.

(4) Correction for start up of recording system

The variation of recording paper speed of the SMAC-B2 accelerograph is represented by the following equation which is based on the tests conducted at the Laboratory shown in **Figure 27**.

$$\gamma = \begin{cases} [1 - 1/b^2(t - to)^2]\gamma a & \text{if } 0 \leqq t \leqq to \\ \gamma a & \text{if } to < t \end{cases} \qquad (4)$$

where γ : paper speed at time t (cm/s)
γa : paper speed after reaching constant speed(cm/s)
t : time after triggering (s)
to : constant (s)
b : constant (s)

If to and b are given, the correction for the start up of recording paper drive is simple problem. For the correction of the digitized records in the preceding annual report, $to=2.0(s)$ and $b=2.0(s)$ were used. After the annual report had been published, it was found that more appropriate correction would be possible with a slight modification of to value. For the correction of the most of the digitized records in this report, $to=1.9(s)$ is used.

(5) Smoothing

Smoothing is applied to a record by the ERS-B, -C and -D accelerograph. A record by the ERS-B, -C and -D accelerograph is digitized at intervals of 0.1 mm which correspond to about 0.005 second on a record by the ERS-B accelerograph and corresponds to about 0.0025 second on a record by the ERS-C and -D accelerograph. Frequency components higher than about 50 Hz are eliminated because there are almost no significant components of seismic acceleration over 50 Hz for the most of the record obtained by the ERS-B, -C and -D accelerograph so far.

The weight function is defined by

$$g(t)=\begin{cases}\Delta t\cdot(f_0+f_1) & if\ t=0\\ \dfrac{2\Delta t}{f_1-f_0}\cdot\dfrac{\cos(2\pi f_0 t)-\cos(2\pi f_1 t)}{(2\pi t)^2} & if\ 0<|t|\leqq 0.5\\ 0 & \text{otherwise}\end{cases} \qquad (5)$$

where Δt is time interval, $f_0=45(Hz)$ and $f_1=55(Hz)$

The filter corresponding to this weighted running average , which is shown in **Figure 28**, is approximately expressed as follows. Errors of the approximation are less than 0.3 %.

$$G(f)=\begin{cases}1 & if\ |f|\leqq f_0\\ \dfrac{f_1-|f|}{f_1-f_0} & if\ f_0<|f|\leqq f_1\\ 0 & if\ f_1<|f|\end{cases} \qquad (6)$$

where $f_0=45(Hz)$ and $f_1=55(Hz)$

(6) Equal Spacing

Data are equally spaced at intervals of 0.01 second by means of linear interpolation. A record by the SMAC-B2 accelerograph is digitized at intervals of 0.1 mm and is processed through the linearization of coordinate. The data processed through the linearization of coordinate are unequally spaced data, whose interval of data are longer than 0.01 second on portions of accelerogram where absolute value of acceleration decreases and intervals of data are shorter than 0.01 second elsewhere.

A record by the ERS-B, -C and -D accelerograph is digitized at intervals of 0.1 mm, which corresponds to about 0.005 second on a record by the ERS-B accelerograph and about 0.0025 second on a record by the ERS-C and -D accelerograph. There is no possibility of aliasing by the equal spacing at the interval of 0.01 seconds because their high frequency components over 50 Hz are eliminated by the smoothing. High density of sampling at digitization enables us to separate high frequency components which are possibly contaminated by digitization errors and assures us much accuracy of the interpolation.

(7) Processing for the records by the ERS-F and -G accelerograph

Standard data processing and preliminary analyses described later for the records by the ERS-F and -G accelerograph are almost the same as those by ERS-B, -C and -D accelerograph. The differences are as follows;

- Overall base-line correction is applied for the data at the standard data processing.
- No smoothing is applied for the data at the standard data processing.
- As an instrument correction at the preliminary analyses, correction for the phase is applied but no correction is applied for the amplitude at the preliminary analyses.
- Low pass filter with cut-off frequency of 25 Hz and roll-off frequency of 40 Hz are applied by using a digital filter of cosine shape in frequency domain at the preliminary analyses.
- As the high pass filtering at the preliminary analyses, parameter E for the Variable Filter in Eq.(20), which is to be described later, is determined by the following equation;

$$E=(p \cdot 0.001) \cdot 0.02236 \quad \cdots\cdots (7)$$

in which p ($=1000\ Gal/2^{15}$) is the sensitivity of the ERS-F and -G accelerograph.

The factors in Eq.(8) was obtained by the study on the noise level obtained by the power spectra of the noise under the conditions with connectors of signal conditioner in short circuit.

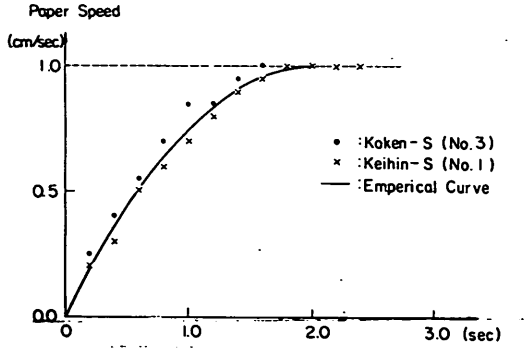


Fig.27 Varible recording speed on start up of recording paper drive

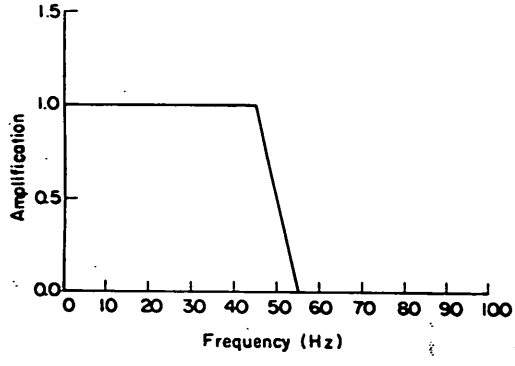


Fig.28 Filter for the smoothing

6. Preliminary Analyses

The Standard procedures of the preliminary analyses described here have been applied for records obtained since 1976[43), 44)]. The standard procedures of preliminary analyses consist of filtering for instrument correction, filtering for correction of low or high frequency components, integration, calculation of response spectra and Fourier spectra. The flow of the preliminary analyses is shown in **Figure 29**.

(1) Methods of Correction and Integration

Instrument correction, filtering, integration are applied in frequency domain. FFT is applied for the accelerogram which is extended with a section of zero outside the digitized portion in order to avoid link effect. The length of section of zero L (s) is determined so as to meet the following condition.

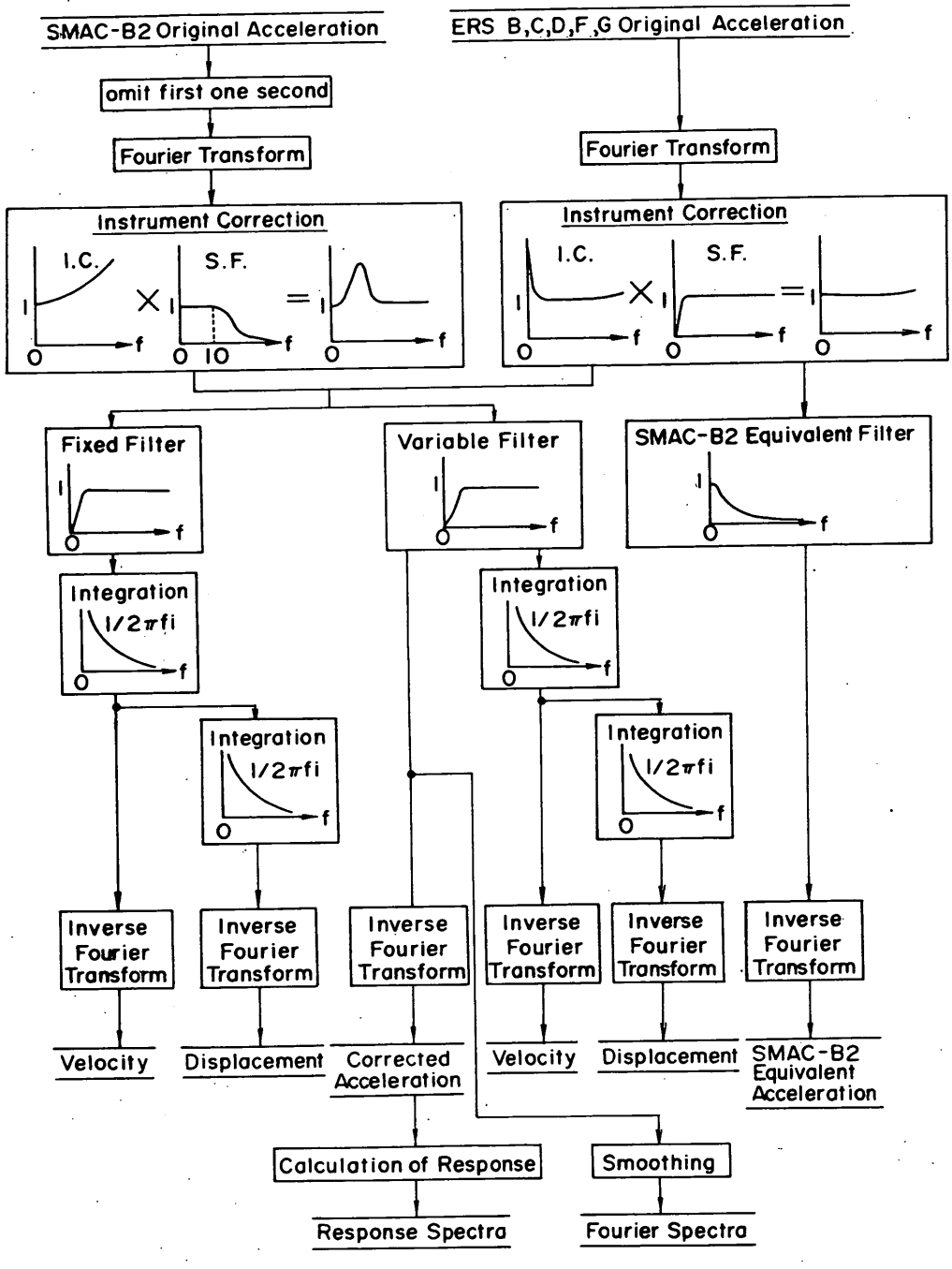


Fig.29 Procedure of preliminary analyses

$$L > max\ [2/3T, 10.0] \quad \cdots\cdots (8)$$

where $T(s)$ is the minimum length of sections made by the division of an accelerogram for the digitization. This condition is based on the examination of impulse responses of the high pass filters for integration to be described later. Length of the section of zero L is decided so as to make calculation time of FFT short as much as possible in the given memory size of the computer.

(2) Filters for Instrument Correction and Supplementary Filter

(a) Filters for a record by the SMAC-B2 accelerograph

The filter for instrument correction $A_s(f)$ is defined by the inverse of the frequency characteristics of the transducer of the SMAC-B2 accelerograph as follows.

$$A_s(f)=1-(\frac{f}{f_s})^2+2h_s(\frac{f}{f_s})i \quad \cdots\cdots (9)$$

where $f_s=1/0.14=7.1(Hz)$ and $h_s=1.0$

The supplementary filter $B_s(f)$ is defined by

$$B_s(f)=\begin{cases} 1 & if\ |f| \leq f_0 \\ [1+(|A_s(f)|-1)exp(-\frac{(|f|-f_0)^2}{20})]\frac{1}{|A_s(f)|} & \text{otherwise} \end{cases} \quad \cdots\cdots (10)$$

where $f_0=10(Hz)$

The supplementary filter is designed to suppress high frequency digitization noise and at the same time preserve high frequency components of an accelerogram in order to lessen an abnormal response of the filter to discontinuities at both ends of digitized portion of the accelerogram. The filter for instrument correction $A_s(f)$ and the supplementary filter $B_s(f)$ are shown in **Figure 30** and **Figure 31**, respectively. Combined filter by $A_s(f)$ and $B_s(f)$, which is shown in **Figure 32**, is applied for overall instrument correction for records by the SMAC-B2 accelerograph.

(b) Filters for a record by the ERS-B, -C and -D accelerograph

The filter for the instrument correction $A_E(f)$ is defined by following equations;

$$A_E(f)=A_P(f)\,.\,A_G(f) \quad \cdots\cdots (11)$$

$$A_P(f)=1+\frac{i}{2h_P}(\frac{f}{f_P}-\frac{f_P}{f}) \quad \cdots\cdots (12)$$

$$A_G(f)=1-(\frac{f}{f_G})^2+2h_G(\frac{f}{f_G})i \quad \cdots\cdots (13)$$

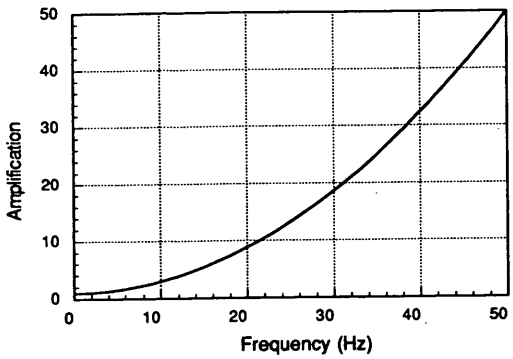


Fig.30 The filter for instrument correction for records by the SMAC-B2 accelerograph

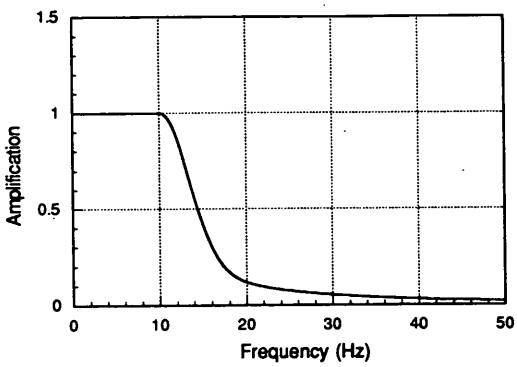


Fig.31 The supplementary filter for records by the SMAC-B2 accelerograph

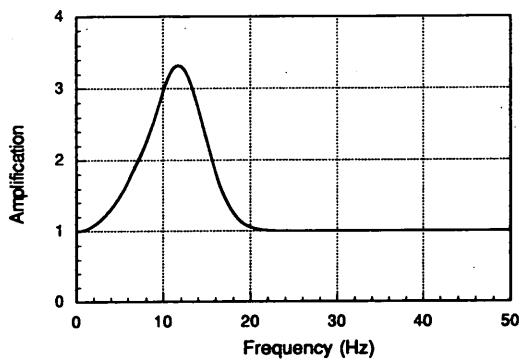


Fig.32 The combined filter for records by the SMAC-B2 accelerograph

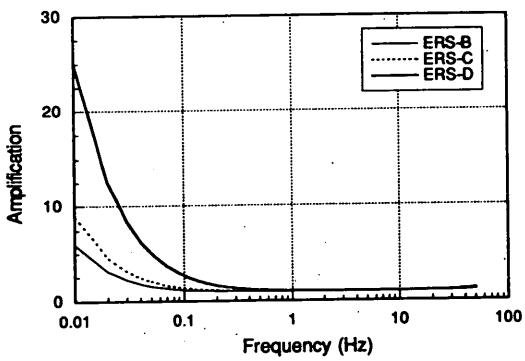


Fig.33 The filter for instrument correction for records by the ERS-B, -C and -D accelerograph

where for a record by the ERS-B accelerograph

f_P=2.0(Hz), h_P=17, f_G=100(Hz) and h_G=0.7

for a record by the ERS-C accelerograph

f_P=3.0(Hz), h_P=17, f_G=270(Hz) and h_G=0.7

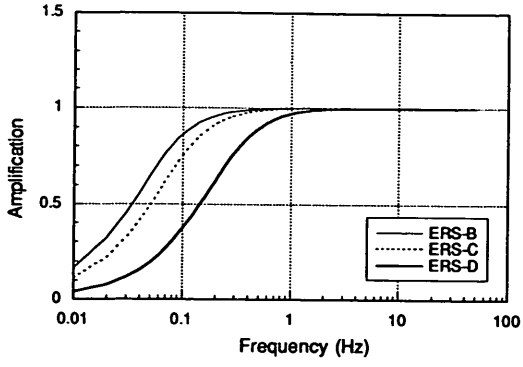
for a record by the ERS-D accelerograph

f_P=5.0(Hz), h_P=10, f_G=100(Hz) and h_G=0.7

In the above equations, $1/A_P(f)$ means frequency characteristics of the pick up of the accelerograph and $1/A_G(f)$ mean those of the galvanometer. Filters for instrument correction $A_E(f)$ are shown in **Figure 33** for 3 types of accelerograph.

The supplementary filter $B_E(f)$ is defined by

$$B_E(f)=\begin{cases}1/|A_P(f)| & \text{if } |f| \leqq f_P \\ 1 & \text{otherwise}\end{cases} \qquad (14)$$



Figu.34 The supplementary filter for records by the ERS-B, -C and -D accelerograph

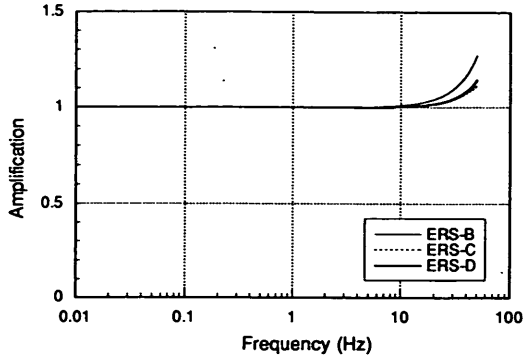


Fig.35 The combined filter for records by the ERS-B, -C and -D accelerograph

where $A_P(f)$: Filter for the instrument correction of the pick up
f_P : Characteristic frequency of the pick up of each accelerograph

The supplementary filter is designed to suppress low frequency digitization errors. The supplementary filters $B_E(f)$ are shown in **Figure 34**. For overall instrument correction of records obtained by ERS-B, -C and -D accelerograph, combined filters by $A_E(f)$ and $B_E(f)$, which is shown in **Figure 35**, are applied.

(c) Filters for a record by the ERS-F and -G accelerograph

As mentioned earlier, correction for the frequency characteristics of phase, shown in **Figure 14 (*b*)**, is only applied for the data as a instrument correction and no correction is applied for the amplitude. As for the amplitude, however, components in high frequency range is cut off by the following equations because there is no significant information found in high frequency range so far.

$$Af(f)=\begin{cases} 1 & if\ |f| \leqq f_1 \\ \frac{1}{2}[\cos(\pi \frac{f-f_1}{f_2-f_1})+1] & if\ f_1 < |f| \leqq f_2 \\ 0 & if\ |f| > f_2 \end{cases} \quad \cdots\cdots (15)$$

where $f_1=25(Hz)$ and $f_2=40(Hz)$

(3) SMAC-B2 Equivalent Filter

Frequency characteristics of SMAC-B2 accelerograph are different from those of ERS type accelerograph. In order to make it easy to compare the accelerograms by these different types of accelerographs, a filter defined in the following equation is applied for records by the ERS type accelerograph.

$$S(f)=\frac{1}{1-(\frac{f}{f_s})^2+2h_s(\frac{f}{f_s})i} \quad \cdots\cdots (16)$$

where $f_s=1/0.14=7.1(Hz)$ and $h_s=1.0$

This filter is shown in **Figure 36** and has the same frequency characteristics as that of the SMAC-B2 accelerograph. The filter is applied for the acceleration records by the ERS type accelerograph processed through the filter for instrument correction and the supplementary filter. Acceleration processed through this filter will be called **'SMAC-B2 Equivalent Acceleration'** in this report. This acceleration can be compared with the **'Original Acceleration'** by the SMAC-B2 accelerograph. Although acceleration processed by this filter can not represent accurate acceleration and its maximum acceleration will be smaller than that of a record through instrument correction especially in high frequency range, all the accelerograms by this procedure can be directly compared with each other.

(4) High pass filters for integration

Processed through the preliminary correction procedure, a digitized accelerogram is expected to have only such errors as random digitization errors and errors of sectional base-line location. Errors of sectional base-line location affect mainly to frequency components lower than about $1/T$, where T is the length of a section of an accelerogram divided for digitization.

As a result of the examination of random digitization errors, frequency characteristics of Signal-to-Noise (SN) ratio calculated for each frequency are found to be similar to those of digitized acceleration. In other words, ratio of digitized acceleration to digitization errors calculated for each frequency is large if the corresponding frequency components of the digitized acceleration is large. For the frequency components higher than about $1/T$, the result of the examination of digitization errors may remain valid. The result implies that SN ratio of a frequency component varies with the frequency characteristics of accelerogram to be digitized.

The cut-off frequency of a high pass filter for integration of a digitized accelerogram should be varied in accordance with frequency characteristics of an accelerogram from such a point of view that SN ratio should be kept higher than some constant level for every frequency component and at the same time the physically real signals should be preserved as much as possible. On the other hand, cut-off frequency of the filter should be kept constant for any accelerograms from such a point of view that the preserved real seismic signals should be filtered out by the same filter for the purpose of comparison between two or more velocities or displacements even if integrated errors are more or less included in them.

In order to satisfy a wide range of applications of the strong-motion records from the various view points, the authors proposed two methods of correction of an accelerogram to obtain integrated velocities and displacements. One is a method with a fixed filter and the other is a method with a variable filter.

(a) Fixed filter

This filter is defined by the following equation.

$$H_1(f)=\frac{1}{1-\left(\frac{f_0}{f}\right)^2+2h\left(\frac{f_0}{f}\right)i}\cdot\frac{1}{\sqrt{1+\left(\frac{f_1}{f}\right)^2}} \qquad (17)$$

where $f_0=1/6\,(Hz)$, $h=0.552$ and $f_1=0.1\,(Hz)$

This filter is designed to make it easy to compare the integrated displacement with records obtained by the one magnification strong-motion seismometer ($T=6$ seconds and $h=0.552$) deployed by the Japan Meteorological Agency (JMA). Cut-off frequency (3 dB down) of this filter is 0.154 Hz. This filter is shown in **Figure 37**.

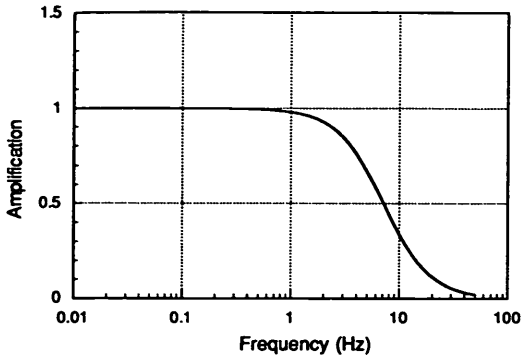


Fig.36 The SMAC-B2 equivalent filter

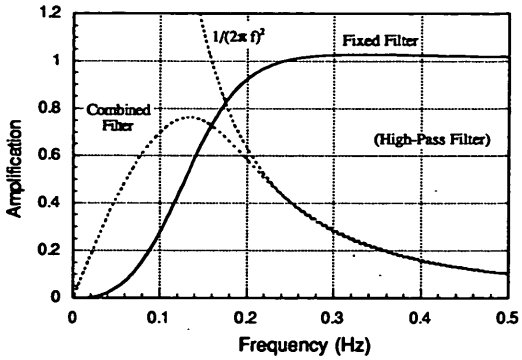


Fig.37 The fixed filter and the combined filter for double integral

(b) Variable filter

This filter is defined by the following equation;

$$H_2(f)=[1-exp\{-(\frac{f}{fc})^2\}]^2 \quad \cdots\cdots (18)$$

The parameter fc in the equation varies so as to make σ equal to E, where σ is defined by

$$\sigma^2=\frac{1}{M}\int_{-\infty}^{\infty}|\chi(f)|^2\cdot[1-exp\{-(fT)^2\}]^4\cdot[1-H_2(f)]^2df \quad \cdots\cdots (19)$$

where M is the length of whole digitized portion,
T is the minimum length of a section of accelerogram,
$X(f)$ is Fourier Transform of the original acceleration and
E is the value listed below;
for a record by the SMAC-B2 accelerograph
$E=0.5$ (Gal)
for a record by the ERS-B, -C and -D accelerograph
$E=0.05p$ (Gal)
where p (Gal/mm) is the sensitivity of the ERS-B, -C and -D accelerograph
for a record by the ERS-F and -G accelerograph
$E=(p\cdot 0.001)\cdot 0.02236$ (Gal)
where p $(1000\ Gal/2^{15})$ is the sensitivity of the ERS-F and -G accelerograph

Cut-off frequency (3 dB down) of this filter is $1.36fc$. This filter is shown in **Figure 38** and **Figure 39**.

Decision procedure of fc is illustrated in **Figure 40**. fc is fundamentally determined so as to filter out some constant amount of low frequency components of an accelerogram higher than about $1/T$. The greater low frequency components of an accelerogram are, the lower fc should be. Because the greater low frequency components of an accelerogram are, the higher SN ratio of these components are. Low frequency components lower than about $1/T$ are eliminated for the decision procedure of fc because they are possible to be contaminated by the errors at sectional base-line location and the relation between the SN ratio and the quantity of a frequency component of an accelerogram is afraid no longer remaining valid.

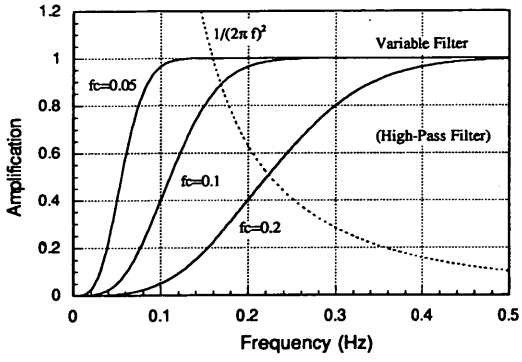
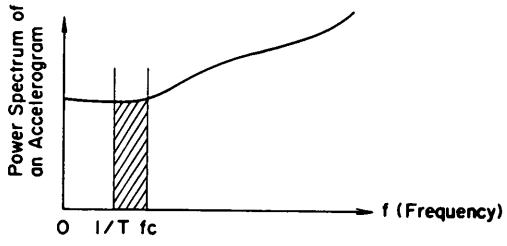


Fig.38 The variable filter and double integral



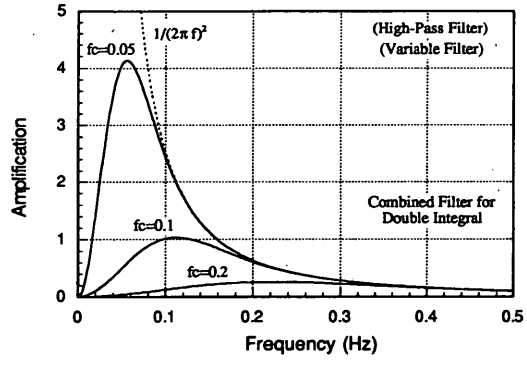


Fig.39 The combined filter of the variable filter for double integral

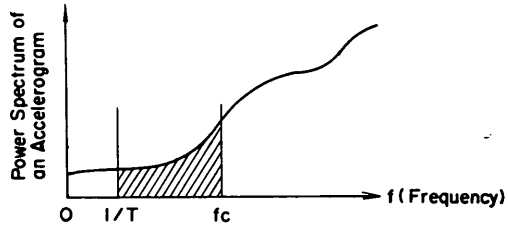


Fig.40 The Simplified illustration of decision procedure of fc

This decision procedure of ***fc*** is, however, a compromise between such a view point as to keep SN ratio over some constant level for every frequency component and keep ***fc*** to be a constant. The reason why such a compromised method is proposed is that the compromise makes decision procedure of ***fc*** more stable against possible fluctuation of the relation between quantity of a frequency component of an accelerogram and the SN ratio. The relation may, to some extent, depend on frequency characteristics of an accelerogram to be digitized, digitized length of an accelerogram non-stationarity of an accelerogram, etc. and the relation itself if valid only in a stochastic sense.

The reason why a fixed low pass supplementary filter is proposed instead of a variable one for a record by the SMAC-B2 accelerograph is that the possible fluctuation of the relation is expected to be greater for high frequency components. Slope of both of the high pass filters proposed here are designed to be mild in order to lessen an artificial predominant frequency component around the cut-off frequency.

(5) Outputs of Preliminary Analyses

(a) Acceleration, Velocity and Displacement

A portion of first one second of the original acceleration of the SMAC-B2 accelerograph is omitted for the instrument correction and the integration because even a slight difference of start up of recording paper drive between SMAC-B2 accelerographs and even a small difference of selection of starting point of digitization may sensitively affect accuracy of the portion of first short section processed through

the correction of start up of the recording paper drive. In the case of the original acceleration of the ERS type accelerograph, no data is omitted. These accelerations are processed by the methods of correction and integration described previously. The calculated results are shown in figures and tables as results of preliminary analyses shown in the later part of this report.

In this report, **'Corrected Acceleration'** denotes acceleration with instrument correction processed through the variable filter and **'SMAC-B2 Equivalent Acceleration'** denotes acceleration obtained by the SMAC-B2 equivalent filter as shown in **Figure 29**. Integrated velocities and displacements are calculated with both the fixed filter and the variable filter. The parameter ***fc*** for cut-off frequency of the variable filter is shown in the tables on the results of preliminary analyses.

The corrected acceleration of the different types of accelerographs can not necessarily be compared with each other because the difference of the supplementary filters produces difference mainly on the high frequency components over 10 Hz of the filtered accelerations. Instead of comparison of the corrected accelerations, SMAC-B2 equivalent acceleration can be freely compared with the original acceleration of the SMAC-B2 accelerograph except for the low frequency components lower than about 0.1 Hz.

(b) Response Spectra

Response spectra are calculated from the corrected acceleration, which is an acceleration with instrument correction processed through the variable filter as described previously. The response spectra in the previous annual reports before 1968 were calculated from the digitized records by a digital computer using Runge-Kuta-Gill method to integrate numerically the equation of motion of the oscillator. The response spectra in the present report are calculated with a step by step calculation of the exact solution to the governing differential equation[45]. No significant difference was seen in the results calculated by the both methods, according to the trial calculations.

The time interval of each step of the calculation is 0.01 second for the oscillators of natural periods longer than 0.2 second. For the oscillators of shorter periods, the small time intervals are selected to that one cycle of the undamped free oscillation of the oscillator is covered at least by 20 steps of the numerical calculation to maintain the necessary accuracy. In these calculation, the digitized records at smaller time intervals are made by means of the interpolation in the computer.

To calculate response spectra, entire length of the record is not necessary and the last part of the record after the maximum response have appeared is in effect meaningless in the calculation. Besides, the shorter record is more preferable from view point of the calculation time. On some long records, their beginning parts of small acceleration are not used in the calculation so far as it is thought that the neglected parts do not affect the results of the calculation. In this report, the whole record length is adopted as length of calculating response spectra for the records less than 60 seconds. For the records of which time duration is more than 60 seconds, the length of 60 seconds which includes portions of main strong-motion is adopted as length of calculation. Acceleration ratio, absolute acceleration response, relative velocity response and relative displacement response are presented in this report as results of response spectra of 0%, 1% and 5% damping.

As response spectra of the period longer than about ***1/fc*** are influenced by the high pass filter (***1.36/fc*** is the period of 3 dB down of the filter; i.e.), calculated response spectra is true if real seismic signals do not exist in the period longer than about ***1/fc*** and calculated response spectra are smaller than the true value if real seismic signals do exist. In the case of the corrected acceleration by the SMAC-B2 accelerograph, response spectra of the period shorter than about 0.1 sec is also influenced by the low pass filter. Users of the response spectra should be careful about these characteristics of the response spectra calculated for the corrected acceleration and difference between the response spectra for the corrected acceleration and those for the uncorrected acceleration which had been calculated so far.

(c) Fourier Spectrum

The Fourier spectra are calculated by the FFT from the corrected acceleration. The time length for calculation is identical with the time length for calculating response spectra. The spectra in this report, however, are multiplied by the length of the record for calculation and then smoothed with the Parzen window of 1 Hz band width.

(d) Loci

The loci of accelerations, velocities and displacements in horizontal plane are included in this report. The records used for plotting loci are corrected accelerations, integrated velocities and displacements processed through the variable filter.

7. Summary of Observation

Strong-motion earthquakes and earthquake responses of structures have been observed in the major ports in Japan since 1962. 4840 accelerograms have been obtained by the end of 1994 in the network of the Port and Harbour Research Institute. As of December 1994, 89 strong-motion accelerographs have been installed in 56 ports in Japan. 63 accelerographs out of 89 are installed at ground surface, 12 accelerographs are in ground by using bore-hole and the rest (14) are on structures such as quay walls.

This report presents all the records obtained in 1994, which are listed in the tables of Strong-Motion Earthquake Observation Results with their maximum accelerations, being classified in accordance with earthquakes. For the records of ground motions with maximum accelerations exceeding 20 Gals (=cm/sec^2), computer plots of reproduced acceleration are presented. For the records of ground motions with maximum accelerations exceeding 50 Gals, computer plots of reproduced accelerograms, integrated velocities and displacements, response spectra, fourier spectra and loci of accelerations, velocities and displacements in horizontal plane are presented.

In **Table 8**, a statistical summary (total number of records) of the strong-motion observation in the network is given at the end of 1994. In **Table 9**, record numbers of accelerograms of which digitized records and spectra have been published by the end of 1994 are shown. The number in the parentheses behind each record number shows the number of the Technical Note of the Port and Harbour Research Institute in which the record is presented.

Table 8 Satistical Summary of Records

(December 1994)

Name of Station	Total Number of Records	Number of Records (20≤ Max. Accel.<50 Gals)	Number of Records (Max. Accel. ≥50 Gals)
AKITA-GB	2	0	0
AKITA-G	2	0	0
AKITA-S*	33	7	2
AMAGASAKI-G	1	0	0
AMAGASAKI-S*	9	2	0
AOMORI-G	3	2	1
AOMORI-S*	48	17	6
CHIBA-S	94	18	4
HACHINOHE-S*	111	16	5
HACHINOHE-JI-S	21	11	7
HAKODATE-FB	14	3	1
HAKODATE-F	14	3	2
HAKODATE-FR	15	4	2
HAKODATE-M	49	16	6
HANASAKI-M*	36	21	7
HANASAKI-F	29	7	3
HIRARA-G	2	0	0
HIRARA-S*	5	1	0
HIROSHIMA-G	2	0	0
HIROSHIMA-S*	9	5	4
HIROSHIMA-JI-S*	5	0	0
HITACHINAKA-F	180	93	27
HOSOSHIMA-S*	54	19	7
HOSOSHIMA-F	12	1	0
ISHIGAKI-G	5	1	0
ISHIGAKI-S*	5	1	0
INAE-S	22	6	0
INAE-SANBASHI-M	20	10	1
INAE-YAITA-M	29	13	2
KAGOSHIMA-G	2	1	0
KAGOSHIMA-S*	26	4	0
KAMAISHI-M	41	18	1
KAMAISHI-MB	40	4	1
KANAZAWA-G	0	0	0
KANAZAWA-S*	9	3	1
KASHIMA-S*	32	9	3
KASHIMA-JI-S*	30	6	3
KASHIMA-ZOKAN-S	129	31	10
KAWASAKI-CHI-M*	187	22	2
KAWASAKI-KO-M*	107	28	6
KAWASAKI-FB	37	5	3
KAWASAKI-F	37	10	4
KAWASAKI-FR	37	16	5

(to be continued)

(**Table 8** Continued)

(December 1994)

Name of Station	Total Number of Records	Number of Records (20≦ Max. Accel.<50 Gals)	Number of Records (Max. Accel. ≧50 Gals)
KEIHIN-JI-S	133	19	2
KINUURA-S*	8	4	2
KINUURA-JI-S	23	4	0
KOBE-DAI6-S	13	3	0
KOBE-DAI8-G	0	0	0
KOBE-DAI8-S*	18	2	1
KOBE-JI-S	15	4	0
KOBE-MAYA-DAI1-M	16	7	2
KOBE-MAYA-DAI2-M	20	7	0
KOBE-MAYA-M	22	4	1
KOCHI-G	1	0	0
KOCHI-S*	21	3	1
KOCHI-JI-S*	13	3	0
KOKEN-G	1	1	1
KOKEN-M*	60	5	0
KOKEN-S	34	6	2
KOMATSUJIMA-G	1	1	1
KOMATSUJIMA-S*	17	2	0
KUSHIRO-G	15	5	2
KUSHIRO-GB	15	2	2
KUSHIRO-S*	49	16	6
KUSHIRO-JI-S*	14	7	3
MATSUYAMA-G	3	2	0
MATSUYAMA-S*	25	4	2
MIKAWA-GB	3	0	0
MIKAWA-G	3	0	0
MINAMATA-M*	3	0	0
MIYAKO-G	23	11	5
MIYAKO-S*	49	28	12
MIYAZAKI-GB	3	1	0
MIYAZAKI-G	3	2	1
MIYAZAKI-M*	50	10	4
MURORAN-G	34	9	4
MURORAN-S*	69	14	6
NAGOYA-ZOKAN-S	26	5	2
NAHA-GB	8	0	0
NAHA-G	8	0	0
NAHA-S*	1	0	0
NAHA-ZOKAN-S*	2	1	0
NAKAGUSUKU-G	1	0	0
NIIGATA-G	5	1	0
NIIGATA-S*	12	1	0
NIIGATA-JI-S*	5	1	0

(to be continued)

(Table 8 Continued)

(December 1994)

Name of Station	Total Number of Records	Number of Records (20≤ Max. Accel.<50 Gals)	Number of Records (Max. Accel. ≥50 Gals)
OFUNATO-S*	21	3	2
OFUNATO-BOCHI-S	71	16	5
OFUNATO-BO-S	116	40	23
OFUNATO-MOUND-M	77	24	8
OITA-G	0	0	0
OITA-S*	13	7	4
OKITSU-S	27	4	0
OMAEZAKI-M	30	2	0
ONAHAMA-S*	67	13	4
ONAHAMA-JI-S	36	25	8
OSAKA-CHUO-S*	8	1	0
OSAKA-JI-S	11	1	0
OSAKA-MINAMI-S	0	0	0
OTARU-G	7	2	1
OTARU-S*	13	0	0
SAKAIMINATO-G	0	0	0
SAKAIMINATO-S*	0	0	0
SAKAIMINATO-JI-S*	13	6	3
SAKATA-S	58	6	0
SENDAI-M	89	19	3
SENDAI-MB	88	2	0
SHIBUSHI-G	3	0	0
SHIBUSHI-S*	15	0	0
SHIMIZU-KOJYO-S	24	7	3
SHIMIZU-MIHO-S	25	4	1
SHIMI. -SEKITAN-M*	23	11	5
SHIMI. -SEKITAN-S*	10	5	2
SHINAGAWA-GB	0	0	0
SHINAGAWA-G	0	0	0
SHINAGAWA-M*	1	1	1
SHINAGAWA-MB*	91	2	0
SHINAGAWA-S*	127	30	8
SHIOGAMA-S*	19	1	0
SHIOGAMA-KOJYO-S	95	19	6
SHIMODA-F	9	1	0
SOMA-S	60	14	6
TAGONOURA-S	59	8	0
TOKACHI-M	107	58	23
TOMAKOMAI-S	35	10	7
TOYAMA-GB	0	0	0
TOYAMA-G	0	0	0
TOYAMA-S*	8	3	2
TSURUGA-G	1	0	0

(to be continued)

(Table 8 Continued)

(December 1994)

Name of Station	Total Number of Records	Number of Records (20≤ Max. Accel.<50 Gals)	Number of Records (Max. Accel. ≥50 Gals)
TSURUGA-S*	33	3	1
URAKAWA-S	133	18	6
WAKA. -GANPEKI-S*	7	2	0
WAKAYAMA-G	18	9	5
WAKAYAMA-S*	41	19	3
WAKAYAMA-JI-S*	12	5	4
WAKA. -SUMIKEN-S*	0	0	0
YAMASHI. -DAI7-M*	81	6	1
YAMASHI. -DAI6-S*	102	31	11
YAMASHITA-HEN-M*	199	19	6
YAMASHITA-FB	53	2	0
YAMASHITA-F	53	13	3
YAMASHITA-FR	53	22	10
YAMASHITA-HEN-S*	119	24	8
YOKKA. -CHITOSE-S	12	6	1
YOKKA. -DAI2-M	20	4	2
YAKKA. -SEKITAN-M	52	11	3
YAKKAICHI-JI-S*	5	2	0
TOTAL	4840	1171	377
ERS	2256	555	168
SMAC	2584	616	209

* Strong-motion observation of the stations had already been stopped.

Table 9 Summary of Analyzed Record Numbers

(December 1994)

Name of Station	Record Numbers which had been digitized and analyzed (Ref. No. **)				
AKITA-S*	S-655(160)	S-1200(319)	S-1567(458)	S-1585(458)	S-1586(458)
AOMORI-S	S-235(80)	S-264(80)	S-304(80)	S-400(80)	S-670(160)
	S-1192(319)	S-1573(458)	S-1592(458)	S-2488(777)	S-2523(778)
	S-2530(778)				
CHIBA-S	S-1195(319)	S-1378(374)	S-1545(487)	S-1884(547)	S-2107(619)
HACHINOHE-S*	S-252(80)	S-310(80)	S-401(80)	S-669(160)	S-857(202)
	S-1202(319)	S-1453(426)	S-1575(458)		
HACHINOHE-JI-S	S-1968(618)	S-2261(676)	S-2486(777)		
HAKODATE-FB	F-508(777)	F-541(778)	F-542(778)	F-544(778)	
HAKODATE-F	F-545(778)	F-546(778)	F-548(778)	F-603(778)	
HAKODATE-FR	F-509(777)	F-549(778)	F-550(778)	F-552(778)	F-604(778)
HAKODATE-M	M-357(374)	M-523(442)	M-630(458)	M-639(458)	M-1444(777)
	M-1472(778)	M-1473(778)	M-1476(778)		
HANASAKI-F	F-478(776)	F-510(777)			
HANASAKI-M*	M-106(287)	M-262(338)	M-496(426)	M-887(547)	M-1014(588)
	M-1017(588)				
HIROSHIMA-S*	S-364(98)	S-1306(338)	S-1623(487)		
HITACHINAKA-F	F-12(588)	F-15(588)	F-19(588)	F-34(618)	F-36(618)
	F-43(618)	F-46(618)	F-107(649)	F-174(649)	F-358(705)
	F-384(705)	F-423(727)	F-456(727)	F-483(776)	F-525(777)
HOSOSHIMA-S*	S-213(98)	S-453(100)	S-544(166)	S-545(116)	S-1231(338)
	S-1625(487)	S-1729(503)			
KAMAISHI-M	M-1447(777)				
KAMAISHI-MB	M-1448(777)				
KANAZAWA-S*	S-2506(776)				
KASHIMA-S*	S-196(64)	S-612(136)	S-647(136)		
KASHIMA-JI-S*	S-770(181)	S-813(202)	S-845(202)	S-882(202)	
KASHIMA-ZOKAN-S	S-1206(319)	S-1506(446)	S-1678(519)	S-1867(547)	S-1910(588)
	S-1957(588)	S-2110(619)	S-2196(676)	S-2206(676)	S-2492(777)
KAWASAKI-CHI-M*	M-186(317)	M-220(319)			
KAWASAKI-FB	F-461(776)				
KAWASAKI-F	F-98(619)	F-123(649)	F-462(776)	F-516(776)	
KAWASAKI-FR	F-463(776)	F-517(776)			
KEIHIN-JI-S	S-1188(319)	S-1390(374)	S-2112(619)		
KINUURA-S*	S-480(100)	S-585(136)			
KOBE-MAYA-M	M-704(487)				
KOCHI-S*	S-211(98)				
KOCHI-JI-S*	S-1730(503)				
KOKEN-G	F-658(840)				
KOKEN-S*	S-1046(317)	S-2106(619)	S-2417(776)		
KOKEN-M*	M-170(317)				
KOMATSUJIMA-G	F-652(840)				
KUSHIRO-G	F-507(777)	F-528(777)			

(to be continued)

(Table 9 Continued)

(December 1994)

Name of Station	Record Numbers which had been digitized and analyzed (Ref. No. **)				
KUSHIRO-GB	F-506(777)	F-527(777)			
KUSHIRO-S*	S-98(62)	S-369(98)	S-634(136)	S-674(160)	S-733(181)
	S-741(181)				
KUSHIRO-JI-S*	S-1976(618)	S-2171(649)	S-2390(727)		
MATSUYAMA-S*	S-1303(338)	S-1731(503)	S-1624(487)		
MIYAKO-G	F-582(776)	F-584(776)	F-514(777)	F-587(778)	
MIYAKO-S*	S-236(80)	S-271(80)	S-312(80)	S-273(98)	S-420(98)
	S-537(116)	S-1204(319)	S-1104(338)	S-1317(338)	S-1972(618)
	F-2255(676)				
MIYAZAKI-G	F-648(840)				
MIYAZAKI-M*	M-228(338)	M-877(547)	M-1107(618)		
MURORAN-G	F-505(777)	F-554(778)	F-560(778)	F-568(778)	
MURORAN-S*	S-234(80)	S-241(80)	S-399(80)	S-1425(426)	S-1474(442)
	S-1571(458)	S-1599(458)	S-1979(618)		
NAGOYA-ZOKAN-S	S-1(55)	S-20(55)	S-578(136)		
NIIGATA-S*	S-107(62)				
NIIGATA-JI-S*	S-1203(319)				
OFUNATO-S*	S-140(64)	S-282(98)	S-361(98)		
OFUNATO-BO-S	S-2547(776)				
OFUNATO-BOCHI-S	S-554(116)	S-786(181)	S-1022(287)	S-1210(319)	S-1120(338)
OFUNATO-MOUNAD-M	M-1493(776)	M-1450(777)			
OITA-S*	S-924(236)	S-1629(487)	S-1734(503)	S-2021(618)	
OKITSU-S	S-1071(317)				
ONAHAMA-S*	S-111(62)	S-1043(287)	S-1191(317)		
ONAHAMA-JI-S	S-1330(338)	S-1505(446)	S-1528(446)	S-1602(487)	S-1633(487)
	S-1946(588)				
OTARU-G	F-536(777)	F-538(778)	F-539(778)	F-540(778)	
SAKAIMINATO-JI-S*	S-2248(676)	S-2251(676)	S-2383(727)		
SAKATA-S	S-1568(458)				
SENDAI-M	M-1127(618)	M-1498(776)	M-1445(777)		
SENDAI-MB	M-1446(777)				
SHIMIZU-KOJYO-S	S-74(62)	S-1063(317)	S-1064(317)	S-1201(319)	
SHIMIZU-MIHO-S	S-1066(317)	S-1069(317)			
SHINAGAWA-S*	S-192(64)	S-340(98)	S-1394(374)	S-1787(519)	S-1885(547)
	S-2111(619)	S-2130(649)	S-2419(776)		
SHIOGAMA-S*	S-138(64)				
SHIOGAMA-KOJYO-S	S-782(181)	S-1118(338)	S-1201(319)	S-2006(618)	S-2029(618)
	S-2551(776)				
SOMA-S	S-1872(547)	S-2001(618)	S-2031(618)	S-2051(618)	S-2096(618)
	S-2220(676)	S-2487(777)			
TAGONOURA-S	S-1055(317)				

(to be continued)

(Table 9 Continued)

(December 1994)

Name of Station	Record Numbers which had been digitized and analyzed (Ref. No. **)				
TOKACHI-M	M-125(287)	M-145(287)	M-247(338)	M-260(338)	M-340(338)
	M-341(374)	M-439(426)	M-521(442)	M-522(442)	M-540(446)
	M-636(487)	M-703(487)	M-911(547)	M-972(547)	M-1078(618)
	M-1200(649)	M-1242(649)	M-1383(727)	M-1416(776)	M-1459(776)
	M-1443(777)	M-1511(840)			
TOMAKOMAI-S	M-877(202)	S-1418(426)	S-1472(442)	S-1977(618)	S-2491(777)
	S-2528(778)	S-2531(778)			
TOYAMA-S*	S-1892(547)	S-2502(776)			
TSURUGA-S*	S-1549(487)				
URAKAWA-S	S-1978(618)	S-2186(676)	S-2401(727)	S-2458(776)	S-2490(777)
WAKAYAMA-G	F-497(776)	F-503(776)	F-660(840)	F-715(840)	F-718(840)
WAKAYAMA-S*	S-945(236)	S-1028(287)			
WAKAYAMA-JI-S*	S-187(64)	S-265(98)	S-266(98)	S-788(181)	
YAMASHITA-F	F-95(619)	F-168(649)	F-325(676)		
YAMASHITA-HEN-S*	S-412(98)	S-658(160)	S-1058(317)	S-1189(319)	S-1362(374)
	S-1386(374)	S-1614(487)	S-2113(619)		
YAMASHITA-HEN-M*	M-217(319)	M-403(374)	M-1022(588)	M-1056(588)	M-1183(619)
	M-1195(649)	M-1226(649)			
YOKKA.-CHITOSE-S	S-577(136)				
YOKKAICHI-JI-S*	S-166(64)				

* Strong-motion observation of the stations had already been stopped.

** The numbers correspond to those of the Technical Note of the Port and Harbour Research Institute, in which results of preliminary analysis are presented.

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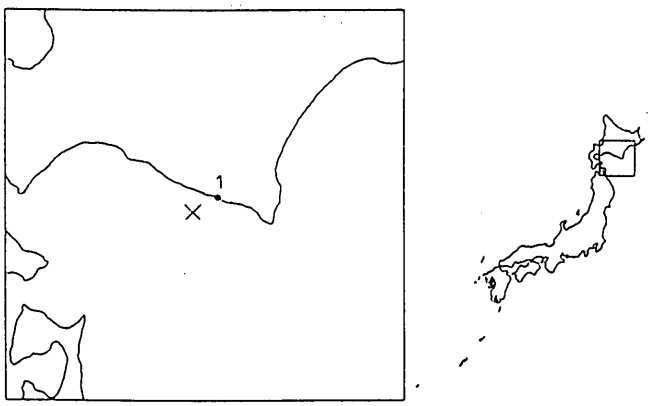
STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

04:58 JAN. 5 ,1994
S OFF URAKAWA
EPICENTER : 42°4.8 'N 142°32.6'E
DEPTH : 70.6KM MAGNITUDE :

JMA INTENSITIES

II : URAKAWA
I : HIROO,TOMAKOMAI



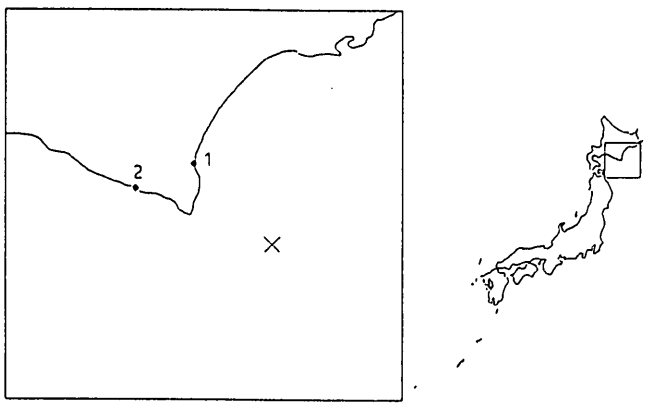
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2556	4	5	2	21

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

19:03 JAN. 26,1994
SE OFF ERIMOMISAKI
EPICENTER : 41°40.6'N 143°56.9'E
DEPTH : 68.7KM MAGNITUDE : 5.6

JMA INTENSITIES

III : HIROO,URAKAWA
II : KUSHIRO,OBIHIRO
I : TOMAKOMAI,MUTSU,OTARU



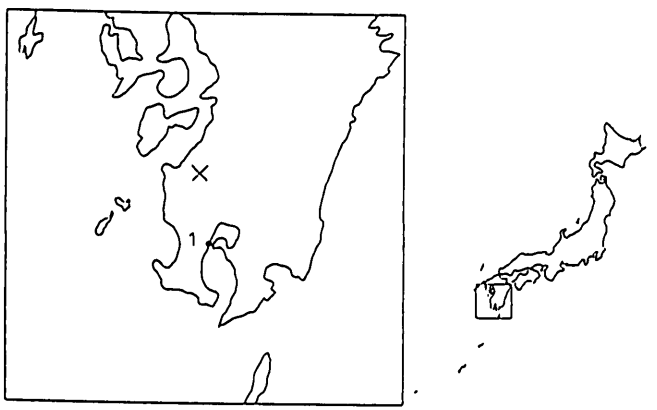
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	TOKACHI-M	ON GROUND	M-1505	26	31	11	85
2	URAKAWA-S	ON GROUND	S-2557	4	3	2	110

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

02:09 FEB. 13,1994
NW KAGOSHIMA PREF
EPICENTER : 32°4.6 'N 130°29.4'E
DEPTH : 9.9KM MAGNITUDE : 4.3

JMA INTENSITIES

Ⅲ : HITOYOSHI
Ⅰ : AKUNE,USHIBUKA



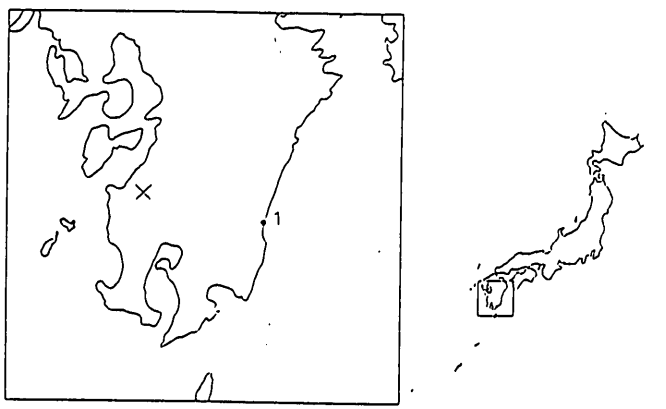
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KAGOSHIMA-G	ON GROUND	F- 706	26	37	15	55

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

02:24 FEB. 13,1994
NW KAGOSHIMA PREF
EPICENTER : 32°5.4 'N 130°29.3'E
DEPTH : 7.8KM MAGNITUDE : 3.4

JMA INTENSITIES

Ⅰ : USHIBUKA,AKUNE



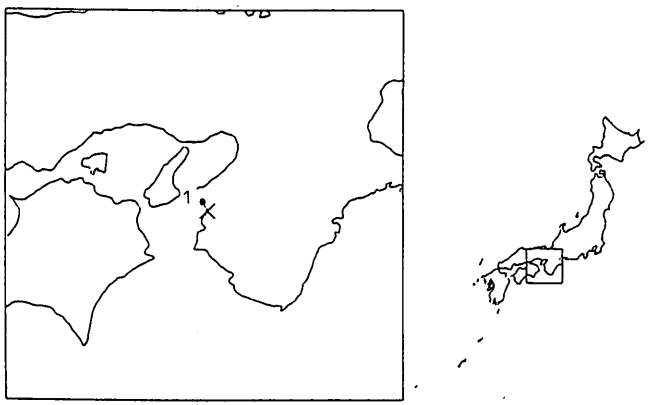
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MIYAZAKI-M	ON GROUND	M-1506	5	3	2	93

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

22:38 FEB. 16,1994
NW WAKAYAMA PREF
EPICENTER : 34°8.8 'N 135°10.9'E
DEPTH : 9.2KM MAGNITUDE : 3.0

JMA INTENSITIES

I : WAKAYAMA



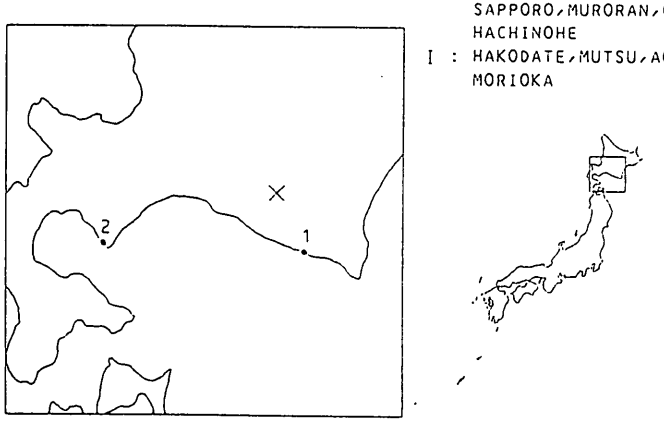
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-G	ON GROUND	F- 659	15	7	14	8

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

20:02 FEB. 18,1994
HIDAKA REGION
EPICENTER : 42°35.4'N 142°34.7'E
DEPTH : 106.9KM MAGNITUDE : 5.1

JMA INTENSITIES

Ⅲ : OBIHIRO,TOMAKOMAI,
KUSHIRO
Ⅱ : URAKAWA,HIROO,IWAMIZAWA,
SAPPORO,MURORAN,OTARU,
HACHINOHE
I : HAKODATE,MUTSU,AOMORI,
MORIOKA



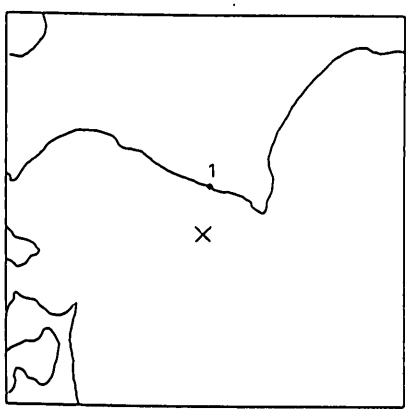
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2558	4	4	2	50
2	MURORAN-G	ON GROUND	F- 677	17	31	8	135

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

07:10 MAR. 18,1994
S OFF URAKAWA
EPICENTER : 41°50.0'N 142°39.8'E
DEPTH : 69.8KM MAGNITUDE : 4.8

JMA INTENSITIES

Ⅲ : URAKAWA
Ⅱ : HIROO
Ⅰ : TOMAKOMAI,OBIHIRO,MUTSU,
HACHINOHE,KUSHIRO



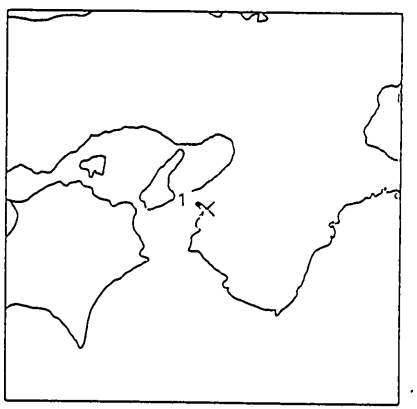
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2559	9	7	2	37

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

15:11 MAR. 24,1994
NW WAKAYAMA PREF
EPICENTER : 34°10.9'N 135°13.4'E
DEPTH : 6.9KM MAGNITUDE : 3.0

JMA INTENSITIES

Ⅲ : WAKAYAMA



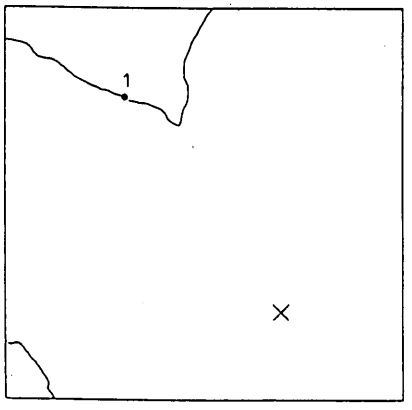
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-G	ON GROUND	F- 661	13	19	26	7

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

10:10 APR. 8 ,1994
FAR E OFF SANRIKU
EPICENTER : 40°33.8'N 143°57.9'E
DEPTH : 2.9KM MAGNITUDE : 6.6

JMA INTENSITIES

II : URAKAWA,MUTSU,MORIOKA,
AOMORI,KUSHIRO
I : MIYAKO,HACHINOHE,
OFUNATO,OBIHIRO,
HAKODATE,TOMAKOMAI,
AKITA,KUTCHAN,SENDAI,
SAKATA,FUKUSHIMA,
ONAHAMA



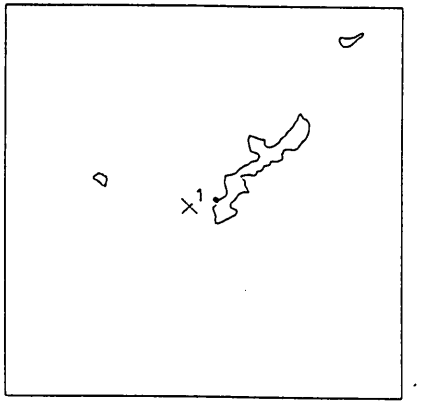
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2560	1	1	1	203

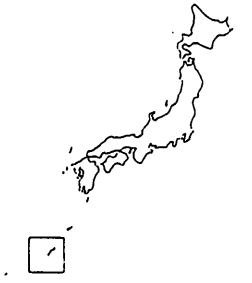
STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

18:51 APR. 22,1994
NEAR OKINAWAJIMA ISLAND
EPICENTER : 26°11.6'N 127°29.0'E
DEPTH : 13.0KM MAGNITUDE : 3.5

JMA INTENSITIES

I : NAHA





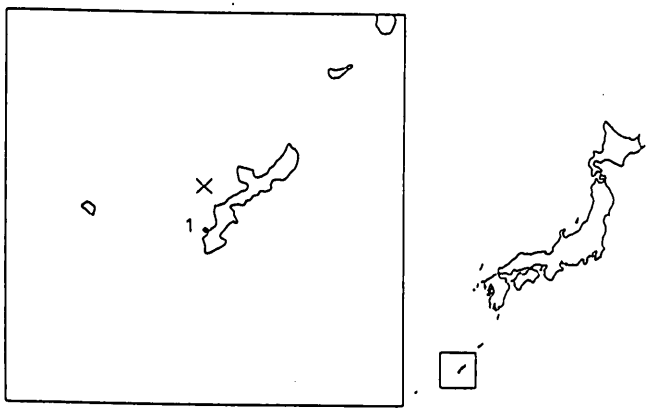
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	NAHA-G	ON GROUND	F- 654	3	4	4	19
1	NAHA-GB	IN GROUND	F- 653	2	1	2	19

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

15:44 APR. 28,1994
NEAR OKINAWAJIMA ISLAND
EPICENTER : 26°33.1'N 127°39.1'E
DEPTH : 57.0KM MAGNITUDE : 4.0

JMA INTENSITIES

I : NAGO,NAHA,KUMEJIMA



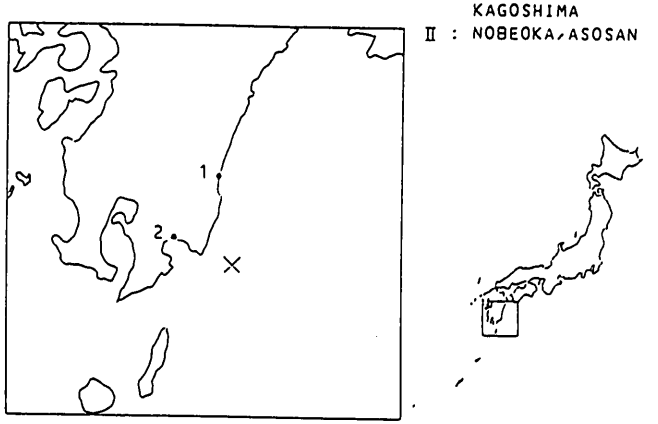
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	NAHA-G	ON GROUND	F- 656	5	7	2	33
1	NAHA-GB	IN GROUND	F- 655	3	3	2	33

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

12:28 APR. 30,1994
SE OFF OSUMI PEN
EPICENTER : 31°17.2'N 131°34.6'E
DEPTH : 48.0KM MAGNITUDE : 6.0

JMA INTENSITIES

Ⅳ : ABURATSU,MIYAKONOJO,
MIYAZAKI
Ⅲ : HITOYOSHI,KUMAMOTO,OITA,
KAGOSHIMA
Ⅱ : NOBEOKA,ASOSAN



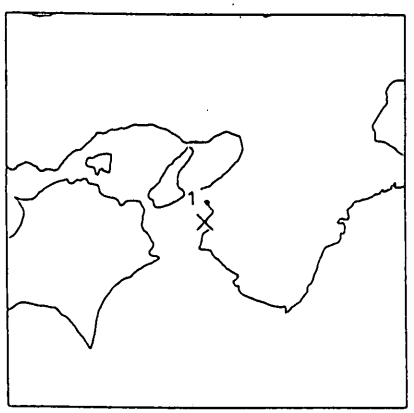
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MIYAZAKI-G	ON GROUND	F- 648	64	71	20	69
1	MIYAZAKI-GB	IN GROUND	F- 647	23	29	12	69
2	SHIBUSHI-G	ON GROUND	F- 651	12	18	13	48

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

17:02 MAY 8 ,1994
NW WAKAYAMA PREF
EPICENTER : 34°4.7 'N 135°7.4 'E
DEPTH : 10.7KM MAGNITUDE : 4.9

JMA INTENSITIES

Ⅲ : WAKAYAMA
Ⅱ : SUMOTO
Ⅰ : TOKUSHIMA,KOBE,
SHIONOMISAKI,NARA,OWASE,
TAKAMATSU,UENO,
MUROTOMISAKI,TADOTSU,
TSU,TOYOOKA,YOKKAICHI



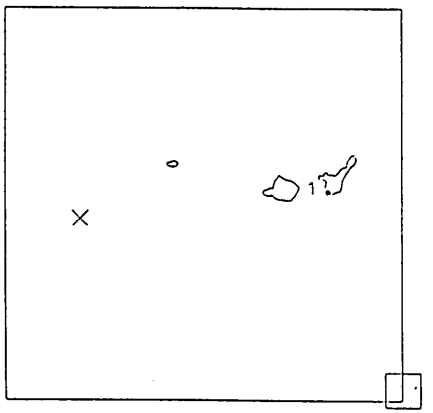
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-G	ON GROUND	F- 660	51	42	28	15

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

13:00 MAY 24,1994
TAIWAN REGION
EPICENTER : 23°58.4'N 122°23.0'E
DEPTH : 41.0KM MAGNITUDE : 6.6

JMA INTENSITIES

Ⅲ : YONAGUNIJIMA,
IRIOMOTEJIMA
Ⅱ : ISHIGAKIJIMA



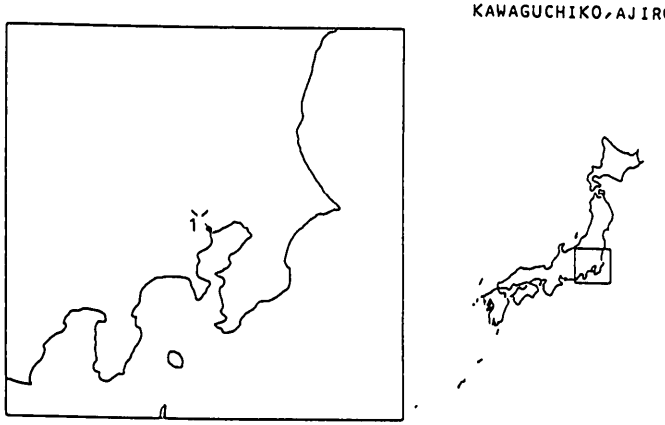
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	ISHIGAKI-G	ON GROUND	F- 735	7	7	2	184

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

23:53 MAY 27,1994
TOKYO PREF
EPICENTER : 35°42.1'N 139°41.7'E
DEPTH : 41.8KM MAGNITUDE : 4.0

JMA INTENSITIES

Ⅲ : TOKYO
Ⅱ : YOKOHAMA
Ⅰ : CHIBA,KAKIOKA,
KAWAGUCHIKO,AJIRO



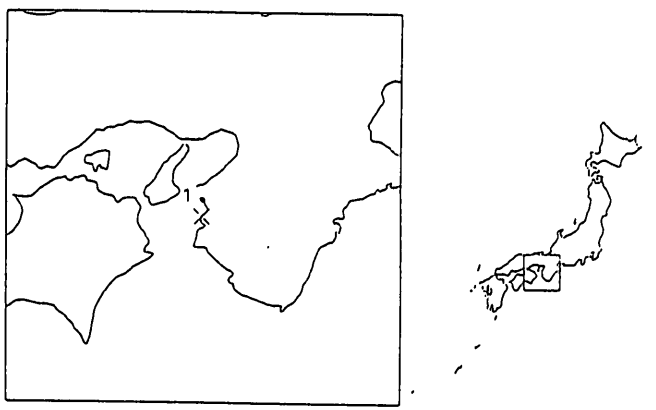
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SHINAGAWA-MB	IN GROUND	M-1507	2	1	1	10
1	SHINAGAWA-S	ON GROUND	S-2561	7	6	6	10

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

05:24 MAY 28,1994
NW WAKAYAMA PREF
EPICENTER : 34°5.7 'N 135°8.4 'E
DEPTH : 9.6KM MAGNITUDE : 3.2

JMA INTENSITIES

Ⅰ : WAKAYAMA



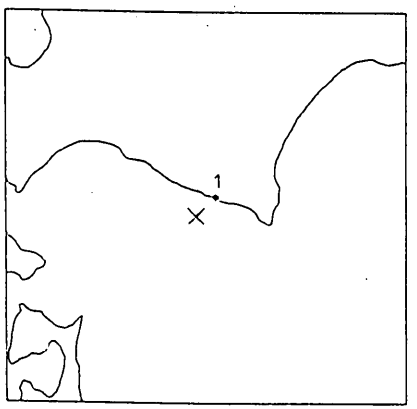
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-G	ON GROUND	F- 662	4	5	9	13

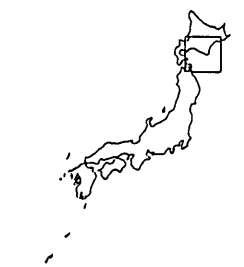
STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

10:21 MAY 28,1994
S OFF URAKAWA
EPICENTER : 42°3.0 'N 142°35.2'E
DEPTH : 61.8KM MAGNITUDE : 4.8

JMA INTENSITIES

Ⅲ : URAKAWA
Ⅱ : HIROO
Ⅰ : TOMAKOMAI,OBIHIRO,MUTSU,
IWAMIZAWA,OTARU





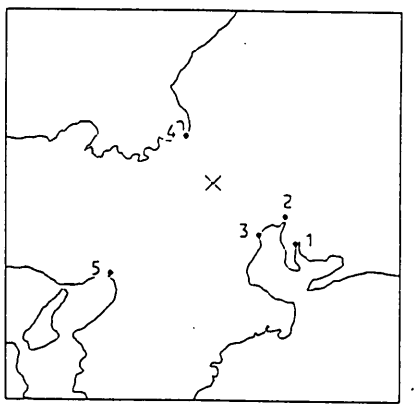
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2562	9	10	3	19

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

17:04 MAY 28,1994
NW SHIGA PREF
EPICENTER : 35°19.4'N 136°16.9'E
DEPTH : 44.1KM MAGNITUDE : 5.2

JMA INTENSITIES

Ⅳ : HIKONE,YOKKAICHI
Ⅲ : TSURUGA,TSU,GIFU,KYOTO,
UENO,NAGOYA
Ⅱ : NARA,FUKUI,MAIZURU,
OSAKA,IRAKO,TOYOOKA,
SHIONOMISAKI



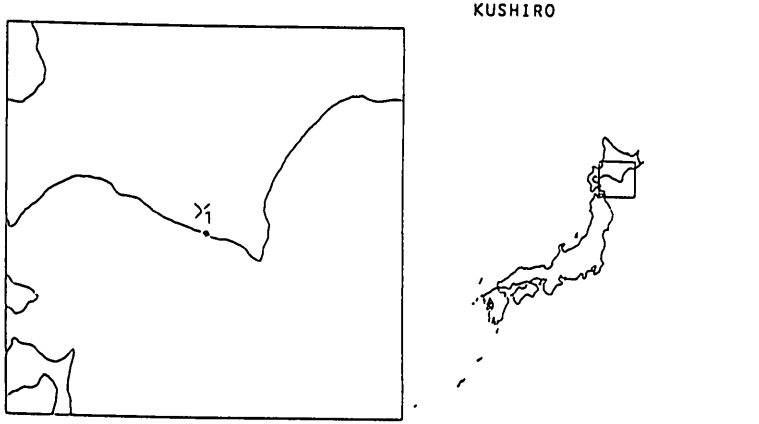
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KINUURA-JI-S	ON GROUND	S-2564	5	6	3	78
2	INAE-S	ON STRUC.	S-2565	6	14	8	60
2	INAE-YAITA-M	ON STRUC.	M-1509	9	25		59
2	NAGOYA-ZOKAN-S	ON GROUND	S-2566	9	8	6	59
3	YOKKA.-CHITOSE-S	ON GROUND	S-2563	25	34	8	52
3	YOKKA.-SEKITAN-M	ON STRUC.	M-1508	25	78		53
4	TSURUGA-G	ON GROUND	F- 650	18	18	11	41
5	AMAGASAKI-G	ON GROUND	F- 649	7	9	4	104

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

00:29 JUNE 3 ,1994
HIDAKA REGION
EPICENTER : 42°19.4'N 142°45.7'E
DEPTH : 59.2KM MAGNITUDE : 4.4

JMA INTENSITIES

Ⅲ : URAKAWA
Ⅱ : HIROO
Ⅰ : OBIHIRO,TOMAKOMAI,
KUSHIRO



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2567	5	7	1	17

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

11:13 JUNE 17,1994
TOKUSHIMA PREF
EPICENTER : 34°4.7 'N 134°37.8'E
DEPTH : 7.7KM MAGNITUDE : 4.0

JMA INTENSITIES

Ⅳ : TOKUSHIMA
Ⅰ : SUMOTO

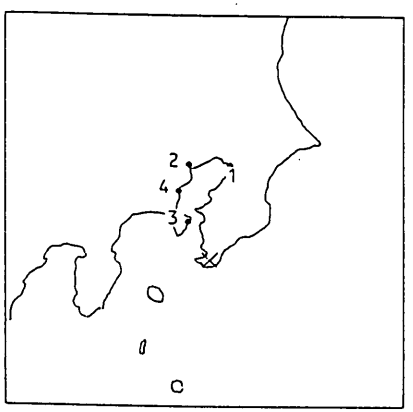
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KOMATSUJIMA-G	ON GROUND	F- 652	67	101	30	5

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

11:01 JUNE 29,1994
SOUTHERN BOSO PENINSULA
EPICENTER : 34°57.1'N 139°52.9'E
DEPTH : 60.0KM MAGNITUDE : 5.2

JMA INTENSITIES

Ⅳ : KATSUURA,AJIRO
Ⅲ : TATEYAMA,YOKOHAMA,CHIBA,
TOKYO
Ⅱ : MISHIMA,MIYAKEJIMA,
KAWAGUCHIKO,KOFU,
KAKIOKA,NIKKO



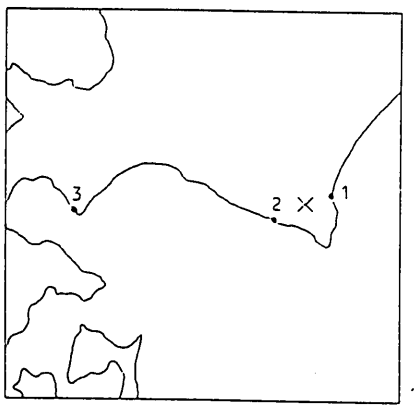
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	CHIBA-S	ON GROUND	S-2568	13	8	6	74
2	SHINAGAWA-MB	IN GROUND	M-1510	3	2	3	75
2	SHINAGAWA-S	ON GROUND	S-2569	11	11	5	75
3	KOKEN-G	ON GROUND	F- 658	52	41	26	33
4	YAMASHITA-FR	ON STRUC.	F- 746	34	45	13	58
4	YAMASHITA-F	ON GROUND	F- 745	30	28	18	58
4	YAMASHITA-FB	IN GROUND	F- 744	13	14	5	58

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

14:14 JULY 1 ,1994
HIDAKA MOUNTAINS REGION
EPICENTER : 42°15.1'N 143°4.9 'E
DEPTH : 67.3KM MAGNITUDE : 5.3

JMA INTENSITIES

Ⅳ : URAKAWA
Ⅲ : HIROO
Ⅱ : OBIHIRO,TOMAKOMAI,
KUSHIRO
Ⅰ : IWAMIZAWA,SAPPORO,
MURORAN,MUTSU,OTARU,
MORI,HACHINOHE



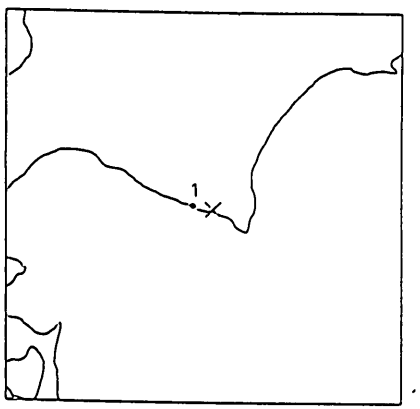
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	TOKACHI-M	ON GROUND	M-1511	55	51	29	20
2	URAKAWA-S	ON GROUND	S-2570	20	19	4	27
3	MURORAN-G	ON GROUND	F- 678	7	7	3	175

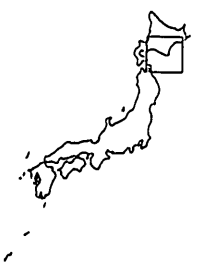
STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

07:43 JULY 2 ,1994
HIDAKA REGION
EPICENTER : 42°7.5 'N 142°57.6'E
DEPTH : 64.0KM MAGNITUDE : 4.9

JMA INTENSITIES

Ⅳ : URAKAWA
Ⅱ : HIROO,OBIHIRO
Ⅰ : TOMAKOMAI,KUSHIRO,
IWAMIZAWA,MUTSU,MORI,
OTARU,HACHINOHE,MORIOKA





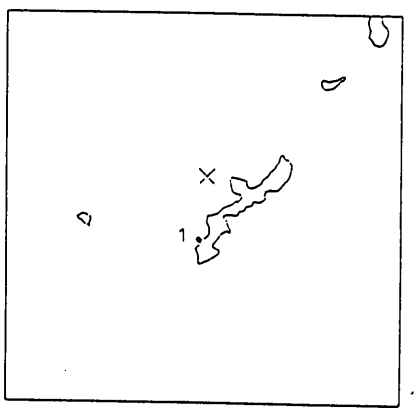
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2571	34	31	7	15

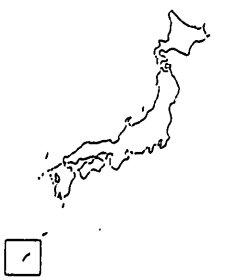
STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

13:36 JULY 11,1994
NEAR OKINAWAJIMA ISLAND
EPICENTER : 26°41.8'N 127°43.1'E
DEPTH : 51.2KM MAGNITUDE : 4.5

JMA INTENSITIES

Ⅱ : NAGO,NAHA
Ⅰ : KUMEJIMA





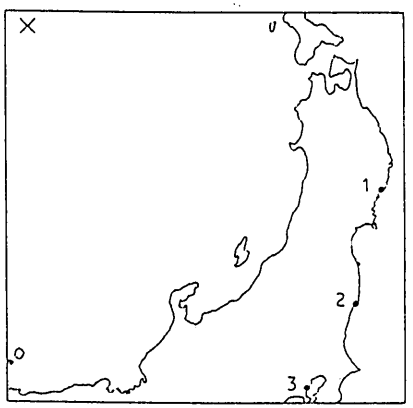
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	NAHA-G	ON GROUND	F- 703	6	5	4	50
1	NAHA-GB	IN GROUND	F- 702	3	3	2	50

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

03:36 JULY 22,1994
NEAR VLADIVOSTOK
EPICENTER : 42°16.6'N 133°33.0'E
DEPTH : 551.6KM MAGNITUDE : 7.6

JMA INTENSITIES

Ⅲ : ONAHAMA,KAKIOKA,TOKYO
Ⅱ : AOMORI,SAPPORO,MUTSU,
SAKATA,HACHINOHE,
MORIOKA,URAKAWA,MIYAKO,
FUKUSHIMA,OFUNATO,
OBIHIRO,UTSUNOMIYA,
KUSHIRO,YOKOHAMA,CHIBA



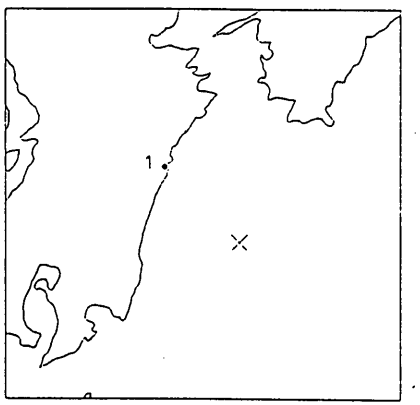
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	OFUNATO-MOUND-M	ON STRUC.	M-1556	9	10	6	779
2	ONAHAMA-JI-S	ON GROUND	S-2572	6	11	5	865
3	YAMASHITA-FR	ON STRUC.	F- 752	9	13	1	925
3	YAMASHITA-F	ON GROUND	F- 751	8	11	2	925
3	YAMASHITA-FB	IN GROUND	F- 750	2	3	1	925

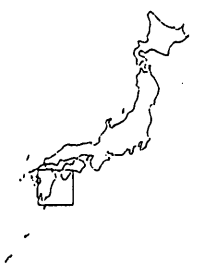
STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

13:51 AUG. 5 ,1994
HYUGANADA REGION
EPICENTER : 31°54.6'N 132°15.1'E
DEPTH : 25.6KM MAGNITUDE : 4.9

JMA INTENSITIES

Ⅰ : NOBEOKA





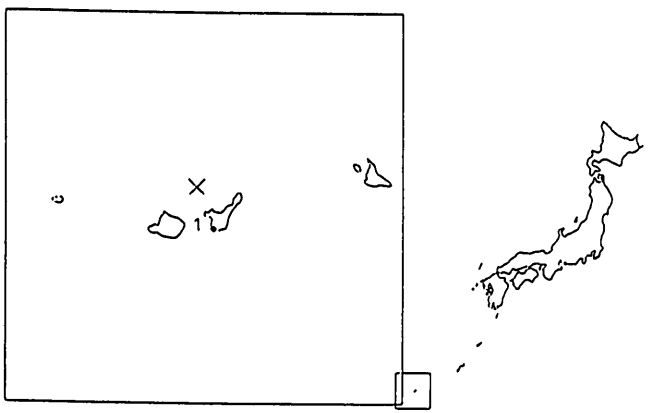
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HOSOSHIMA-F	ON GROUND	F- 766	5	9	2	80

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

01:25 AUG. 12,1994
NEAR ISHIGAKIJIMA ISLAND
EPICENTER : 24°37.5'N 124°0.6 'E
DEPTH : 56.0KM MAGNITUDE : 4.3

JMA INTENSITIES

Ⅲ : IRIOMOTEJIMA
Ⅱ : ISHIGAKIJIMA
Ⅰ : MIYAKOJIMA



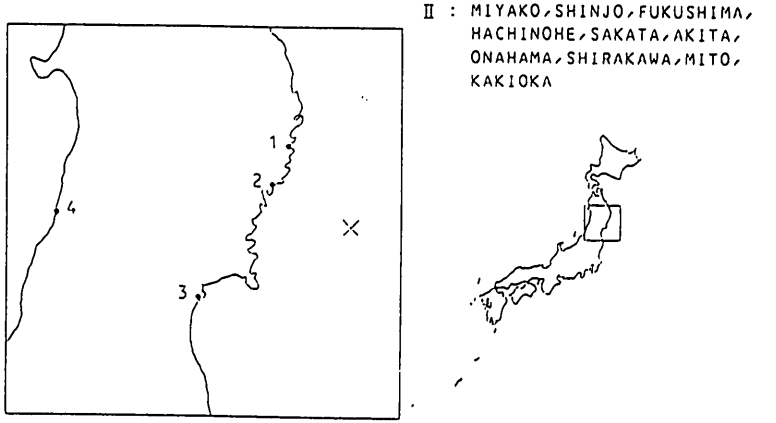
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	ISHIGAKI-G	ON GROUND	F- 736	21	14	6	35

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

18:06 AUG. 14,1994
E OFF MIYAGI PREF
EPICENTER : 38°40.6'N 142°23.3'E
DEPTH : 42.4KM MAGNITUDE : 6.0

JMA INTENSITIES

Ⅳ : OFUNATO
Ⅲ : ISHINOMAKI,SENDAI,
MORIOKA
Ⅱ : MIYAKO,SHINJO,FUKUSHIMA,
HACHINOHE,SAKATA,AKITA,
ONAHAMA,SHIRAKAWA,MITO,
KAKIOKA



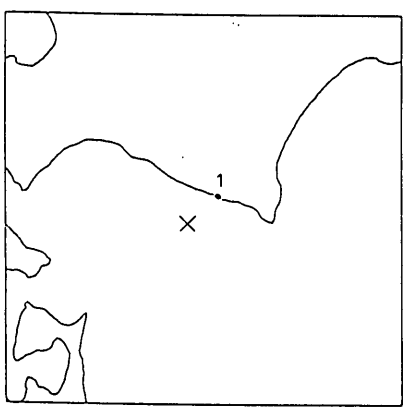
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KAMAISHI-MB	IN GROUND	M-1559	7	8	7	78
1	KAMAISHI-M	ON GROUND	M-1558	13	13	17	78
2	OFUNATO-MOUND-M	ON STRUC.	M-1557	54		41	67
2	OFUNATO-BO-S	ON STRUC.	S-2624	23	82	9	67
2	OFUNATO-BOCHI-S	ON GROUND	S-2625	14	21	5	67
3	SENDAI-MB	IN GROUND	M-1513	6	7	4	127
3	SENDAI-M	ON GROUND	M-1512	26	15	7	127
4	SAKATA-S	ON GROUND	S-2573	3	3	1	223

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

00:13 AUG. 16,1994
S OFF URAKAWA
EPICENTER : 41°59.5'N 142°28.1'E
DEPTH : 65.9KM MAGNITUDE : 4.6

JMA INTENSITIES

Ⅲ : URAKAWA
Ⅱ : HIROO
Ⅰ : OBIHIRO,KUSHIRO



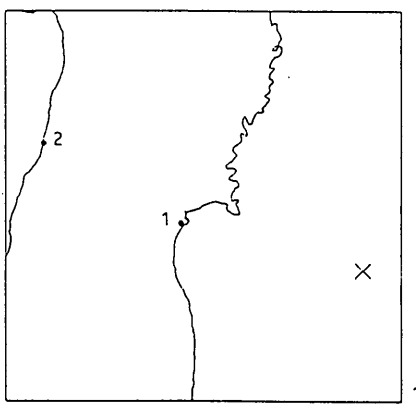
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2575	12	12	2	31

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

19:09 AUG. 16,1994
SE OFF MIYAGI PREF
EPICENTER : 37°49.7'N 142°35.8'E
DEPTH : 22.0KM MAGNITUDE : 6.0

JMA INTENSITIES

Ⅲ : SENDAI,OFUNATO,
FUKUSHIMA,MORIOKA
Ⅱ : ISHINOMAKI,ONAHAMA,
SHIRAKAWA,SHINJO,SAKATA,
AKITA,MUTSU



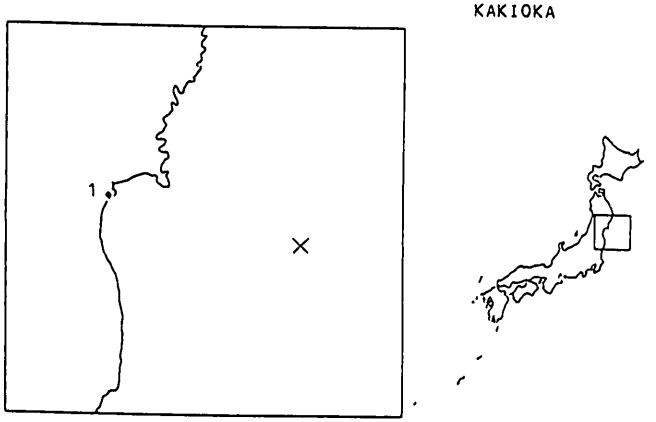
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SENDAI-MB	IN GROUND	M-1515	4	6	2	147
1	SENDAI-M	ON GROUND	M-1514	11	11	4	147
2	SAKATA-S	ON GROUND	S-2574	2	3	1	270

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

19:17 AUG. 16,1994
SE OFF MIYAGI PREF
EPICENTER : 37°49.5'N 142°37.8'E
DEPTH : 18.0KM MAGNITUDE : 5.3

JMA INTENSITIES

I : ISHINOMAKI,OFUNATO,
SENDAI,FUKUSHIMA,
SHIRAKAWA,MORIOKA,
KAKIOKA



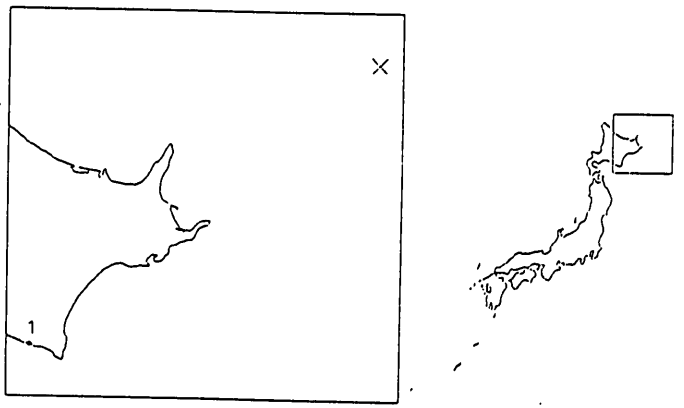
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SENDAI-MB	IN GROUND	M-1517	1	1	1	150
1	SENDAI-M	ON GROUND	M-1516	4	3	1	150

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

03:37 AUG. 29,1994
KURILE ISLANDS REGION
EPICENTER : 44°54.9'N 150°51.5'E
DEPTH : 45.0KM MAGNITUDE : 6.3

JMA INTENSITIES

I : KUSHIRO,URAKAWA,MUTSU



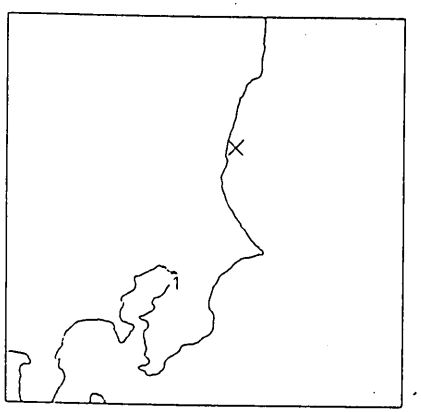
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2576	3	2	2	719

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

01:55 AUG. 30,1994
NORTHERN IBARAKI PREF
EPICENTER : 36°27.3'N 140°42.2'E
DEPTH : 50.3KM MAGNITUDE : 4.3

JMA INTENSITIES

Ⅲ : MITO,KAKIOKA
Ⅰ : ONAHAMA,UTSUNOMIYA,
CHOSHI,SHIRAKAWA,NIKKO,
TOKYO,KUMAGAYA



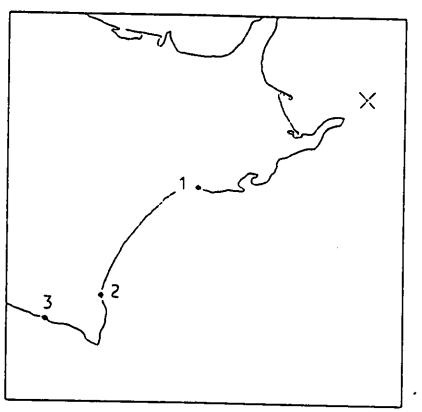
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	CHIBA-S	ON GROUND	S-2579	6	6	1	109

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

18:07 AUG. 31,1994
NEAR KUNASHIRI ISLAND
EPICENTER : 43°29.4'N 146°4.1 'E
DEPTH : 83.6KM MAGNITUDE : 6.5

JMA INTENSITIES

Ⅴ : KUSHIRO
Ⅳ : NEMURO
Ⅲ : HIROO,HACHINOHE
Ⅱ : OBIHIRO,URAKAWA,
TOMAKOMAI,MUTSU,AOMORI,
MORIOKA,OFUNATO



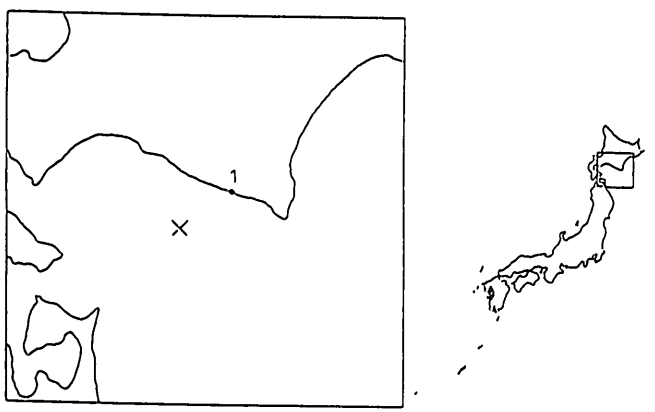
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KUSHIRO-G	ON GROUND	F- 666	41	43	14	148
1	KUSHIRO-GB	IN GROUND	F- 665	16	17	6	148
2	TOKACHI-M	ON GROUND	M-1518	18	19	9	260
3	URAKAWA-S	ON GROUND	S-2577	5	4	2	306

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

21:29 SEP. 4 ,1994
S OFF URAKAWA
EPICENTER : 41°56.6'N 142°16.1'E
DEPTH : 65.9KM MAGNITUDE : 4.5

JMA INTENSITIES

Ⅱ : URAKAWA
Ⅰ : HIROO



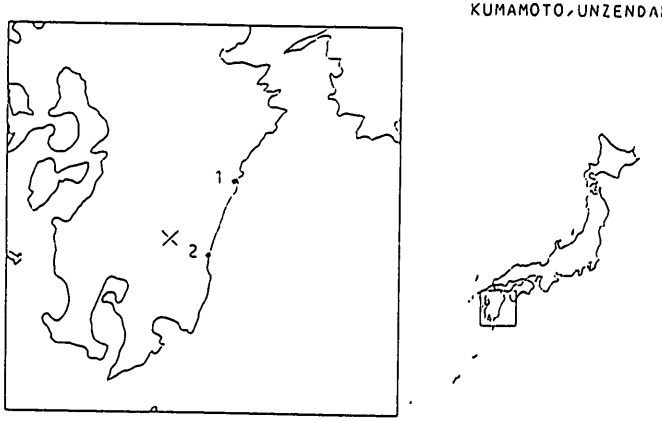
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2578	3	4	1	48

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

12:48 SEP. 7 ,1994
SOUTHERN MIYAZAKI PREF
EPICENTER : 32°0.8 'N 131°8.8 'E
DEPTH : 19.8KM MAGNITUDE : 4.5

JMA INTENSITIES

Ⅲ : MIYAKONOJO,HITOYOSHI
Ⅱ : MIYAZAKI
Ⅰ : ABURATSU,NOBEOKA,
KUMAMOTO,UNZENDAKE,OITA



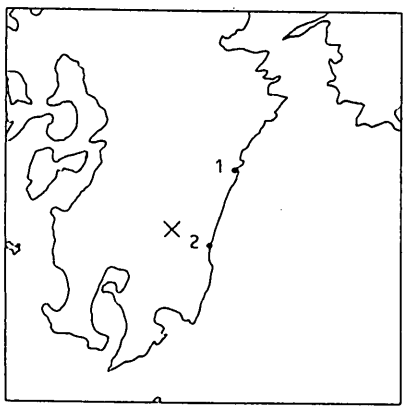
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HOSOSHIMA-F	ON GROUND	F- 767	10	14	4	66
2	MIYAZAKI-G	ON GROUND	F- 683	9	15	11	31
2	MIYAZAKI-GB	IN GROUND	F- 682	4	5	3	31

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

12:54 SEP. 7 ,1994
SOUTHERN MIYAZAKI PREF
EPICENTER : 32°0.6 'N 131°9.1 'E
DEPTH : 19.3KM MAGNITUDE : 5.3

JMA INTENSITIES

Ⅲ : MIYAZAKI,MIYAKONOJO,
HITOYOSHI
Ⅱ : NOBEOKA,UNZENDAKE,OITA
Ⅰ : ABURATSU,KAGOSHIMA,
ASOSAN,KUMAMOTO,
USHIBUKA,HITA,SAGA,
FUKUOKA,UWAJIMA



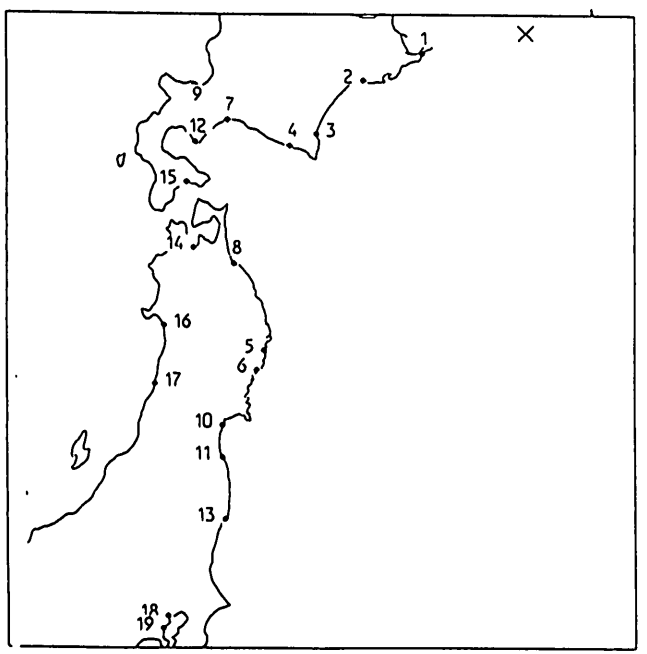
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HOSOSHIMA-F	ON GROUND	F- 768	27	27	9	66
2	MIYAZAKI-G	ON GROUND	F- 685	33	32	25	31
2	MIYAZAKI-GB	IN GROUND	F- 684	16	13	6	31

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

22:22 OCT. 4 ,1994
E OFF HOKKAIDO
EPICENTER : 43°22.3'N 147°42.5'E
DEPTH : 23.0KM MAGNITUDE : 8.1

JMA INTENSITIES

Ⅵ : KUSHIRO
Ⅴ : NEMURO,HIROO,URAKAWA
Ⅳ : ABASHIRI,OBIHIRO,
HACHINOHE,TOMAKOMAI,
MUTSU,AOMORI,MORIOKA,
OFUNATO



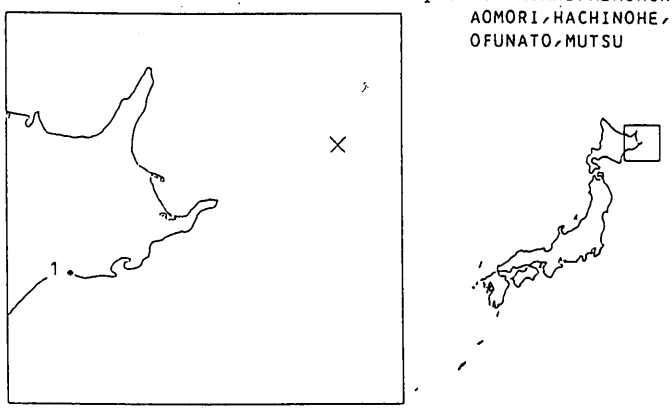
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 681	380	346	256	171
2	KUSHIRO-G	ON GROUND	F- 671	197	269	112	274
2	KUSHIRO-GB	IN GROUND	F- 670	101	105	54	274
3	TOKACHI-M	ON GROUND	M-1519	142	163	105	377
4	URAKAWA-S	ON GROUND	S-2580	86	81	28	424
5	KAMAISHI-MB	IN GROUND	M-1524	20	20	19	665
5	KAMAISHI-M	ON GROUND	M-1523	32	44	30	665
6	OFUNATO-MOUND-M	ON STRUC.	M-1525	53		38	695
6	OFUNATO-BO-S	ON STRUC.	S-2587	43	83	23	695
6	OFUNATO-BOCHI-S	ON GROUND	S-2586	13	12	8	695
7	TOMAKOMAI-S	ON GROUND	S-2581	54	51	13	501
8	HACHINOHE-JI-S	ON GROUND	S-2582	94	71	30	601
9	OTARU-G	ON GROUND	F- 676	9	8	6	540
10	SENDAI-MB	IN GROUND	M-1522	10	11	7	797
10	SENDAI-M	ON GROUND	M-1521	38	24	13	797
11	SOMA-S	ON GROUND	S-2584	28	24	7	838
12	MURORAN-G	ON GROUND	F- 679	77	87	34	562
13	ONAHAMA-JI-S	ON GROUND	S-2583	8	11	7	918
14	AOMORI-G	ON GROUND	F- 680	38	42	23	639
15	HAKODATE-FR	ON STRUC.	F- 669	55	33	13	597
15	HAKODATE-F	ON GROUND	F- 668	32	32	14	597
15	HAKODATE-FB	IN GROUND	F- 667	22	18	12	597
15	HAKODATE-M	ON GROUND	M-1520	39	37	17	597
16	AKITA-S	ON GROUND	S-2588	1	1	1	752
17	SAKATA-S	ON GROUND	S-2585	9	9	4	823
18	SHINAGAWA-MB	IN GROUND	M-1526	5	5	4	1097
18	SHINAGAWA-S	ON GROUND	S-2589	14	13	5	1097
19	YAMASHITA-FR	ON STRUC.	F- 755	20	13	3	1118
19	YAMASHITA-F	ON GROUND	F- 754	8	8	4	1118
19	YAMASHITA-FB	IN GROUND	F- 753	4	3	3	1118

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

22:42 OCT. 4 ,1994
E OFF HOKKAIDO
EPICENTER : 43°37.9'N 147°1.3 'E
DEPTH : 4.0KM MAGNITUDE : 6.3

JMA INTENSITIES

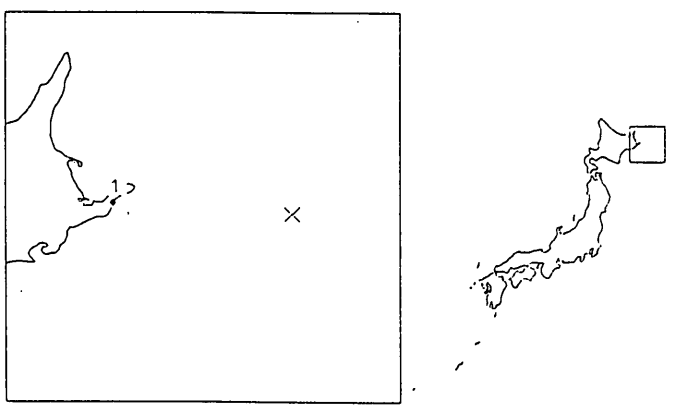
Ⅲ : KUSHIRO,NEMURO
Ⅱ : OBIHIRO,URAKAWA,HIROO,
MORIOKA
Ⅰ : TOMAKOMAI,ABASHIRI,
AOMORI,HACHINOHE,
OFUNATO,MUTSU



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KUSHIRO-G	ON GROUND	F- 673	10	12	4	226
1	KUSHIRO-GB	IN GROUND	F- 672	4	4	2	226

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

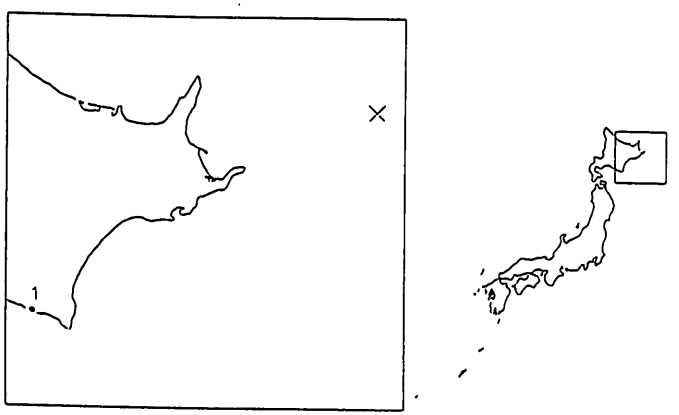
21:34 OCT. 5 ,1994
E OFF HOKKAIDO
EPICENTER : 43°1.4 'N 147°13.9'E
DEPTH : 46.0KM MAGNITUDE : 5.5



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 772	4	8	3	136

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

02:10 OCT. 6 ,1994
E OFF HOKKAIDO
EPICENTER : 43°44.3'N 147°41.9'E
DEPTH : 7.0KM MAGNITUDE : 3.8



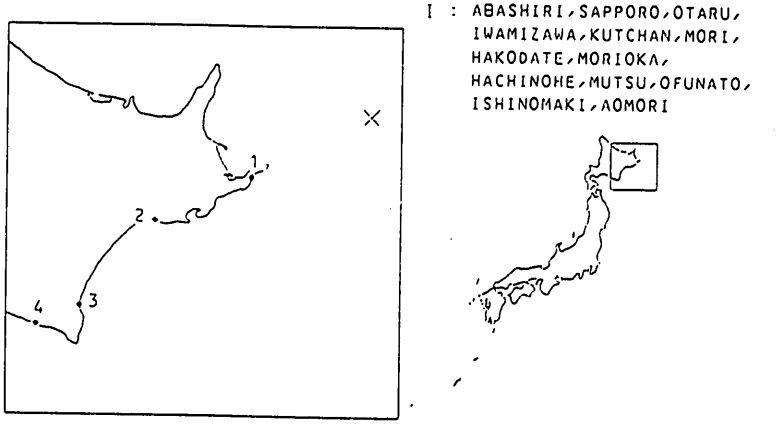
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2594	2	2	1	437

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

05:39 OCT. 6 ,1994
E OFF HOKKAIDO
EPICENTER : 43°40.9'N 147°10.2'E
DEPTH : 30.0KM MAGNITUDE : 6.2

JMA INTENSITIES

Ⅲ : KUSHIRO,NEMURO
Ⅱ : OBIHIRO,URAKAWA,HIROO, TOMAKOMAI
I : ABASHIRI,SAPPORO,OTARU, IWAMIZAWA,KUTCHAN,MORI, HAKODATE,MORIOKA, HACHINOHE,MUTSU,OFUNATO, ISHINOMAKI,AOMORI



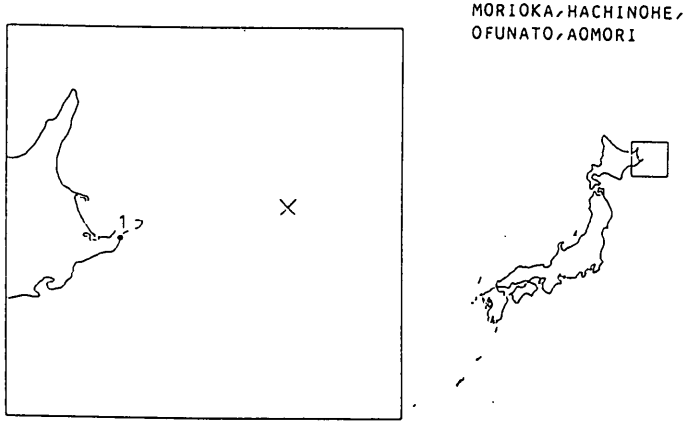
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 773	14	13	9	135
2	KUSHIRO-G	ON GROUND	F- 675	13	17	4	239
2	KUSHIRO-GB	IN GROUND	F- 674	4	5	2	239
3	TOKACHI-M	ON GROUND	M-1527	6	4	2	348
4	URAKAWA-S	ON GROUND	S-2590	3	3	1	395

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

11:36 OCT. 7 ,1994
E OFF HOKKAIDO
EPICENTER : 43°20.2'N 147°11.7'E
DEPTH : 45.6KM MAGNITUDE : 5.8

JMA INTENSITIES

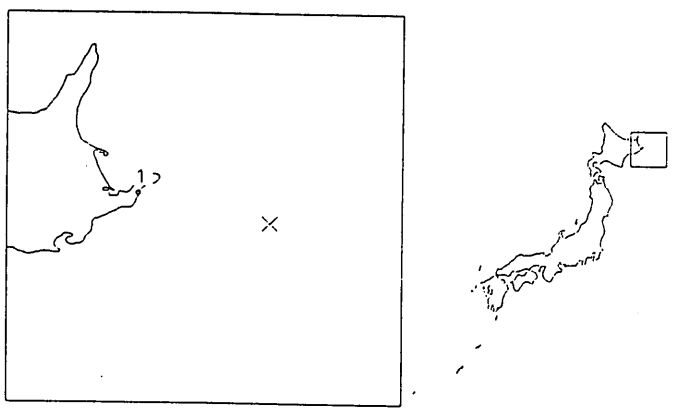
Ⅲ : KUSHIRO
Ⅱ : NEMURO
Ⅰ : OBIHIRO,URAKAWA,HIROO,
MORIOKA,HACHINOHE,MUTSU,
OFUNATO,AOMORI



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 774	8	11	4	130

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

16:00 OCT. 7 ,1994
OFF NEMURO PENINSULA
EPICENTER : 42°56.9'N 146°45.6'E
DEPTH : 45.8KM MAGNITUDE : 5.6



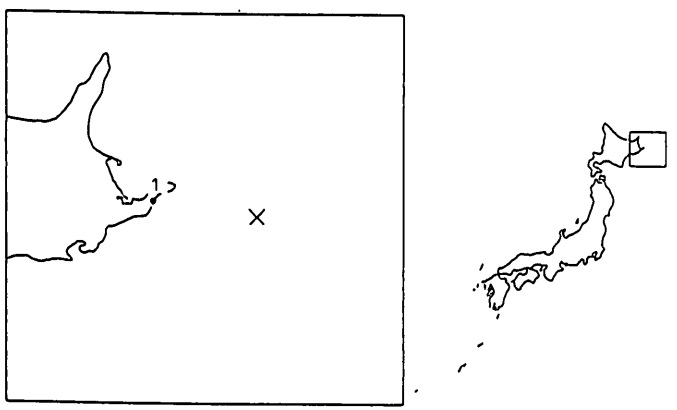
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 775	15	15	5	101

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

14:28 OCT. 8 ,1994
OFF NEMURO PENINSULA
EPICENTER : 43°4.9 'N 146°31.9'E
DEPTH : 36.4KM MAGNITUDE : 5.4

JMA INTENSITIES

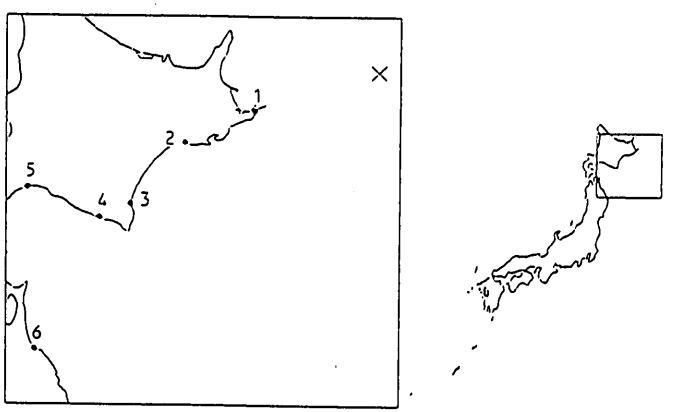
II : NEMURO
I : KUSHIRO



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 776	6	8	3	79

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

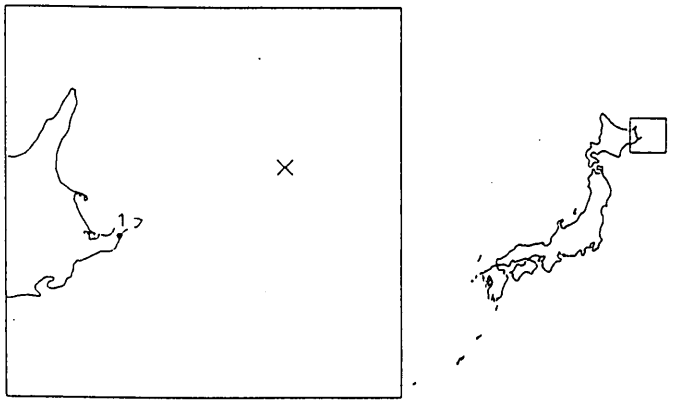
16:55 OCT. 9 ,1994
E OFF HOKKAIDO
EPICENTER : 43°33.3'N 147°48.4'E
DEPTH : 0.0KM MAGNITUDE : 7.0



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 777	20	23	11	181
2	KUSHIRO-G	ON GROUND	F- 696	19	20	6	285
2	KUSHIRO-GB	IN GROUND	F- 695	8	7	3	285
3	TOKACHI-M	ON GROUND	M-1528	11	11	4	391
4	URAKAWA-S	ON GROUND	S-2593	7	6	5	438
5	TOMAKOMAI-S	ON GROUND	S-2592	4	6	1	512
6	HACHINOHE-JI-S	ON GROUND	S-2591	3	3	1	618

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

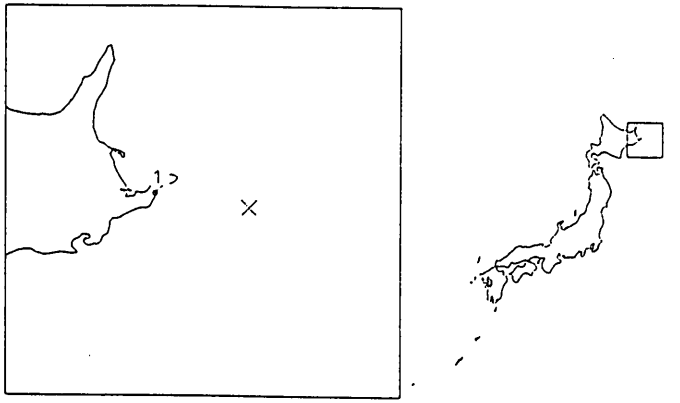
21:24 OCT. 9 ,1994
E OFF HOKKAIDO
EPICENTER : 43°35.8'N 147°13.7'E
DEPTH : 42.0KM MAGNITUDE : 5.7



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 778	10	9	4	136

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

01:22 OCT. 14,1994
OFF NEMURO PENINSULA
EPICENTER : 43°5.8 'N 146°26.2'E
DEPTH : 46.5KM MAGNITUDE : 4.8



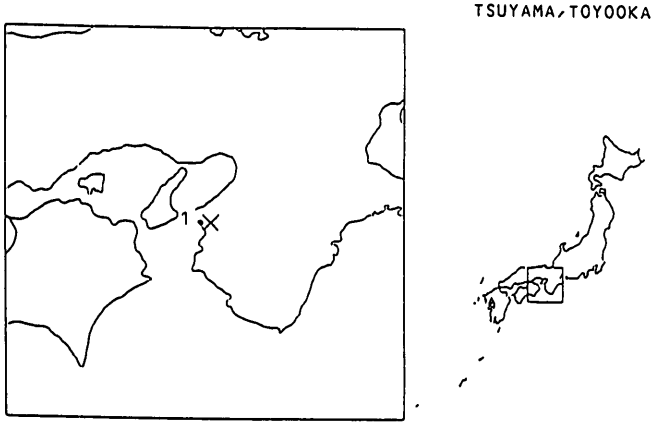
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 779	7	8	3	71

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

08:21 OCT. 16,1994
NW WAKAYAMA PREF
EPICENTER : 34°12.9'N 135°14.0'E
DEPTH : 5.9KM MAGNITUDE : 4.4

JMA INTENSITIES

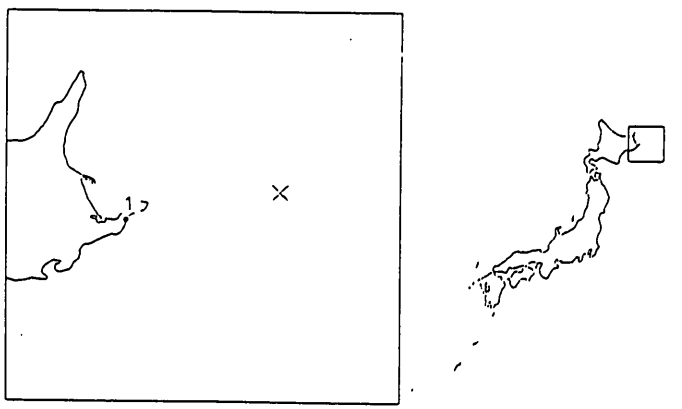
Ⅳ : WAKAYAMA
Ⅱ : SUMOTO,KOBE
Ⅰ : TOKUSHIMA,NARA,HIMEJI,
TSUYAMA,TOYOOKA



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-G	ON GROUND	F- 715	73	59	58	7

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

02:12 OCT. 19,1994
E OFF HOKKAIDO
EPICENTER : 43°19.4'N 147°3.4 'E
DEPTH : 66.3KM MAGNITUDE : 6.2



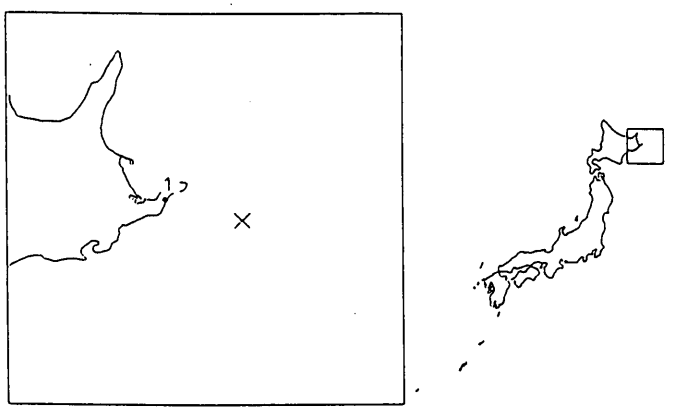
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 780	11	13	6	118

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

08:47 OCT. 19,1994
OFF NEMURO PENINSULA
EPICENTER : 43°4.3 'N 146°16.8'E
DEPTH : 44.5KM MAGNITUDE : 4.3

JMA INTENSITIES

I : NEMURO



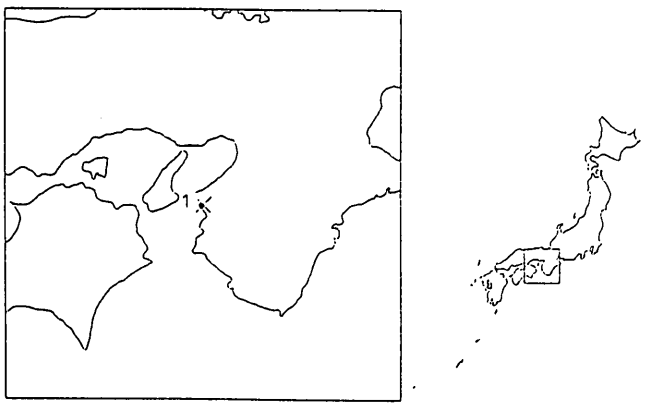
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 781	4	8	3	60

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

22:51 OCT. 19,1994
NW WAKAYAMA PREF
EPICENTER : 34°13.5'N 135°9.9 'E
DEPTH : 4.5KM MAGNITUDE : 3.0

JMA INTENSITIES

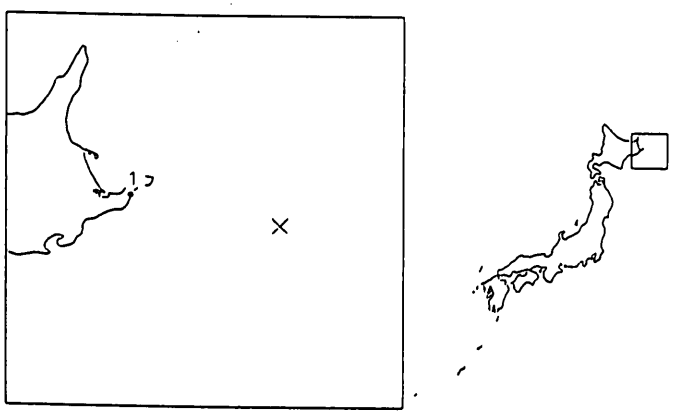
II : WAKAYAMA



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-G	ON GROUND	F- 716	10	32	17	1

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

04:26 OCT. 25,1994
OFF NEMURO PENINSULA
EPICENTER : 42°56.0'N 146°55.8'E
DEPTH : 50.4KM MAGNITUDE : 5.6

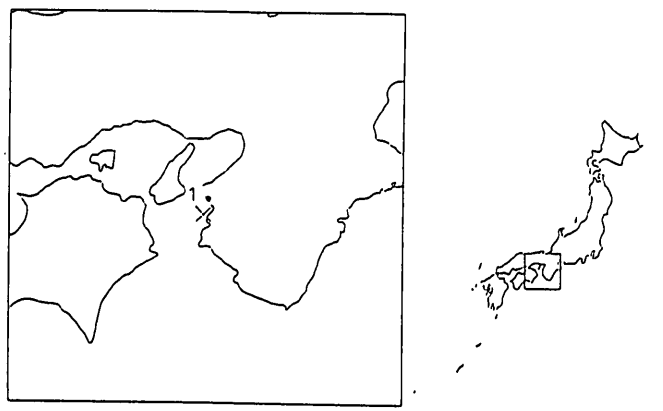


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 782	10	11	6	115

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

17:08 NOV. 1 ,1994
NW WAKAYAMA PREF
EPICENTER : 34°6.5 'N 135°6.5 'E
DEPTH : 10.0KM MAGNITUDE : 3.7

JMA INTENSITIES
I : SUMOTO,WAKAYAMA



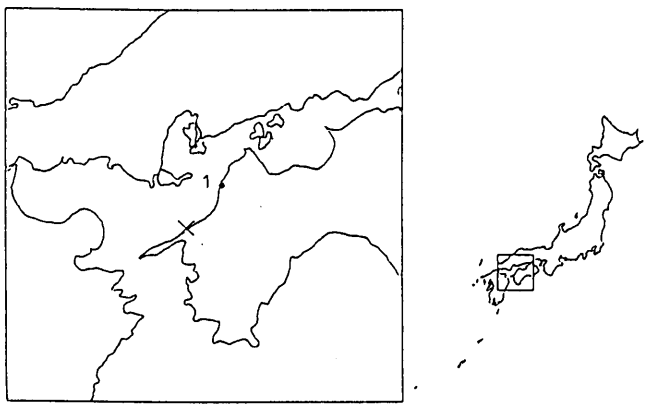
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-G	ON GROUND	F- 717	12	16	8	12

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

16:17 NOV. 4 ,1994
IYONADA SETONAIKAI
EPICENTER : 33°33.4'N 132°25.2'E
DEPTH : 49.4KM MAGNITUDE : 4.2

JMA INTENSITIES

II : KURE,MATSUYAMA
I : TADOTSU,FUKUYAMA,
HIROSHIMA,UWAJIMA,
YAMAGUCHI



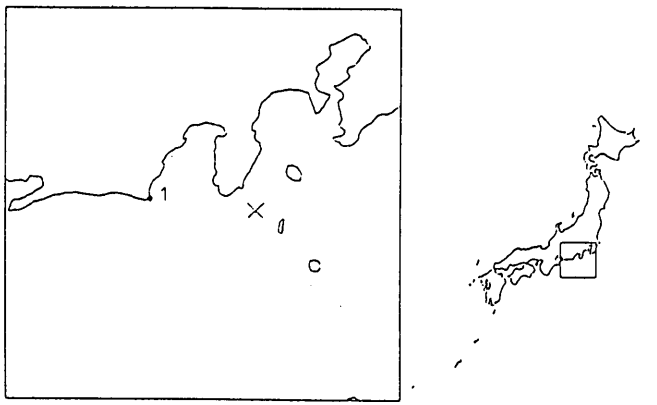
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MATSUYAMA-G	ON GROUND	F- 712	10	8	5	42

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

03:47 NOV. 9 ,1994
NEAR NIIJIMA ISLAND
EPICENTER : 34°29.0'N 139°4.8 'E
DEPTH : 1.0KM MAGNITUDE : 4.1

JMA INTENSITIES

II : IROZAKI,OMAEZAKI
I : OSHIMA,AJIRO,SHIZUOKA,
YOKOHAMA



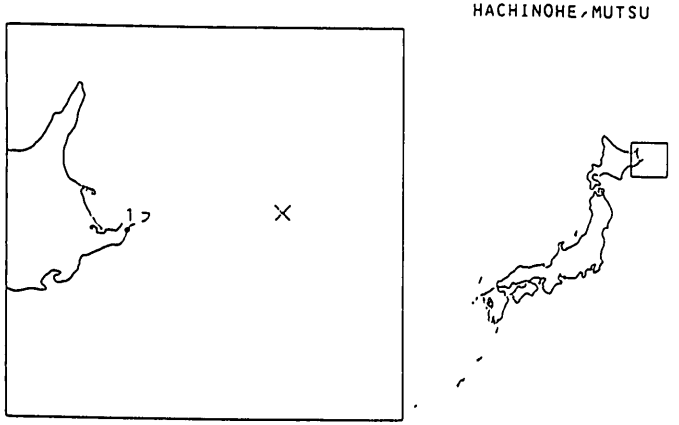
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	OMAEZAKI-M	ON GROUND	M-1529	5	2	1	80

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

03:21 NOV. 10,1994
E OFF HOKKAIDO
EPICENTER : 43°15.9'N 147°3.2 'E
DEPTH : 56.1KM MAGNITUDE : 5.8

JMA INTENSITIES

II : NEMURO,KUSHIRO
I : OBIHIRO,HIROO,URAKAWA,
TOMAKOMAI,MORIOKA,
HACHINOHE,MUTSU



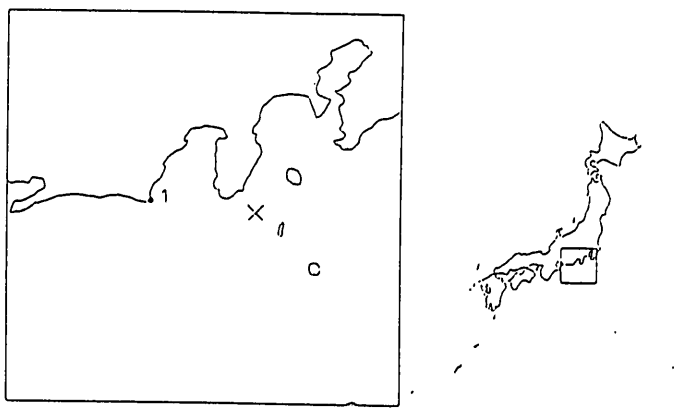
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 783	7	8	4	118

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

05:24 NOV. 13,1994
NEAR NIIJIMA ISLAND
EPICENTER : 34°29.3'N 139°4.8 'E
DEPTH : 2.6KM MAGNITUDE : 3.9

JMA INTENSITIES

II : IROZAKI,OMAEZAKI
I : OSHIMA



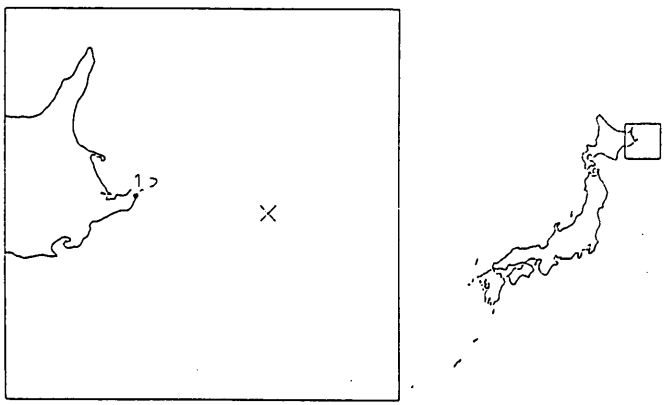
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	OMAEZAKI-M	ON GROUND	M-1530	3	2	1	79

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

06:46 NOV. 20,1994
OFF NEMURO PENINSULA
EPICENTER : 43°2.3 'N 146°47.9'E
DEPTH : 43.5KM MAGNITUDE : 5.4

JMA INTENSITIES

II : NEMURO,KUSHIRO



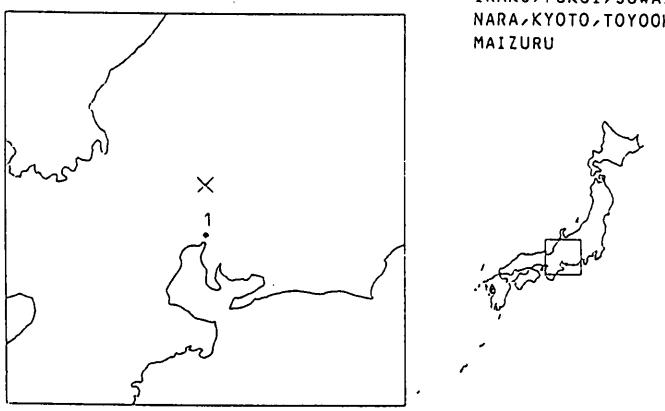
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 784	9	9	5	101

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

17:22 NOV. 20,1994
SW GIFU PREF
EPICENTER : 35°26.1'N 136°53.3'E
DEPTH : 15.3KM MAGNITUDE : 4.4

JMA INTENSITIES

III : GIFU
II : NAGOYA,HIKONE,IIDA
I : YOKKAICHI,TSURUGA,TSU,
IRAKO,FUKUI,SUWA,KOFU,
NARA,KYOTO,TOYOOKA,
MAIZURU



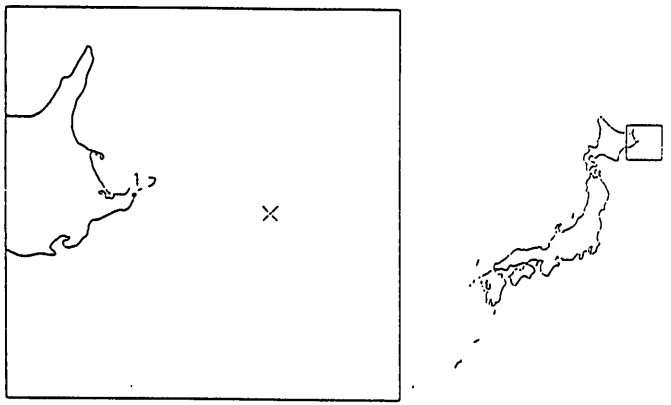
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	INAE-YAITA-M	ON STRUC.	M-1531	2	20		39
1	NAGOYA-ZOKAN-S	ON GROUND	S-2595	5	1	3	40

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

17:30 NOV. 20,1994
E OFF HOKKAIDO
EPICENTER : 43°1.9 'N 146°49.6'E
DEPTH : 49.3KM MAGNITUDE : 5.1

JMA INTENSITIES

I : NEMURO,KUSHIRO



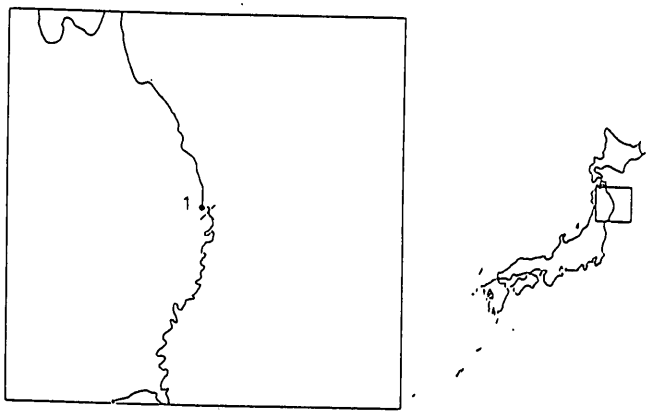
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 785	6	6	3	104

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

21:45 NOV. 21,1994
NORTHERN IWATE PREF
EPICENTER : 39°36.7'N 142°1.2 'E
DEPTH : 58.7KM MAGNITUDE : 3.6

JMA INTENSITIES

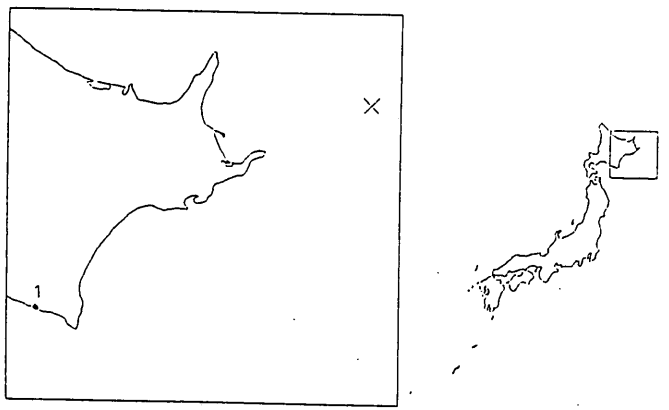
I : MIYAKO



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MIYAKO-G	ON GROUND	F- 722	12	7	4	5

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

20:11 NOV. 22,1994
E OFF HOKKAIDO
EPICENTER : 43°40.1'N 147°13.1'E
DEPTH : 44.0KM MAGNITUDE : 5.8



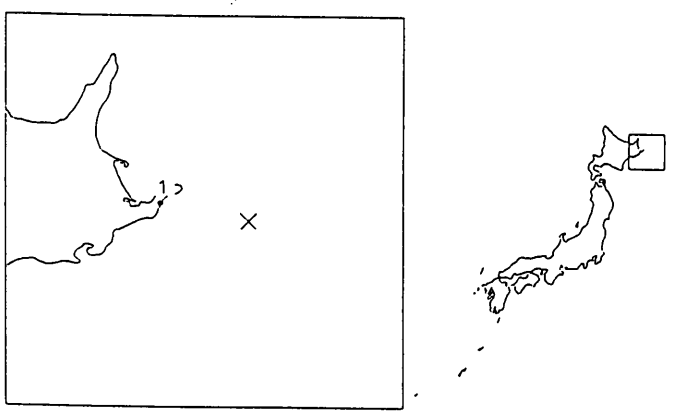
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2596	1	1	1	398

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

03:24 DEC. 6 ,1994
OFF NEMURO PENINSULA
EPICENTER : 43°4.9 'N 146°23.2'E
DEPTH : 46.5KM MAGNITUDE : 4.5

JMA INTENSITIES

I : NEMURO



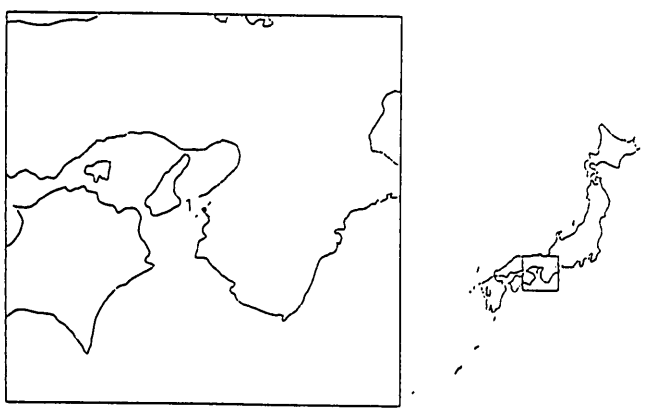
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-F	ON GROUND	F- 786	7	6	2	68

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

16:50 DEC. 9 ,1994
NW WAKAYAMA PREF
EPICENTER : 34°13.0'N 135°8.2 'E
DEPTH : 10.3KM MAGNITUDE : 3.4

JMA INTENSITIES

Ⅱ : WAKAYAMA



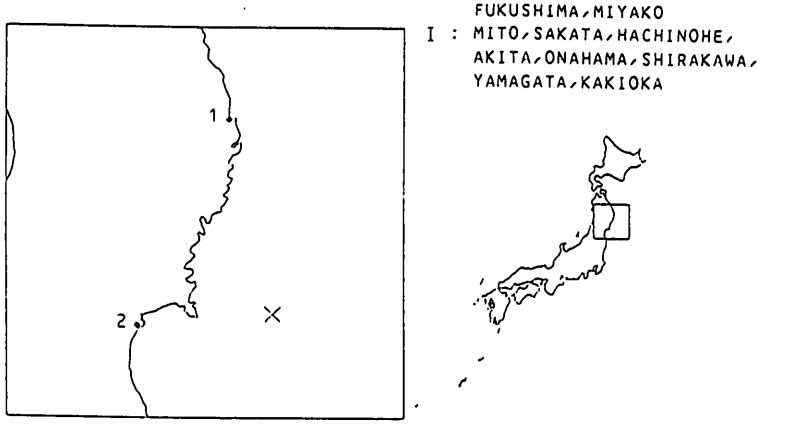
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-G	ON GROUND	F- 718	40	31	60	1

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

18:26 DEC. 10,1994
E OFF MIYAGI PREF
EPICENTER : 38°17.2'N 142°11.7'E
DEPTH : 48.3KM MAGNITUDE : 5.1

JMA INTENSITIES

Ⅲ : SENDAI,OFUNATO,
ISHINOMAKI
Ⅱ : SHINJO,MORIOKA,
FUKUSHIMA,MIYAKO
Ⅰ : MITO,SAKATA,HACHINOHE,
AKITA,ONAHAMA,SHIRAKAWA,
YAMAGATA,KAKIOKA



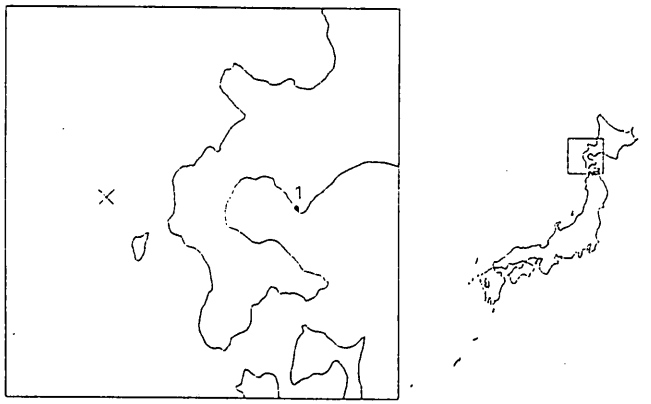
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MIYAKO-G	ON GROUND	F- 724	11	11	6	152
2	SENDAI-MB	IN GROUND	M-1533	4	5	4	102
2	SENDAI-M	ON GROUND	M-1532	23	31	9	102

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

12:43 DEC. 11,1994
SW OFF HOKKAIDO
EPICENTER : 42°30.3'N 139°12.3'E
DEPTH : 37.7KM MAGNITUDE : 4.8

JMA INTENSITIES

II : SUTTSU,MORI
I : ESASHI,MURORAN



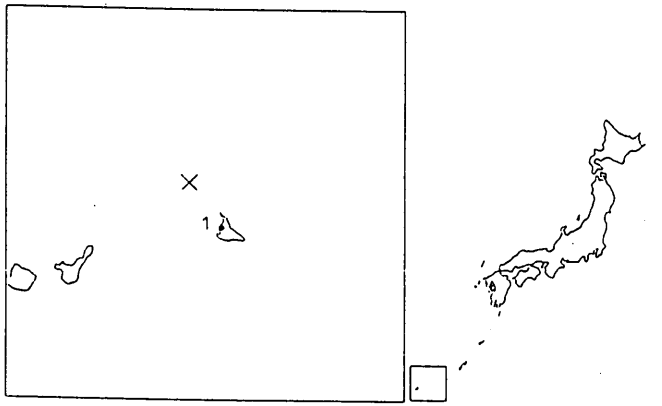
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MURORAN-G	ON GROUND	F- 699	22	27	10	144

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

12:07 DEC. 16,1994
NEAR MIYAKOJIMA ISLAND
EPICENTER : 25°6.3 'N 125°1.2 'E
DEPTH : 28.0KM MAGNITUDE : 4.1

JMA INTENSITIES

III : MIYAKOJIMA



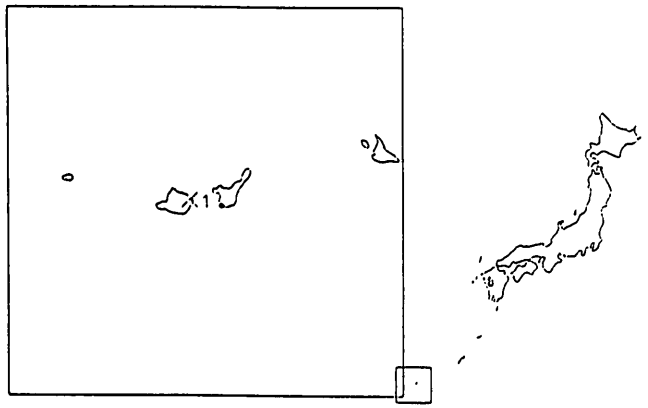
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HIRARA-G	ON GROUND	F- 707	13	11	7	42

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

08:16 DEC. 17,1994
NEAR ISHIGAKIJIMA ISLAND
EPICENTER : 24°21.5'N 123°55.2'E
DEPTH : 13.9KM MAGNITUDE : 4.1

JMA INTENSITIES

II : ISHIGAKIJIMA,
IRIOMOTEJIMA



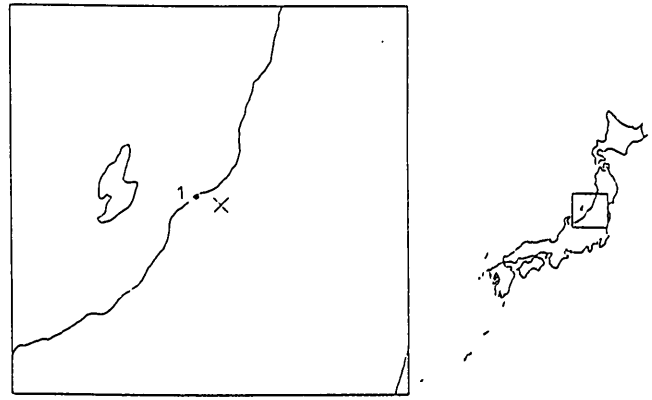
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	ISHIGAKI-G	ON GROUND	F- 737	11	9	4	24

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

14:16 DEC. 19,1994
NE NIIGATA PREF
EPICENTER : 37°52.4'N 139°16.3'E
DEPTH : 11.6KM MAGNITUDE : 4.2

JMA INTENSITIES

II : NIIGATA,SHIRAKAWA
I : AIKAWA



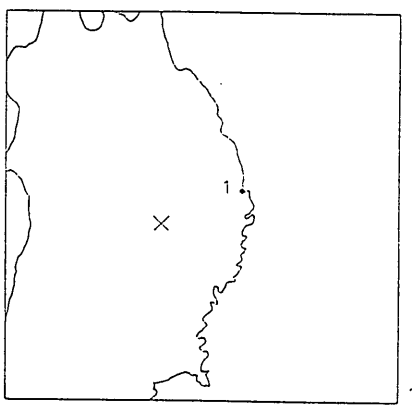
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	NIIGATA-G	ON GROUND	F- 704	16	9	4	19

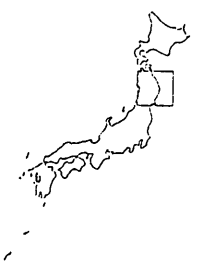
STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

00:00 DEC. 21,1994
SOUTHERN IWATE PREF
EPICENTER : 39°27.6'N 141°14.3'E
DEPTH : 88.7KM MAGNITUDE : 4.9

JMA INTENSITIES

Ⅳ : OFUNATO
Ⅲ : MIYAKO,MORIOKA
Ⅱ : SAKATA,ISHINOMAKI
Ⅰ : HACHINOHE,SENDAI





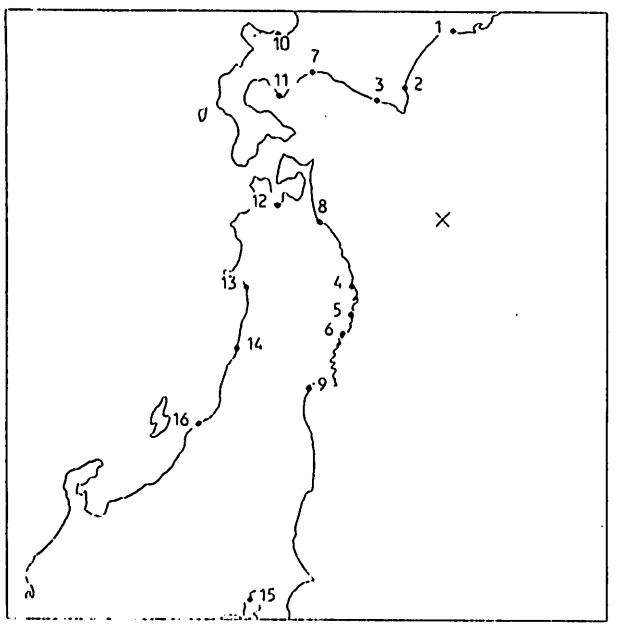
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MIYAKO-G	ON GROUND	F- 725	44	45	14	66

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

21:19 DEC. 28,1994
FAR E OFF SANRIKU
EPICENTER : 40°25.6'N 143°44.9'E
DEPTH : 0.0KM MAGNITUDE : 7.5

JMA INTENSITIES

Ⅵ : HACHINOHE
Ⅴ : MORIOKA,AOMORI,MUTSU
Ⅳ : OFUNATO,MIYAKO,HAKODATE,
OBIHIRO,TOMAKOMAI,
URAKAWA



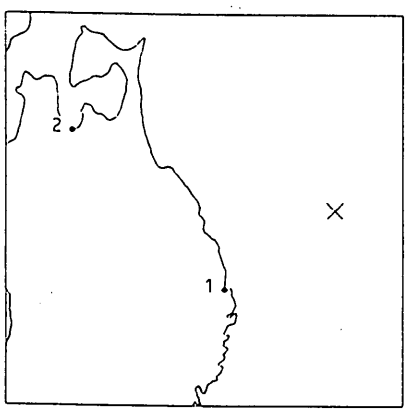
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KUSHIRO-G	ON GROUND	F- 698	8	10	4	290
1	KUSHIRO-GB	IN GROUND	F- 697	3	5	2	290
2	TOKACHI-M	ON GROUND	M-1534	18	19	10	210
3	URAKAWA-S	ON GROUND	S-2599	19	21	12	209
4	MIYAKO-G	ON GROUND	F- 726	118	122	49	174
5	KAMAISHI-MB	IN GROUND	M-1540	19	21	14	203
5	KAMAISHI-M	ON GROUND	M-1537	27	26	17	203
6	OFUNATO-MOUND-M	ON STRUC.	M-1535	51	58	37	232
6	OFUNATO-BO-S	ON STRUC.	S-2601	61	70	21	232
7	TOMAKOMAI-S	ON GROUND	S-2600	68	44	9	302
8	HACHINOHE-JI-S	ON GROUND	S-2597	381	545	105	191
9	SHIOGAMA-KOJYO-S	ON GROUND	S-2602	28	29	16	330
10	OTARU-G	ON GROUND	F- 694	5	7	4	379
9	SENDAI-MB	IN GROUND	M-1547	8	6	4	334
9	SENDAI-M	ON GROUND	M-1536	11	10	5	334
11	MURORAN-G	ON GROUND	F- 700	59	89	27	315
12	AOMORI-G	ON GROUND	F- 692	142	142	68	256
13	AKITA-G	ON GROUND	F- 711	7	9	5	321
13	AKITA-GB	IN GROUND	F- 710	6	9	5	321
13	AKITA-G	ON GROUND	F- 709	23	16	7	321
13	AKITA-GB	IN GROUND	F- 708	20	13	7	321
14	SAKATA-S	ON GROUND	S-2604	18	19	6	374
15	KAWASAKI-FR	ON STRUC.	F- 740	12		2	649
15	KAWASAKI-F	ON GROUND	F- 739	11	12	3	649
15	KAWASAKI-FB	IN GROUND	F- 738	3		2	649
16	NIIGATA-G	ON GROUND	F- 705	7	8	2	489

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

05:52 DEC. 29,1994
NE OFF IWATE PREF
EPICENTER : 40°6.9 'N 143°1.3 'E
DEPTH : 0.0KM MAGNITUDE : 6.4

JMA INTENSITIES

Ⅲ : MIYAKO,OFUNATO,MORIOKA
Ⅱ : HACHINOHE,AOMORI,MUTSU,
AKITA,ISHINOMAKI,SAKATA,
FUKUSHIMA,ONAHAMA,
SENDAI,SHINJO



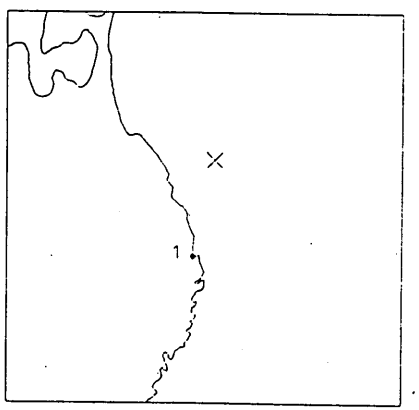
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MIYAKO-G	ON GROUND	F- 727	79	48	30	103
2	AOMORI-G	ON GROUND	F- 693	5	7	3	207

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

06:30 DEC. 29,1994
NE OFF IWATE PREF
EPICENTER : 40°17.7'N 142°15.0'E
DEPTH : 25.2KM MAGNITUDE :

JMA INTENSITIES

Ⅱ : MIYAKO,MORIOKA,MUTSU
Ⅰ : HACHINOHE,OFUNATO,
AOMORI,KUSHIRO,URAKAWA,
TOMAKOMAI,HAKODATE



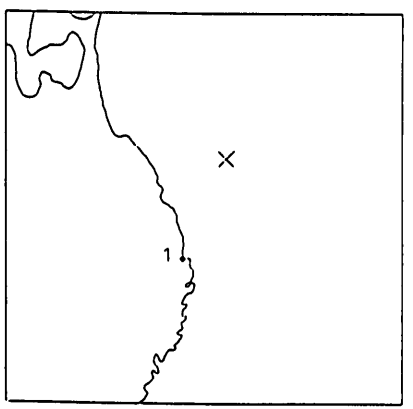
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MIYAKO-G	ON GROUND	F- 728	14	14	4	76

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

07:36 DEC. 29,1994
NE OFF IWATE PREF
EPICENTER : 40°18.3'N 142°27.3'E
DEPTH : 27.2KM MAGNITUDE : 5.0

JMA INTENSITIES

II : AOMORI,OFUNATO,
HACHINOHE,MORIOKA,
MIYAKO
I : ISHINOMAKI,SENDAI,MUTSU



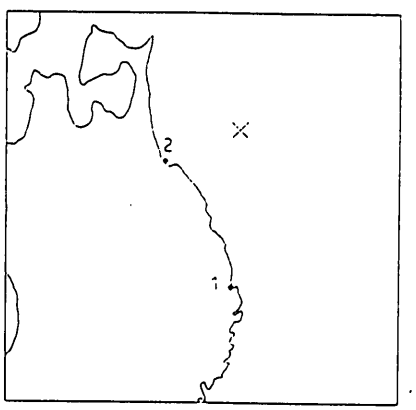
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MIYAKO-G	ON GROUND	F- 729	19	16	8	84

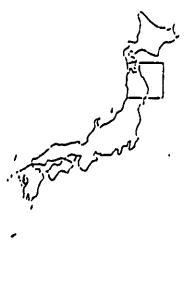
STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

00:29 DEC. 30,1994
E OFF AOMORI PREF
EPICENTER : 40°43.8'N 142°11.0'E
DEPTH : 52.5KM MAGNITUDE : 5.6

JMA INTENSITIES

IV : HACHINOHE
III : MUTSU,MORIOKA
II : AOMORI,HAKODATE,MIYAKO,
URAKAWA,OFUNATO,
TOMAKOMAI





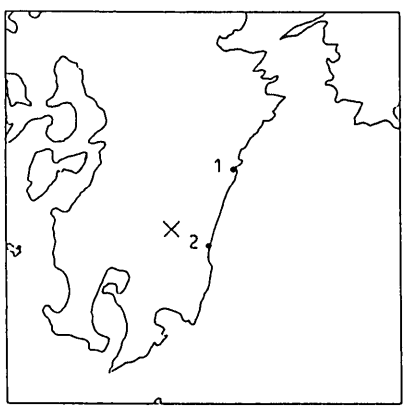
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	MIYAKO-G	ON GROUND	F- 730	15	18	6	122
2	HACHINOHE-JI-S	ON GROUND	S-2598	52	42	8	61

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

12:54 SEP. 7 ,1994
SOUTHERN MIYAZAKI PREF
EPICENTER : 32°0.6 'N 131°9.1 'E
DEPTH : 19.3KM MAGNITUDE : 5.3

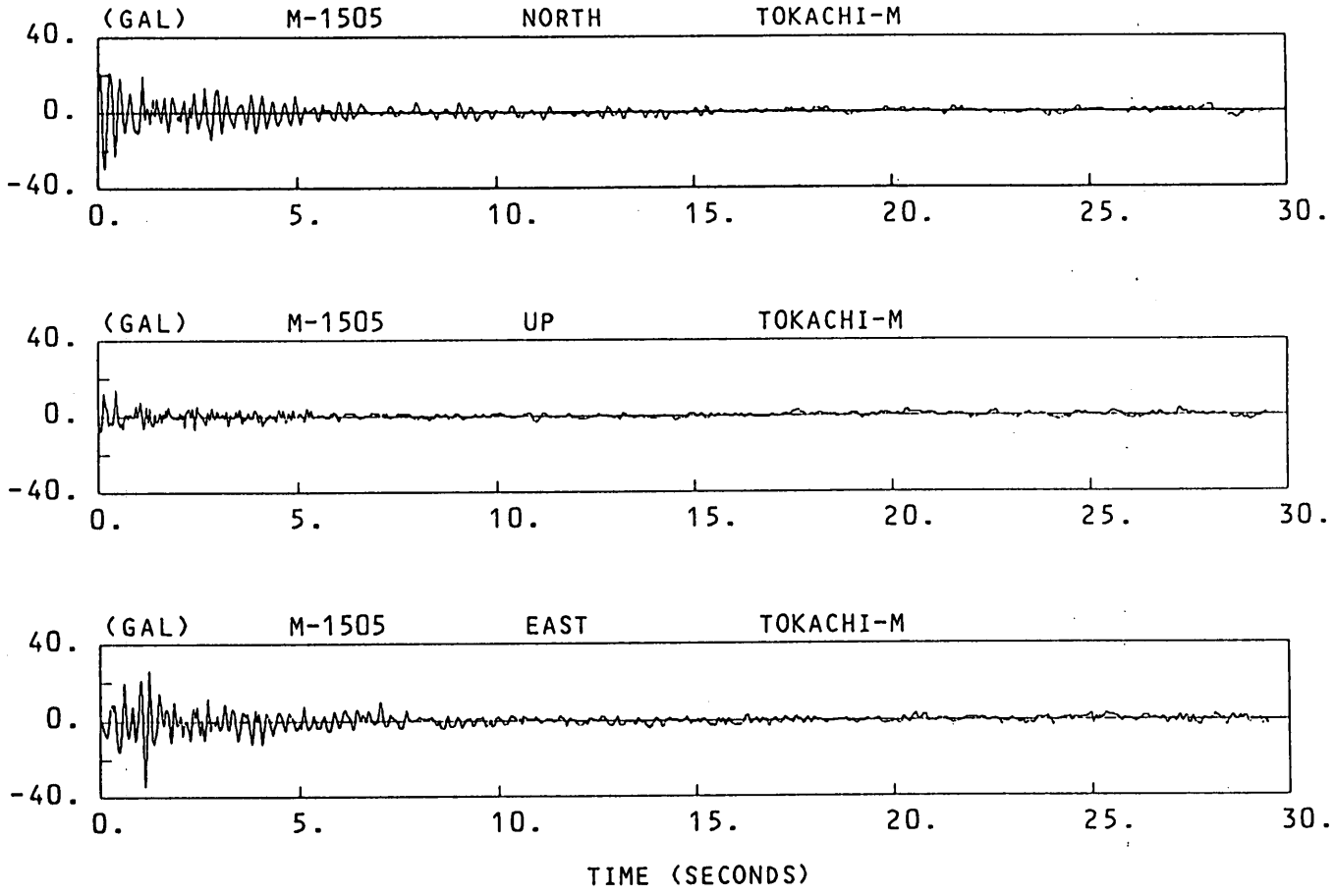
JMA INTENSITIES

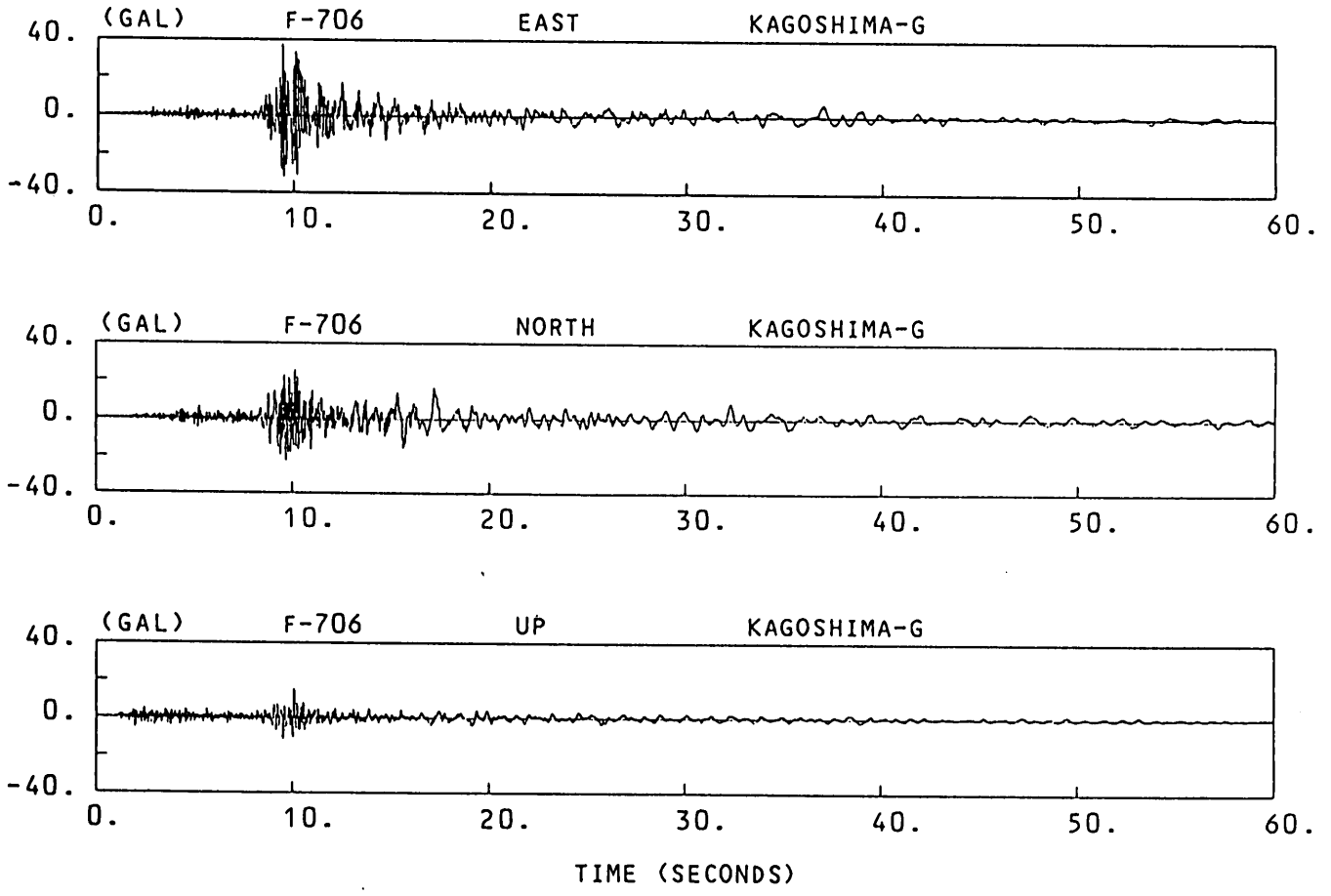
Ⅲ : MIYAZAKI,MIYAKONOJO,
HITOYOSHI
Ⅱ : NOBEOKA,UNZENDAKE,OITA
Ⅰ : ABURATSU,KAGOSHIMA,
ASOSAN,KUMAMOTO,
USHIBUKA,HITA,SAGA,
FUKUOKA,UWAJIMA

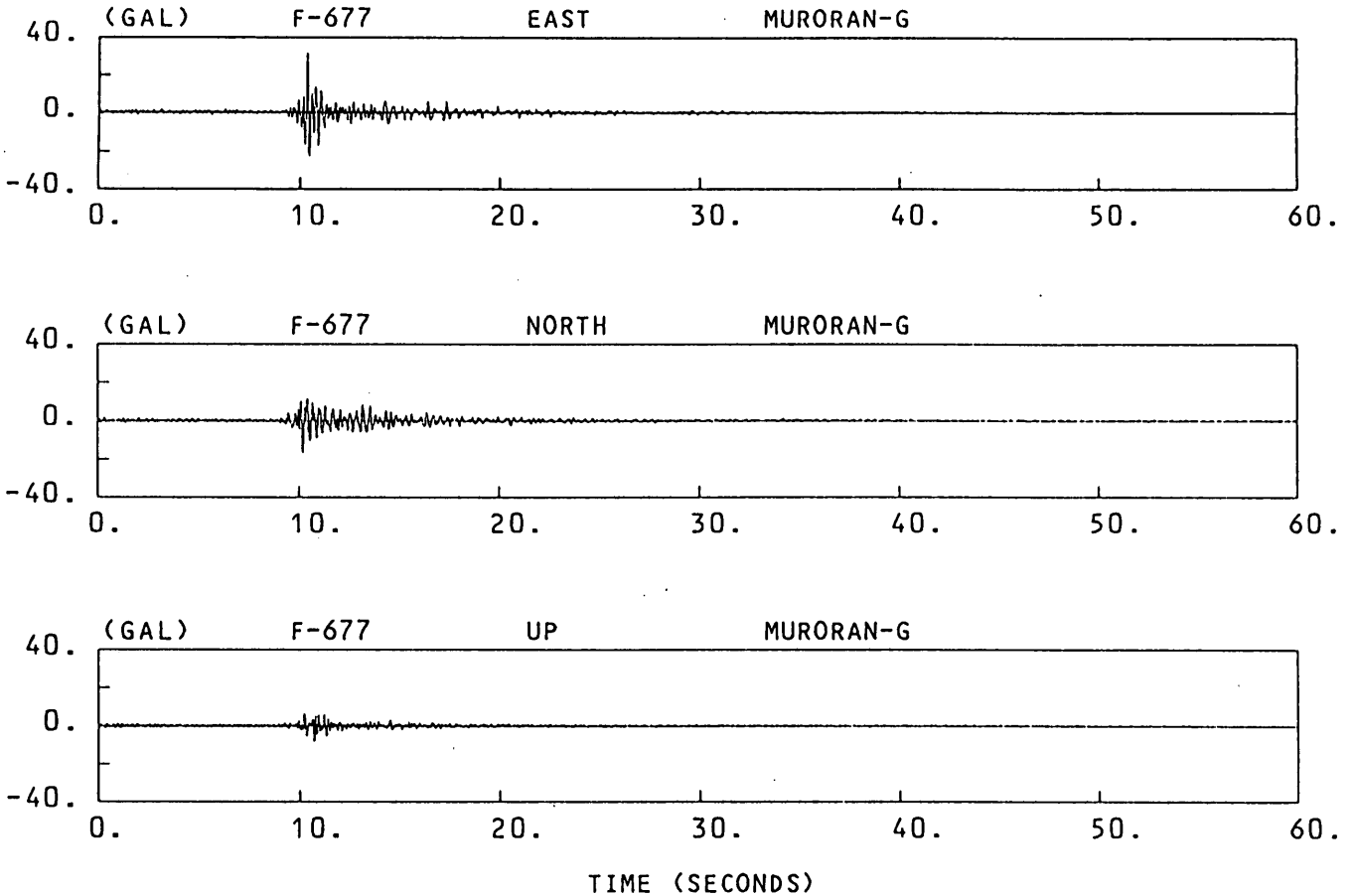


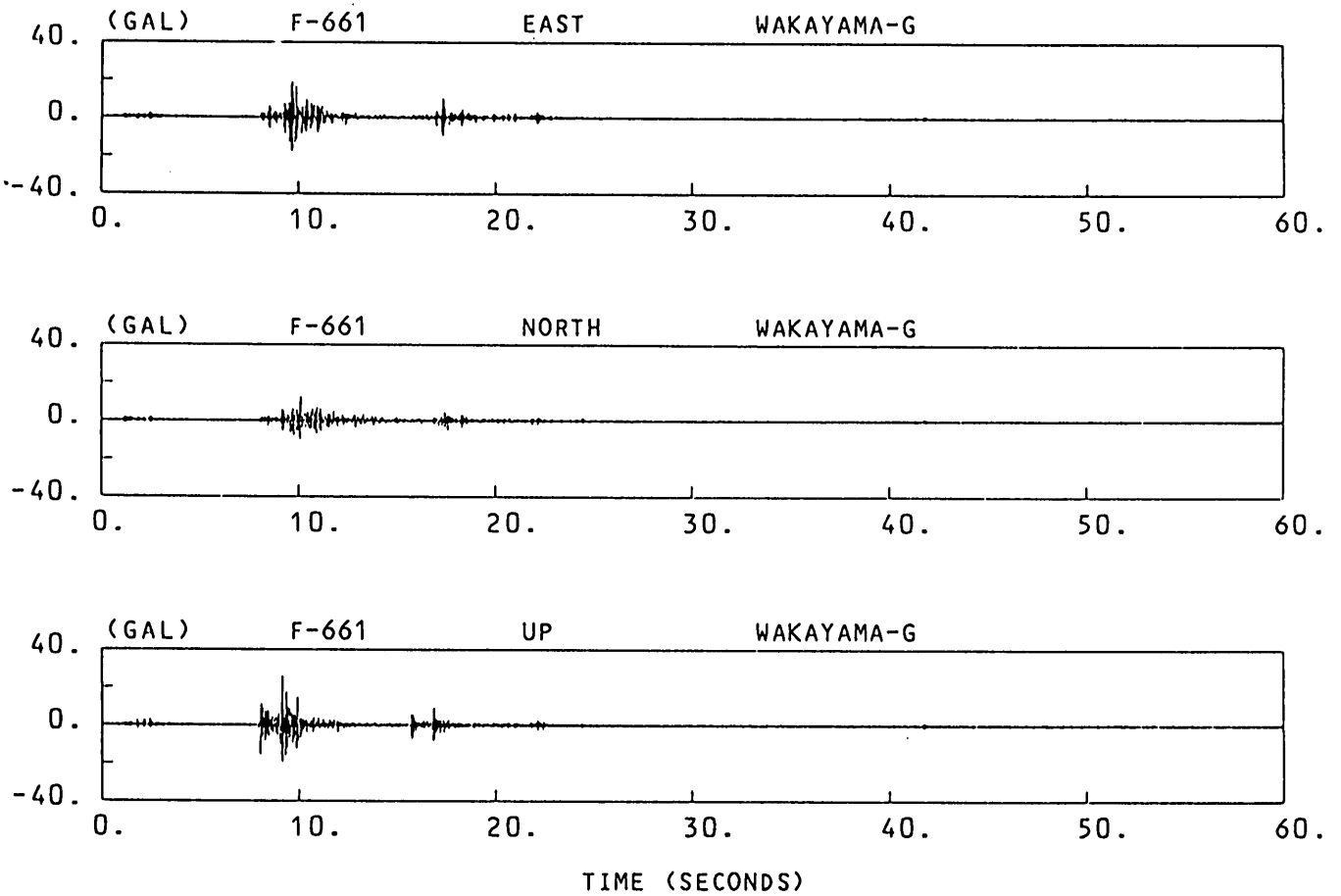
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HOSOSHIMA-F	ON GROUND	F- 768	27	27	9	66
2	MIYAZAKI-G	ON GROUND	F- 685	33	32	25	31
2	MIYAZAKI-GB	IN GROUND	F- 684	16	13	6	31

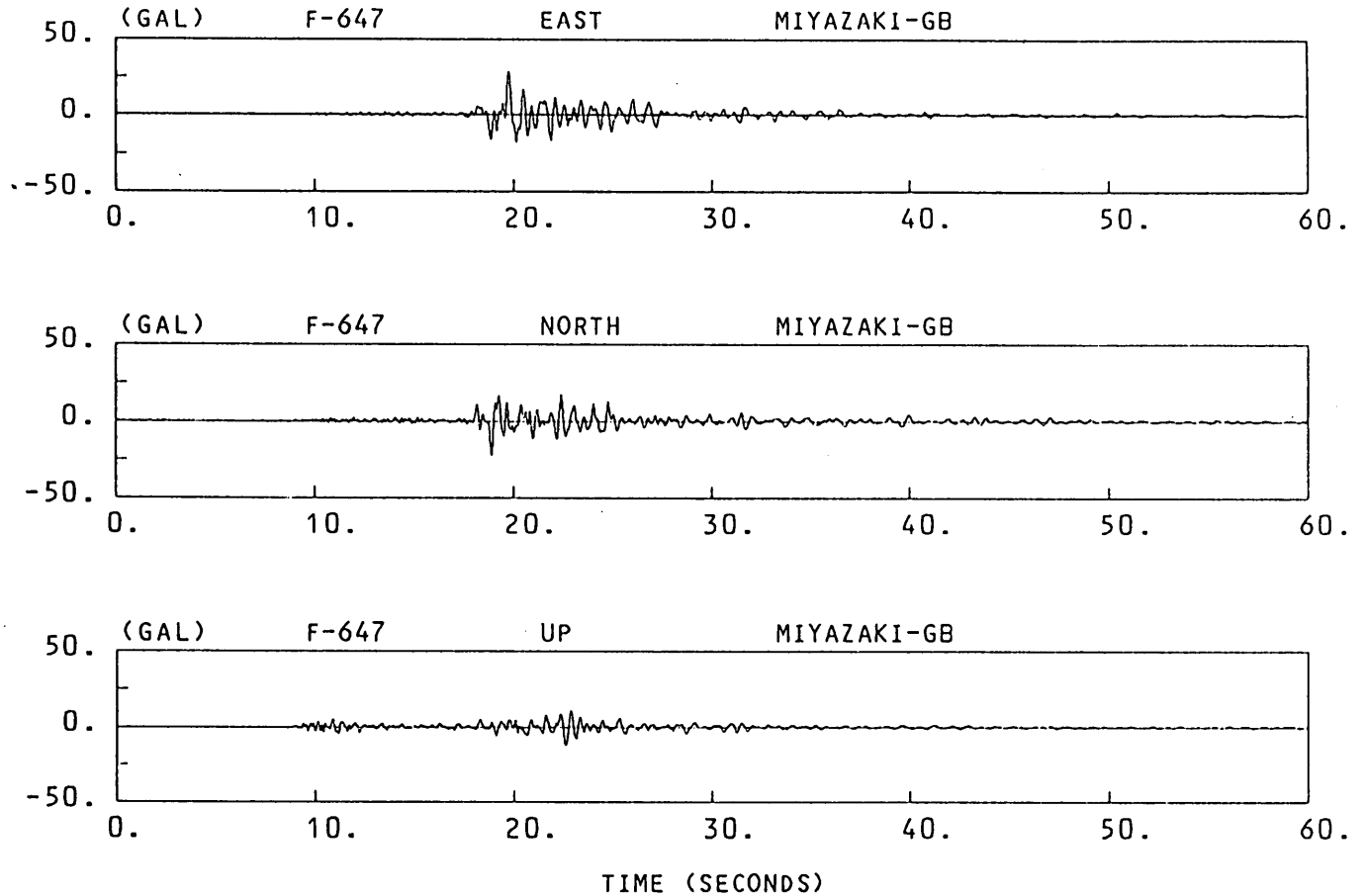
Results of preliminary Analyses(1994)


(GAL) M-1505 NORTH TOKACHI-M
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
(GAL) M-1505 UP TOKACHI-M
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
(GAL) M-1505 EAST TOKACHI-M
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
TIME (SECONDS)


(GAL) F-706 EAST KAGOSHIMA-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-706 NORTH KAGOSHIMA-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-706 UP KAGOSHIMA-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


(GAL) F-677 EAST MURORAN-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-677 NORTH MURORAN-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-677 UP MURORAN-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


(GAL) F-661 EAST WAKAYAMA-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-661 NORTH WAKAYAMA-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-661 UP WAKAYAMA-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


(GAL) F-647 EAST MIYAZAKI-GB
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-647 NORTH MIYAZAKI-GB
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-647 UP MIYAZAKI-GB
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)

RECORD NUMBER : F-648

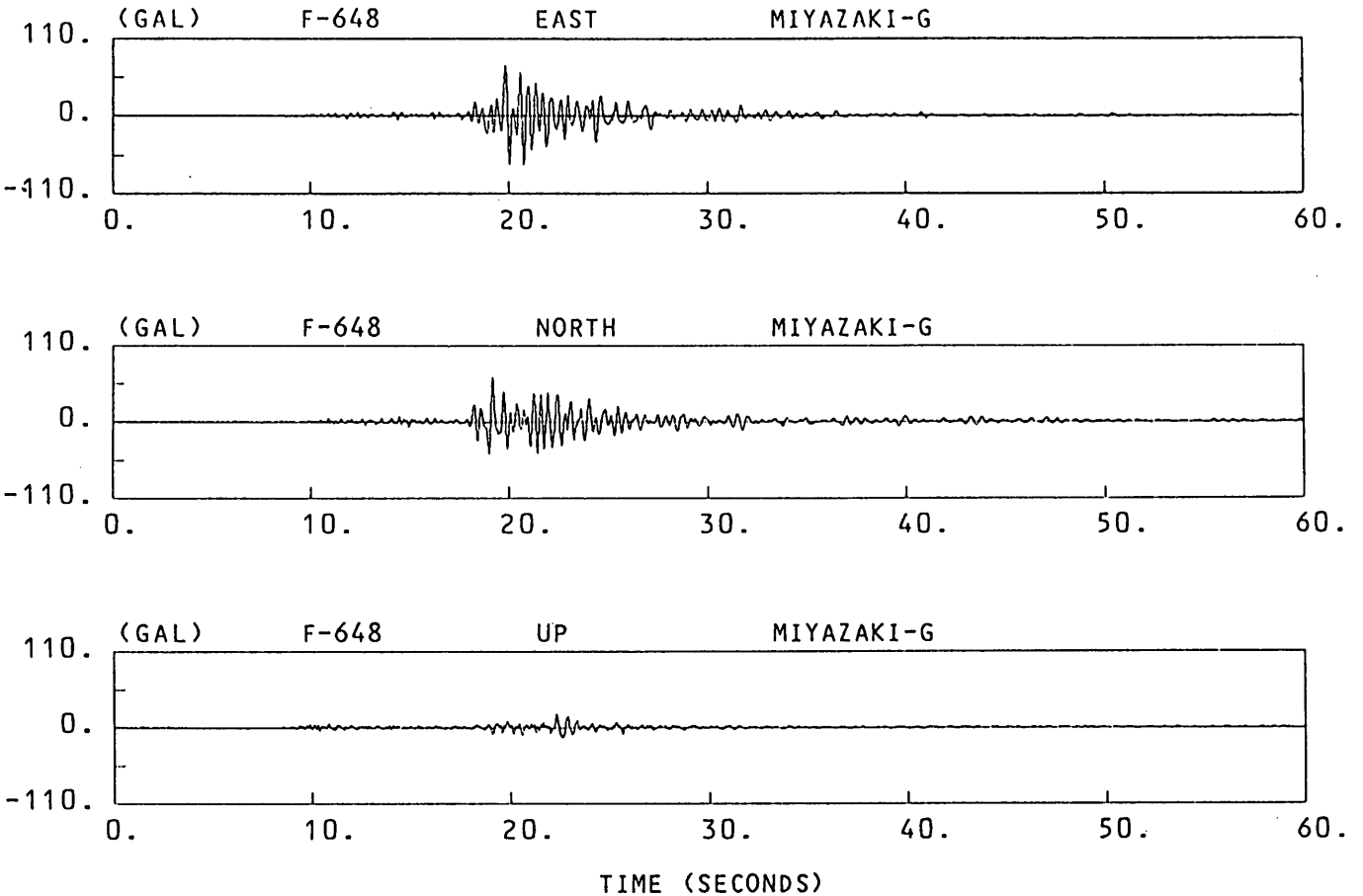
STATION : MIYAZAKI-G

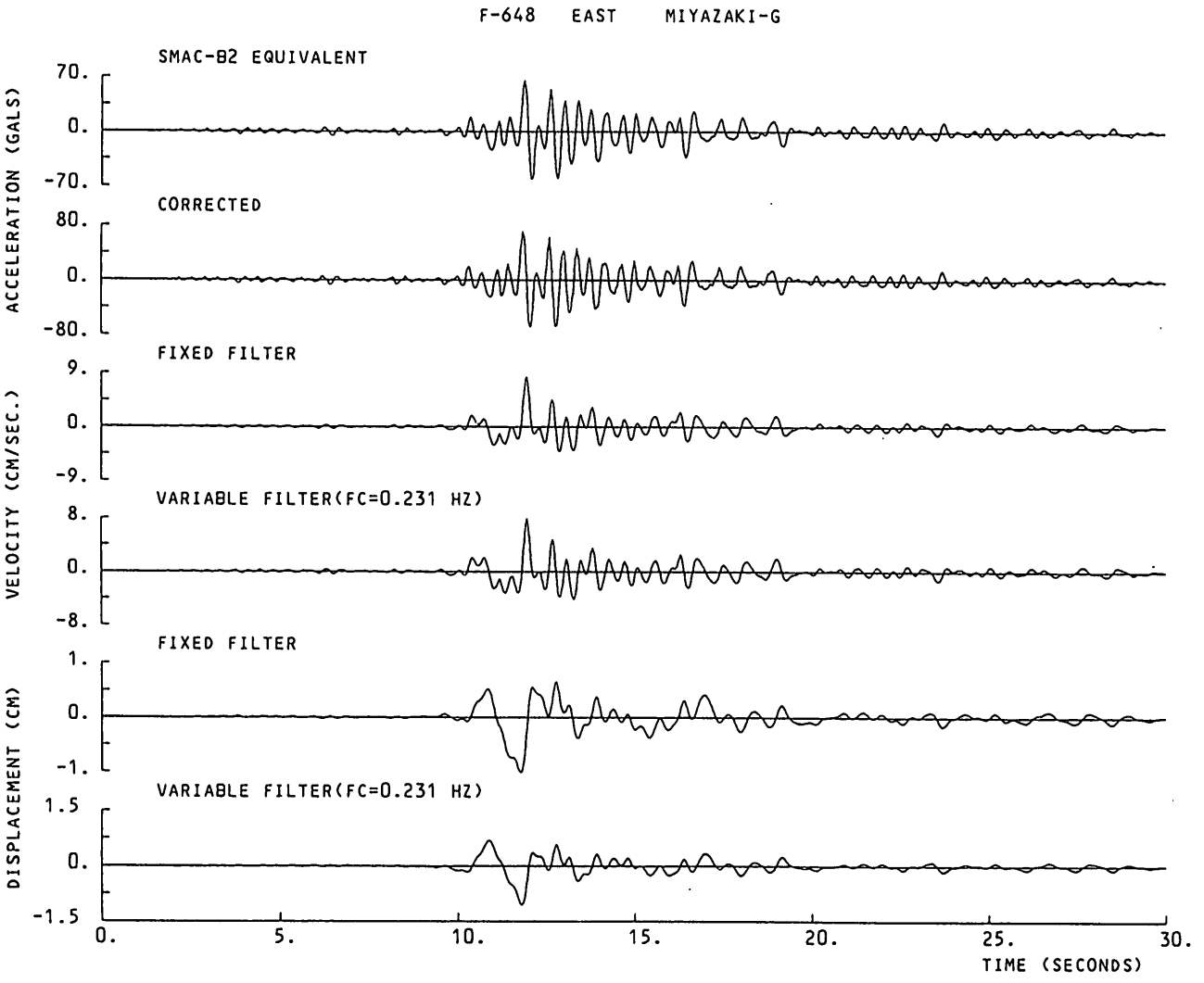
EARTHQUAKE DATA

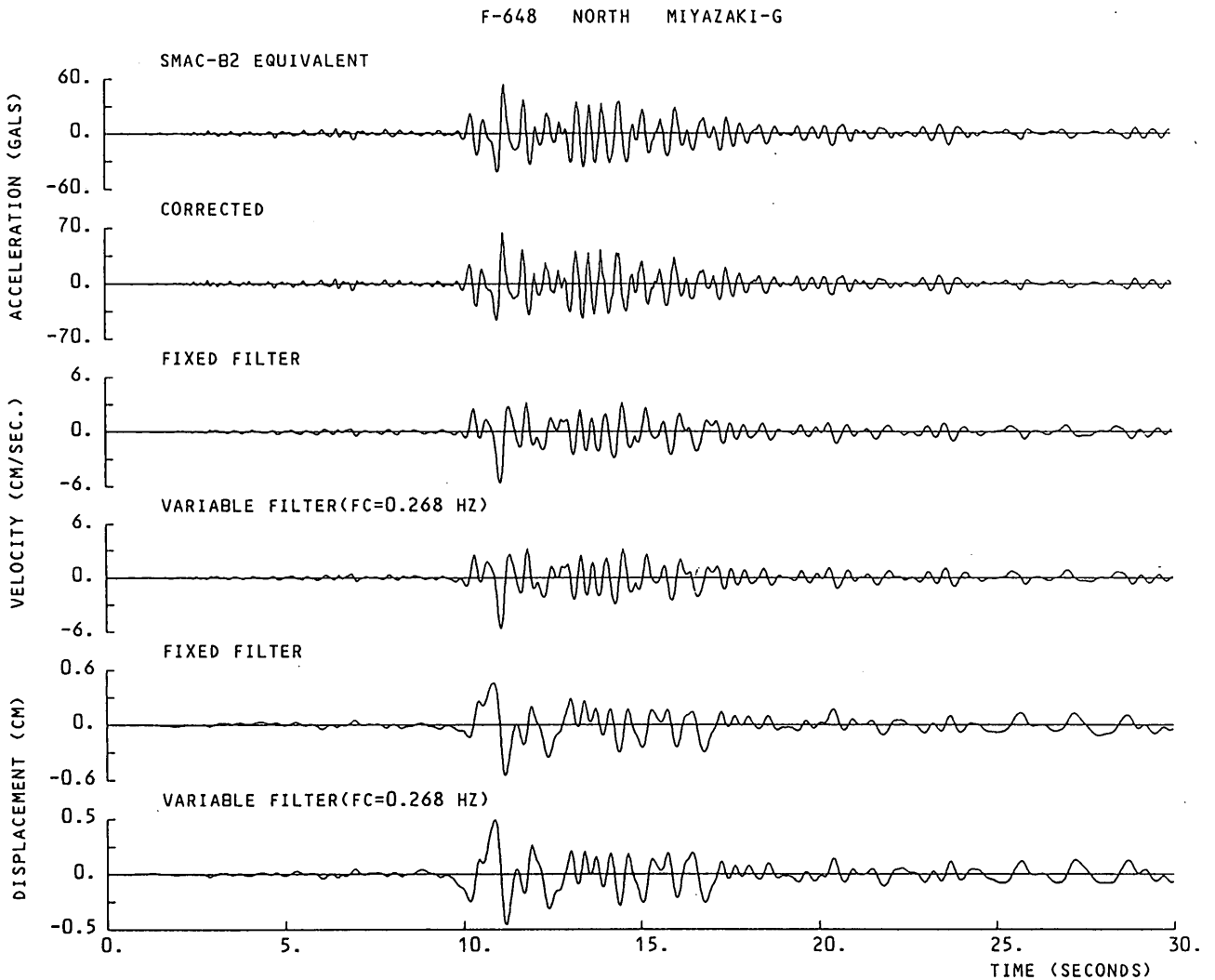
DATE AND TIME	12:28 APR 30,1994
LOCATION OF HYPOCENTER	
EPICENTRAL REGION	SE OFF OSUMI PEN
LATITUDE	31°17.2' N
LONGITUDE	131°34.6' E
DEPTH	48.0KM
JMA MAGNITUDE	6.0

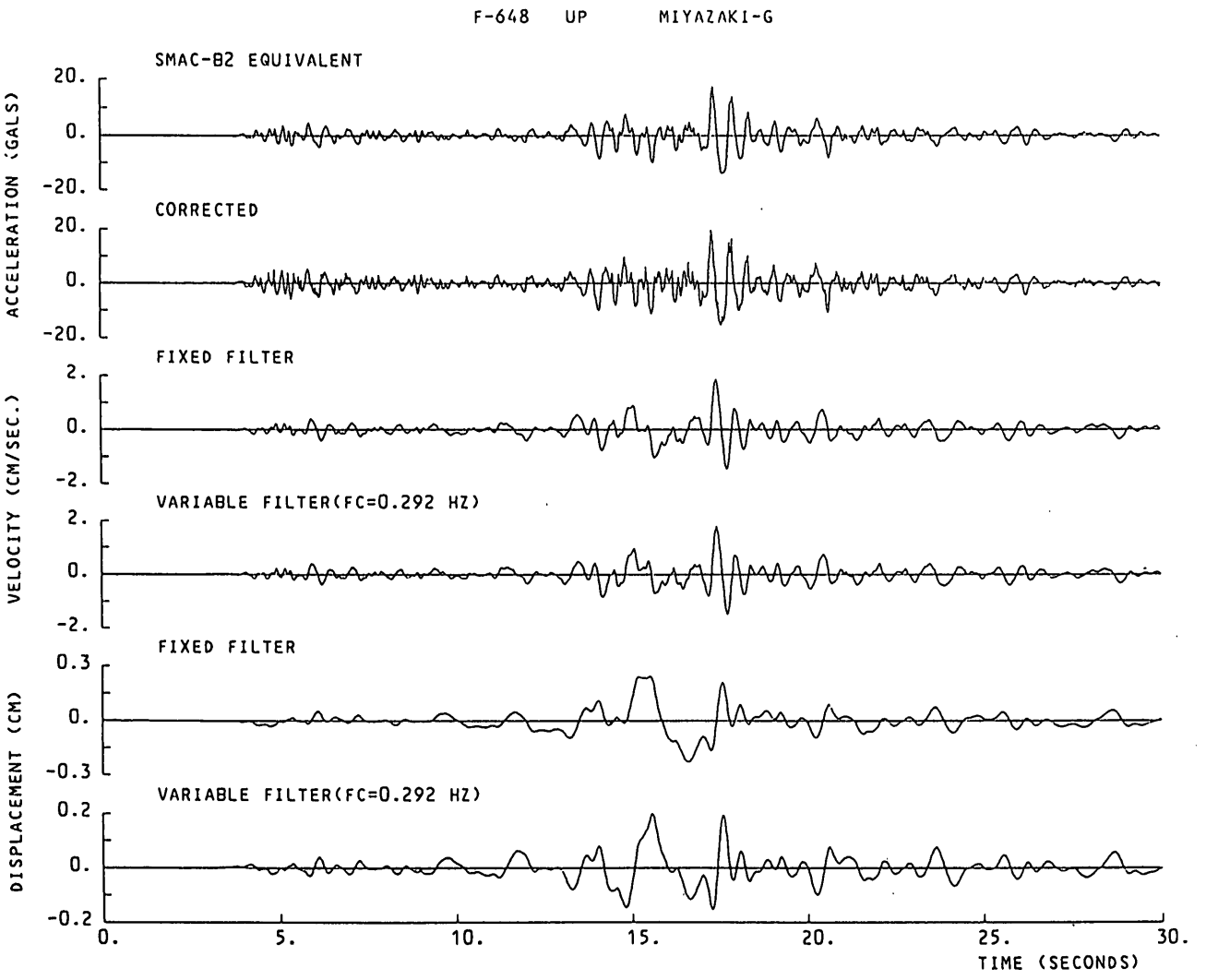
	PEAK VALUES OF COMPONENTS			
	N S	E W	U D	HORIZONTAL*
PARAMETER OF THE VARIABLE FILTER				
FC (HZ)	0.268	0.231	0.292	
MAXIMUM ACCELERATION (GAL)				
SMAC-B2 EQUIVALENT	55.1	65.5	17.3	69.0
ORIGINAL	63.8	71.3	19.9	73.7
CORRECTED	63.8	71.0	19.6	73.6
MAXIMUM VELOCITY (CM/SEC)				
FIXED FILTER	5.68	8.43	1.88	8.48
VARIABLE FILTER	5.64	7.92	1.79	7.96
MAXIMUM DISPLACEMENT (CM)				
FIXED FILTER	0.55	1.01	0.24	1.01
VARIABLE FILTER	0.49	1.06	0.20	1.06

* RESULTANT OF HORIZONTAL COMPONENTS


(GAL) F-648 EAST MIYAZAKI-G
110.
0.
-110.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-648 NORTH MIYAZAKI-G
110.
0.
-110.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-648 UP MIYAZAKI-G
110.
0.
-110.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


F-648 EAST MIYAZAKI-G
SMAC-B2 EQUIVALENT
70.
0.
-70.
CORRECTED
80.
0.
-80.
ACCELERATION (GALS)
FIXED FILTER
9.
0.
-9.
VARIABLE FILTER(FC=0.231 HZ)
8.
0.
-8.
VELOCITY (CM/SEC.)
FIXED FILTER
1.
0.
-1.
VARIABLE FILTER(FC=0.231 HZ)
1.5
0.
-1.5
DISPLACEMENT (CM)
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-648 NORTH MIYAZAKI-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.268 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.268 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
60.
0.
-60.
70.
0.
-70.
6.
0.
-6.
6.
0.
-6.
0.6
0.
-0.6
0.5
0.
-0.5
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-648 UP MIYAZAKI-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.292 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.292 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
20.
0.
-20.
2.
-2.
0.3
-0.3
0.2
-0.2
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

RESPONSE SPECTRUM

RECORD = F-648 COMPONENT = EAST SIGNAL = CORRECTION = STATION = MIYAZAKI-G
DATE AND TIME = 1994.04.30.12.28 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 71.01 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	85.9	0.24	0.005	74.6	0.13	0.005	73.4	0.11	0.005	72.9	0.10	0.005	72.3	0.09	0.005
0.10	95.6	0.83	0.024	93.8	0.68	0.024	89.6	0.55	0.023	83.9	0.44	0.021	78.0	0.37	0.019
0.15	143.5	2.27	0.082	100.4	1.20	0.057	93.6	1.03	0.053	89.3	0.92	0.051	84.0	0.81	0.047
0.20	168.5	4.21	0.171	122.7	2.58	0.124	104.8	2.02	0.106	98.7	1.67	0.099	95.0	1.40	0.093
0.25	231.3	8.15	0.366	169.1	5.52	0.268	145.1	4.37	0.228	125.2	3.40	0.197	108.3	2.52	0.163
0.30	202.5	8.24	0.462	151.5	5.75	0.346	153.6	5.67	0.348	148.7	5.53	0.335	122.5	4.09	0.261
0.35	451.4	24.17	1.401	378.5	19.67	1.172	306.5	16.07	0.946	226.9	11.45	0.693	135.5	5.78	0.387
0.40	1203.1	76.74	4.876	468.6	29.83	1.895	342.5	21.69	1.381	218.1	13.81	0.866	136.3	7.01	0.497
0.45	207.0	15.06	1.062	181.8	12.83	0.933	184.0	12.65	0.940	170.8	10.94	0.857	125.5	7.83	0.572
0.50	179.9	14.74	1.139	184.2	14.37	1.167	173.7	13.02	1.094	152.2	11.41	0.943	112.3	8.38	0.625
0.55	324.7	28.65	2.488	185.0	17.47	1.417	156.9	14.49	1.196	135.8	11.95	1.018	99.0	8.74	0.662
0.60	412.6	38.75	3.762	202.1	20.53	1.840	162.1	17.38	1.469	126.1	13.03	1.121	86.6	8.92	0.683
0.65	233.0	24.74	2.494	193.1	20.35	2.061	163.0	17.26	1.733	123.1	13.53	1.284	76.0	8.91	0.690
0.70	352.6	39.34	4.377	156.8	20.08	1.943	134.8	17.77	1.661	103.6	14.29	1.250	68.5	8.88	0.721
0.75	152.6	21.13	2.174	128.2	18.35	1.825	114.0	16.41	1.613	93.7	13.55	1.297	64.5	8.83	0.777
0.80	197.8	25.33	3.206	111.1	14.91	1.797	97.9	13.82	1.574	83.3	12.01	1.305	60.5	8.41	0.811
0.85	162.9	22.51	2.982	101.8	15.27	1.859	83.3	12.49	1.514	71.7	10.82	1.262	55.4	8.01	0.816
0.90	141.2	20.79	2.896	92.0	13.09	1.884	77.6	11.95	1.583	61.8	10.91	1.214	49.9	8.01	0.801
0.95	104.0	17.19	2.377	80.6	13.99	1.840	67.5	12.11	1.533	54.2	11.10	1.183	45.5	8.28	0.837
1.00	97.7	16.81	2.476	67.4	14.07	1.705	55.6	12.57	1.393	47.8	11.43	1.154	43.7	8.45	0.887
1.10	70.4	16.69	2.157	59.0	15.16	1.807	54.5	13.90	1.661	47.5	11.95	1.425	41.9	8.47	1.025
1.20	75.0	16.26	2.734	63.9	14.54	2.326	57.5	13.21	2.084	48.2	11.23	1.708	41.0	8.02	1.187
1.30	67.9	12.83	2.905	60.1	11.78	2.566	53.8	10.90	2.282	44.6	9.58	1.839	40.0	7.43	1.341
1.40	56.8	13.48	2.818	50.2	12.03	2.487	46.1	10.80	2.259	42.0	8.83	1.982	38.5	7.48	1.465
1.50	59.0	14.87	3.362	45.6	12.68	2.591	42.9	11.48	2.411	39.2	9.71	2.115	36.4	8.12	1.551
1.60	50.8	14.81	3.296	40.5	12.50	2.620	38.3	11.60	2.447	35.4	10.60	2.161	33.9	8.69	1.598
1.70	45.9	13.49	3.363	38.4	12.82	2.804	33.3	12.21	2.401	31.2	11.19	2.140	31.2	9.14	1.611
1.80	41.7	13.75	3.421	34.3	13.12	2.809	29.6	12.54	2.398	27.1	11.55	2.069	28.6	9.48	1.596
1.90	36.5	13.74	3.341	27.3	13.15	2.485	23.9	12.62	2.156	23.2	11.71	1.963	26.1	9.71	1.562
2.00	34.4	13.44	3.481	22.8	12.96	2.302	20.2	12.51	2.021	19.8	11.72	1.840	23.7	9.87	1.512
2.20	24.0	12.58	2.948	18.0	12.32	2.196	16.5	12.04	1.990	14.5	11.48	1.646	19.7	10.01	1.390
2.40	13.8	11.94	2.012	12.8	11.74	1.856	12.0	11.54	1.719	11.3	11.14	1.488	16.5	9.99	1.258
2.60	9.2	11.27	1.581	8.4	11.15	1.425	8.1	11.03	1.346	8.2	10.76	1.235	14.0	9.88	1.130
2.80	7.8	10.67	1.544	7.3	10.61	1.432	7.0	10.55	1.363	6.7	10.38	1.241	12.1	9.74	1.013
3.00	6.7	10.19	1.517	6.4	10.16	1.453	6.3	10.13	1.392	6.1	10.04	1.280	10.6	9.58	1.007
3.20	5.9	9.77	1.521	5.7	9.77	1.461	5.6	9.78	1.405	5.5	9.74	1.302	9.5	9.43	1.046
3.40	5.1	9.42	1.501	5.0	9.45	1.451	5.0	9.47	1.401	5.0	9.48	1.310	8.5	9.29	1.075
3.60	4.5	9.15	1.472	4.4	9.19	1.430	4.4	9.23	1.388	4.5	9.26	1.308	7.8	9.16	1.095
3.80	3.9	8.94	1.441	3.9	8.99	1.405	4.0	9.03	1.370	4.1	9.08	1.301	7.2	9.04	1.109
4.00	3.5	8.77	1.410	3.5	8.83	1.380	3.5	8.87	1.350	3.7	8.93	1.291	6.7	8.94	1.118

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

RESPONSE SPECTRUM

RECORD = F-648 COMPONENT = NORTH SIGNAL = CORRECTION = STATION = MIYAZAKI-G
DATE AND TIME = 1994.04.30.12.28 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 63.64 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	69.4	0.22	0.004	66.2	0.11	0.004	65.8	0.09	0.004	65.6	0.08	0.004	65.4	0.07	0.004
0.10	91.2	0.56	0.023	74.0	0.45	0.019	72.3	0.43	0.018	70.9	0.43	0.018	69.8	0.33	0.017
0.15	126.3	2.83	0.072	99.1	1.50	0.056	80.2	1.14	0.046	75.9	0.85	0.043	75.9	0.64	0.042
0.20	185.6	4.98	0.188	111.1	2.74	0.113	104.8	2.16	0.105	97.0	1.71	0.098	88.0	1.30	0.086
0.25	144.5	4.48	0.229	134.0	4.52	0.211	124.6	3.90	0.197	118.7	3.12	0.186	100.4	2.20	0.150
0.30	962.6	45.50	2.194	345.0	15.67	0.785	225.7	9.86	0.513	150.0	6.08	0.337	105.9	3.23	0.224
0.35	396.0	21.67	1.229	255.7	12.94	0.792	216.3	11.00	0.668	153.8	8.01	0.469	99.8	4.17	0.285
0.40	700.2	44.55	2.838	348.7	21.72	1.415	253.8	15.19	1.022	158.3	9.31	0.631	96.8	4.61	0.356
0.45	260.7	18.66	1.337	192.1	13.93	0.984	166.0	11.66	0.847	132.6	8.83	0.667	96.4	5.28	0.445
0.50	370.4	30.24	2.345	251.6	19.98	1.593	199.1	16.20	1.253	133.8	11.36	0.828	91.8	6.16	0.520
0.55	590.4	52.02	4.524	244.8	22.32	1.876	172.3	15.76	1.313	126.1	11.24	0.942	83.9	6.67	0.570
0.60	197.1	19.27	1.797	156.3	15.73	1.425	127.2	14.00	1.152	99.9	11.01	0.892	75.0	6.88	0.601
0.65	269.2	28.21	2.881	150.9	16.14	1.611	104.8	12.24	1.115	84.7	9.94	0.884	66.6	6.91	0.621
0.70	139.5	16.30	1.731	89.4	11.59	1.107	82.2	9.72	1.012	70.6	8.41	0.856	59.3	6.87	0.635
0.75	79.5	11.10	1.133	70.8	9.49	1.008	65.8	8.96	0.930	61.3	7.91	0.853	53.1	6.82	0.649
0.80	136.6	17.18	2.215	73.8	10.18	1.195	58.6	8.76	0.945	55.3	7.75	0.876	48.0	6.80	0.663
0.85	94.8	13.70	1.735	72.3	9.55	1.321	58.8	8.83	1.070	51.6	7.82	0.921	43.6	6.79	0.676
0.90	85.1	12.57	1.747	65.0	10.43	1.331	55.0	8.96	1.122	48.7	8.05	0.973	39.8	6.81	0.687
0.95	118.5	18.39	2.708	61.5	9.96	1.404	52.0	9.02	1.180	45.3	8.23	1.007	36.2	6.80	0.692
1.00	73.5	12.22	1.862	51.4	10.02	1.300	47.5	9.10	1.195	41.3	8.29	1.017	32.9	6.78	0.690
1.10	78.6	13.88	2.409	55.1	9.99	1.685	45.2	8.75	1.372	32.8	8.06	0.971	30.9	6.63	0.750
1.20	67.9	14.36	2.476	42.1	11.08	1.535	35.1	9.48	1.274	29.2	7.61	1.007	28.7	6.39	0.811
1.30	46.1	11.88	1.972	36.0	8.81	1.539	30.0	7.92	1.279	26.5	7.06	1.068	26.6	6.09	0.859
1.40	35.3	8.63	1.752	27.0	7.20	1.335	24.2	6.64	1.190	23.6	6.43	1.094	24.5	5.77	0.891
1.50	25.1	7.14	1.432	21.3	6.85	1.207	21.0	6.68	1.176	21.0	6.34	1.105	22.6	5.47	0.913
1.60	19.9	7.34	1.289	19.2	6.98	1.239	18.8	6.83	1.195	18.8	6.51	1.116	20.7	5.66	0.925
1.70	18.0	7.43	1.320	17.3	7.23	1.260	16.9	7.04	1.207	16.8	6.69	1.118	19.1	5.81	0.929
1.80	16.0	7.67	1.311	15.3	7.44	1.246	14.9	7.22	1.191	14.9	6.84	1.103	17.5	5.93	0.924
1.90	13.6	7.86	1.246	13.1	7.57	1.188	12.9	7.33	1.142	13.1	6.93	1.067	16.1	6.03	0.914
2.00	11.0	7.80	1.114	10.8	7.54	1.090	10.9	7.31	1.066	11.5	6.94	1.020	14.9	6.10	0.898
2.20	7.6	7.30	0.938	7.7	7.20	0.929	7.9	7.09	0.932	8.9	6.85	0.924	12.7	6.18	0.858
2.40	8.6	7.07	1.253	6.0	6.99	0.858	6.2	6.91	0.857	7.2	6.73	0.853	11.0	6.20	0.819
2.60	6.8	6.90	1.162	5.4	6.84	0.928	5.0	6.77	0.795	5.9	6.64	0.797	9.7	6.19	0.781
2.80	4.8	6.73	0.954	4.4	6.70	0.862	4.1	6.66	0.782	5.0	6.55	0.751	8.6	6.18	0.745
3.00	4.1	6.70	0.928	3.7	6.65	0.835	3.5	6.60	0.760	4.3	6.49	0.709	7.8	6.15	0.711
3.20	3.0	6.67	0.775	2.7	6.60	0.694	2.8	6.54	0.654	3.7	6.43	0.661	7.0	6.12	0.680
3.40	2.6	6.55	0.747	2.3	6.50	0.654	2.3	6.45	0.608	3.2	6.36	0.612	6.4	6.10	0.650
3.60	2.1	6.39	0.686	2.0	6.37	0.653	2.0	6.34	0.626	2.8	6.28	0.581	5.9	6.07	0.624
3.80	1.9	6.25	0.678	1.8	6.24	0.652	1.8	6.23	0.628	2.5	6.20	0.587	5.5	6.03	0.601
4.00	1.6	6.14	0.657	1.6	6.15	0.638	1.6	6.15	0.620	2.3	6.13	0.587	5.1	6.00	0.581

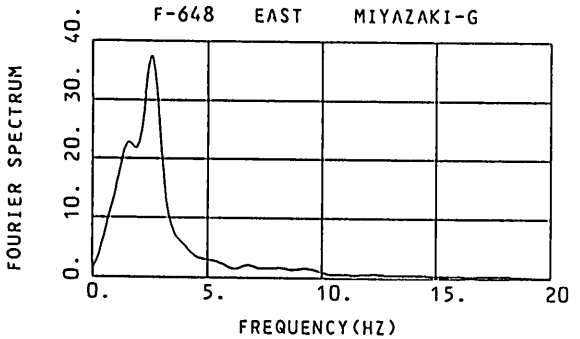
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

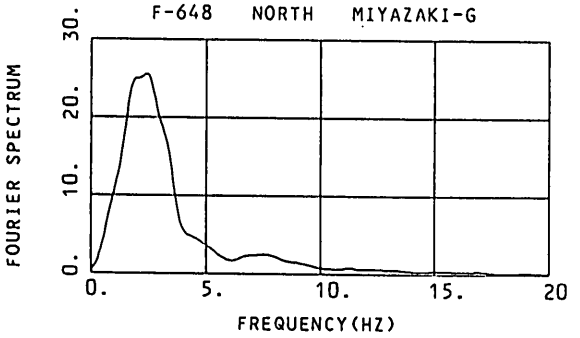
RESPONSE SPECTRUM

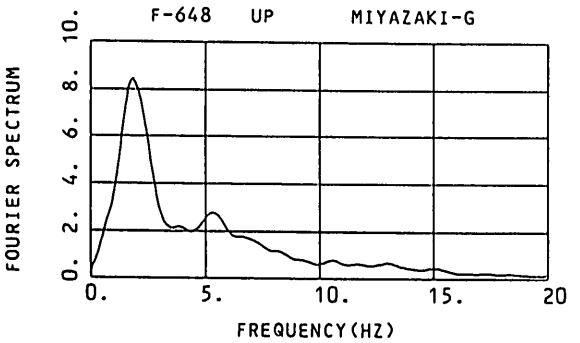
RECORD = F-648 COMPONENT = UP SIGNAL = CORRECTION = STATION = MIYAZAKI-G
DATE AND TIME = 1994.04.30.12.28 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 19.57 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

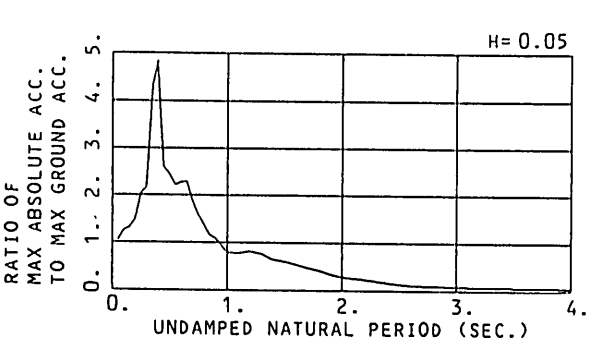
	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	27.9	0.11	0.002	22.3	0.06	0.001	21.1	0.05	0.001	20.6	0.04	0.001	20.5	0.03	0.001
0.10	61.3	0.86	0.016	29.2	0.32	0.007	23.8	0.29	0.006	21.5	0.23	0.005	21.1	0.15	0.005
0.15	89.8	2.06	0.051	44.7	0.81	0.026	33.7	0.55	0.019	25.0	0.38	0.014	23.1	0.22	0.013
0.20	144.1	4.52	0.146	51.3	1.38	0.052	38.6	0.97	0.039	31.3	0.62	0.031	26.6	0.38	0.026
0.25	59.2	2.25	0.094	43.2	1.39	0.068	37.5	1.10	0.059	30.8	0.82	0.048	26.7	0.55	0.040
0.30	96.0	4.39	0.219	42.9	1.85	0.098	36.6	1.43	0.083	31.2	1.21	0.070	26.9	0.88	0.057
0.35	76.8	4.30	0.238	34.5	1.77	0.107	36.8	1.55	0.114	36.5	1.61	0.112	27.6	1.17	0.081
0.40	108.3	6.74	0.439	61.0	3.44	0.247	54.2	2.74	0.218	43.5	2.16	0.174	29.8	1.39	0.112
0.45	72.6	5.19	0.372	65.3	4.66	0.335	58.1	4.00	0.296	46.9	3.02	0.237	31.7	1.84	0.148
0.50	207.8	16.45	1.316	102.8	8.16	0.649	72.9	5.86	0.459	51.7	3.89	0.321	32.4	2.24	0.183
0.55	70.5	6.09	0.540	64.9	6.00	0.496	59.7	5.46	0.455	48.9	4.23	0.367	30.8	2.49	0.214
0.60	168.6	16.00	1.537	78.7	7.86	0.716	63.7	6.35	0.577	47.6	4.66	0.425	29.6	2.72	0.243
0.65	87.3	9.39	0.934	64.2	7.06	0.687	53.6	6.05	0.571	41.2	4.76	0.431	27.9	2.84	0.264
0.70	42.0	5.01	0.521	44.7	5.58	0.553	41.7	5.18	0.514	35.4	4.32	0.428	25.4	2.79	0.273
0.75	78.4	9.33	1.117	38.0	4.84	0.541	34.1	4.35	0.483	29.1	3.69	0.402	22.6	2.63	0.273
0.80	39.1	4.93	0.633	28.3	4.36	0.457	25.7	3.94	0.413	22.9	3.36	0.359	19.9	2.43	0.267
0.85	26.5	3.77	0.486	16.6	3.26	0.302	17.1	3.20	0.310	17.5	2.98	0.310	17.5	2.36	0.260
0.90	20.5	3.38	0.420	13.5	2.43	0.276	12.5	2.51	0.254	14.4	2.66	0.285	15.6	2.32	0.254
0.95	23.8	4.35	0.545	15.7	2.82	0.357	13.9	2.54	0.314	13.3	2.58	0.291	14.0	2.29	0.249
1.00	29.3	4.80	0.741	14.4	3.07	0.363	13.2	2.79	0.330	12.3	2.60	0.299	12.7	2.28	0.246
1.10	19.7	3.86	0.604	13.2	2.57	0.403	12.1	2.69	0.367	10.8	2.69	0.316	10.5	2.27	0.237
1.20	22.5	4.56	0.821	13.1	4.03	0.477	11.0	3.52	0.396	8.8	2.89	0.304	8.6	2.23	0.220
1.30	17.5	4.47	0.748	13.1	3.61	0.560	10.5	3.08	0.444	7.8	2.49	0.317	7.1	2.13	0.202
1.40	14.9	3.95	0.738	10.4	3.39	0.516	9.0	2.97	0.443	7.5	2.43	0.359	6.0	2.02	0.227
1.50	9.8	2.75	0.557	8.4	2.34	0.477	7.7	2.16	0.434	6.7	1.99	0.373	5.5	1.94	0.243
1.60	10.2	2.83	0.658	7.1	2.56	0.460	6.8	2.29	0.435	6.1	1.84	0.380	5.3	1.94	0.250
1.70	11.5	3.19	0.839	7.1	2.73	0.519	6.5	2.40	0.471	5.5	1.92	0.395	5.1	1.99	0.251
1.80	12.3	3.56	1.013	8.2	2.68	0.670	6.9	2.54	0.555	5.3	2.33	0.412	4.8	2.07	0.251
1.90	12.9	4.19	1.180	7.5	3.51	0.685	6.1	3.13	0.553	4.7	2.66	0.408	4.4	2.14	0.252
2.00	9.8	4.34	0.990	7.0	3.73	0.706	5.5	3.31	0.555	3.9	2.79	0.377	3.9	2.19	0.246
2.20	5.4	2.68	0.665	4.9	2.73	0.594	4.4	2.71	0.529	3.8	2.57	0.430	3.7	2.19	0.291
2.40	3.5	2.15	0.518	3.5	2.21	0.502	3.4	2.25	0.483	3.3	2.27	0.437	3.5	2.12	0.323
2.60	2.8	2.04	0.476	2.8	2.06	0.477	2.8	2.07	0.467	2.9	2.07	0.435	3.3	2.02	0.339
2.80	2.8	2.11	0.557	2.6	2.08	0.516	2.5	2.04	0.485	2.5	1.96	0.438	3.0	1.92	0.344
3.00	2.4	2.36	0.544	2.2	2.25	0.503	2.2	2.17	0.471	2.2	2.04	0.425	2.8	1.84	0.341
3.20	1.7	2.37	0.439	1.7	2.28	0.430	1.7	2.21	0.418	1.8	2.09	0.394	2.5	1.85	0.333
3.40	1.2	2.28	0.360	1.3	2.23	0.365	1.3	2.18	0.365	1.5	2.09	0.357	2.3	1.88	0.320
3.60	1.0	2.21	0.318	1.0	2.18	0.322	1.1	2.15	0.325	1.3	2.08	0.325	2.1	1.89	0.306
3.80	0.8	2.17	0.287	0.8	2.14	0.290	0.9	2.11	0.293	1.1	2.06	0.296	1.9	1.90	0.291
4.00	0.7	2.13	0.267	0.7	2.10	0.258	0.7	2.08	0.263	0.9	2.03	0.271	1.8	1.90	0.278

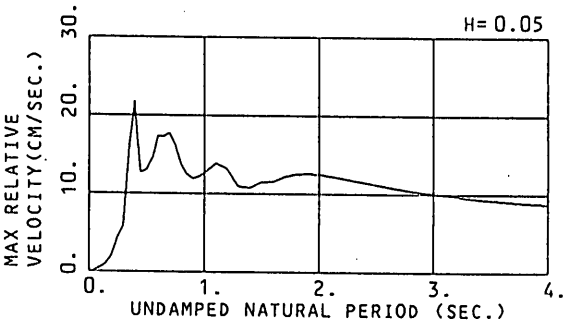
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

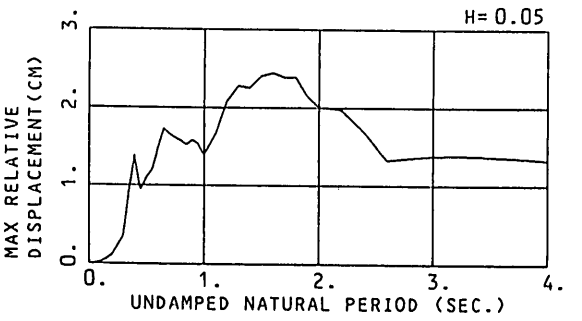






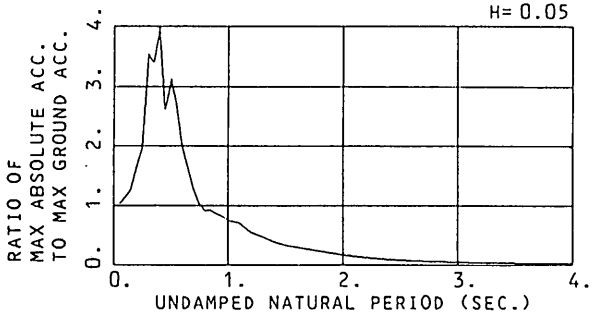


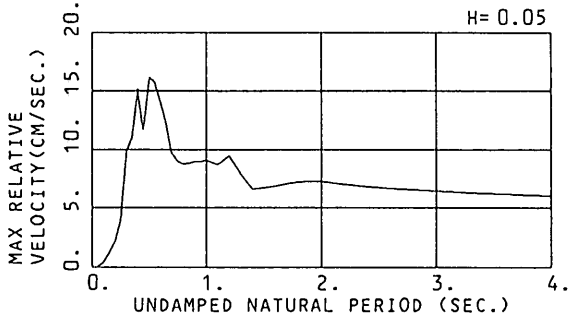


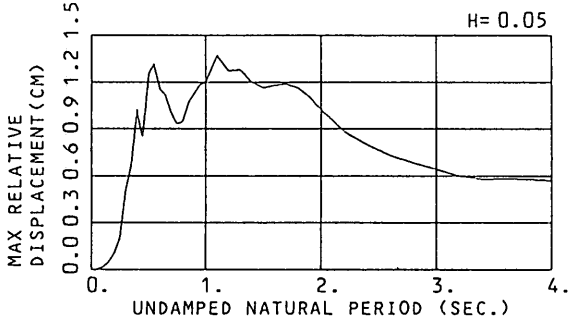


RESPONSE SPECTRA

F-648 NORTH MIYAZAKI-G
(1/FC=3.73 SEC.)

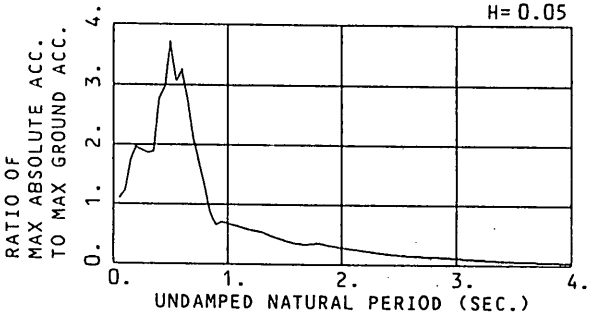


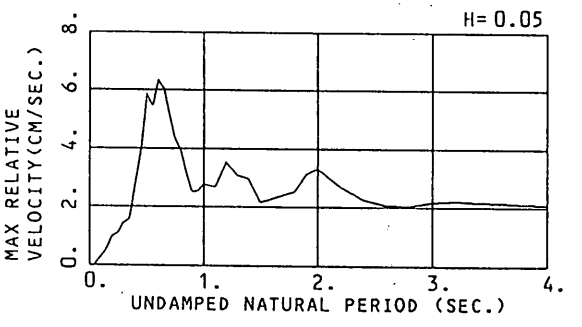


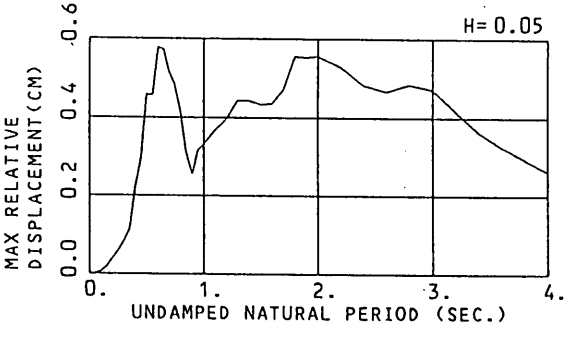


RESPONSE SPECTRA

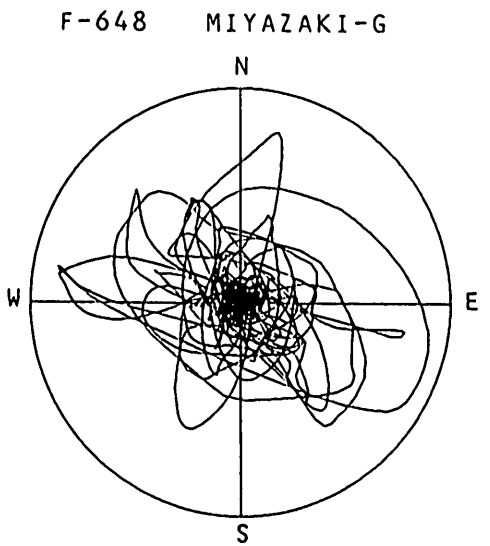
F-648 UP MIYAZAKI-G
(1/FC=3.42 SEC.)



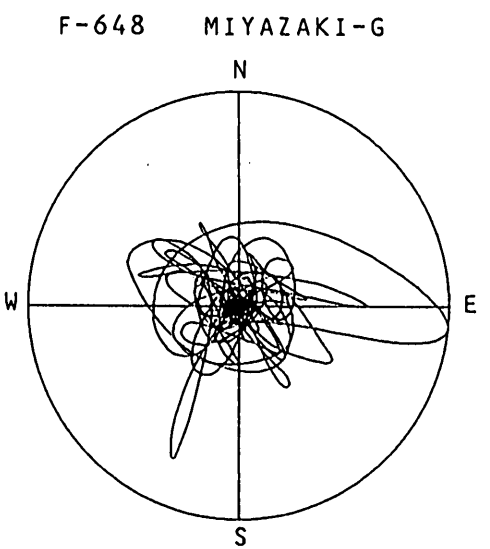




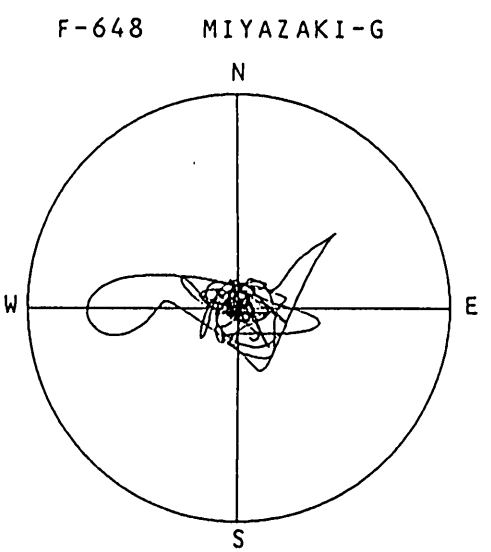
RESPONSE SPECTRA



ACCELERATION
R=80.0 GAL
MAX=73.6 GAL



VELOCITY
R=8.0 CM/SEC.
MAX=8.0 CM/SEC.



DISPLACEMENT
R=1.50 CM
MAX=1.07 CM

RECORD NUMBER : F-660

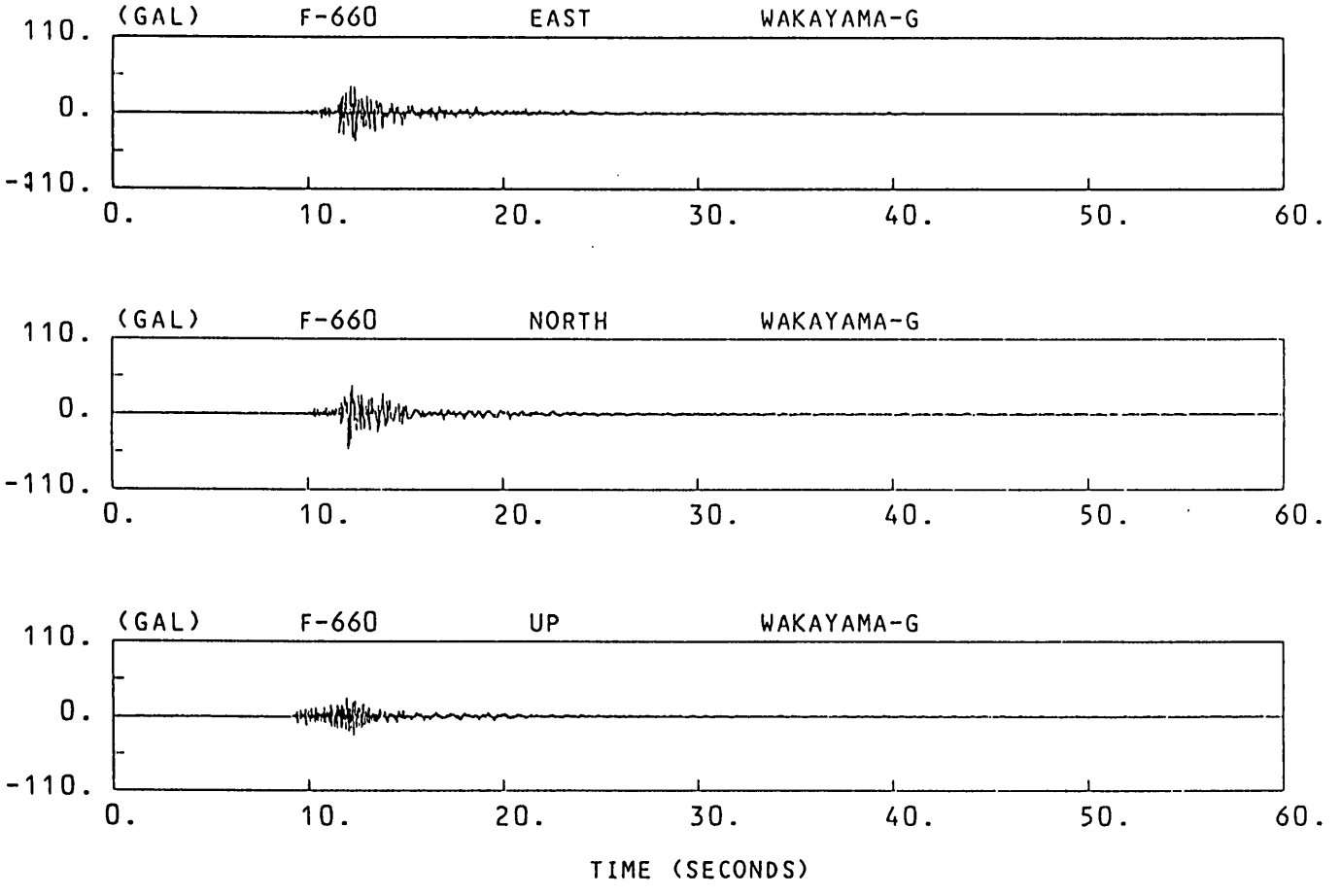
STATION : WAKAYAMA-G

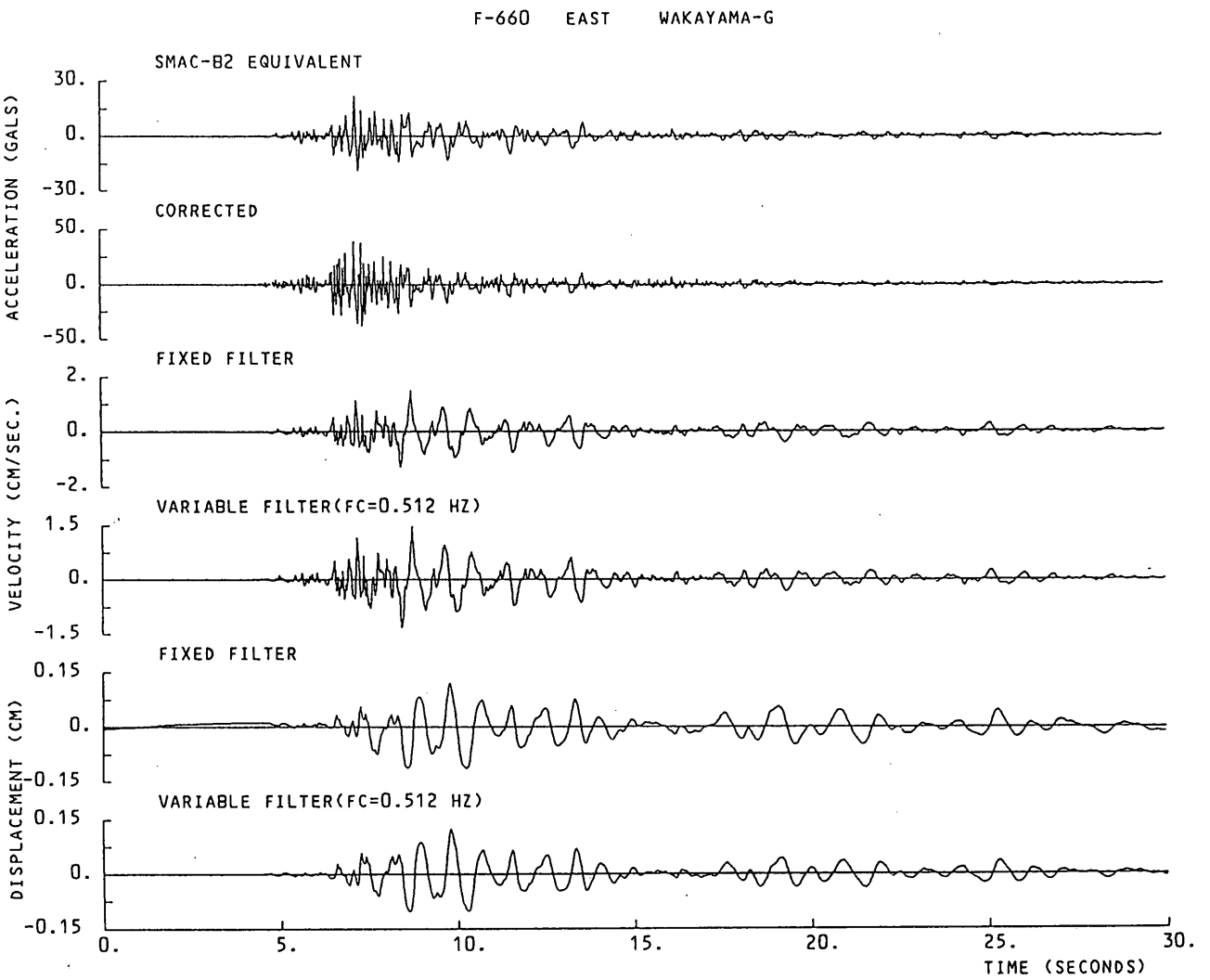
EARTHQUAKE DATA

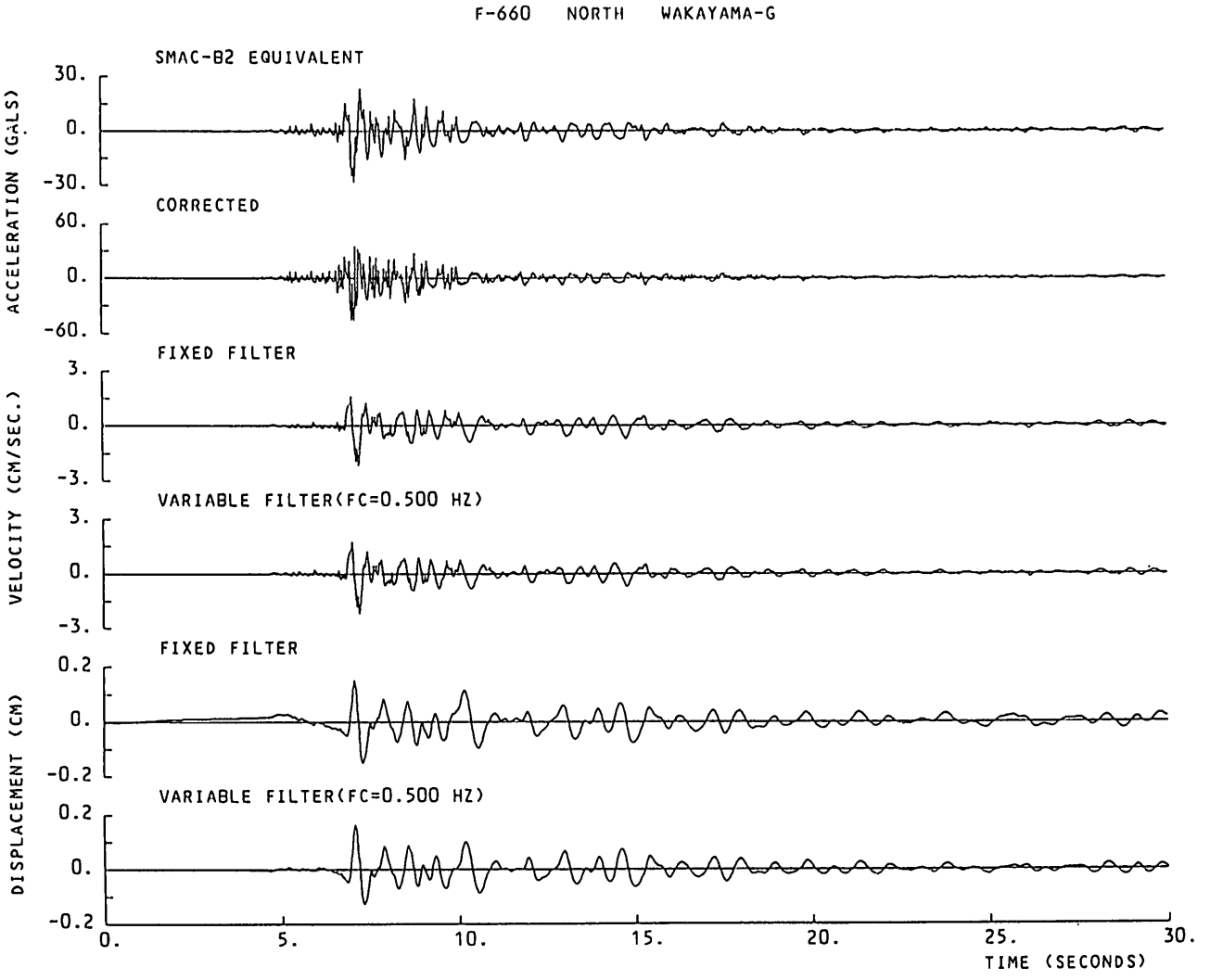
DATE AND TIME	17: 2 MAY 8,1994
LOCATION OF HYPOCENTER	
EPICENTRAL REGION	NW WAKAYAMA PREF
LATITUDE	34° 4.7' N
LONGITUDE	135° 7.4' E
DEPTH	10.7KM
JMA MAGNITUDE	4.9

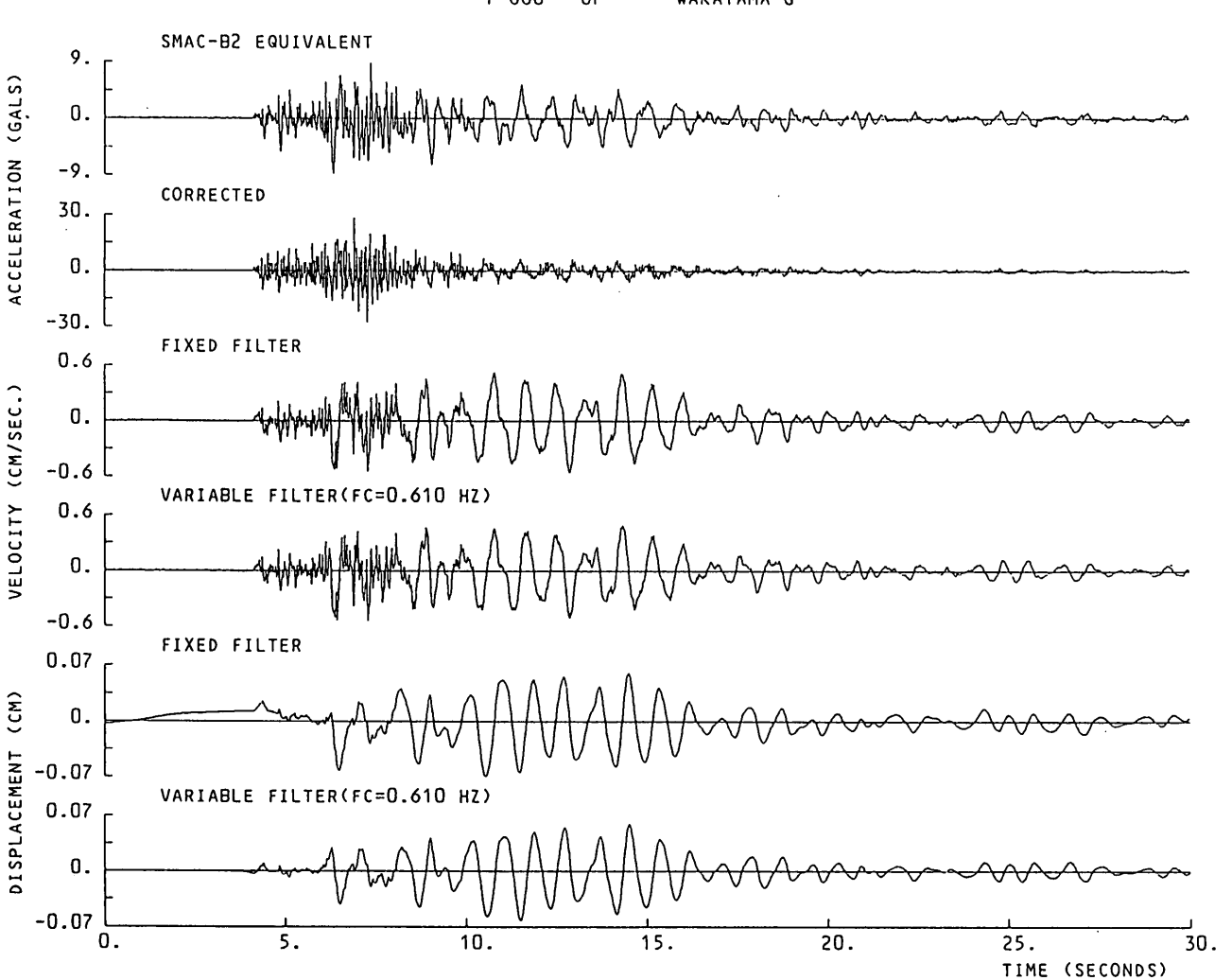
	PEAK VALUES OF COMPONENTS			
	N S	E W	U D	HORIZONTAL*
PARAMETER OF THE VARIABLE FILTER				
FC (HZ)	0.500	0.512	0.610	
MAXIMUM ACCELERATION (GAL)				
SMAC-B2 EQUIVALENT	28.6	23.2	8.8	28.9
ORIGINAL	51.2	41.5	28.2	53.5
CORRECTED	50.3	41.2	28.4	52.9
MAXIMUM VELOCITY (CM/SEC)				
FIXED FILTER	2.21	1.50	0.58	2.46
VARIABLE FILTER	2.23	1.48	0.55	2.50
MAXIMUM DISPLACEMENT (CM)				
FIXED FILTER	0.15	0.12	0.07	0.16
VARIABLE FILTER	0.16	0.12	0.06	0.16

* RESULTANT OF HORIZONTAL COMPONENTS


(GAL) F-660 EAST WAKAYAMA-G
110.
0.
-110.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-660 NORTH WAKAYAMA-G
110.
0.
-110.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-660 UP WAKAYAMA-G
110.
0.
-110.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


F-660 EAST WAKAYAMA-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.512 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.512 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
TIME (SECONDS)
30.
0.
-30.
50.
-50.
2.
-2.
1.5
-1.5
0.15
-0.15
5.
10.
15.
20.
25.


F-660 NORTH WAKAYAMA-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.500 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.500 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
30.
0.
-30.
60.
-60.
3.
-3.
0.2
-0.2
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-660 UP WAKAYAMA-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.610 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.610 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
9.
0.
-9.
30.
0.
-30.
0.6
0.
-0.6
0.6
0.
-0.6
0.07
0.
-0.07
0.07
0.
-0.07
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

RESPONSE SPECTRUM

RECORD = F-660 COMPONENT = EAST SIGNAL = CORRECTION = STATION = WAKAYAMA-G
DATE AND TIME = 1994.05.08.16.41 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 41.24 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	92.1	0.64	0.006	65.8	0.37	0.004	63.8	0.34	0.004	59.4	0.30	0.004	52.3	0.23	0.003
0.10	229.8	3.62	0.058	130.7	2.15	0.033	101.4	1.74	0.025	77.3	1.30	0.019	61.0	0.83	0.014
0.15	208.3	4.91	0.119	120.9	2.74	0.069	95.8	2.19	0.054	78.7	1.74	0.044	52.1	1.20	0.028
0.20	201.3	6.47	0.204	131.8	4.41	0.134	109.9	3.71	0.110	84.1	2.74	0.082	55.6	1.41	0.049
0.25	107.1	4.41	0.170	89.5	3.84	0.142	78.7	3.44	0.124	63.0	2.82	0.098	42.1	1.80	0.057
0.30	77.2	3.54	0.176	46.3	2.39	0.106	41.4	2.36	0.093	36.7	2.22	0.081	30.9	1.75	0.059
0.35	140.8	7.66	0.437	56.6	2.77	0.175	43.0	2.24	0.133	31.8	2.04	0.097	22.9	1.63	0.061
0.40	62.3	3.88	0.253	27.2	2.19	0.110	27.7	2.09	0.111	27.2	1.90	0.108	20.6	1.54	0.073
0.45	124.4	8.83	0.638	51.8	3.57	0.265	42.1	2.96	0.215	31.3	2.29	0.158	19.1	1.51	0.086
0.50	76.8	6.15	0.486	49.2	3.83	0.312	36.8	2.87	0.232	28.4	2.28	0.177	18.1	1.53	0.105
0.55	83.7	7.31	0.642	40.5	3.52	0.310	32.7	2.79	0.249	24.0	2.12	0.181	17.7	1.45	0.120
0.60	45.0	4.23	0.411	28.4	2.43	0.259	26.4	2.17	0.239	22.2	1.80	0.197	16.7	1.42	0.131
0.65	23.7	2.62	0.254	23.6	2.15	0.252	23.0	2.18	0.244	20.4	2.01	0.210	15.9	1.44	0.143
0.70	35.0	3.86	0.435	29.3	3.17	0.363	25.2	2.87	0.311	19.4	2.38	0.238	15.4	1.46	0.158
0.75	54.2	6.36	0.772	39.0	4.52	0.554	30.2	3.60	0.428	21.6	2.64	0.303	15.0	1.52	0.174
0.80	73.4	9.46	1.191	46.7	5.91	0.756	35.6	4.49	0.574	23.9	2.96	0.381	14.5	1.66	0.185
0.85	104.8	14.16	1.917	44.8	6.21	0.819	32.9	4.38	0.598	23.1	3.04	0.412	13.6	1.77	0.199
0.90	57.3	8.33	1.176	35.1	5.40	0.720	26.8	4.21	0.546	19.7	2.87	0.394	12.6	1.79	0.206
0.95	30.0	4.54	0.685	23.3	3.85	0.532	19.8	3.36	0.450	15.6	2.66	0.348	11.4	1.72	0.206
1.00	16.9	3.20	0.427	15.2	2.97	0.385	13.9	2.73	0.350	12.2	2.40	0.298	10.3	1.77	0.202
1.10	17.3	3.11	0.529	9.0	2.55	0.274	8.1	2.46	0.244	7.8	2.28	0.229	8.3	1.81	0.186
1.20	7.2	2.23	0.262	5.9	2.21	0.213	5.6	2.18	0.203	5.6	2.11	0.194	6.7	1.80	0.171
1.30	8.8	1.98	0.375	6.0	1.97	0.257	5.2	1.98	0.221	4.5	1.95	0.178	5.6	1.77	0.159
1.40	6.7	1.83	0.335	4.2	1.84	0.207	3.8	1.85	0.188	3.7	1.84	0.171	4.8	1.73	0.154
1.50	3.1	1.76	0.175	3.0	1.77	0.172	3.1	1.77	0.170	3.2	1.77	0.165	4.2	1.69	0.151
1.60	4.8	1.70	0.312	2.9	1.71	0.190	2.6	1.72	0.164	2.7	1.72	0.160	3.8	1.66	0.147
1.70	2.9	1.68	0.209	2.2	1.68	0.163	2.2	1.68	0.157	2.4	1.68	0.155	3.5	1.64	0.145
1.80	1.9	1.65	0.154	1.9	1.65	0.153	1.9	1.65	0.152	2.1	1.65	0.150	3.2	1.62	0.142
1.90	1.6	1.62	0.150	1.6	1.62	0.149	1.7	1.63	0.148	1.9	1.63	0.146	2.9	1.60	0.140
2.00	1.4	1.60	0.141	1.4	1.61	0.142	1.5	1.61	0.143	1.7	1.61	0.143	2.7	1.59	0.138
2.20	1.1	1.59	0.135	1.1	1.59	0.136	1.2	1.59	0.137	1.4	1.59	0.137	2.4	1.57	0.135
2.40	0.9	1.57	0.133	0.9	1.57	0.134	1.0	1.57	0.134	1.1	1.57	0.135	2.2	1.56	0.133
2.60	0.8	1.56	0.131	0.8	1.56	0.132	0.8	1.56	0.133	1.0	1.56	0.134	2.0	1.55	0.132
2.80	0.7	1.56	0.136	0.7	1.55	0.136	0.7	1.55	0.135	0.9	1.55	0.134	1.8	1.54	0.131
3.00	0.6	1.55	0.140	0.6	1.54	0.138	0.7	1.54	0.136	0.8	1.54	0.134	1.7	1.53	0.131
3.20	0.5	1.53	0.137	0.5	1.53	0.136	0.6	1.53	0.135	0.7	1.53	0.134	1.5	1.52	0.131
3.40	0.4	1.51	0.131	0.5	1.52	0.132	0.5	1.52	0.132	0.6	1.52	0.132	1.4	1.52	0.130
3.60	0.4	1.51	0.129	0.4	1.51	0.130	0.5	1.51	0.131	0.6	1.52	0.131	1.3	1.51	0.130
3.80	0.4	1.51	0.130	0.4	1.51	0.131	0.4	1.51	0.131	0.5	1.51	0.131	1.3	1.51	0.129
4.00	0.3	1.51	0.133	0.3	1.51	0.132	0.4	1.51	0.132	0.5	1.51	0.131	1.2	1.51	0.129

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

RESPONSE SPECTRUM

RECORD = F-660 COMPONENT = NORTH SIGNAL = CORRECTION = STATION = WAKAYAMA-G
DATE AND TIME = 1994.05.08.16.41 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 50.29 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	80.1	0.55	0.005	68.7	0.44	0.004	68.5	0.43	0.004	69.0	0.39	0.004	64.8	0.29	0.004
0.10	152.1	2.44	0.039	125.0	1.77	0.032	113.5	1.51	0.029	94.7	1.23	0.023	74.3	0.81	0.017
0.15	247.0	5.92	0.141	145.7	3.52	0.082	112.0	2.61	0.064	76.4	1.75	0.044	54.5	0.94	0.028
0.20	178.5	5.65	0.181	77.3	2.56	0.078	70.2	2.24	0.070	54.3	1.64	0.054	43.3	1.18	0.039
0.25	79.6	3.46	0.126	63.4	2.79	0.100	53.7	2.31	0.085	48.8	2.01	0.077	42.9	1.47	0.065
0.30	87.1	4.10	0.199	71.8	3.18	0.164	67.1	2.83	0.152	58.8	2.24	0.132	47.8	1.61	0.099
0.35	140.3	7.35	0.435	95.7	5.63	0.295	83.8	4.71	0.258	69.6	3.43	0.212	48.4	2.07	0.133
0.40	175.0	11.11	0.709	99.0	5.99	0.400	83.3	5.13	0.336	65.0	4.10	0.257	45.1	2.48	0.157
0.45	193.6	13.70	0.993	84.2	6.70	0.432	72.0	5.89	0.368	59.4	4.69	0.300	39.0	2.90	0.180
0.50	140.5	11.05	0.890	84.2	6.86	0.534	64.5	5.59	0.407	53.7	4.52	0.333	35.1	3.06	0.203
0.55	116.9	10.21	0.896	57.9	4.86	0.444	53.2	4.59	0.405	45.6	4.13	0.340	32.1	3.07	0.215
0.60	48.9	4.56	0.446	45.5	4.27	0.414	42.3	4.03	0.383	37.3	3.72	0.329	28.2	2.94	0.217
0.65	41.4	4.56	0.443	36.6	4.22	0.391	33.9	3.92	0.360	30.0	3.40	0.309	25.6	2.78	0.226
0.70	55.7	6.30	0.692	38.4	5.09	0.476	28.9	4.26	0.356	25.0	3.36	0.297	23.4	2.80	0.233
0.75	87.8	10.51	1.251	40.1	5.09	0.570	31.2	4.21	0.442	23.1	3.24	0.320	21.4	2.80	0.236
0.80	63.4	8.14	1.027	38.3	4.80	0.619	27.9	3.81	0.449	20.7	3.09	0.326	19.5	2.79	0.237
0.85	95.7	13.08	1.751	32.2	4.37	0.589	21.9	3.68	0.399	16.8	3.02	0.299	17.7	2.76	0.237
0.90	34.0	4.92	0.697	23.0	3.63	0.471	19.0	3.18	0.388	14.8	2.96	0.297	16.1	2.73	0.235
0.95	31.1	5.01	0.710	19.3	3.43	0.441	15.2	3.00	0.342	12.9	2.90	0.279	14.7	2.70	0.232
1.00	28.1	4.74	0.712	16.5	3.12	0.418	11.6	3.01	0.289	11.3	2.83	0.270	13.5	2.67	0.228
1.10	13.8	3.12	0.422	11.1	3.03	0.341	9.4	2.94	0.286	8.7	2.78	0.247	11.3	2.59	0.219
1.20	8.7	2.91	0.318	6.7	2.86	0.242	6.4	2.81	0.227	6.8	2.71	0.226	9.7	2.51	0.210
1.30	6.4	2.76	0.276	4.9	2.73	0.207	5.1	2.70	0.209	5.5	2.63	0.210	8.4	2.44	0.202
1.40	8.3	2.65	0.413	5.3	2.64	0.262	4.3	2.62	0.211	4.6	2.57	0.199	7.4	2.37	0.194
1.50	6.1	2.61	0.346	4.4	2.59	0.248	3.7	2.58	0.207	3.9	2.53	0.192	6.7	2.36	0.188
1.60	4.0	2.59	0.262	3.3	2.57	0.215	3.1	2.54	0.200	3.5	2.50	0.185	6.0	2.35	0.182
1.70	3.0	2.55	0.218	2.8	2.53	0.204	2.8	2.51	0.192	3.2	2.48	0.181	5.5	2.34	0.177
1.80	2.3	2.52	0.190	2.3	2.50	0.188	2.5	2.49	0.186	2.9	2.45	0.182	5.0	2.33	0.172
1.90	2.1	2.49	0.192	2.1	2.47	0.189	2.3	2.46	0.187	2.7	2.43	0.182	4.7	2.32	0.171
2.00	1.9	2.46	0.194	1.9	2.44	0.191	2.1	2.43	0.188	2.5	2.40	0.183	4.3	2.31	0.171
2.20	1.6	2.39	0.193	1.6	2.38	0.189	1.7	2.38	0.187	2.1	2.36	0.182	3.8	2.29	0.172
2.40	1.3	2.34	0.185	1.3	2.34	0.184	1.5	2.34	0.182	1.8	2.33	0.180	3.4	2.28	0.171
2.60	1.0	2.31	0.179	1.1	2.31	0.179	1.3	2.31	0.178	1.6	2.30	0.177	3.1	2.26	0.171
2.80	0.9	2.30	0.178	1.0	2.29	0.177	1.1	2.29	0.176	1.4	2.29	0.175	2.8	2.25	0.170
3.00	0.8	2.28	0.177	0.8	2.28	0.176	1.0	2.28	0.175	1.3	2.27	0.174	2.6	2.24	0.169
3.20	0.7	2.27	0.175	0.7	2.26	0.174	0.9	2.26	0.173	1.2	2.26	0.172	2.4	2.24	0.168
3.40	0.6	2.25	0.172	0.6	2.25	0.171	0.8	2.25	0.171	1.1	2.25	0.170	2.2	2.23	0.167
3.60	0.5	2.25	0.168	0.6	2.25	0.168	0.7	2.25	0.168	1.0	2.24	0.168	2.1	2.23	0.167
3.80	0.5	2.24	0.165	0.5	2.24	0.165	0.6	2.24	0.166	0.9	2.24	0.166	2.0	2.22	0.166
4.00	0.4	2.24	0.163	0.5	2.24	0.164	0.6	2.24	0.165	0.8	2.24	0.165	1.9	2.22	0.166

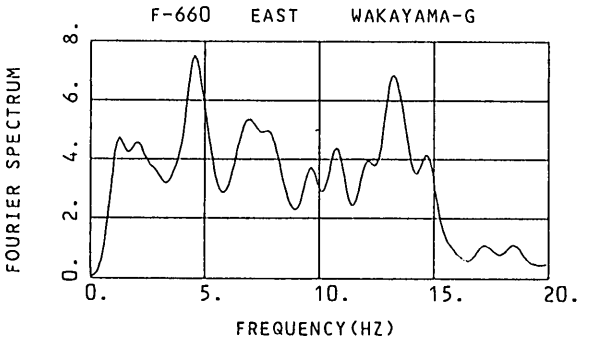
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

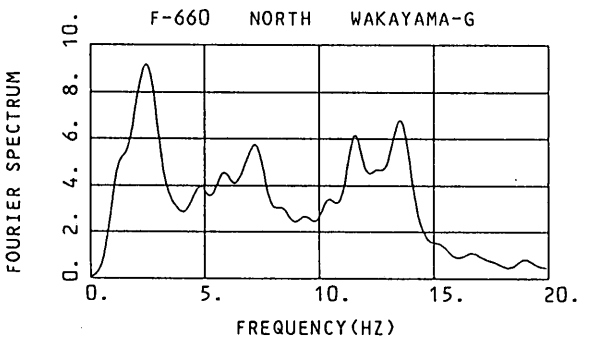
RESPONSE SPECTRUM

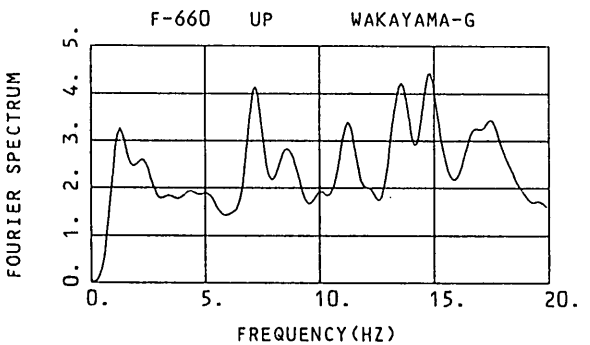
RECORD = F-660 COMPONENT = UP SIGNAL = CORRECTION = STATION = WAKAYAMA-G
DATE AND TIME = 1994.05.08.16.41 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 28.39 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

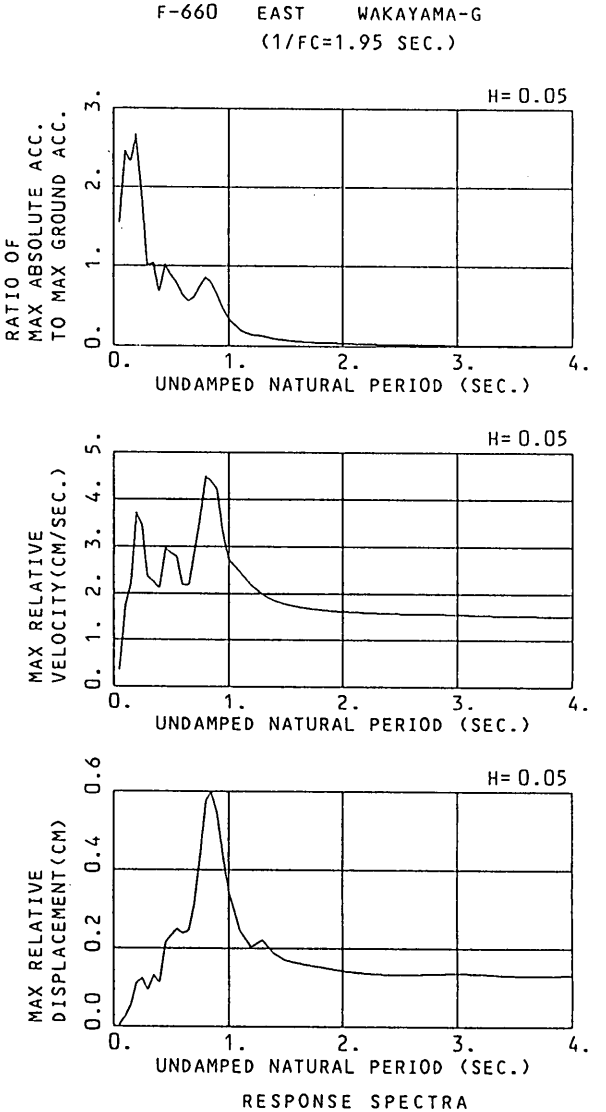
	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	217.6	1.73	0.014	83.6	0.62	0.005	69.9	0.48	0.004	58.2	0.36	0.004	47.3	0.24	0.003
0.10	192.5	3.04	0.049	67.8	1.07	0.017	49.6	0.81	0.013	39.9	0.65	0.010	31.3	0.42	0.007
0.15	67.7	1.63	0.039	55.1	1.40	0.032	42.7	1.18	0.024	34.9	0.95	0.019	25.6	0.61	0.013
0.20	123.8	3.93	0.125	48.5	1.64	0.049	34.1	1.15	0.034	23.4	0.84	0.023	16.9	0.57	0.015
0.25	53.9	2.13	0.085	26.6	1.20	0.042	21.1	0.99	0.033	16.3	0.77	0.025	12.7	0.56	0.018
0.30	41.9	2.01	0.095	23.3	1.05	0.053	18.6	1.02	0.042	16.4	0.89	0.036	12.6	0.60	0.025
0.35	37.3	2.01	0.116	20.8	1.15	0.064	19.2	1.03	0.059	16.4	0.82	0.050	11.6	0.55	0.034
0.40	35.2	2.13	0.143	24.8	1.40	0.100	19.6	1.12	0.078	14.1	0.85	0.055	11.2	0.60	0.039
0.45	73.1	5.15	0.375	31.6	2.31	0.162	21.1	1.60	0.108	13.8	1.05	0.069	10.1	0.65	0.044
0.50	30.2	2.41	0.192	16.7	1.51	0.106	13.1	1.31	0.082	10.9	1.02	0.067	9.3	0.68	0.052
0.55	40.5	3.51	0.310	17.0	1.55	0.130	13.0	1.29	0.099	10.5	1.00	0.078	8.9	0.70	0.059
0.60	33.0	3.10	0.301	20.3	1.91	0.184	15.5	1.44	0.141	11.5	1.01	0.103	8.5	0.70	0.065
0.65	32.4	3.18	0.347	20.8	2.10	0.222	15.0	1.55	0.160	10.7	1.10	0.113	7.9	0.79	0.072
0.70	50.4	5.59	0.625	20.2	2.13	0.251	13.6	1.61	0.168	10.5	1.25	0.128	7.1	0.85	0.080
0.75	22.4	2.72	0.319	19.9	2.37	0.284	16.8	2.05	0.238	12.0	1.54	0.168	7.4	0.88	0.095
0.80	31.5	4.08	0.511	23.4	2.98	0.379	18.6	2.43	0.299	13.3	1.72	0.211	7.6	0.89	0.107
0.85	62.0	8.42	1.135	29.8	4.09	0.544	19.9	2.74	0.363	13.4	1.73	0.240	7.3	0.88	0.114
0.90	52.3	7.51	1.073	29.4	4.29	0.602	19.8	2.88	0.405	11.9	1.84	0.239	6.6	0.89	0.113
0.95	34.2	5.33	0.782	20.6	3.44	0.470	15.2	2.62	0.345	10.2	1.75	0.226	5.8	0.93	0.117
1.00	22.0	3.62	0.556	16.0	2.70	0.405	12.6	2.18	0.318	8.9	1.61	0.221	5.3	0.95	0.117
1.10	10.4	2.07	0.319	7.5	1.55	0.230	6.7	1.34	0.204	5.6	1.24	0.167	4.3	0.92	0.110
1.20	4.6	1.25	0.168	4.2	1.11	0.151	4.1	1.01	0.149	3.9	0.97	0.135	3.4	0.84	0.102
1.30	5.3	1.45	0.227	3.9	1.16	0.168	3.4	1.02	0.146	3.2	0.89	0.129	2.9	0.76	0.099
1.40	3.4	1.03	0.170	3.1	0.93	0.152	2.8	0.86	0.139	2.6	0.77	0.122	2.4	0.70	0.095
1.50	2.0	0.87	0.114	1.9	0.82	0.109	2.0	0.78	0.110	2.0	0.73	0.107	2.1	0.67	0.091
1.60	1.5	0.71	0.097	1.5	0.73	0.094	1.5	0.72	0.093	1.6	0.71	0.094	1.8	0.66	0.086
1.70	1.2	0.69	0.087	1.2	0.69	0.086	1.2	0.68	0.086	1.3	0.68	0.086	1.6	0.64	0.082
1.80	1.0	0.65	0.086	1.0	0.64	0.084	1.0	0.65	0.083	1.1	0.65	0.081	1.4	0.63	0.079
1.90	0.9	0.62	0.087	0.9	0.62	0.084	0.9	0.62	0.082	1.0	0.63	0.079	1.3	0.62	0.076
2.00	0.8	0.59	0.083	0.8	0.60	0.082	0.8	0.61	0.080	0.9	0.62	0.078	1.2	0.61	0.074
2.20	0.6	0.60	0.079	0.6	0.60	0.077	0.6	0.60	0.076	0.7	0.60	0.074	1.0	0.60	0.072
2.40	0.5	0.60	0.075	0.5	0.59	0.073	0.5	0.59	0.072	0.6	0.59	0.071	0.9	0.59	0.070
2.60	0.4	0.57	0.072	0.4	0.58	0.072	0.4	0.58	0.071	0.5	0.58	0.071	0.8	0.58	0.069
2.80	0.4	0.57	0.070	0.4	0.57	0.070	0.4	0.57	0.070	0.4	0.57	0.070	0.7	0.57	0.068
3.00	0.3	0.55	0.072	0.3	0.56	0.070	0.3	0.56	0.070	0.4	0.56	0.069	0.7	0.57	0.068
3.20	0.3	0.55	0.068	0.3	0.55	0.068	0.3	0.55	0.068	0.3	0.56	0.067	0.6	0.56	0.067
3.40	0.2	0.55	0.069	0.2	0.55	0.067	0.2	0.55	0.065	0.3	0.56	0.066	0.6	0.56	0.066
3.60	0.2	0.56	0.065	0.2	0.55	0.065	0.2	0.55	0.064	0.3	0.55	0.065	0.5	0.56	0.066
3.80	0.2	0.55	0.065	0.2	0.55	0.064	0.2	0.55	0.064	0.3	0.55	0.065	0.5	0.56	0.065
4.00	0.2	0.55	0.067	0.2	0.55	0.066	0.2	0.55	0.066	0.2	0.55	0.065	0.5	0.55	0.065

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

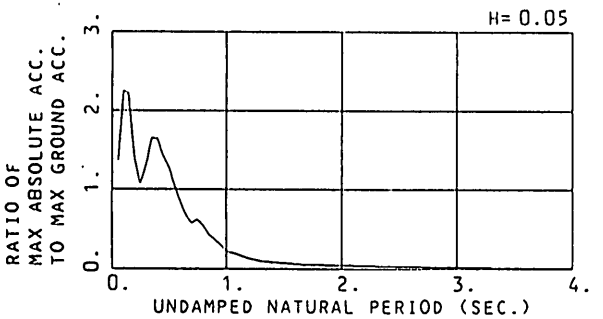

F-660 EAST WAKAYAMA-G
FOURIER SPECTRUM
0. 2. 4. 6. 8.
0. 5. 10. 15. 20.
FREQUENCY(HZ)

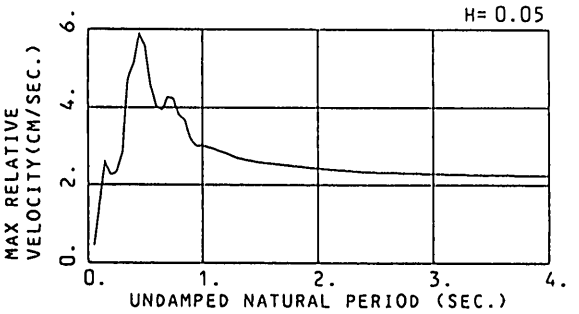

F-660 NORTH WAKAYAMA-G
FOURIER SPECTRUM
0. 2. 4. 6. 8. 10.
0. 5. 10. 15. 20.
FREQUENCY(HZ)

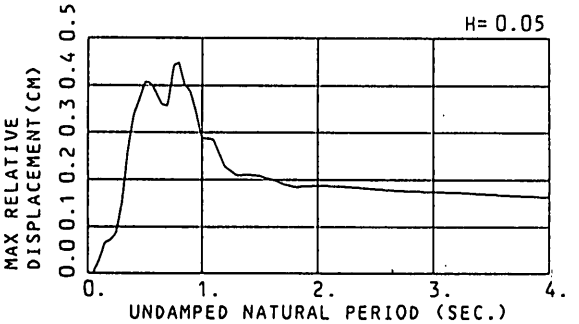

F-660 UP WAKAYAMA-G
FOURIER SPECTRUM
0. 1. 2. 3. 4. 5.
0. 5. 10. 15. 20.
FREQUENCY(HZ)


F-660 EAST WAKAYAMA-G
(1/FC=1.95 SEC.)
H= 0.05
RATIO OF
MAX ABSOLUTE ACC.
TO MAX GROUND ACC.
0. 1. 2. 3.
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
H= 0.05
MAX RELATIVE
VELOCITY(CM/SEC.)
0. 1. 2. 3. 4. 5.
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
H= 0.05
MAX RELATIVE
DISPLACEMENT(CM)
0.0 0.2 0.4 0.6
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
RESPONSE SPECTRA

F-660 NORTH WAKAYAMA-G
(1/FC=2.00 SEC.)

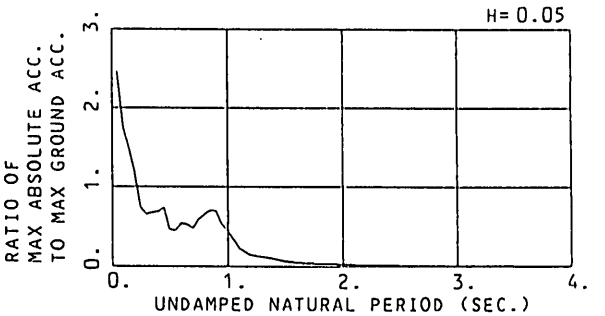


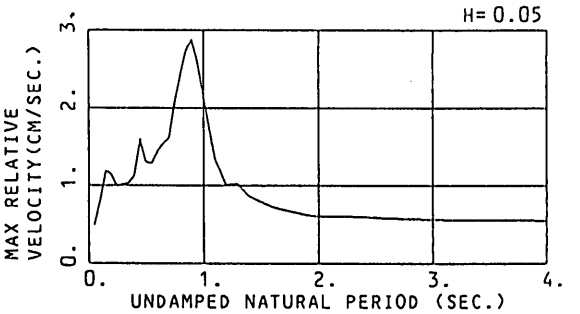


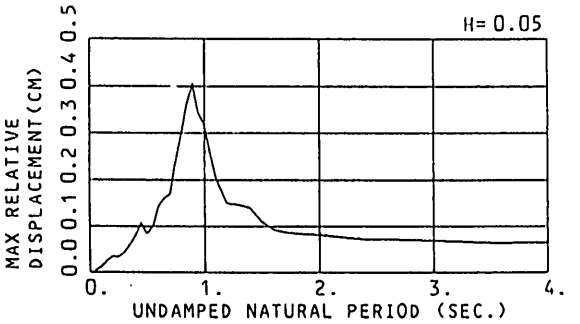


RESPONSE SPECTRA

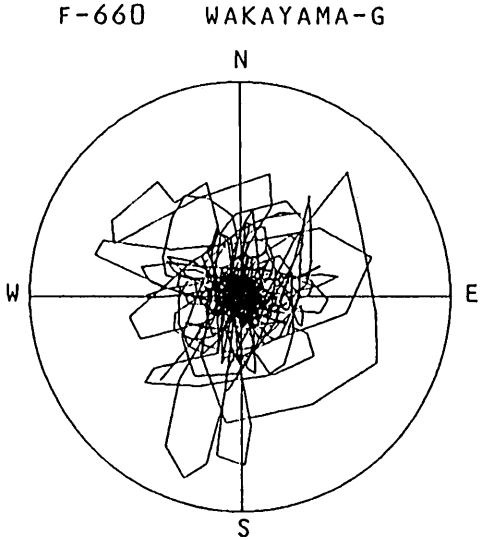
F-660 UP WAKAYAMA-G
(1/FC=1.64 SEC.)



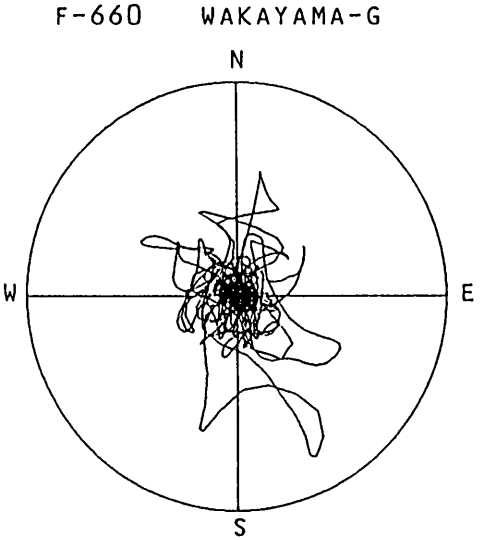




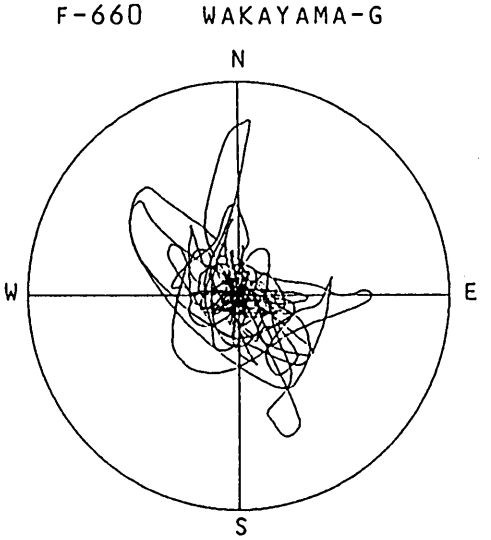
RESPONSE SPECTRA



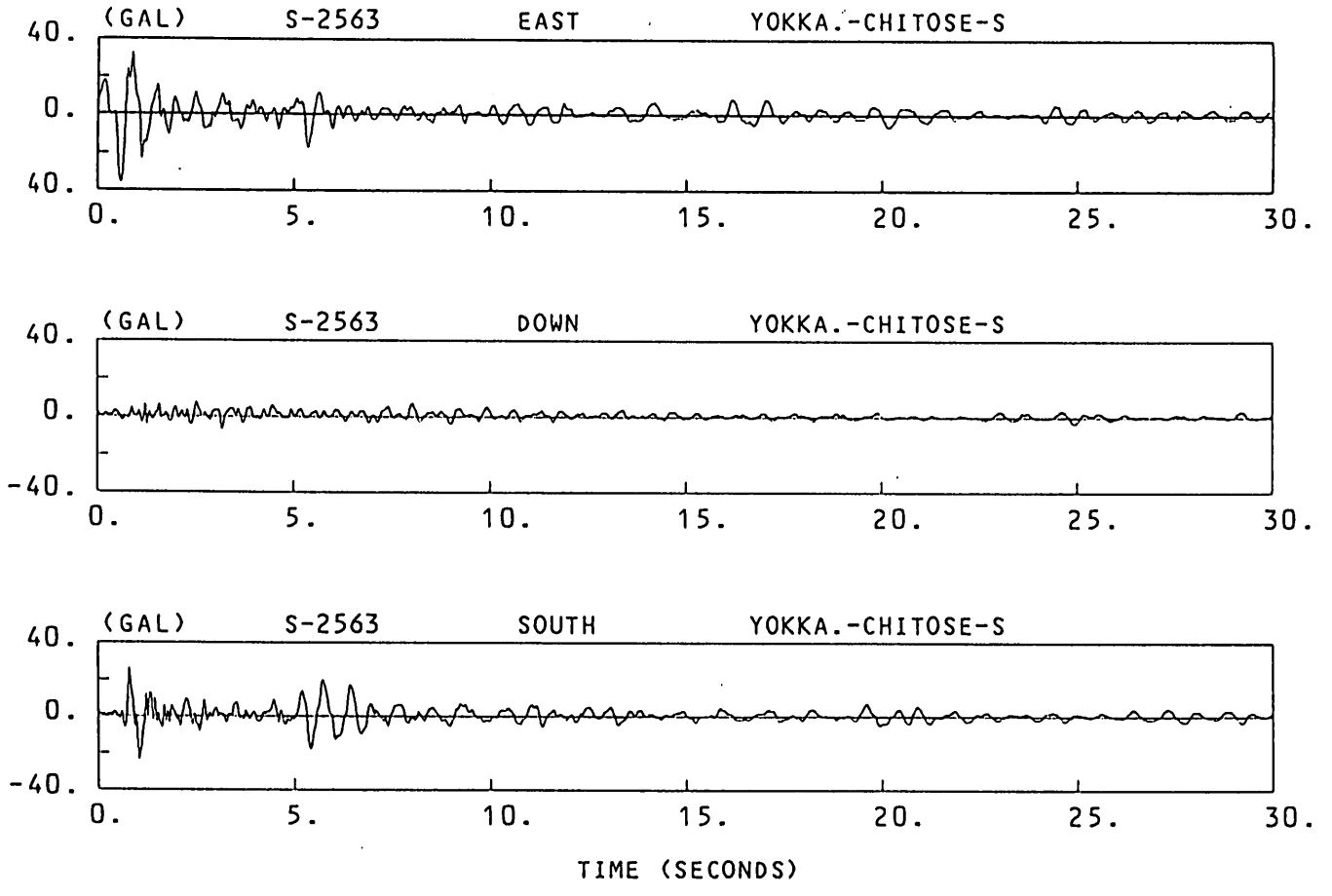
ACCELERATION
R=60.0 GAL
MAX=52.9 GAL



VELOCITY
R=3.0 CM/SEC.
MAX=2.5 CM/SEC.



DISPLACEMENT
R=0.20 CM
MAX=0.16 CM


(GAL) S-2563 EAST YOKKA.-CHITOSE-S
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
(GAL) S-2563 DOWN YOKKA.-CHITOSE-S
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
(GAL) S-2563 SOUTH YOKKA.-CHITOSE-S
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
TIME (SECONDS)

RECORD NUMBER : F-652

STATION : KOMATSUJIMA-G

EARTHQUAKE DATA

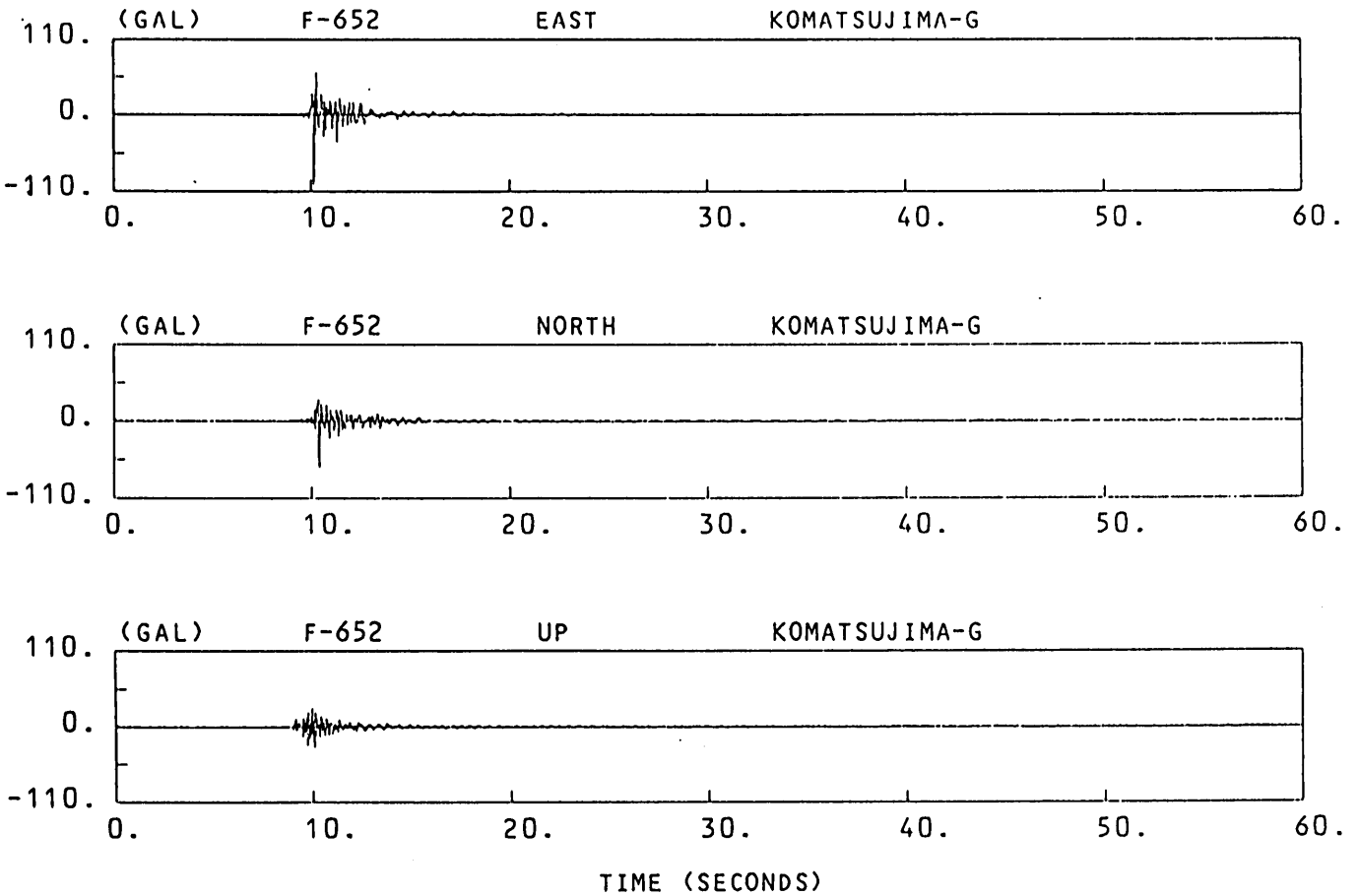
****

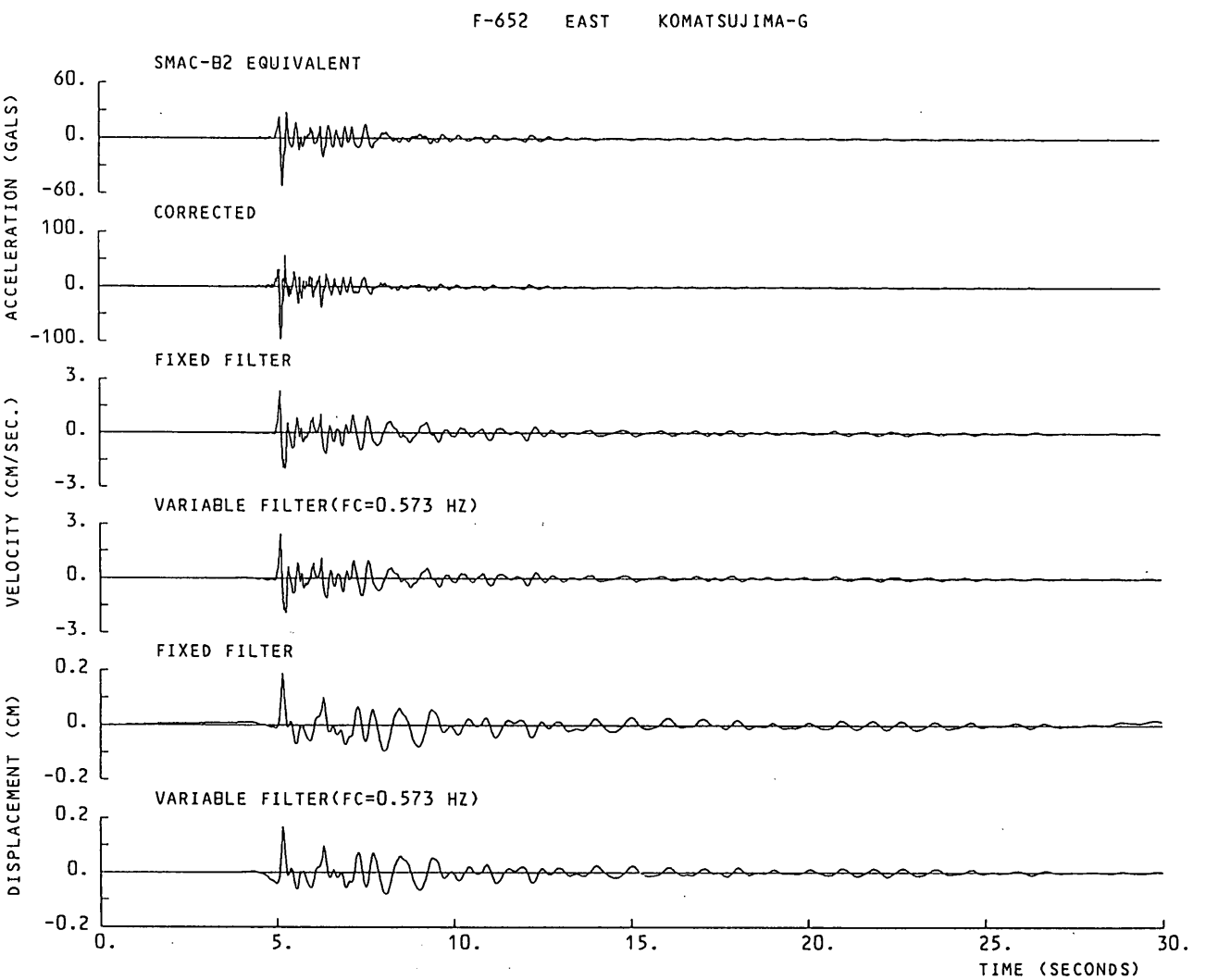
DATE AND TIME	11:13 JUNE17,1994
LOCATION OF HYPOCENTER	
EPICENTRAL REGION	TOKUSHIMA PREF
LATITUDE	34° 4.7' N
LONGITUDE	134° 37.8' E
DEPTH	7.7KM
JMA MAGNITUDE	4.0

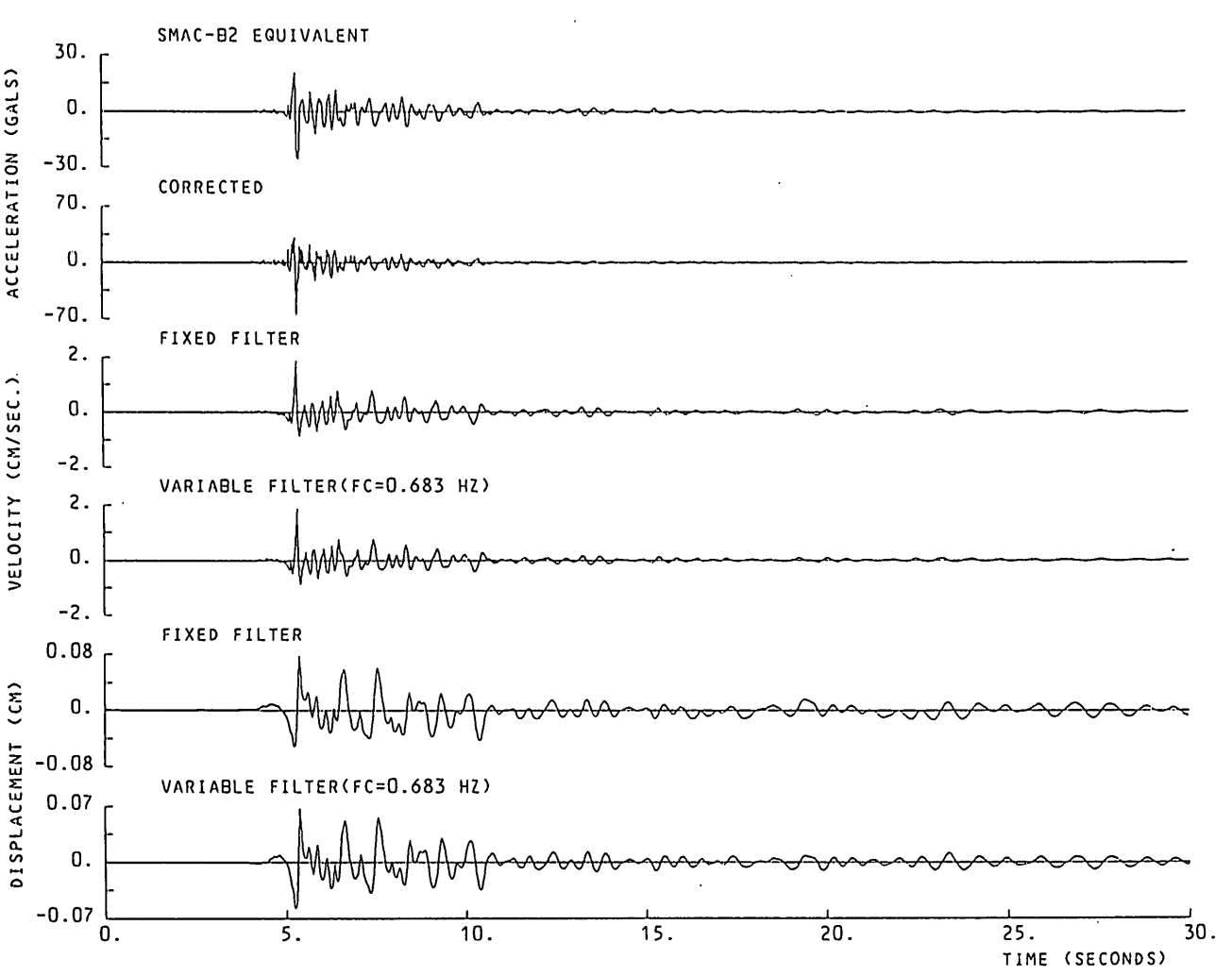
****

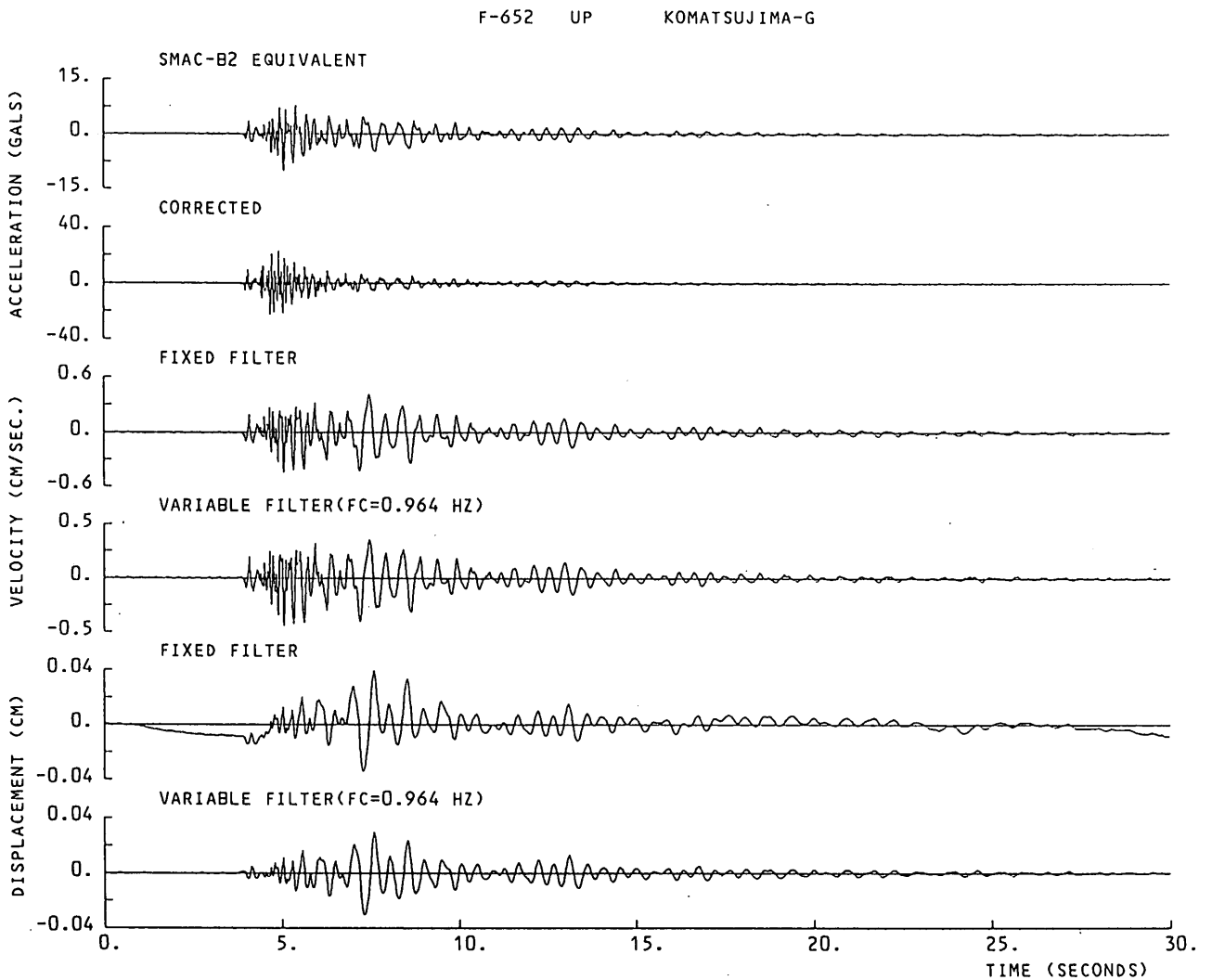
	PEAK VALUES OF COMPONENTS			
	N S	E W	U D	HORIZONTAL*
PARAMETER OF THE VARIABLE FILTER				
FC (HZ)	0.683	0.573	0.964	
MAXIMUM ACCELERATION (GAL)				
SMAC-B2 EQUIVALENT	26.1	53.0	10.2	53.2
ORIGINAL	66.8	100.7	30.1	100.7
CORRECTED	65.9	97.3	33.6	97.5
MAXIMUM VELOCITY (CM/SEC)				
FIXED FILTER	1.88	2.51	0.50	2.53
VARIABLE FILTER	1.87	2.65	0.50	2.68
MAXIMUM DISPLACEMENT (CM)				
FIXED FILTER	0.08	0.19	0.04	0.19
VARIABLE FILTER	0.07	0.17	0.03	0.17

* RESULTANT OF HORIZONTAL COMPONENTS


(GAL) F-652 EAST KOMATSUJIMA-G
110.
0.
-110.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-652 NORTH KOMATSUJIMA-G
110.
0.
-110.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-652 UP KOMATSUJIMA-G
110.
0.
-110.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


F-652 EAST KOMATSUJIMA-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.573 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.573 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
60.
0.
-60.
100.
0.
-100.
3.
0.
-3.
3.
0.
-3.
0.2
0.
-0.2
0.2
0.
-0.2
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-652 NORTH KOMATSUJIMA-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.683 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.683 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
30.
0.
-30.
70.
0.
-70.
2.
0.
-2.
2.
0.
-2.
0.08
0.
-0.08
0.07
0.
-0.07
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-652 UP KOMATSUJIMA-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.964 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.964 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
15.
0.
-15.
40.
0.
-40.
0.6
0.
-0.6
0.5
0.
-0.5
0.04
0.
-0.04
0.04
0.
-0.04
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

RESPONSE SPECTRUM

RECORD = F-652 COMPONENT = EAST SIGNAL = CORRECTION = STATION = KOMATSUJIMA-G
DATE AND TIME = 1994.06.17.11.13 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 97.33 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	302.4	2.18	0.019	191.3	0.95	0.012	179.6	0.75	0.011	162.7	0.62	0.010	138.0	0.47	0.008
0.10	413.2	6.54	0.105	227.0	3.57	0.058	187.1	2.81	0.047	168.3	2.28	0.042	141.7	1.56	0.034
0.15	229.8	5.36	0.131	170.3	3.89	0.097	163.7	3.65	0.093	150.0	3.19	0.085	128.9	2.13	0.067
0.20	231.4	7.12	0.234	176.9	5.51	0.180	156.5	4.85	0.157	131.1	3.79	0.130	108.7	2.59	0.097
0.25	255.4	10.50	0.404	193.1	8.25	0.306	156.6	6.60	0.248	122.7	4.72	0.189	87.1	3.12	0.118
0.30	227.0	11.22	0.518	143.4	7.02	0.327	108.3	5.60	0.247	90.1	4.87	0.201	67.9	3.39	0.135
0.35	94.9	5.78	0.295	83.5	5.43	0.259	75.3	5.09	0.233	68.6	4.49	0.208	54.5	3.52	0.153
0.40	68.4	4.77	0.277	64.9	4.52	0.261	61.6	4.29	0.247	56.9	4.05	0.223	47.4	3.52	0.167
0.45	58.0	4.29	0.297	51.3	4.20	0.262	48.9	4.11	0.249	45.8	3.93	0.226	41.0	3.45	0.174
0.50	128.7	10.16	0.815	79.2	6.17	0.502	57.2	4.64	0.360	37.8	3.75	0.234	34.9	3.39	0.174
0.55	84.7	7.36	0.649	53.3	5.19	0.408	39.5	4.09	0.301	29.1	3.56	0.211	29.6	3.31	0.172
0.60	40.9	4.25	0.373	33.2	3.50	0.302	27.7	3.43	0.251	23.2	3.39	0.198	25.2	3.22	0.165
0.65	44.5	4.35	0.477	30.7	3.32	0.329	23.5	3.25	0.250	18.7	3.24	0.186	21.7	3.13	0.159
0.70	36.5	4.17	0.453	22.2	3.24	0.276	16.4	3.16	0.203	15.3	3.11	0.172	18.8	3.04	0.151
0.75	22.6	3.25	0.321	19.4	3.17	0.276	16.7	3.09	0.237	13.9	2.99	0.174	16.4	2.96	0.152
0.80	37.8	4.79	0.613	21.3	3.09	0.344	16.6	3.02	0.267	12.8	2.88	0.192	15.3	2.88	0.158
0.85	27.0	3.66	0.495	19.3	3.01	0.352	15.7	2.95	0.286	11.9	2.83	0.212	14.3	2.81	0.162
0.90	13.6	2.97	0.279	12.2	2.92	0.251	12.1	2.88	0.247	10.8	2.77	0.214	13.4	2.74	0.167
0.95	22.5	3.44	0.515	13.1	2.85	0.299	11.4	2.80	0.258	10.0	2.72	0.221	12.7	2.67	0.170
1.00	21.2	3.31	0.536	15.5	2.76	0.391	12.7	2.73	0.319	9.5	2.66	0.232	11.9	2.61	0.173
1.10	28.8	5.18	0.884	15.1	2.94	0.462	12.0	2.59	0.366	8.6	2.54	0.256	10.7	2.50	0.178
1.20	12.0	2.63	0.436	9.5	2.57	0.346	7.8	2.52	0.284	7.0	2.44	0.207	9.6	2.41	0.181
1.30	6.8	2.65	0.293	5.8	2.61	0.250	5.3	2.56	0.216	6.1	2.48	0.199	8.7	2.33	0.183
1.40	4.4	2.66	0.216	4.3	2.62	0.206	4.6	2.59	0.203	5.4	2.51	0.198	8.0	2.31	0.184
1.50	3.6	2.67	0.207	3.7	2.64	0.204	4.0	2.60	0.201	4.8	2.53	0.196	7.3	2.34	0.184
1.60	3.2	2.68	0.204	3.2	2.65	0.202	3.5	2.62	0.199	4.3	2.55	0.195	6.8	2.37	0.184
1.70	2.7	2.69	0.200	2.8	2.66	0.198	3.1	2.63	0.196	3.9	2.56	0.193	6.3	2.39	0.183
1.80	2.4	2.69	0.195	2.5	2.66	0.194	2.8	2.63	0.193	3.6	2.57	0.190	5.8	2.41	0.182
1.90	2.1	2.68	0.192	2.2	2.66	0.191	2.5	2.63	0.190	3.2	2.58	0.188	5.5	2.43	0.181
2.00	1.9	2.68	0.189	2.0	2.65	0.189	2.3	2.63	0.188	3.0	2.58	0.187	5.1	2.44	0.181
2.20	1.5	2.67	0.187	1.6	2.65	0.186	1.9	2.63	0.185	2.6	2.59	0.184	4.6	2.47	0.179
2.40	1.3	2.67	0.184	1.4	2.65	0.183	1.6	2.63	0.182	2.2	2.59	0.181	4.1	2.48	0.177
2.60	1.0	2.66	0.179	1.2	2.65	0.179	1.4	2.63	0.179	2.0	2.60	0.179	3.7	2.49	0.176
2.80	0.9	2.66	0.175	1.0	2.64	0.176	1.3	2.63	0.176	1.8	2.60	0.176	3.4	2.50	0.175
3.00	0.8	2.65	0.173	0.9	2.63	0.174	1.1	2.62	0.174	1.6	2.59	0.175	3.2	2.51	0.174
3.20	0.7	2.64	0.172	0.8	2.63	0.173	1.0	2.62	0.173	1.5	2.59	0.174	2.9	2.52	0.173
3.40	0.6	2.64	0.173	0.7	2.63	0.173	0.9	2.62	0.173	1.4	2.59	0.173	2.7	2.52	0.173
3.60	0.5	2.63	0.174	0.6	2.62	0.174	0.8	2.61	0.173	1.3	2.59	0.173	2.6	2.53	0.172
3.80	0.5	2.63	0.174	0.6	2.62	0.174	0.8	2.61	0.174	1.2	2.59	0.173	2.4	2.53	0.172
4.00	0.4	2.63	0.175	0.5	2.62	0.174	0.7	2.61	0.174	1.1	2.60	0.173	2.3	2.54	0.172

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

RESPONSE SPECTRUM

RECORD = F-652 COMPONENT = NORTH SIGNAL = CORRECTION = STATION = KOMATSUJIMA-G
DATE AND TIME = 1994.06.17.11.13 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 65.90 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	178.2	1.32	0.011	157.1	0.97	0.010	143.0	0.79	0.009	123.9	0.59	0.008	97.5	0.40	0.006
0.10	206.7	3.18	0.052	119.5	1.74	0.030	113.1	1.35	0.028	101.5	1.17	0.025	85.0	0.91	0.020
0.15	148.5	3.37	0.085	113.3	2.50	0.064	101.4	2.30	0.058	90.1	1.95	0.051	72.8	1.33	0.038
0.20	129.8	3.97	0.132	110.8	3.47	0.112	97.7	3.15	0.098	85.3	2.63	0.084	65.4	1.75	0.060
0.25	245.3	9.65	0.388	137.6	5.82	0.217	97.5	4.14	0.154	68.6	2.58	0.107	54.9	1.95	0.076
0.30	99.7	4.70	0.227	66.6	3.33	0.152	59.1	2.86	0.134	52.9	2.58	0.117	43.8	2.01	0.083
0.35	56.1	3.45	0.174	47.9	3.04	0.149	44.7	2.89	0.138	39.3	2.63	0.120	33.4	2.08	0.084
0.40	71.0	4.51	0.288	43.3	2.87	0.176	33.3	2.77	0.134	29.7	2.57	0.117	25.3	2.08	0.082
0.45	107.8	7.69	0.553	47.7	3.42	0.244	32.8	2.53	0.167	23.5	2.41	0.118	22.8	2.04	0.089
0.50	45.2	3.62	0.286	32.4	2.70	0.204	26.8	2.32	0.168	20.3	2.21	0.126	20.5	1.97	0.095
0.55	53.2	4.64	0.408	30.1	2.81	0.230	22.9	2.18	0.174	16.7	2.05	0.118	18.4	1.88	0.100
0.60	28.7	2.72	0.262	20.6	1.94	0.188	16.8	1.93	0.152	14.5	1.89	0.119	16.6	1.78	0.103
0.65	26.9	2.80	0.288	15.7	1.88	0.168	12.3	1.83	0.127	12.7	1.75	0.121	15.1	1.69	0.105
0.70	12.3	1.97	0.152	10.7	1.92	0.131	10.7	1.88	0.128	11.2	1.79	0.123	13.8	1.60	0.107
0.75	19.0	2.27	0.270	10.0	1.97	0.142	9.4	1.92	0.129	10.0	1.84	0.123	12.6	1.62	0.108
0.80	14.2	2.05	0.231	8.8	2.00	0.143	8.3	1.96	0.129	8.9	1.87	0.123	11.6	1.66	0.108
0.85	14.0	2.08	0.256	9.2	2.03	0.168	7.5	1.99	0.137	8.0	1.91	0.122	10.7	1.69	0.108
0.90	14.2	2.35	0.292	9.4	2.05	0.193	7.1	2.01	0.145	7.1	1.93	0.120	9.9	1.72	0.108
0.95	14.0	2.34	0.321	10.2	2.07	0.233	7.9	2.03	0.179	6.4	1.95	0.124	9.1	1.75	0.107
1.00	12.9	2.19	0.327	9.4	2.08	0.237	7.2	2.04	0.181	5.8	1.97	0.123	8.5	1.77	0.106
1.10	7.5	2.12	0.231	6.0	2.08	0.184	5.4	2.04	0.162	4.7	1.98	0.130	7.4	1.80	0.102
1.20	5.5	2.08	0.199	4.1	2.06	0.149	3.9	2.03	0.138	3.9	1.97	0.121	6.6	1.82	0.098
1.30	2.6	2.05	0.110	2.5	2.03	0.107	2.5	2.01	0.106	3.3	1.96	0.102	5.8	1.83	0.095
1.40	1.9	2.02	0.094	1.8	2.01	0.091	2.1	1.99	0.090	2.8	1.95	0.091	5.3	1.84	0.092
1.50	1.5	2.00	0.083	1.5	1.98	0.084	1.8	1.97	0.085	2.5	1.94	0.087	4.8	1.84	0.089
1.60	1.2	1.97	0.079	1.3	1.96	0.081	1.5	1.95	0.082	2.2	1.92	0.083	4.4	1.84	0.086
1.70	1.0	1.96	0.076	1.1	1.95	0.077	1.4	1.94	0.079	2.0	1.91	0.081	4.1	1.84	0.084
1.80	0.9	1.94	0.073	1.0	1.93	0.075	1.2	1.92	0.076	1.8	1.90	0.078	3.8	1.84	0.082
1.90	0.8	1.92	0.072	0.9	1.92	0.073	1.1	1.91	0.074	1.7	1.89	0.077	3.5	1.83	0.081
2.00	0.7	1.91	0.071	0.8	1.91	0.072	1.0	1.90	0.073	1.5	1.89	0.075	3.3	1.83	0.079
2.20	0.6	1.89	0.070	0.7	1.89	0.071	0.9	1.88	0.072	1.4	1.87	0.074	3.0	1.83	0.077
2.40	0.5	1.89	0.070	0.6	1.88	0.071	0.8	1.88	0.071	1.2	1.87	0.072	2.7	1.83	0.076
2.60	0.4	1.88	0.069	0.5	1.87	0.069	0.7	1.87	0.070	1.1	1.86	0.071	2.4	1.83	0.075
2.80	0.3	1.87	0.067	0.4	1.87	0.068	0.6	1.86	0.069	1.0	1.85	0.070	2.2	1.82	0.074
3.00	0.3	1.86	0.067	0.4	1.86	0.068	0.5	1.86	0.068	0.9	1.85	0.070	2.1	1.82	0.073
3.20	0.3	1.86	0.067	0.3	1.86	0.068	0.5	1.85	0.068	0.8	1.85	0.069	1.9	1.82	0.072
3.40	0.2	1.85	0.067	0.3	1.85	0.068	0.4	1.85	0.068	0.8	1.84	0.069	1.8	1.82	0.072
3.60	0.2	1.85	0.068	0.3	1.85	0.068	0.4	1.85	0.069	0.7	1.84	0.069	1.7	1.82	0.072
3.80	0.2	1.85	0.068	0.3	1.85	0.069	0.4	1.85	0.069	0.7	1.84	0.069	1.6	1.82	0.071
4.00	0.2	1.85	0.069	0.2	1.85	0.069	0.4	1.84	0.069	0.7	1.84	0.069	1.5	1.82	0.071

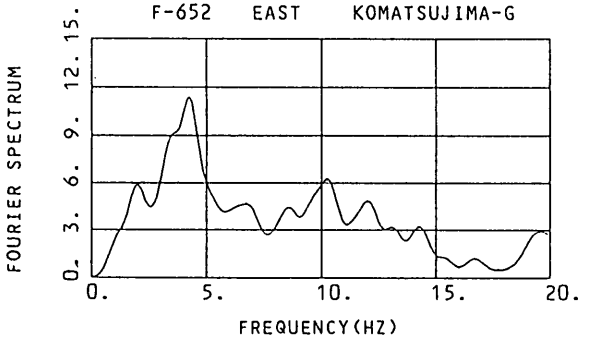
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

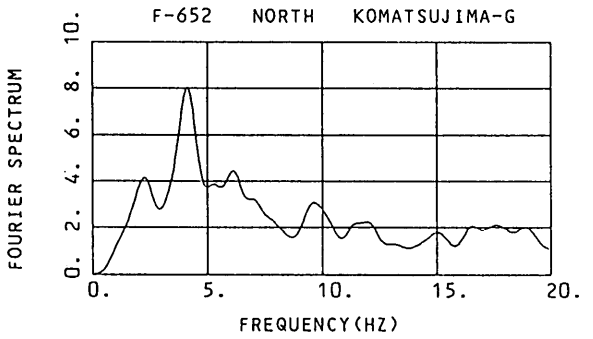
RESPONSE SPECTRUM

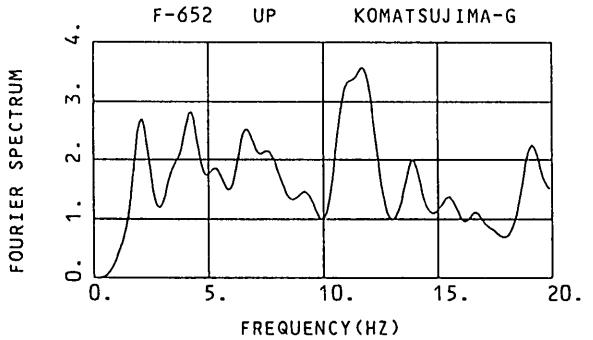
RECORD = F-652 COMPONENT = UP SIGNAL = CORRECTION = STATION = KOMATSUJIMA-G
DATE AND TIME = 1994.06.17.11.13 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 33.56 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

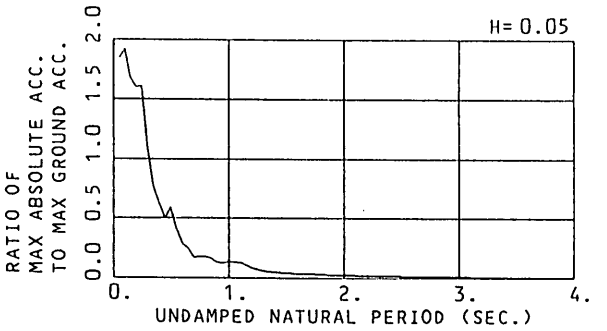
	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	187.9	1.46	0.012	121.5	0.92	0.008	94.8	0.69	0.006	66.9	0.45	0.004	46.1	0.24	0.003
0.10	109.5	1.78	0.028	90.4	1.39	0.023	77.2	1.21	0.019	58.0	0.93	0.014	37.1	0.53	0.008
0.15	132.3	3.15	0.075	75.9	1.71	0.043	54.8	1.24	0.031	39.9	0.86	0.022	27.6	0.62	0.013
0.20	84.1	2.68	0.085	41.1	1.26	0.042	30.9	1.10	0.031	25.2	1.00	0.025	20.7	0.73	0.018
0.25	67.6	2.69	0.107	45.3	1.80	0.071	35.3	1.45	0.056	23.6	1.04	0.037	14.9	0.67	0.019
0.30	65.0	3.10	0.148	25.2	1.26	0.057	21.7	1.11	0.049	17.9	0.92	0.039	11.9	0.68	0.024
0.35	16.3	0.99	0.050	13.5	0.90	0.042	12.7	0.81	0.039	11.6	0.69	0.035	9.9	0.64	0.025
0.40	37.0	2.37	0.150	18.5	1.07	0.075	14.9	0.86	0.060	11.7	0.65	0.047	8.4	0.59	0.031
0.45	34.3	2.44	0.176	26.1	1.83	0.133	21.1	1.49	0.108	14.4	1.08	0.073	8.9	0.56	0.041
0.50	74.2	5.91	0.470	33.6	2.70	0.212	24.3	1.92	0.153	15.1	1.19	0.094	8.7	0.61	0.048
0.55	23.9	2.17	0.183	19.3	1.76	0.148	16.2	1.49	0.123	12.2	1.12	0.091	7.8	0.63	0.052
0.60	10.6	1.20	0.097	10.7	1.19	0.097	10.4	1.12	0.094	9.3	0.98	0.083	6.6	0.67	0.053
0.65	9.6	1.16	0.103	8.8	1.07	0.094	8.4	1.00	0.089	7.6	0.91	0.079	5.7	0.68	0.053
0.70	12.0	1.35	0.149	8.3	1.07	0.102	7.4	0.99	0.091	6.3	0.88	0.076	4.9	0.67	0.051
0.75	8.6	1.10	0.123	6.5	0.99	0.092	5.9	0.92	0.083	5.2	0.83	0.071	4.2	0.65	0.051
0.80	6.8	0.99	0.111	5.6	0.83	0.091	5.0	0.79	0.080	4.5	0.74	0.070	3.8	0.62	0.052
0.85	5.0	0.91	0.091	4.3	0.82	0.078	4.1	0.74	0.075	3.9	0.65	0.068	3.4	0.58	0.051
0.90	5.5	0.82	0.112	3.6	0.75	0.073	3.4	0.69	0.070	3.3	0.60	0.064	3.1	0.54	0.051
0.95	3.3	0.69	0.076	3.0	0.65	0.069	2.9	0.62	0.066	2.8	0.57	0.061	2.8	0.51	0.049
1.00	2.6	0.65	0.067	2.5	0.62	0.064	2.4	0.60	0.061	2.4	0.56	0.057	2.5	0.51	0.048
1.10	1.9	0.57	0.057	1.8	0.55	0.054	1.7	0.54	0.052	1.7	0.52	0.048	2.0	0.51	0.044
1.20	1.3	0.52	0.047	1.3	0.51	0.047	1.3	0.51	0.046	1.4	0.51	0.045	1.8	0.51	0.042
1.30	1.0	0.51	0.041	1.0	0.51	0.041	1.0	0.51	0.042	1.1	0.51	0.041	1.5	0.50	0.039
1.40	0.8	0.51	0.037	0.8	0.51	0.038	0.8	0.51	0.039	0.9	0.51	0.039	1.4	0.50	0.038
1.50	0.7	0.51	0.039	0.7	0.50	0.039	0.7	0.50	0.038	0.8	0.50	0.038	1.2	0.50	0.037
1.60	0.6	0.50	0.038	0.6	0.50	0.038	0.6	0.50	0.038	0.7	0.50	0.037	1.1	0.50	0.036
1.70	0.5	0.49	0.036	0.5	0.49	0.036	0.5	0.50	0.036	0.6	0.50	0.036	1.0	0.50	0.036
1.80	0.4	0.49	0.036	0.4	0.49	0.036	0.5	0.50	0.036	0.6	0.50	0.036	0.9	0.50	0.035
1.90	0.4	0.50	0.037	0.4	0.50	0.036	0.4	0.50	0.036	0.5	0.50	0.035	0.9	0.50	0.035
2.00	0.4	0.50	0.036	0.4	0.50	0.035	0.4	0.50	0.035	0.5	0.50	0.035	0.8	0.50	0.034
2.20	0.3	0.49	0.032	0.3	0.49	0.032	0.3	0.49	0.033	0.4	0.49	0.033	0.7	0.50	0.034
2.40	0.2	0.48	0.033	0.2	0.49	0.033	0.3	0.49	0.033	0.3	0.49	0.033	0.6	0.49	0.033
2.60	0.2	0.48	0.035	0.2	0.48	0.034	0.2	0.49	0.034	0.3	0.49	0.033	0.6	0.49	0.033
2.80	0.2	0.49	0.034	0.2	0.49	0.033	0.2	0.49	0.033	0.3	0.49	0.033	0.5	0.49	0.033
3.00	0.1	0.49	0.031	0.1	0.49	0.031	0.2	0.49	0.032	0.2	0.49	0.032	0.5	0.49	0.032
3.20	0.1	0.49	0.032	0.1	0.49	0.032	0.1	0.49	0.031	0.2	0.49	0.031	0.5	0.49	0.032
3.40	0.1	0.49	0.033	0.1	0.49	0.032	0.1	0.49	0.031	0.2	0.49	0.031	0.4	0.49	0.032
3.60	0.1	0.49	0.032	0.1	0.49	0.032	0.1	0.49	0.032	0.2	0.49	0.032	0.4	0.49	0.032
3.80	0.1	0.49	0.033	0.1	0.49	0.033	0.1	0.49	0.033	0.2	0.49	0.032	0.4	0.49	0.032
4.00	0.1	0.49	0.035	0.1	0.49	0.034	0.1	0.49	0.033	0.2	0.49	0.033	0.4	0.49	0.032

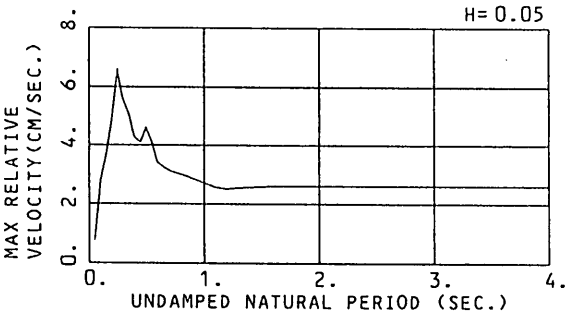
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

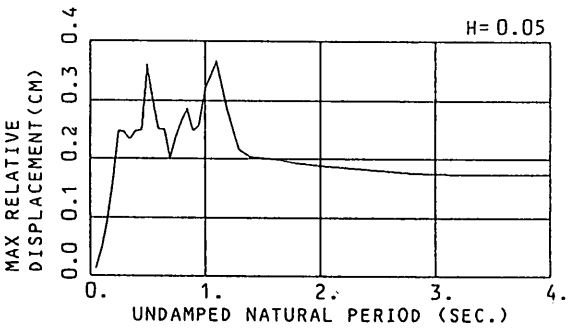






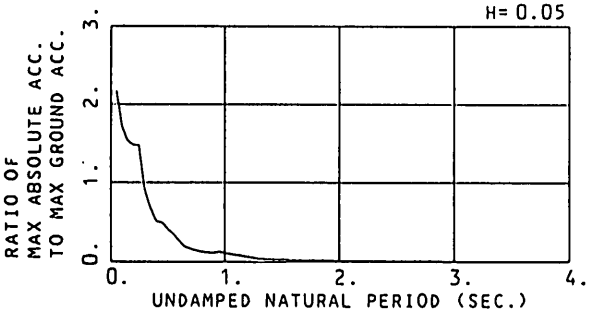


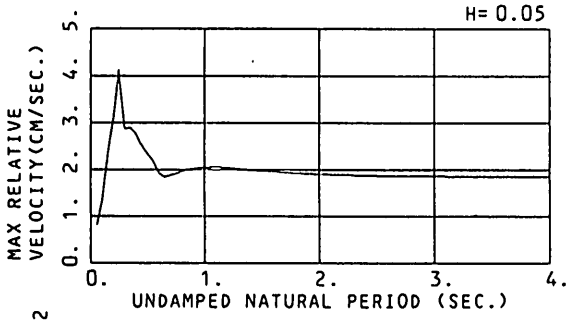


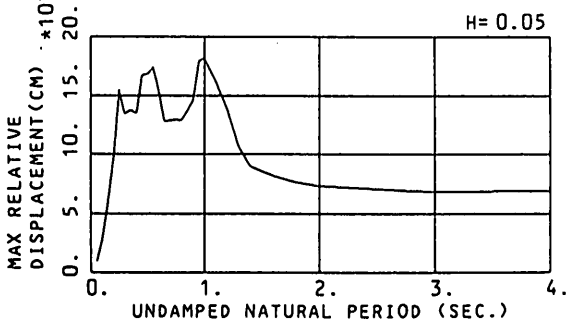


RESPONSE SPECTRA

F-652 NORTH KOMATSUJIMA-G
(1/FC=1.46 SEC.)

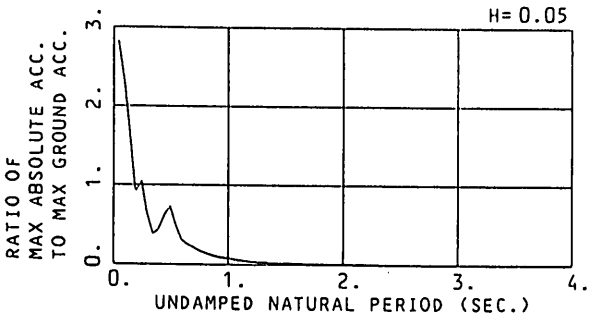


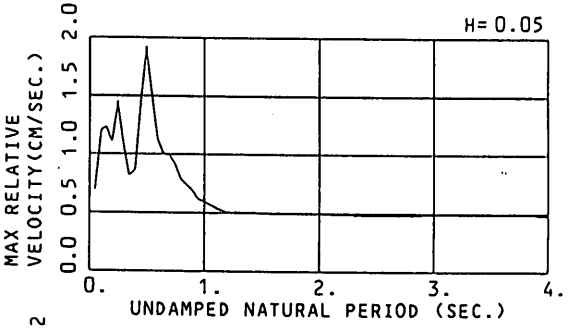


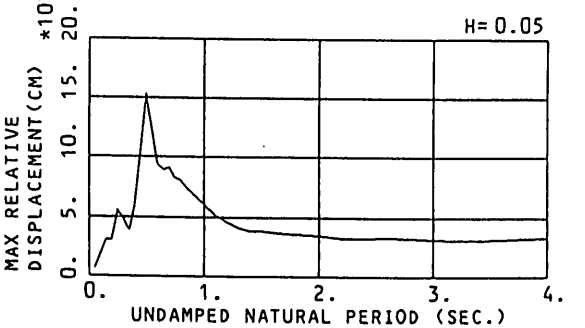


RESPONSE SPECTRA

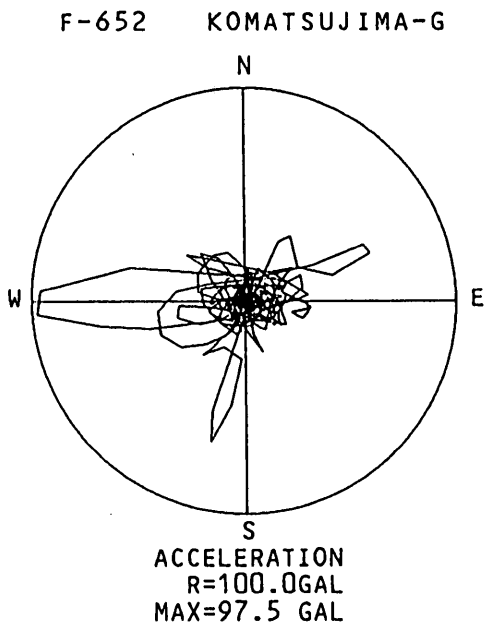
F-652 UP KOMATSUJIMA-G
(1/FC=1.04 SEC.)

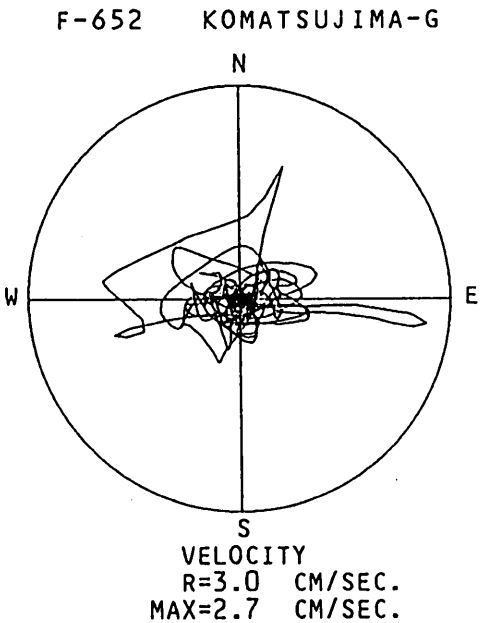


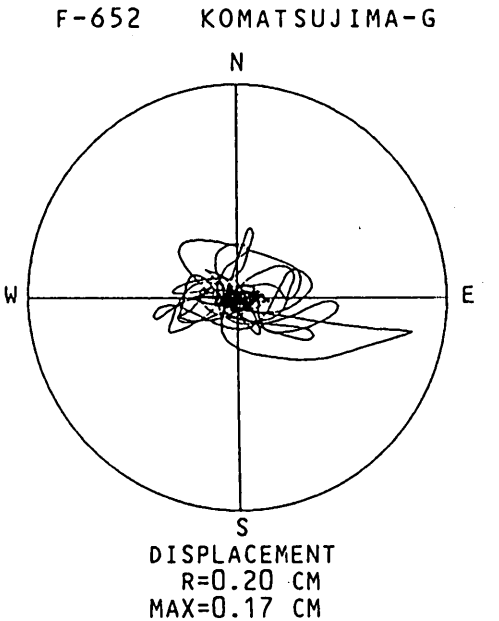


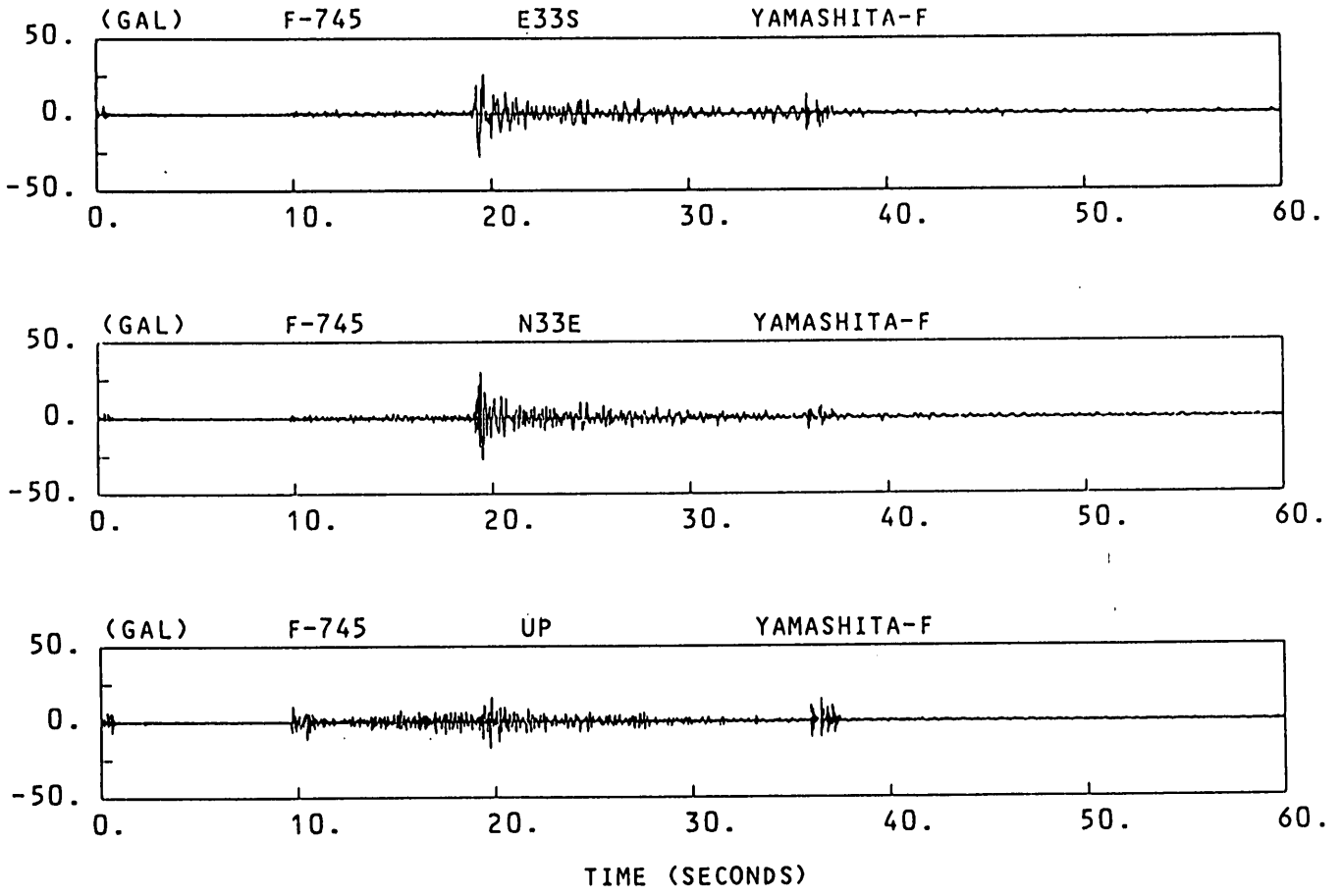


RESPONSE SPECTRA


F-652 KOMATSUJIMA-G
N
W
E
S
ACCELERATION
R=100.0GAL
MAX=97.5 GAL


F-652 KOMATSUJIMA-G
N
W
E
S
VELOCITY
R=3.0 CM/SEC.
MAX=2.7 CM/SEC.


F-652 KOMATSUJIMA-G
N
W
E
S
DISPLACEMENT
R=0.20 CM
MAX=0.17 CM


(GAL) F-745 E33S YAMASHITA-F
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-745 N33E YAMASHITA-F
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-745 UP YAMASHITA-F
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)

RECORD NUMBER : F-658

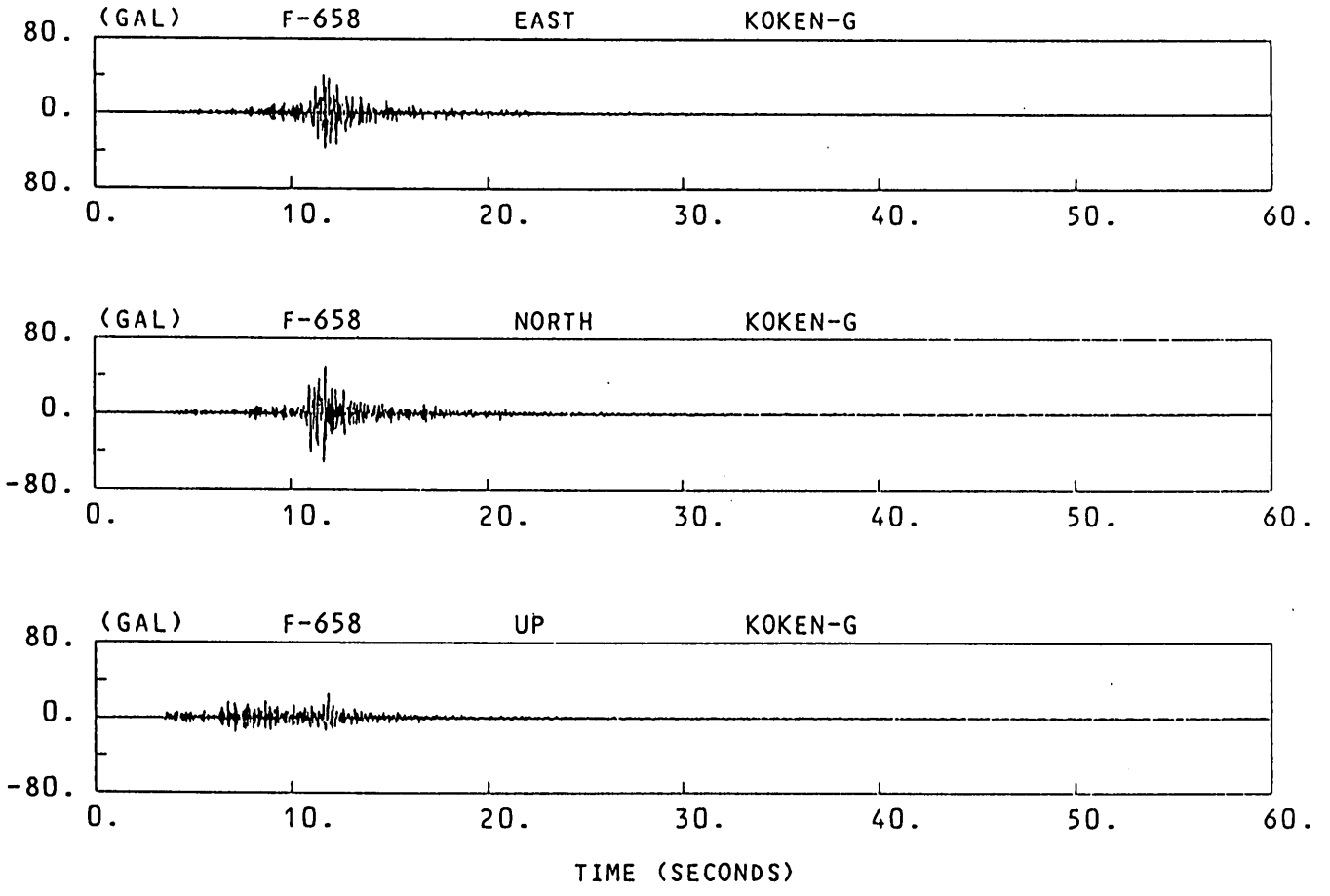
STATION : KOKEN-G

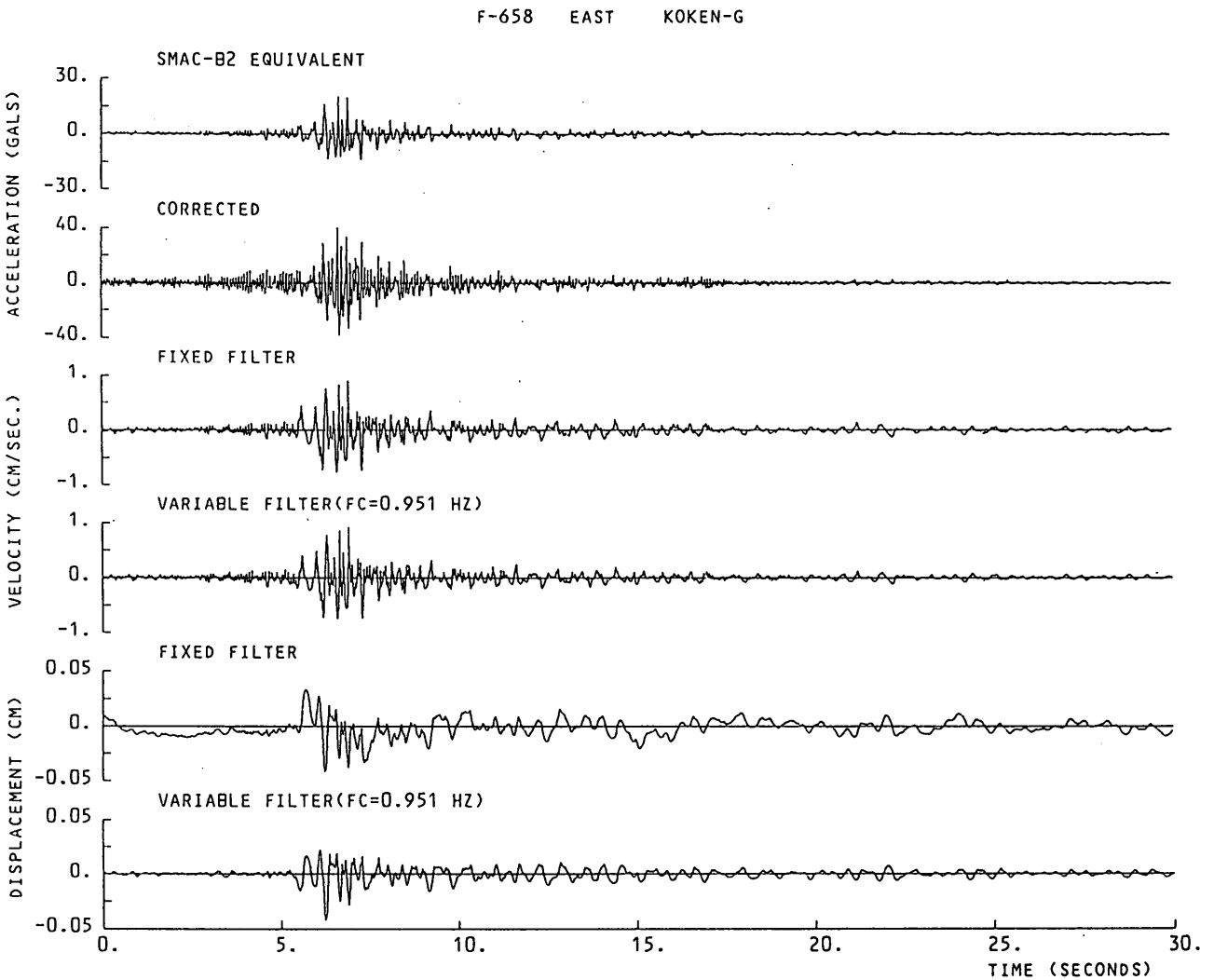
EARTHQUAKE DATA

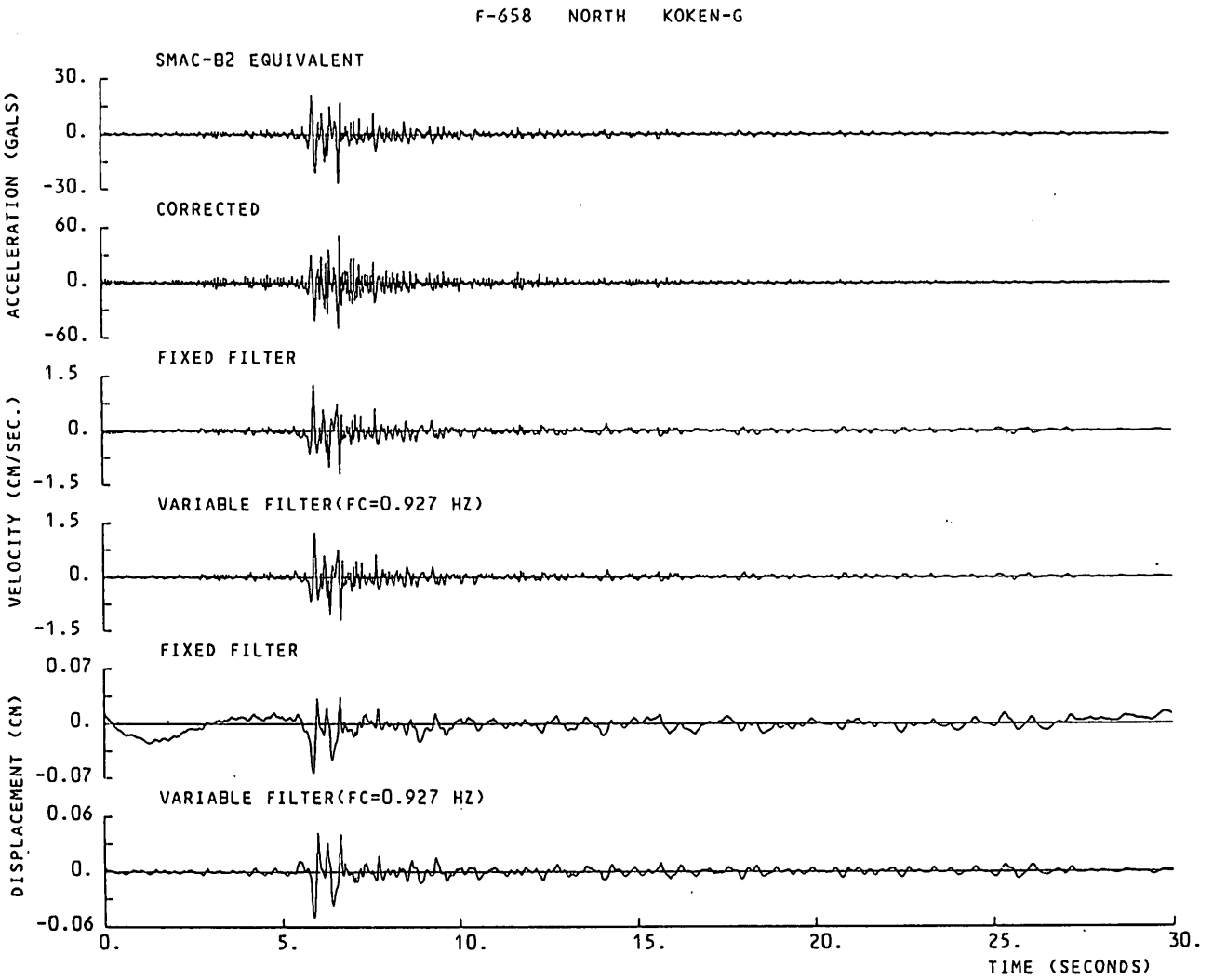
DATE AND TIME	11: 1 JUNE29,1994
LOCATION OF HYPOCENTER	
EPICENTRAL REGION	SOUTHERN BOSO PENINSULA
LATITUDE	34°57.1' N
LONGITUDE	139°52.9' E
DEPTH	60.0KM
JMA MAGNITUDE	5.2

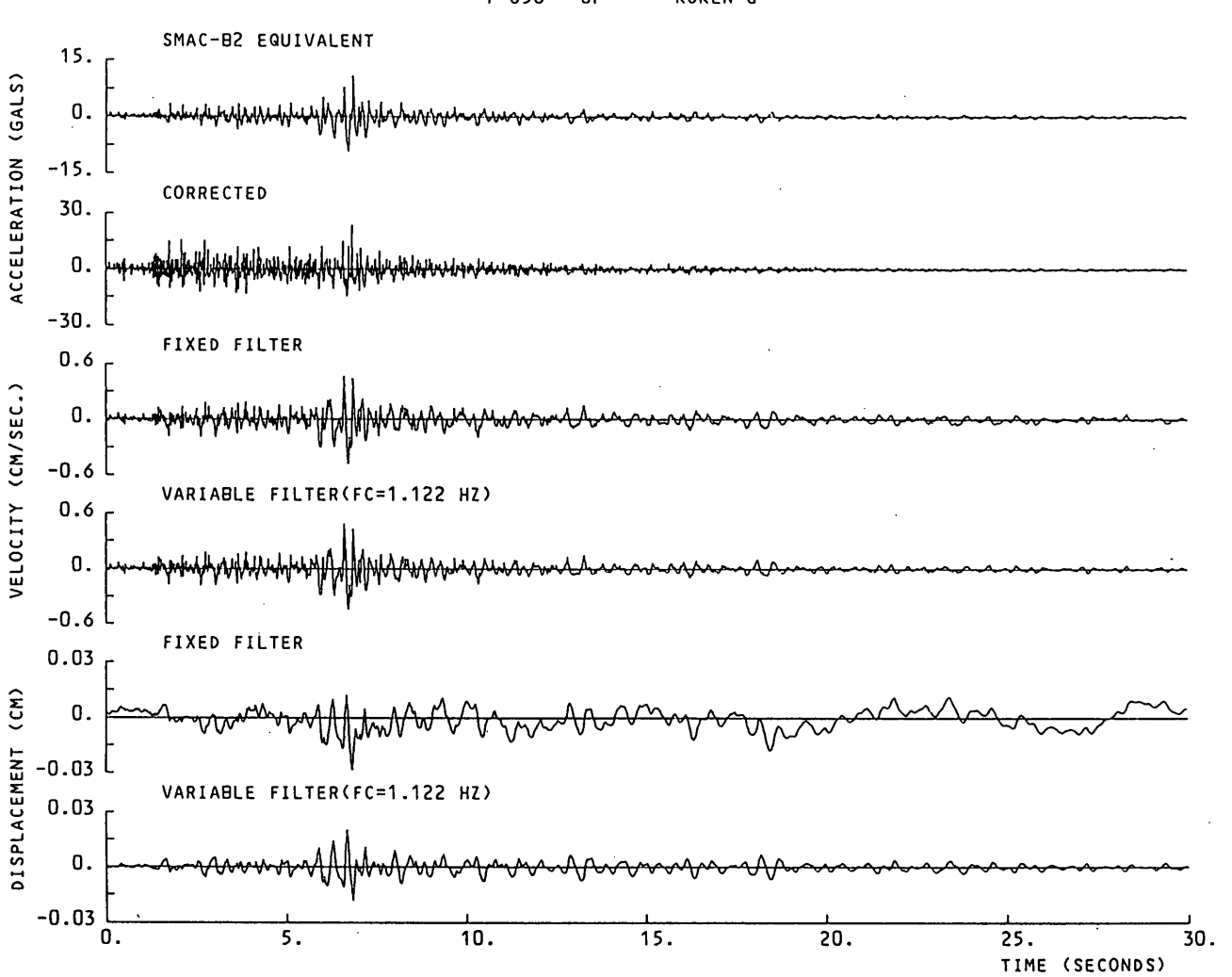
	PEAK VALUES OF COMPONENTS			
	N S	E W	U D	HORIZONTAL*
PARAMETER OF THE VARIABLE FILTER				
FC (HZ)	0.927	0.951	1.122	
MAXIMUM ACCELERATION (GAL)				
SMAC-B2 EQUIVALENT	26.9	20.4	10.8	33.8
ORIGINAL	52.1	40.6	25.8	65.2
CORRECTED	53.3	40.1	25.4	66.7
MAXIMUM VELOCITY (CM/SEC)				
FIXED FILTER	1.29	0.90	0.50	1.48
VARIABLE FILTER	1.26	0.91	0.52	1.48
MAXIMUM DISPLACEMENT (CM)				
FIXED FILTER	0.07	0.04	0.03	0.07
VARIABLE FILTER	0.05	0.04	0.02	0.05

* RESULTANT OF HORIZONTAL COMPONENTS


(GAL) F-658 EAST KOKEN-G
80.
0.
80.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-658 NORTH KOKEN-G
80.
0.
-80.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-658 UP KOKEN-G
80.
0.
-80.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


F-658 EAST KOKEN-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.951 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.951 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
30.
0.
-30.
40.
0.
-40.
1.
0.
-1.
1.
0.
-1.
0.05
0.
-0.05
0.05
0.
-0.05
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-658 NORTH KOKEN-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.927 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.927 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
30.
0.
-30.
60.
0.
-60.
1.5
0.
-1.5
1.5
0.
-1.5
0.07
0.
-0.07
0.06
0.
-0.06
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-658 UP KOKEN-G
SMAC-B2 EQUIVALENT
15.
0.
-15.
CORRECTED
30.
0.
-30.
ACCELERATION (GALS)
FIXED FILTER
0.6
0.
-0.6
VARIABLE FILTER(FC=1.122 HZ)
0.6
0.
-0.6
VELOCITY (CM/SEC.)
FIXED FILTER
0.03
0.
-0.03
VARIABLE FILTER(FC=1.122 HZ)
0.03
0.
-0.03
DISPLACEMENT (CM)
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

RESPONSE SPECTRUM

RECORD = F-658 COMPONENT = EAST SIGNAL = CORRECTION = STATION = KOKEN-G
DATE AND TIME = 1994.06.29.12.02 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 40.09 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	115.2	0.77	0.007	56.7	0.23	0.004	52.9	0.21	0.003	50.6	0.19	0.003	48.4	0.18	0.003
0.10	300.8	4.81	0.076	127.5	1.85	0.032	120.6	1.69	0.030	102.4	1.50	0.026	70.3	0.93	0.016
0.15	229.5	5.50	0.131	117.7	3.08	0.068	99.8	2.71	0.057	80.0	2.15	0.044	58.2	1.45	0.030
0.20	118.8	3.84	0.120	94.5	3.13	0.096	84.1	2.78	0.085	68.9	2.26	0.067	46.7	1.42	0.040
0.25	116.8	4.64	0.185	59.2	2.75	0.094	50.8	2.36	0.081	43.2	1.89	0.066	31.9	1.34	0.041
0.30	62.1	3.31	0.142	47.3	2.70	0.108	41.5	2.47	0.094	34.4	2.13	0.077	26.8	1.46	0.054
0.35	71.5	4.78	0.222	48.1	3.55	0.149	40.3	2.85	0.125	33.4	2.08	0.101	23.7	1.37	0.063
0.40	56.5	3.62	0.229	33.2	2.98	0.134	29.1	2.56	0.117	24.3	2.02	0.095	18.9	1.36	0.062
0.45	21.6	1.91	0.111	19.8	1.84	0.102	18.3	1.76	0.092	15.8	1.58	0.077	14.0	1.34	0.054
0.50	18.6	1.62	0.118	12.0	1.37	0.076	11.4	1.22	0.071	10.8	1.22	0.064	10.5	1.24	0.048
0.55	8.9	1.14	0.068	7.4	1.11	0.057	6.9	1.11	0.053	7.2	1.12	0.050	8.4	1.15	0.044
0.60	13.2	1.31	0.120	7.0	1.12	0.064	6.1	1.11	0.054	6.4	1.09	0.052	7.4	1.09	0.045
0.65	19.3	2.01	0.206	7.1	1.07	0.076	6.0	1.06	0.062	5.8	1.04	0.055	6.7	1.03	0.045
0.70	10.9	1.34	0.136	5.5	1.26	0.068	5.2	1.20	0.062	5.1	1.12	0.055	6.0	1.01	0.044
0.75	9.0	1.38	0.129	4.9	1.30	0.070	4.0	1.24	0.054	4.2	1.15	0.049	5.3	1.02	0.042
0.80	3.9	1.26	0.063	3.1	1.22	0.050	3.0	1.19	0.046	3.3	1.13	0.043	4.7	1.02	0.039
0.85	6.0	1.12	0.110	3.0	1.12	0.054	2.8	1.11	0.049	2.8	1.08	0.043	4.2	1.01	0.040
0.90	4.9	1.04	0.100	2.7	1.04	0.054	2.6	1.04	0.050	2.7	1.03	0.045	3.8	1.00	0.041
0.95	2.9	1.02	0.066	2.3	0.99	0.052	2.3	0.98	0.050	2.5	0.99	0.047	3.4	0.99	0.043
1.00	2.3	0.97	0.058	2.2	0.96	0.055	2.2	0.95	0.052	2.4	0.95	0.049	3.3	0.97	0.044
1.10	1.8	0.91	0.054	1.8	0.91	0.054	1.9	0.91	0.053	2.1	0.92	0.050	2.9	0.95	0.045
1.20	1.5	0.88	0.056	1.5	0.89	0.054	1.6	0.90	0.053	1.8	0.91	0.051	2.6	0.94	0.046
1.30	1.2	0.90	0.052	1.2	0.90	0.052	1.3	0.91	0.051	1.6	0.91	0.050	2.4	0.93	0.046
1.40	1.0	0.91	0.051	1.0	0.91	0.050	1.1	0.91	0.050	1.4	0.91	0.049	2.2	0.92	0.046
1.50	0.9	0.92	0.051	0.9	0.92	0.050	1.0	0.92	0.049	1.2	0.92	0.048	2.0	0.92	0.046
1.60	0.8	0.92	0.049	0.8	0.92	0.049	0.9	0.92	0.048	1.1	0.92	0.047	1.9	0.92	0.046
1.70	0.6	0.92	0.047	0.7	0.92	0.047	0.8	0.92	0.047	1.0	0.92	0.047	1.7	0.92	0.045
1.80	0.6	0.91	0.045	0.6	0.91	0.046	0.7	0.91	0.046	0.9	0.92	0.046	1.6	0.92	0.045
1.90	0.5	0.91	0.046	0.5	0.91	0.046	0.6	0.91	0.046	0.8	0.91	0.046	1.5	0.92	0.045
2.00	0.5	0.91	0.047	0.5	0.91	0.046	0.6	0.91	0.046	0.8	0.91	0.045	1.4	0.92	0.045
2.20	0.4	0.91	0.046	0.4	0.91	0.046	0.5	0.91	0.045	0.7	0.91	0.045	1.3	0.91	0.044
2.40	0.3	0.90	0.044	0.3	0.91	0.044	0.4	0.91	0.044	0.6	0.91	0.044	1.2	0.91	0.044
2.60	0.2	0.90	0.042	0.3	0.90	0.043	0.4	0.90	0.043	0.5	0.91	0.043	1.1	0.91	0.043
2.80	0.2	0.90	0.042	0.2	0.90	0.043	0.3	0.90	0.043	0.5	0.90	0.043	1.0	0.91	0.043
3.00	0.2	0.90	0.044	0.2	0.90	0.043	0.3	0.90	0.043	0.4	0.90	0.043	0.9	0.91	0.043
3.20	0.2	0.90	0.044	0.2	0.90	0.044	0.3	0.90	0.044	0.4	0.90	0.044	0.9	0.91	0.043
3.40	0.2	0.90	0.045	0.2	0.90	0.044	0.2	0.90	0.044	0.4	0.90	0.044	0.8	0.91	0.043
3.60	0.1	0.90	0.044	0.2	0.90	0.044	0.2	0.90	0.044	0.3	0.90	0.043	0.8	0.90	0.043
3.80	0.1	0.90	0.043	0.1	0.90	0.043	0.2	0.90	0.043	0.3	0.90	0.043	0.7	0.90	0.043
4.00	0.1	0.90	0.042	0.1	0.90	0.042	0.2	0.90	0.042	0.3	0.90	0.043	0.7	0.90	0.043

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

RESPONSE SPECTRUM

RECORD = F-658 COMPONENT = NORTH SIGNAL = CORRECTION = STATION = KOKEN-G
DATE AND TIME = 1994.06.29.12.02 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 53.33 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	112.3	0.68	0.007	73.7	0.30	0.005	71.0	0.28	0.004	69.3	0.28	0.004	67.1	0.26	0.004
0.10	464.6	7.42	0.118	235.5	3.77	0.060	186.6	2.92	0.047	134.1	2.10	0.033	93.7	1.18	0.021
0.15	190.7	4.36	0.109	139.0	3.31	0.080	111.7	2.76	0.063	102.7	2.47	0.057	69.8	1.70	0.034
0.20	143.1	4.53	0.145	110.6	3.52	0.112	93.4	3.03	0.094	80.5	2.40	0.079	60.2	1.59	0.053
0.25	130.7	5.42	0.207	105.3	4.27	0.167	83.9	3.31	0.133	64.6	2.68	0.100	46.5	1.89	0.063
0.30	122.1	5.94	0.278	86.9	4.09	0.199	69.9	3.32	0.158	49.6	2.53	0.109	33.1	1.94	0.063
0.35	65.9	4.02	0.204	36.3	3.33	0.113	32.8	2.94	0.101	29.5	2.46	0.087	27.2	1.79	0.066
0.40	22.1	1.96	0.090	20.2	1.94	0.082	20.3	1.99	0.082	20.6	1.99	0.080	21.1	1.77	0.069
0.45	21.4	1.92	0.110	18.8	1.77	0.096	17.9	1.82	0.091	17.4	1.88	0.084	17.9	1.75	0.071
0.50	20.7	2.34	0.131	14.2	2.30	0.090	14.3	2.21	0.088	14.4	2.05	0.085	15.5	1.76	0.073
0.55	27.3	2.49	0.210	13.6	2.39	0.104	11.8	2.28	0.088	12.1	2.10	0.085	13.5	1.76	0.075
0.60	21.7	2.43	0.198	13.7	2.27	0.125	12.5	2.15	0.113	10.9	1.99	0.095	12.0	1.71	0.076
0.65	17.4	1.80	0.186	13.3	1.76	0.142	11.9	1.76	0.125	10.2	1.74	0.103	10.6	1.63	0.076
0.70	9.4	1.75	0.117	9.4	1.69	0.116	9.1	1.64	0.110	8.5	1.56	0.096	9.5	1.53	0.075
0.75	7.9	1.62	0.112	7.0	1.63	0.099	6.8	1.61	0.093	6.7	1.55	0.084	8.5	1.44	0.073
0.80	9.1	1.76	0.148	5.7	1.67	0.091	5.5	1.61	0.085	5.5	1.54	0.077	7.6	1.41	0.071
0.85	6.2	1.52	0.114	4.3	1.55	0.077	4.4	1.55	0.076	4.7	1.52	0.072	6.9	1.40	0.068
0.90	5.7	1.58	0.116	3.7	1.55	0.074	3.6	1.53	0.071	4.1	1.49	0.067	6.2	1.39	0.066
0.95	3.0	1.54	0.067	2.7	1.52	0.061	2.9	1.50	0.063	3.5	1.47	0.063	5.7	1.38	0.064
1.00	2.3	1.43	0.058	2.3	1.46	0.058	2.5	1.46	0.059	3.1	1.45	0.060	5.3	1.38	0.062
1.10	2.1	1.49	0.063	2.0	1.46	0.060	2.0	1.44	0.057	2.5	1.42	0.056	4.5	1.36	0.058
1.20	1.6	1.35	0.059	1.6	1.38	0.058	1.7	1.39	0.057	2.1	1.39	0.054	4.0	1.35	0.056
1.30	1.3	1.39	0.055	1.3	1.38	0.054	1.4	1.37	0.055	1.8	1.37	0.054	3.6	1.34	0.053
1.40	1.3	1.38	0.065	1.3	1.36	0.061	1.3	1.36	0.058	1.6	1.35	0.055	3.2	1.33	0.052
1.50	1.0	1.31	0.059	1.0	1.32	0.058	1.1	1.33	0.057	1.4	1.33	0.055	3.0	1.32	0.050
1.60	0.8	1.31	0.050	0.8	1.32	0.053	0.9	1.32	0.054	1.3	1.32	0.054	2.7	1.31	0.050
1.70	0.7	1.34	0.055	0.8	1.33	0.055	0.8	1.32	0.055	1.2	1.32	0.054	2.5	1.31	0.051
1.80	0.8	1.32	0.063	0.8	1.32	0.060	0.8	1.31	0.058	1.1	1.31	0.055	2.4	1.30	0.051
1.90	0.7	1.29	0.063	0.7	1.29	0.060	0.7	1.30	0.058	1.0	1.30	0.055	2.2	1.29	0.051
2.00	0.6	1.27	0.056	0.6	1.28	0.056	0.6	1.28	0.055	0.9	1.29	0.054	2.1	1.29	0.051
2.20	0.4	1.28	0.049	0.4	1.28	0.049	0.5	1.28	0.050	0.8	1.29	0.052	1.9	1.28	0.051
2.40	0.4	1.30	0.053	0.4	1.29	0.053	0.5	1.29	0.053	0.7	1.28	0.053	1.7	1.28	0.051
2.60	0.4	1.29	0.063	0.4	1.28	0.060	0.4	1.28	0.058	0.7	1.28	0.055	1.6	1.28	0.051
2.80	0.3	1.26	0.062	0.3	1.26	0.060	0.4	1.27	0.057	0.6	1.27	0.055	1.4	1.27	0.051
3.00	0.2	1.24	0.054	0.3	1.25	0.054	0.3	1.26	0.053	0.6	1.26	0.053	1.3	1.27	0.051
3.20	0.2	1.25	0.046	0.2	1.25	0.047	0.3	1.26	0.048	0.5	1.26	0.050	1.3	1.27	0.051
3.40	0.2	1.26	0.052	0.2	1.26	0.050	0.3	1.26	0.048	0.5	1.26	0.048	1.2	1.27	0.050
3.60	0.2	1.27	0.053	0.2	1.27	0.051	0.3	1.27	0.049	0.5	1.27	0.048	1.1	1.27	0.050
3.80	0.1	1.28	0.054	0.2	1.28	0.051	0.3	1.27	0.048	0.4	1.27	0.049	1.0	1.27	0.051
4.00	0.1	1.28	0.054	0.2	1.28	0.051	0.2	1.27	0.052	0.4	1.27	0.052	1.0	1.26	0.051

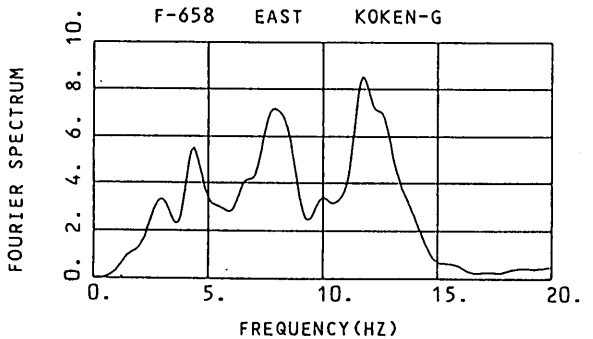
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

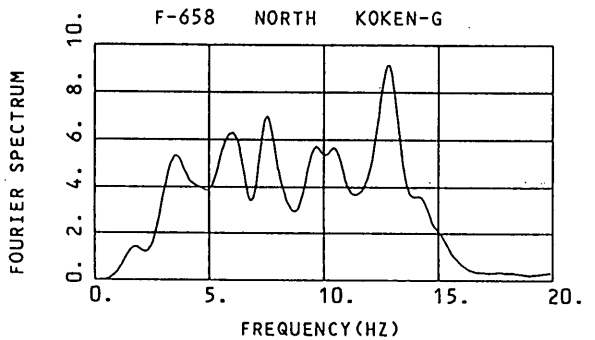
RESPONSE SPECTRUM

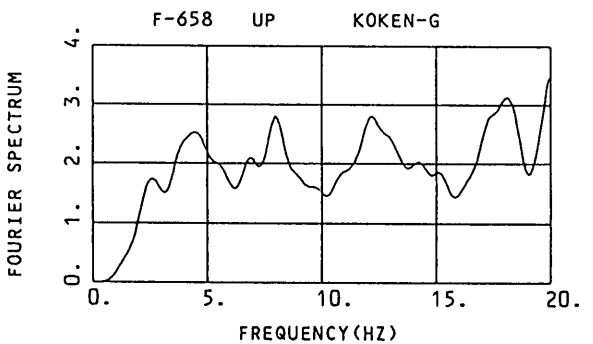
RECORD = F-658 COMPONENT = UP SIGNAL = CORRECTION = STATION = KOKEN-G
DATE AND TIME = 1994.06.29.12.02 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 25.41 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

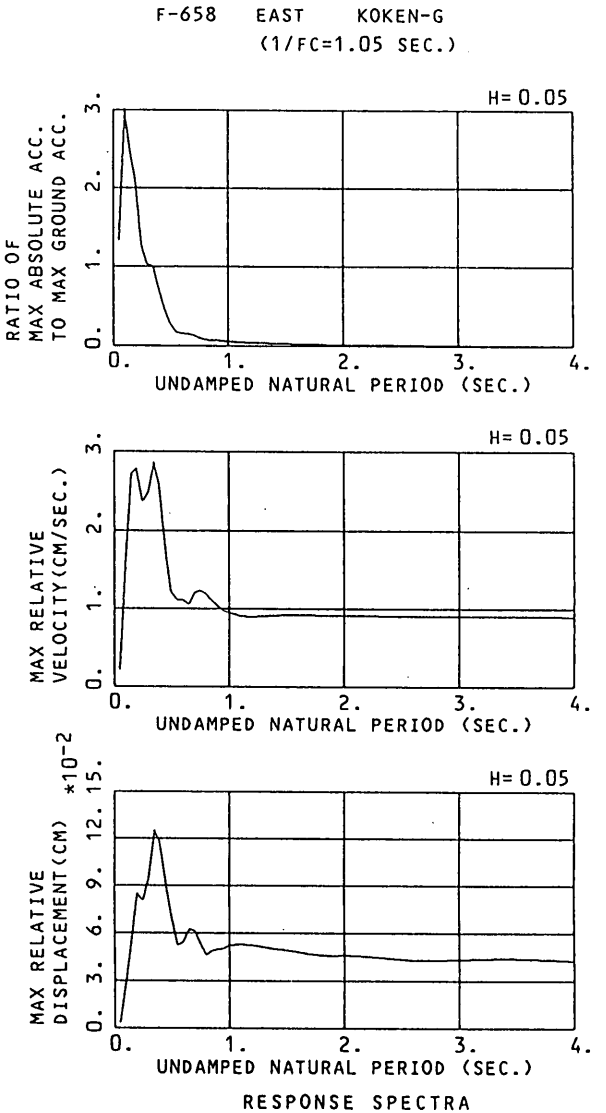
	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	530.3	4.20	0.034	109.5	0.86	0.007	70.3	0.54	0.004	45.3	0.34	0.003	33.8	0.18	0.002
0.10	149.4	2.37	0.038	51.4	0.69	0.013	49.6	0.74	0.013	42.6	0.65	0.011	33.8	0.42	0.008
0.15	104.5	2.44	0.060	57.0	1.37	0.032	40.7	0.93	0.023	29.3	0.65	0.017	19.6	0.44	0.010
0.20	73.2	2.42	0.074	54.4	1.82	0.055	41.7	1.38	0.042	31.9	0.96	0.032	20.9	0.56	0.019
0.25	51.6	2.02	0.082	39.6	1.67	0.063	33.3	1.40	0.053	24.8	1.04	0.038	19.3	0.63	0.026
0.30	28.1	1.36	0.064	21.3	1.17	0.048	20.4	1.14	0.047	19.3	1.02	0.043	16.2	0.76	0.031
0.35	29.6	1.66	0.092	24.6	1.49	0.076	22.5	1.41	0.069	18.0	1.21	0.054	12.7	0.88	0.032
0.40	22.8	1.67	0.093	19.4	1.68	0.078	17.3	1.55	0.070	13.7	1.29	0.055	9.9	0.88	0.031
0.45	37.1	2.66	0.190	15.8	1.37	0.081	14.1	1.28	0.071	11.2	1.09	0.055	7.5	0.80	0.032
0.50	13.6	1.13	0.086	8.6	1.02	0.055	8.2	0.91	0.052	7.3	0.84	0.044	6.6	0.73	0.030
0.55	8.5	0.85	0.065	5.2	0.82	0.040	5.1	0.79	0.039	4.9	0.73	0.036	5.5	0.67	0.029
0.60	5.4	0.76	0.049	3.3	0.73	0.030	3.4	0.72	0.030	3.6	0.69	0.031	4.6	0.62	0.027
0.65	5.3	0.86	0.056	3.3	0.74	0.035	2.8	0.70	0.030	2.7	0.66	0.027	3.8	0.58	0.025
0.70	8.3	0.92	0.103	3.6	0.61	0.044	2.4	0.63	0.030	2.0	0.62	0.023	3.3	0.57	0.023
0.75	5.5	0.67	0.079	2.6	0.60	0.037	2.0	0.60	0.028	1.8	0.59	0.022	2.9	0.56	0.022
0.80	2.6	0.58	0.043	1.8	0.57	0.029	1.6	0.57	0.025	1.7	0.57	0.023	2.6	0.55	0.022
0.85	4.1	0.58	0.076	1.5	0.53	0.027	1.5	0.54	0.025	1.6	0.55	0.024	2.4	0.54	0.022
0.90	1.8	0.56	0.036	1.3	0.53	0.027	1.3	0.54	0.025	1.4	0.54	0.024	2.2	0.54	0.022
0.95	1.5	0.59	0.034	1.1	0.56	0.026	1.1	0.54	0.023	1.3	0.54	0.024	2.0	0.53	0.022
1.00	1.3	0.50	0.033	1.1	0.52	0.027	1.1	0.53	0.025	1.2	0.53	0.023	1.9	0.53	0.022
1.10	0.8	0.59	0.026	0.8	0.55	0.023	0.8	0.54	0.022	1.0	0.53	0.022	1.7	0.52	0.022
1.20	0.9	0.51	0.031	0.7	0.51	0.026	0.7	0.52	0.023	0.8	0.53	0.022	1.5	0.52	0.021
1.30	0.7	0.57	0.030	0.6	0.55	0.026	0.6	0.54	0.023	0.7	0.53	0.022	1.4	0.52	0.021
1.40	0.5	0.52	0.027	0.5	0.53	0.023	0.5	0.53	0.022	0.6	0.53	0.021	1.3	0.52	0.021
1.50	0.4	0.50	0.025	0.4	0.51	0.023	0.4	0.52	0.022	0.6	0.52	0.021	1.2	0.52	0.020
1.60	0.5	0.56	0.032	0.4	0.55	0.027	0.4	0.54	0.024	0.5	0.53	0.022	1.1	0.52	0.020
1.70	0.3	0.56	0.025	0.3	0.55	0.019	0.3	0.54	0.020	0.5	0.53	0.020	1.0	0.52	0.020
1.80	0.4	0.50	0.033	0.4	0.51	0.027	0.4	0.52	0.024	0.4	0.52	0.021	0.9	0.52	0.020
1.90	0.3	0.50	0.028	0.3	0.49	0.024	0.3	0.51	0.022	0.4	0.52	0.021	0.9	0.52	0.020
2.00	0.3	0.50	0.033	0.3	0.51	0.028	0.3	0.51	0.025	0.4	0.52	0.022	0.8	0.52	0.020
2.20	0.2	0.57	0.027	0.2	0.55	0.023	0.2	0.54	0.022	0.3	0.53	0.021	0.8	0.52	0.020
2.40	0.2	0.52	0.034	0.2	0.52	0.029	0.2	0.52	0.026	0.3	0.52	0.022	0.7	0.51	0.020
2.60	0.2	0.49	0.033	0.2	0.49	0.028	0.2	0.50	0.025	0.3	0.51	0.022	0.6	0.51	0.020
2.80	0.2	0.49	0.035	0.2	0.50	0.030	0.2	0.50	0.027	0.3	0.51	0.024	0.6	0.51	0.021
3.00	0.2	0.53	0.043	0.2	0.53	0.036	0.2	0.52	0.031	0.3	0.52	0.026	0.6	0.51	0.021
3.20	0.1	0.56	0.035	0.1	0.55	0.029	0.1	0.54	0.027	0.2	0.53	0.023	0.5	0.52	0.020
3.40	0.1	0.56	0.035	0.1	0.55	0.029	0.1	0.54	0.025	0.2	0.53	0.023	0.5	0.52	0.020
3.60	0.1	0.54	0.036	0.1	0.53	0.031	0.1	0.53	0.028	0.2	0.52	0.025	0.5	0.51	0.021
3.80	0.1	0.51	0.046	0.1	0.51	0.040	0.1	0.51	0.035	0.2	0.51	0.028	0.4	0.51	0.021
4.00	0.1	0.49	0.048	0.1	0.49	0.041	0.1	0.50	0.036	0.2	0.51	0.029	0.4	0.51	0.022

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

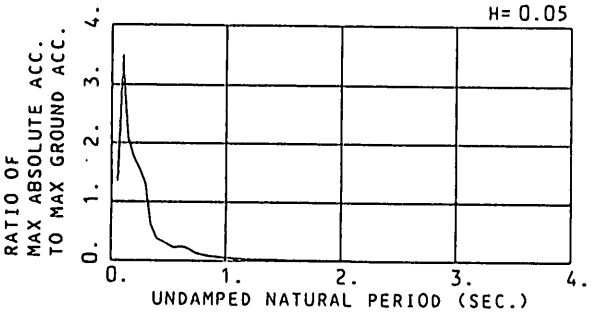

F-658 EAST KOKEN-G
FOURIER SPECTRUM
0. 2. 4. 6. 8. 10.
0. 5. 10. 15. 20.
FREQUENCY(HZ)

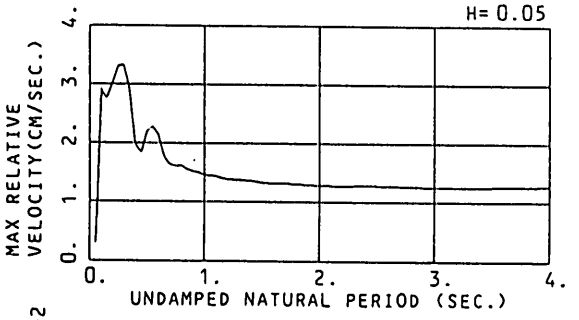

F-658 NORTH KOKEN-G
FOURIER SPECTRUM
0. 2. 4. 6. 8. 10.
0. 5. 10. 15. 20.
FREQUENCY(HZ)

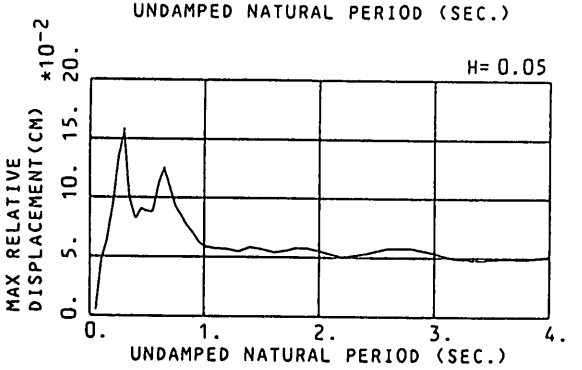

F-658 UP KOKEN-G
FOURIER SPECTRUM
0. 1. 2. 3. 4.
0. 5. 10. 15. 20.
FREQUENCY(HZ)


F-658 EAST KOKEN-G
(1/FC=1.05 SEC.)
H= 0.05
RATIO OF
MAX ABSOLUTE ACC.
TO MAX GROUND ACC.
0. 1. 2. 3.
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
H= 0.05
MAX RELATIVE
VELOCITY(CM/SEC.)
0. 1. 2. 3.
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
H= 0.05
MAX RELATIVE
DISPLACEMENT(CM) *10-2
0. 3. 6. 9. 12. 15.
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
RESPONSE SPECTRA

F-658 NORTH KOKEN-G
(1/FC=1.08 SEC.)

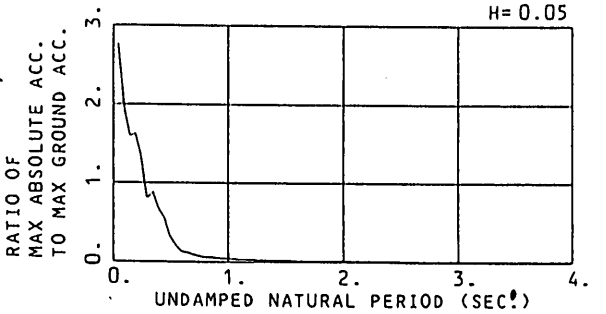


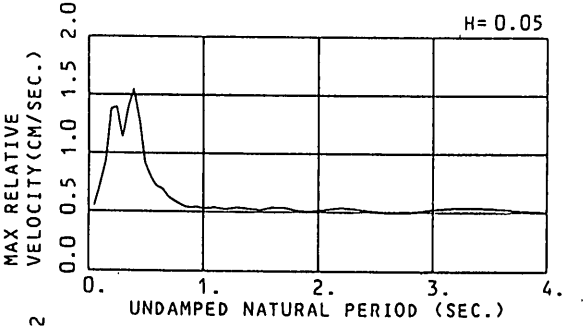


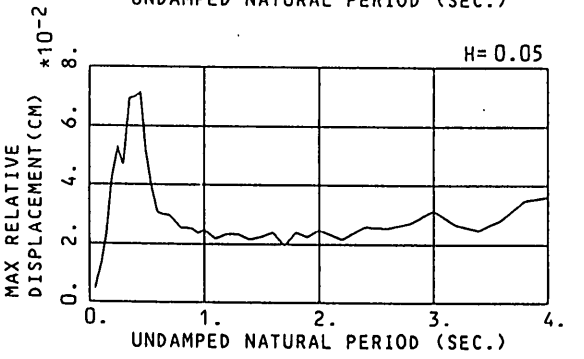


RESPONSE SPECTRA

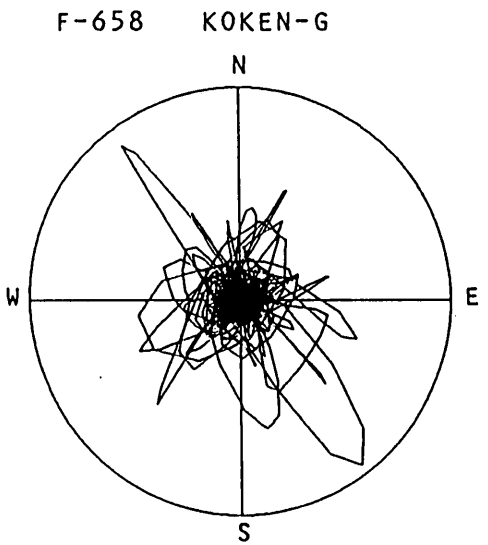
F-658 UP KOKEN-G
(1/FC=0.89 SEC.)



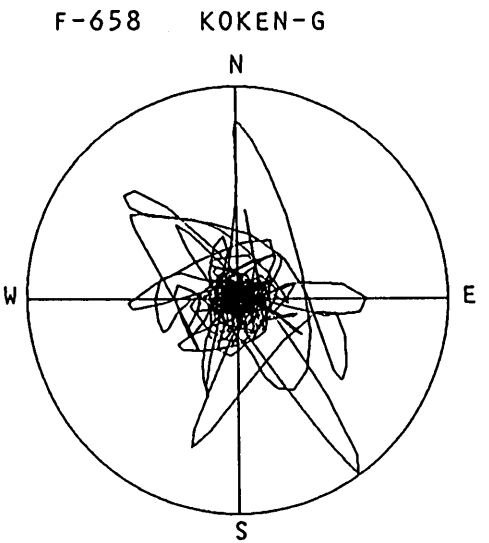




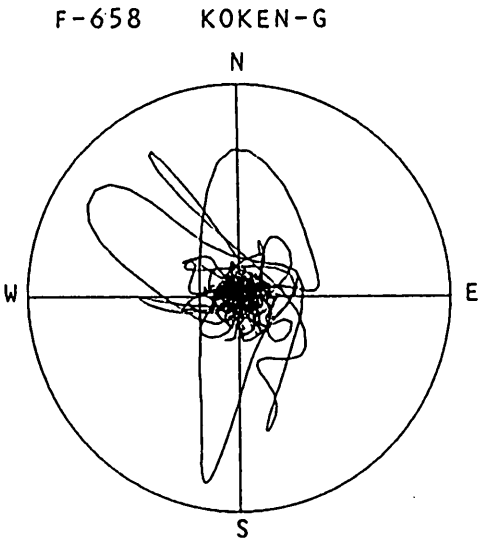
RESPONSE SPECTRA



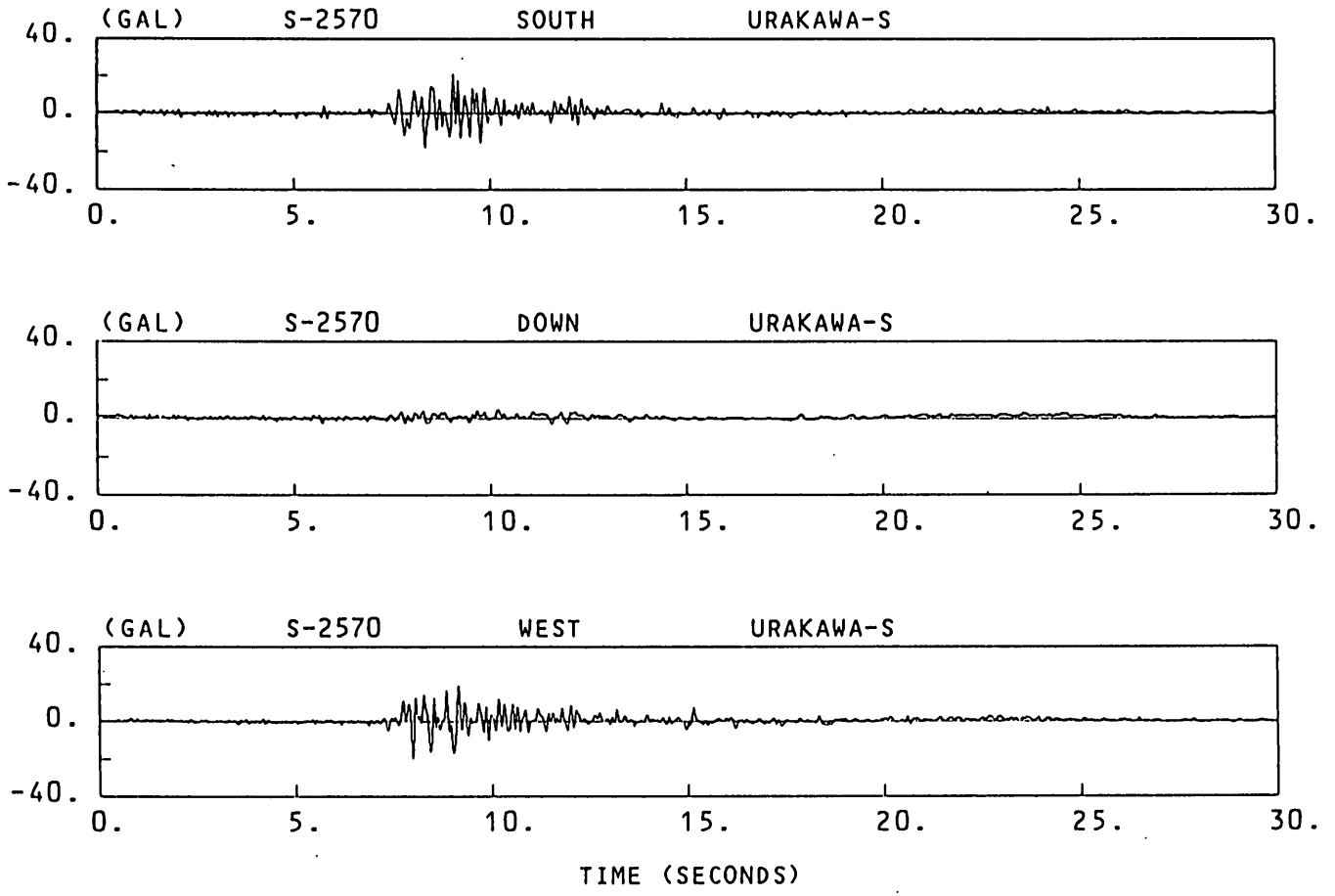
ACCELERATION
R=70.0 GAL
MAX=66.7 GAL



VELOCITY
R=1.5 CM/SEC.
MAX=1.5 CM/SEC.



DISPLACEMENT
R=0.06 CM
MAX=0.05 CM


(GAL) S-2570 SOUTH URAKAWA-S
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
(GAL) S-2570 DOWN URAKAWA-S
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
(GAL) S-2570 WEST URAKAWA-S
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
TIME (SECONDS)

RECORD NUMBER : M-1511

STATION : TOKACHI-M

EARTHQUAKE DATA

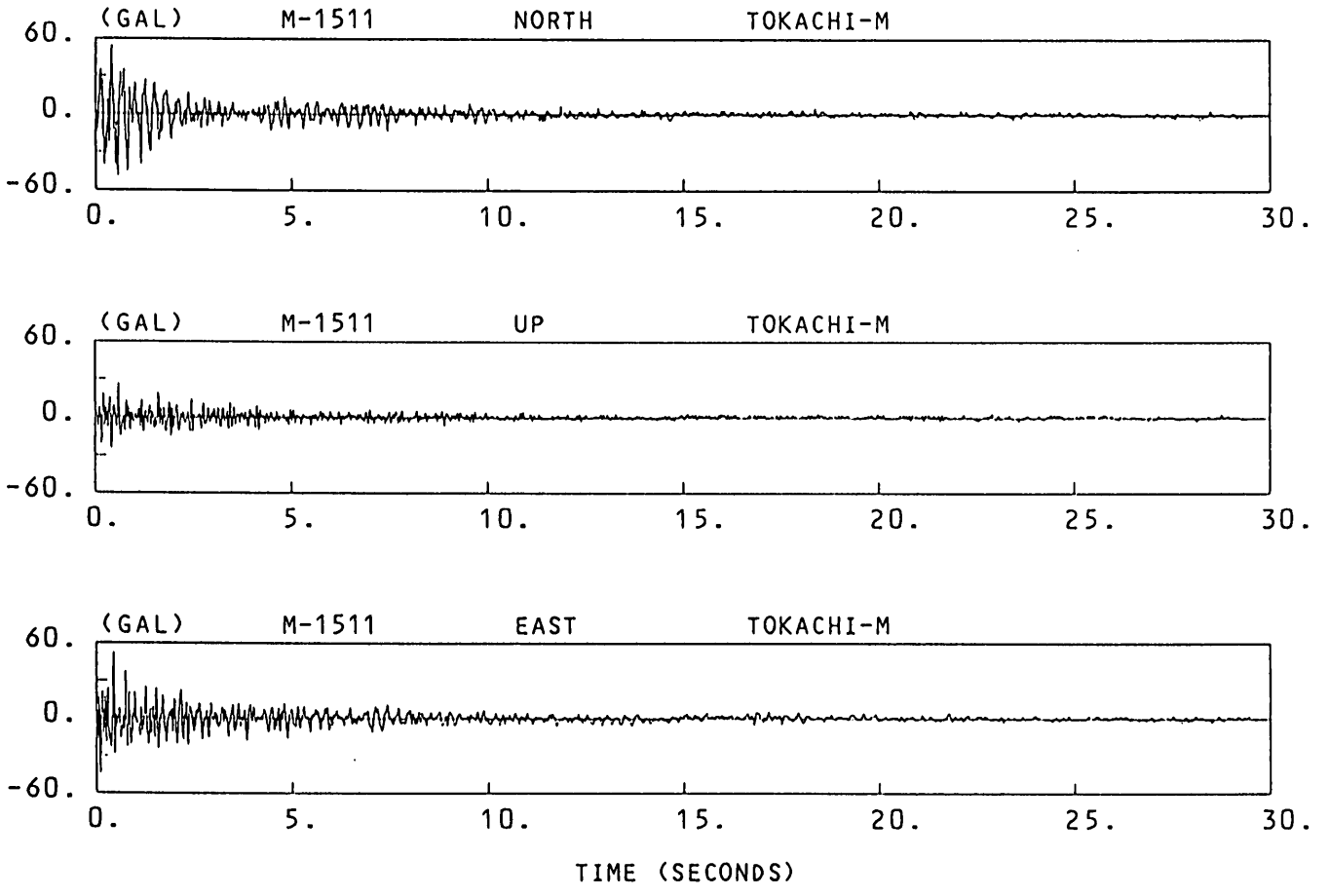
****

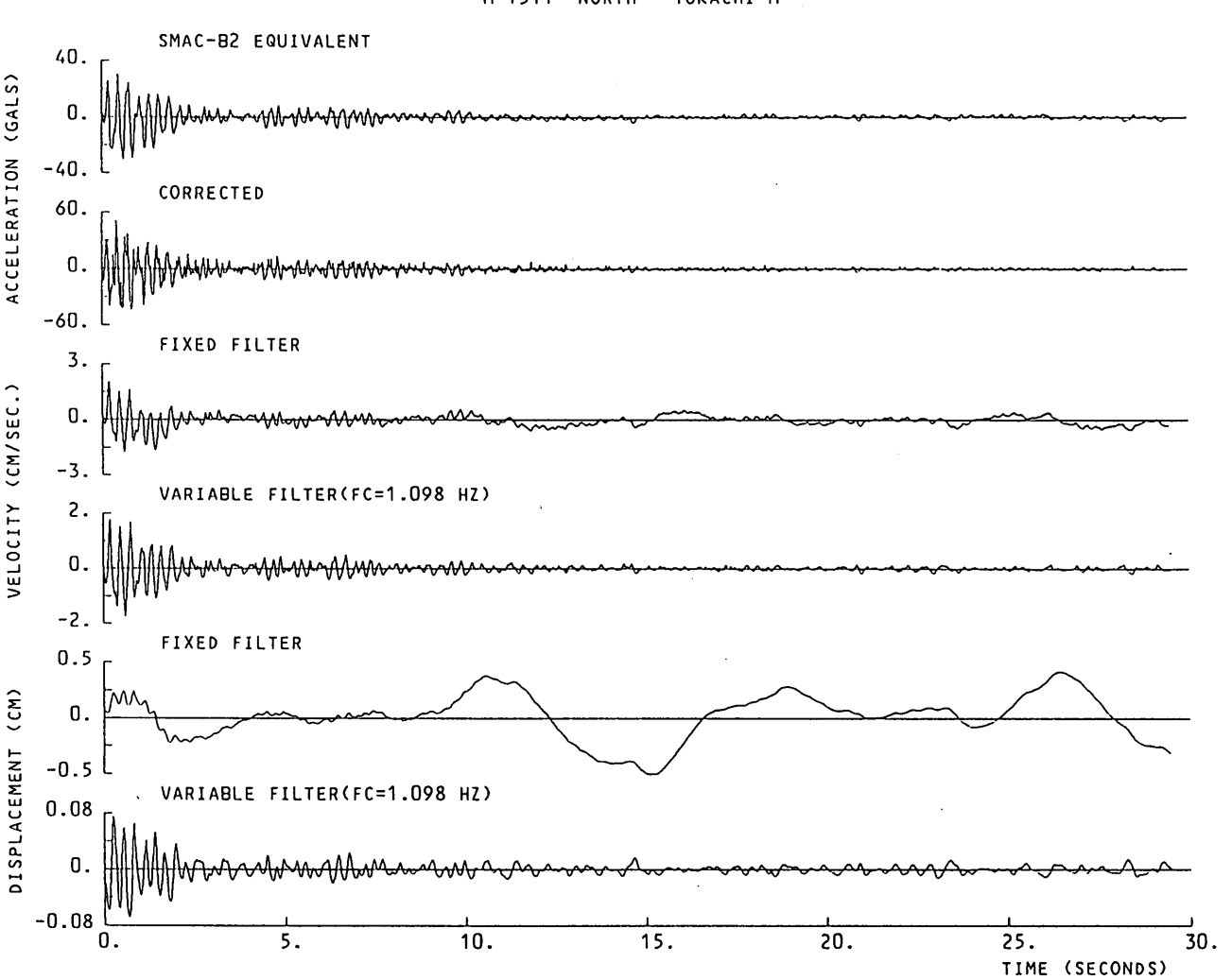
DATE AND TIME	14:14 JULY 1,1994
LOCATION OF HYPOCENTER	
EPICENTRAL REGION	HIDAKA MOUNTAINS REGION
LATITUDE	42° 15.1' N
LONGITUDE	143° 4.9' E
DEPTH	67.3KM
JMA MAGNITUDE	5.3

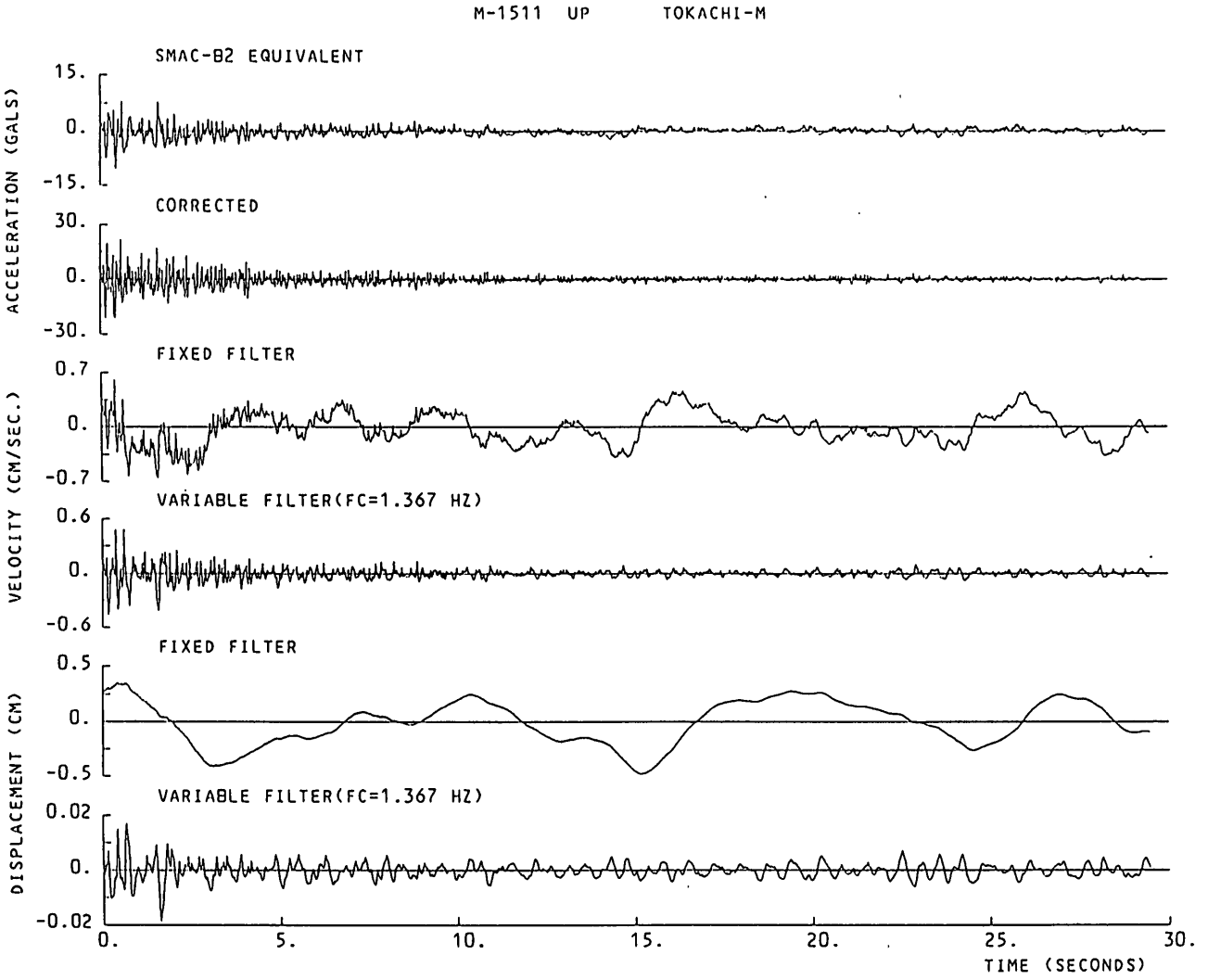
****

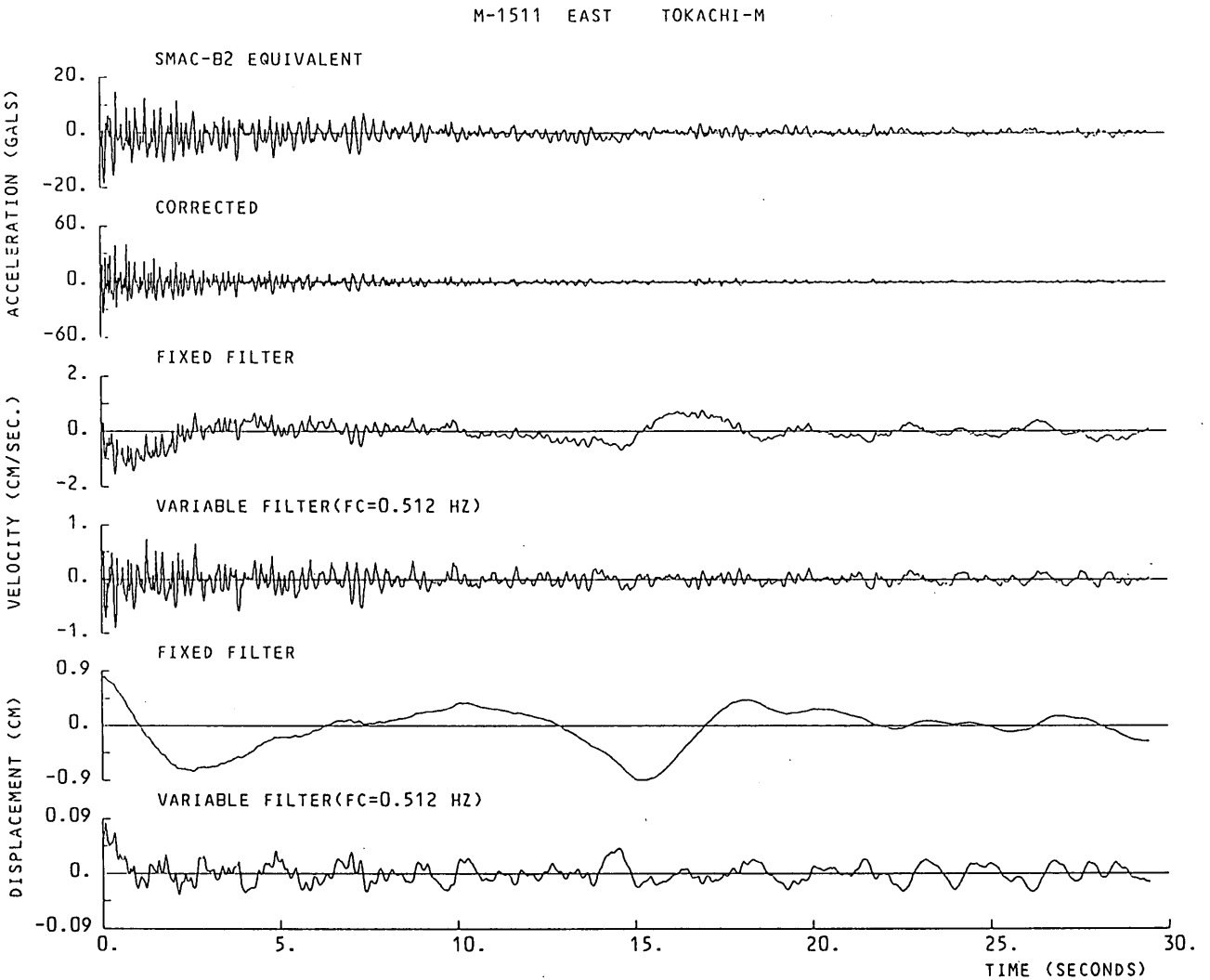
	PEAK VALUES OF COMPONENTS			
	N S	E W	U D	HORIZONTAL*
PARAMETER OF THE VARIABLE FILTER				
FC (HZ)	1.098	0.512	1.367	
MAXIMUM ACCELERATION (GAL)				
SMAC-B2 EQUIVALENT	31.0	18.6	10.6	33.8
ORIGINAL	54.2	52.3	26.1	62.0
CORRECTED	55.4	56.2	26.5	65.2
MAXIMUM VELOCITY (CM/SEC)				
FIXED FILTER	2.06	1.57	0.67	2.14
VARIABLE FILTER	1.77	0.92	0.51	1.78
MAXIMUM DISPLACEMENT (CM)				
FIXED FILTER	0.50	0.89	0.47	1.02
VARIABLE FILTER	0.07	0.08	0.02	0.10

* RESULTANT OF HORIZONTAL COMPONENTS


(GAL) M-1511 NORTH TOKACHI-M
60.
0.
-60.
0. 5. 10. 15. 20. 25. 30.
(GAL) M-1511 UP TOKACHI-M
60.
0.
-60.
0. 5. 10. 15. 20. 25. 30.
(GAL) M-1511 EAST TOKACHI-M
60.
0.
-60.
0. 5. 10. 15. 20. 25. 30.
TIME (SECONDS)


M-1511 NORTH TOKACHI-M
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=1.098 HZ)
FIXED FILTER
VARIABLE FILTER(FC=1.098 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
TIME (SECONDS)
40.
0.
-40.
60.
0.
-60.
3.
0.
-3.
2.
0.
-2.
0.5
0.
-0.5
0.08
0.
-0.08
0.
5.
10.
15.
20.
25.
30.


M-1511 UP TOKACHI-M
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=1.367 HZ)
FIXED FILTER
VARIABLE FILTER(FC=1.367 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
15.
0.
-15.
30.
0.
-30.
0.7
0.
-0.7
0.6
0.
-0.6
0.5
0.
-0.5
0.02
0.
-0.02
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


M-1511 EAST TOKACHI-M
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.512 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.512 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
20.
0.
-20.
60.
0.
-60.
2.
0.
-2.
1.
0.
-1.
0.9
0.
-0.9
0.09
0.
-0.09
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

RESPONSE SPECTRUM

RECORD = M-1511 COMPONENT = NORTH SIGNAL = GR. ACC. CORRECTION = STATION = TOKACHI-M
DATE AND TIME = 1994- 7- 1-14-14 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 55.36 (GAL)
TIME LENGTH = 29.49 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	194.8	1.52	0.012	101.7	0.52	0.006	88.5	0.41	0.006	76.5	0.32	0.005	68.8	0.22	0.004
0.10	215.4	3.18	0.055	157.0	2.24	0.040	126.9	1.80	0.032	102.3	1.23	0.026	84.3	0.79	0.020
0.15	288.6	6.59	0.164	161.6	3.95	0.092	133.8	2.92	0.076	99.0	2.08	0.056	69.8	1.25	0.036
0.20	135.0	4.06	0.137	122.3	3.52	0.124	104.9	3.12	0.106	89.9	2.48	0.090	64.7	1.76	0.060
0.25	284.5	11.39	0.450	222.4	8.82	0.351	183.4	7.01	0.288	134.0	4.82	0.209	77.5	2.66	0.108
0.30	356.8	16.95	0.813	218.2	11.08	0.497	160.8	8.21	0.364	113.6	6.13	0.254	67.5	3.22	0.132
0.35	151.9	8.47	0.471	93.5	6.09	0.291	82.8	5.55	0.255	67.6	4.67	0.203	49.9	2.99	0.130
0.40	59.3	4.71	0.240	54.4	4.41	0.220	50.1	4.16	0.202	43.8	3.70	0.172	37.2	2.81	0.120
0.45	40.0	3.91	0.205	37.8	3.74	0.194	36.2	3.59	0.183	33.4	3.28	0.164	27.9	2.63	0.122
0.50	32.6	3.17	0.207	29.3	3.09	0.185	28.2	2.99	0.176	26.8	2.85	0.161	24.1	2.42	0.123
0.55	30.9	2.86	0.237	22.5	2.56	0.172	21.9	2.51	0.165	21.3	2.45	0.152	20.8	2.22	0.122
0.60	37.7	3.68	0.344	18.6	2.32	0.170	17.5	2.21	0.157	16.9	2.12	0.142	18.0	2.03	0.118
0.65	18.0	2.57	0.192	16.6	2.45	0.177	15.7	2.36	0.165	14.5	2.21	0.144	15.5	1.94	0.112
0.70	14.5	2.69	0.180	13.6	2.57	0.168	13.0	2.47	0.158	12.4	2.31	0.141	13.4	1.99	0.109
0.75	11.0	2.67	0.157	10.5	2.57	0.149	10.2	2.48	0.141	10.1	2.33	0.129	12.1	2.02	0.110
0.80	14.9	2.59	0.242	8.2	2.50	0.131	8.2	2.43	0.129	8.6	2.31	0.124	11.1	2.03	0.112
0.85	12.0	2.47	0.219	7.3	2.40	0.132	7.3	2.34	0.130	7.8	2.24	0.125	10.3	2.01	0.114
0.90	7.6	2.33	0.155	6.7	2.29	0.137	6.6	2.25	0.131	7.0	2.17	0.126	9.6	1.99	0.115
0.95	6.7	2.19	0.154	6.1	2.17	0.139	6.0	2.14	0.132	6.4	2.09	0.127	9.0	1.96	0.116
1.00	7.6	2.09	0.194	5.5	2.05	0.138	5.4	2.04	0.132	5.9	2.01	0.128	8.4	1.92	0.118
1.10	4.5	2.14	0.138	4.5	2.10	0.136	4.6	2.07	0.134	5.1	2.01	0.130	7:5	1.88	0.120
1.20	3.8	2.15	0.138	3.8	2.12	0.137	3.9	2.09	0.135	4.4	2.03	0.131	6.7	1.91	0.121
1.30	3.2	2.14	0.139	3.2	2.11	0.137	3.4	2.09	0.136	3.9	2.04	0.132	6.1	1.92	0.123
1.40	2.8	2.11	0.139	2.8	2.09	0.138	2.9	2.07	0.136	3.5	2.03	0.133	5.6	1.93	0.124
1.50	2.5	2.08	0.140	2.5	2.06	0.138	2.6	2.05	0.137	3.1	2.02	0.134	5.1	1.93	0.126
1.60	2.2	2.05	0.140	2.2	2.03	0.139	2.3	2.02	0.137	2.8	2.00	0.134	4.7	1.93	0.127
1.70	1.9	2.01	0.141	1.9	2.00	0.139	2.1	2.00	0.138	2.6	1.98	0.135	4.4	1.92	0.128
1.80	1.7	1.98	0.141	1.7	1.98	0.139	1.9	1.97	0.138	2.4	1.96	0.135	4.1	1.91	0.128
1.90	1.5	1.96	0.141	1.6	1.95	0.140	1.7	1.94	0.138	2.2	1.93	0.136	3.9	1.90	0.129
2.00	1.4	1.96	0.141	1.4	1.95	0.140	1.6	1.94	0.139	2.0	1.92	0.136	3.6	1.89	0.130
2.20	1.2	1.96	0.142	1.2	1.95	0.140	1.3	1.94	0.139	1.8	1.92	0.137	3.3	1.87	0.131
2.40	1.0	1.96	0.143	1.0	1.95	0.141	1.1	1.94	0.140	1.6	1.92	0.138	3.0	1.87	0.132
2.60	0.9	1.96	0.149	0.9	1.95	0.145	1.0	1.94	0.142	1.4	1.93	0.138	2.7	1.88	0.133
2.80	0.8	1.96	0.154	0.8	1.95	0.150	0.9	1.94	0.147	1.3	1.93	0.140	2.5	1.89	0.133
3.00	0.7	1.96	0.162	0.7	1.95	0.158	0.8	1.95	0.154	1.2	1.93	0.146	2.3	1.89	0.134
3.20	0.7	1.96	0.171	0.7	1.95	0.167	0.8	1.95	0.163	1.1	1.93	0.155	2.1	1.90	0.137
3.40	0.6	1.96	0.179	0.6	1.95	0.175	0.7	1.95	0.170	1.0	1.93	0.163	2.0	1.90	0.144
3.60	0.6	1.96	0.186	0.6	1.95	0.181	0.7	1.95	0.177	0.9	1.94	0.169	1.9	1.90	0.150
3.80	0.5	1.96	0.192	0.6	1.95	0.187	0.6	1.95	0.183	0.9	1.94	0.175	1.8	1.91	0.155
4.00	0.5	1.96	0.197	0.5	1.95	0.193	0.6	1.95	0.188	0.8	1.94	0.180	1.7	1.91	0.161

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

RESPONSE SPECTRUM

RECORD = M-1511 COMPONENT = UP SIGNAL = GR. ACC. CORRECTION = STATION = TOKACHI-M
DATE AND TIME = 1994- 7- 1-14-14 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 26.51 (GAL)
TIME LENGTH = 29.49 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	61.0	0.41	0.004	39.7	0.22	0.003	40.8	0.21	0.003	41.3	0.19	0.003	36.5	0.16	0.002
0.10	230.2	3.62	0.058	90.7	1.36	0.023	75.2	1.08	0.019	55.8	0.80	0.014	41.3	0.50	0.009
0.15	83.8	2.12	0.048	48.0	1.27	0.028	42.1	1.07	0.024	34.0	0.90	0.019	26.7	0.58	0.013
0.20	80.7	2.58	0.082	30.1	0.89	0.030	25.3	0.75	0.025	20.7	0.64	0.021	16.8	0.50	0.014
0.25	53.5	2.14	0.085	36.2	1.51	0.057	30.5	1.23	0.048	23.0	0.88	0.036	14.4	0.60	0.019
0.30	43.9	2.24	0.100	31.3	1.55	0.072	25.7	1.31	0.058	19.4	0.96	0.043	12.5	0.66	0.023
0.35	47.2	2.62	0.146	18.0	1.10	0.056	14.0	1.01	0.043	12.0	0.86	0.036	10.0	0.68	0.024
0.40	35.2	2.23	0.143	10.8	0.87	0.044	9.5	0.84	0.038	7.4	0.78	0.029	7.2	0.66	0.021
0.45	17.5	1.26	0.090	7.9	0.79	0.040	6.1	0.71	0.031	5.4	0.66	0.027	5.6	0.62	0.020
0.50	11.2	0.91	0.071	4.9	0.56	0.031	4.4	0.57	0.028	4.3	0.58	0.024	4.9	0.58	0.020
0.55	9.0	0.80	0.069	5.6	0.55	0.043	4.1	0.53	0.031	3.5	0.54	0.026	4.3	0.55	0.021
0.60	8.8	0.87	0.080	4.6	0.52	0.042	4.1	0.51	0.037	3.4	0.52	0.030	3.8	0.53	0.022
0.65	6.2	0.71	0.067	4.0	0.52	0.042	3.6	0.50	0.037	3.2	0.51	0.031	3.4	0.52	0.022
0.70	8.8	0.99	0.109	3.6	0.51	0.044	2.9	0.50	0.036	2.7	0.50	0.031	3.0	0.51	0.022
0.75	5.9	0.76	0.084	2.8	0.50	0.040	2.4	0.50	0.034	2.4	0.50	0.030	2.8	0.50	0.023
0.80	2.5	0.50	0.040	2.3	0.50	0.037	2.2	0.50	0.035	2.2	0.50	0.031	2.5	0.50	0.024
0.85	3.7	0.51	0.067	2.0	0.50	0.036	1.9	0.50	0.034	2.0	0.50	0.031	2.4	0.50	0.024
0.90	2.3	0.51	0.047	1.6	0.50	0.033	1.6	0.50	0.032	1.7	0.50	0.029	2.2	0.50	0.024
0.95	1.8	0.52	0.042	1.3	0.50	0.030	1.4	0.50	0.029	1.5	0.50	0.027	2.0	0.50	0.024
1.00	3.0	0.53	0.076	1.1	0.50	0.026	1.1	0.50	0.026	1.3	0.50	0.025	1.9	0.49	0.023
1.10	1.5	0.49	0.047	0.7	0.49	0.021	0.8	0.49	0.021	1.0	0.49	0.022	1.7	0.49	0.022
1.20	0.8	0.49	0.030	0.5	0.49	0.019	0.6	0.49	0.019	0.8	0.49	0.019	1.5	0.49	0.020
1.30	0.5	0.49	0.019	0.5	0.49	0.019	0.5	0.49	0.019	0.8	0.49	0.019	1.4	0.49	0.019
1.40	0.4	0.49	0.022	0.4	0.49	0.019	0.5	0.49	0.019	0.7	0.49	0.019	1.3	0.49	0.019
1.50	0.4	0.49	0.022	0.4	0.49	0.019	0.4	0.49	0.019	0.6	0.49	0.019	1.2	0.49	0.019
1.60	0.3	0.49	0.021	0.3	0.49	0.020	0.4	0.49	0.020	0.6	0.49	0.019	1.1	0.49	0.019
1.70	0.3	0.49	0.021	0.3	0.49	0.020	0.4	0.49	0.020	0.5	0.49	0.020	1.0	0.49	0.019
1.80	0.2	0.49	0.020	0.3	0.49	0.020	0.3	0.49	0.020	0.5	0.49	0.020	0.9	0.49	0.020
1.90	0.2	0.49	0.022	0.3	0.49	0.021	0.3	0.49	0.021	0.5	0.49	0.021	0.9	0.49	0.020
2.00	0.2	0.50	0.023	0.2	0.49	0.023	0.3	0.49	0.022	0.4	0.49	0.022	0.8	0.49	0.020
2.20	0.2	0.50	0.025	0.2	0.50	0.024	0.3	0.50	0.024	0.4	0.50	0.023	0.8	0.49	0.021
2.40	0.2	0.50	0.026	0.2	0.50	0.025	0.2	0.50	0.024	0.3	0.50	0.023	0.7	0.50	0.021
2.60	0.1	0.50	0.026	0.2	0.50	0.025	0.2	0.50	0.024	0.3	0.50	0.023	0.6	0.50	0.021
2.80	0.1	0.50	0.025	0.1	0.50	0.024	0.2	0.50	0.024	0.3	0.50	0.023	0.6	0.50	0.021
3.00	0.1	0.50	0.024	0.1	0.50	0.024	0.2	0.50	0.023	0.3	0.50	0.023	0.6	0.50	0.021
3.20	0.1	0.51	0.024	0.1	0.50	0.024	0.2	0.50	0.024	0.2	0.50	0.023	0.5	0.50	0.022
3.40	0.1	0.51	0.025	0.1	0.51	0.024	0.1	0.50	0.024	0.2	0.50	0.024	0.5	0.50	0.022
3.60	0.1	0.51	0.025	0.1	0.51	0.025	0.1	0.51	0.024	0.2	0.50	0.024	0.5	0.50	0.023
3.80	0.1	0.51	0.025	0.1	0.51	0.025	0.1	0.51	0.025	0.2	0.51	0.024	0.4	0.50	0.023
4.00	0.1	0.51	0.025	0.1	0.51	0.025	0.1	0.51	0.025	0.2	0.51	0.024	0.4	0.50	0.023

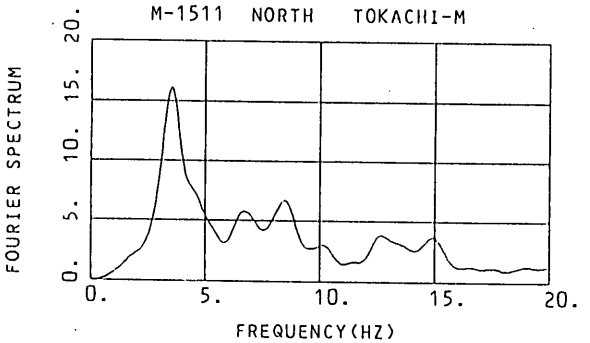
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

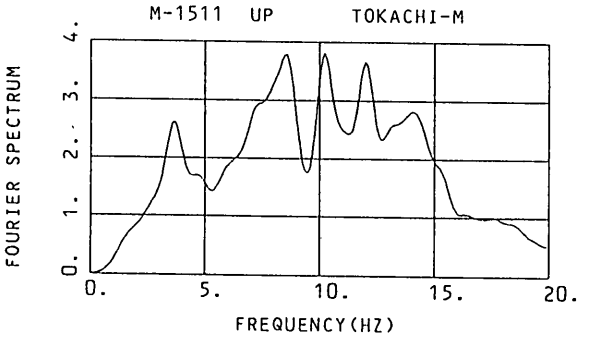
RESPONSE SPECTRUM

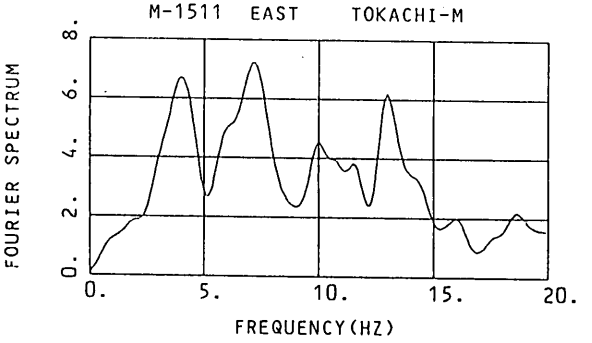
RECORD = M-1511 COMPONENT = EAST SIGNAL = GR. ACC. CORRECTION = STATION = TOKACHI-M
DATE AND TIME = 1994- 7- 1-14-14 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 56.19 (GAL)
TIME LENGTH = 29.49 (SEC) SKIPPED LENGTH = 0.00 (SEC)

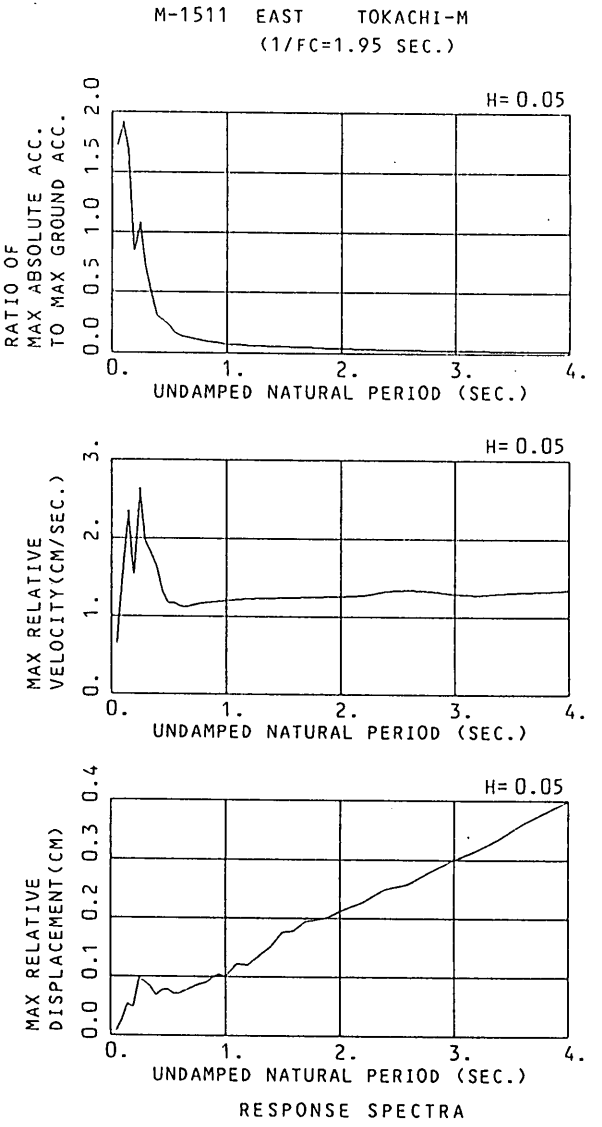
	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	214.0	1.67	0.014	121.0	0.87	0.008	96.5	0.63	0.006	80.8	0.51	0.005	64.6	0.37	0.004
0.10	372.1	5.89	0.094	149.0	2.30	0.038	107.8	1.61	0.027	80.3	1.32	0.020	65.5	0.94	0.015
0.15	266.7	6.35	0.152	125.6	3.06	0.071	94.4	2.34	0.054	68.5	1.71	0.037	54.5	1.18	0.026
0.20	110.9	3.52	0.112	63.8	1.88	0.064	47.4	1.53	0.048	43.2	1.51	0.043	34.8	1.34	0.028
0.25	224.7	8.90	0.356	88.2	3.78	0.140	60.9	2.64	0.096	39.9	2.03	0.061	26.0	1.44	0.036
0.30	154.1	7.47	0.351	55.9	2.75	0.128	40.1	1.96	0.091	31.1	1.54	0.068	23.6	1.28	0.044
0.35	98.8	5.66	0.307	37.3	2.28	0.116	26.9	1.80	0.083	20.4	1.57	0.060	18.1	1.10	0.041
0.40	24.2	1.82	0.098	20.7	1.72	0.084	16.9	1.63	0.068	14.1	1.46	0.055	14.0	1.10	0.043
0.45	48.4	3.56	0.248	19.6	1.44	0.101	15.1	1.30	0.077	11.6	1.23	0.058	12.5	1.01	0.048
0.50	26.9	2.26	0.170	15.4	1.43	0.098	12.6	1.16	0.079	10.6	1.04	0.064	11.2	0.95	0.051
0.55	34.1	3.02	0.261	13.5	1.28	0.103	9.3	1.16	0.071	8.8	1.06	0.063	10.1	0.97	0.054
0.60	22.4	2.09	0.204	9.3	1.17	0.085	7.9	1.13	0.071	7.8	1.07	0.067	9.2	1.00	0.057
0.65	8.9	1.31	0.095	7.4	1.13	0.079	7.2	1.11	0.076	6.9	1.09	0.071	8.4	1.02	0.060
0.70	19.2	2.17	0.238	7.7	1.15	0.096	6.6	1.13	0.081	6.3	1.10	0.076	7.7	1.03	0.063
0.75	16.5	1.95	0.235	7.4	1.17	0.105	6.0	1.15	0.085	5.8	1.12	0.080	7.1	1.05	0.067
0.80	11.9	1.53	0.193	5.8	1.18	0.094	5.5	1.16	0.088	5.4	1.13	0.083	6.6	1.06	0.071
0.85	13.3	1.82	0.244	5.5	1.19	0.099	5.1	1.17	0.092	5.0	1.14	0.087	6.2	1.07	0.074
0.90	16.3	2.40	0.334	6.6	1.20	0.134	4.9	1.18	0.100	4.6	1.15	0.089	5.8	1.08	0.077
0.95	8.5	1.38	0.195	5.7	1.20	0.129	4.6	1.19	0.103	4.3	1.16	0.092	5.4	1.09	0.079
1.00	7.4	1.22	0.186	4.2	1.21	0.106	4.0	1.20	0.100	4.0	1.17	0.095	5.1	1.10	0.082
1.10	14.5	2.64	0.443	5.8	1.22	0.176	4.0	1.21	0.122	3.5	1.18	0.099	4.6	1.12	0.086
1.20	5.3	1.38	0.193	3.5	1.23	0.124	3.4	1.22	0.119	3.5	1.20	0.111	4.1	1.13	0.091
1.30	8.0	1.75	0.344	3.5	1.24	0.150	3.3	1.23	0.135	3.4	1.20	0.126	3.8	1.14	0.104
1.40	4.9	1.45	0.244	3.9	1.25	0.190	3.2	1.23	0.152	3.3	1.21	0.139	3.7	1.16	0.116
1.50	4.5	1.33	0.259	3.7	1.25	0.211	3.2	1.24	0.175	3.1	1.22	0.151	3.6	1.16	0.126
1.60	6.1	1.71	0.396	3.4	1.25	0.220	2.8	1.24	0.178	3.0	1.22	0.161	3.4	1.17	0.135
1.70	5.7	1.67	0.418	3.1	1.31	0.229	2.8	1.24	0.195	2.8	1.23	0.170	3.3	1.18	0.144
1.80	7.2	2.09	0.593	2.7	1.33	0.216	2.5	1.25	0.197	2.6	1.23	0.178	3.2	1.19	0.152
1.90	2.7	1.32	0.247	2.4	1.26	0.222	2.3	1.25	0.202	2.5	1.23	0.185	3.0	1.19	0.158
2.00	3.1	1.27	0.311	2.3	1.26	0.234	2.2	1.25	0.212	2.4	1.24	0.191	2.9	1.20	0.165
2.20	2.5	1.38	0.309	2.1	1.32	0.250	2.0	1.27	0.228	2.1	1.24	0.201	2.7	1.20	0.175
2.40	2.6	1.43	0.382	1.9	1.38	0.275	1.8	1.33	0.250	1.9	1.25	0.217	2.5	1.21	0.184
2.60	2.3	1.43	0.387	1.6	1.38	0.274	1.6	1.34	0.259	1.7	1.26	0.240	2.3	1.22	0.195
2.80	1.8	1.40	0.356	1.5	1.36	0.291	1.5	1.32	0.281	1.5	1.25	0.262	2.1	1.22	0.214
3.00	1.8	1.35	0.402	1.4	1.32	0.310	1.4	1.29	0.300	1.4	1.25	0.280	2.0	1.23	0.232
3.20	1.5	1.32	0.376	1.3	1.30	0.326	1.3	1.28	0.316	1.3	1.26	0.297	1.8	1.23	0.248
3.40	1.5	1.33	0.431	1.2	1.32	0.350	1.2	1.30	0.336	1.2	1.26	0.311	1.7	1.23	0.262
3.60	1.5	1.35	0.489	1.2	1.33	0.373	1.1	1.31	0.360	1.1	1.28	0.334	1.6	1.24	0.275
3.80	1.2	1.36	0.422	1.1	1.34	0.394	1.1	1.33	0.380	1.1	1.30	0.355	1.5	1.24	0.292
4.00	1.1	1.37	0.446	1.0	1.35	0.413	1.0	1.34	0.399	1.0	1.31	0.373	1.4	1.24	0.309

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

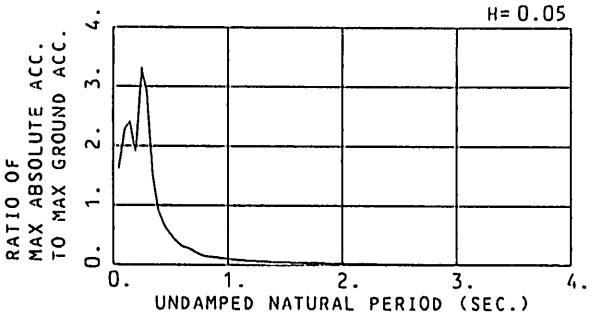

M-1511 NORTH TOKACHI-M
FOURIER SPECTRUM
0. 5. 10. 15. 20.
FREQUENCY(HZ)

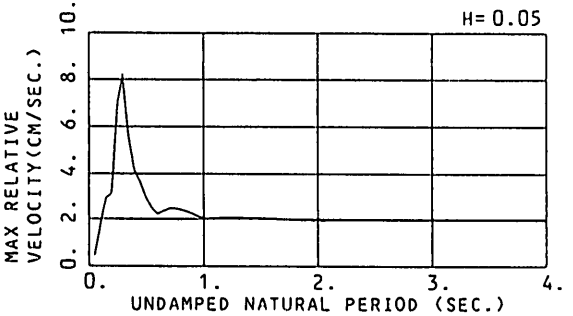

M-1511 UP TOKACHI-M
FOURIER SPECTRUM
0. 1. 2. 3. 4.
0. 5. 10. 15. 20.
FREQUENCY(HZ)

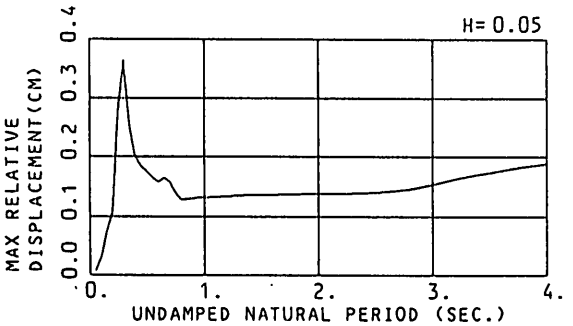

M-1511 EAST TOKACHI-M
FOURIER SPECTRUM
0. 2. 4. 6. 8.
0. 5. 10. 15. 20.
FREQUENCY(HZ)


M-1511 EAST TOKACHI-M
(1/FC=1.95 SEC.)
H= 0.05
RATIO OF
MAX ABSOLUTE ACC.
TO MAX GROUND ACC.
0.0 0.5 1.0 1.5 2.0
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
H= 0.05
MAX RELATIVE
VELOCITY(CM/SEC.)
0. 1. 2. 3.
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
H= 0.05
MAX RELATIVE
DISPLACEMENT(CM)
0.0 0.1 0.2 0.3 0.4
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
RESPONSE SPECTRA

M-1511 NORTH TOKACHI-M
(1/FC=0.91 SEC.)

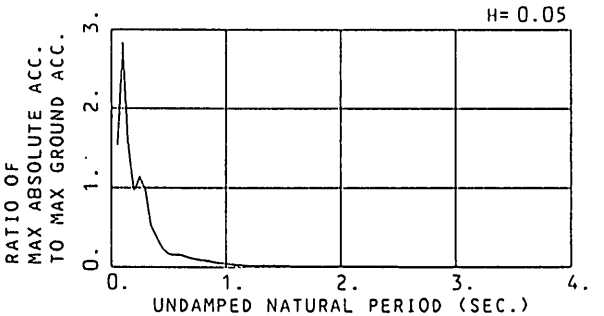


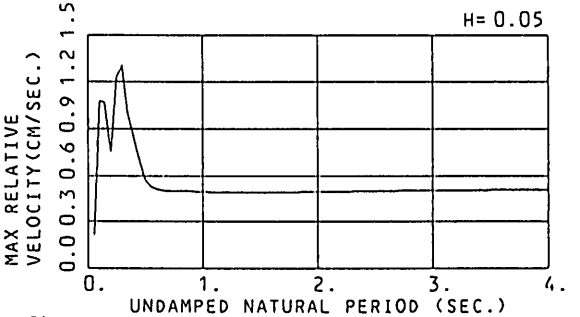


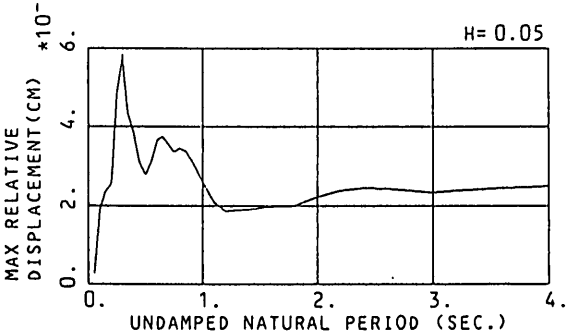


RESPONSE SPECTRA

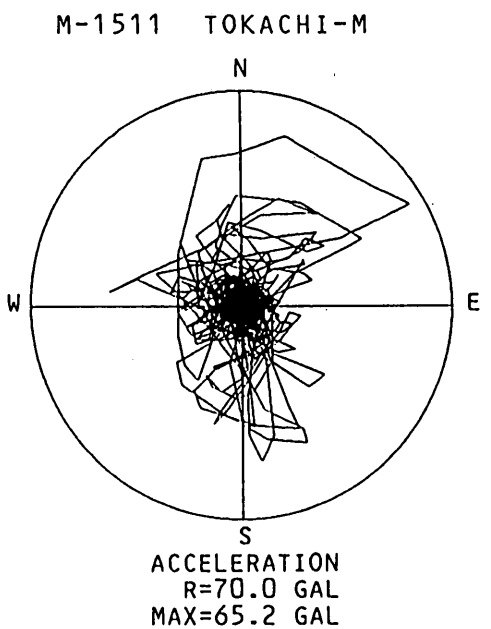
M-1511 UP TOKACHI-M
(1/FC=0.73 SEC.)



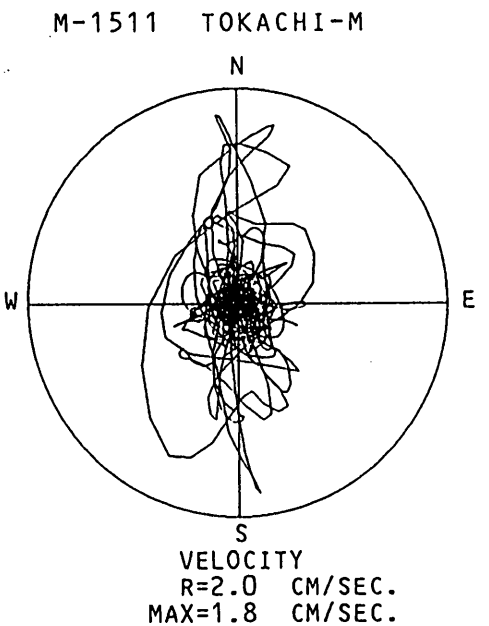




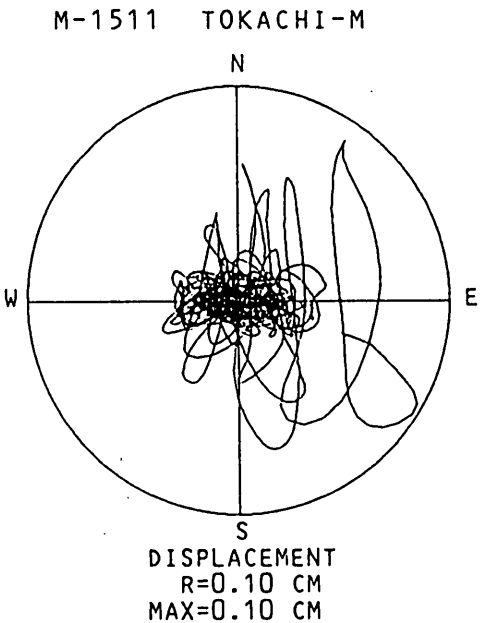
RESPONSE SPECTRA



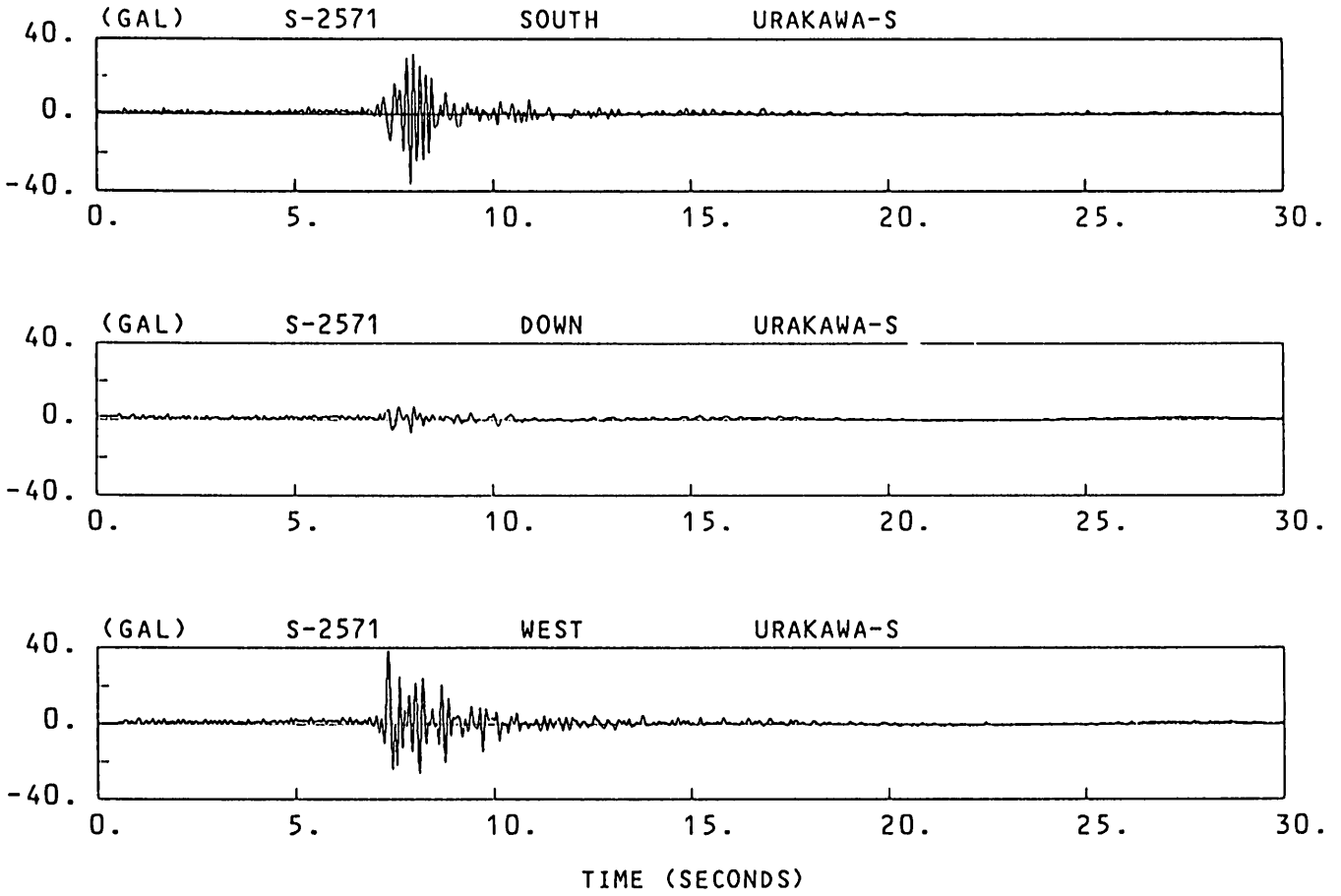
ACCELERATION
R=70.0 GAL
MAX=65.2 GAL

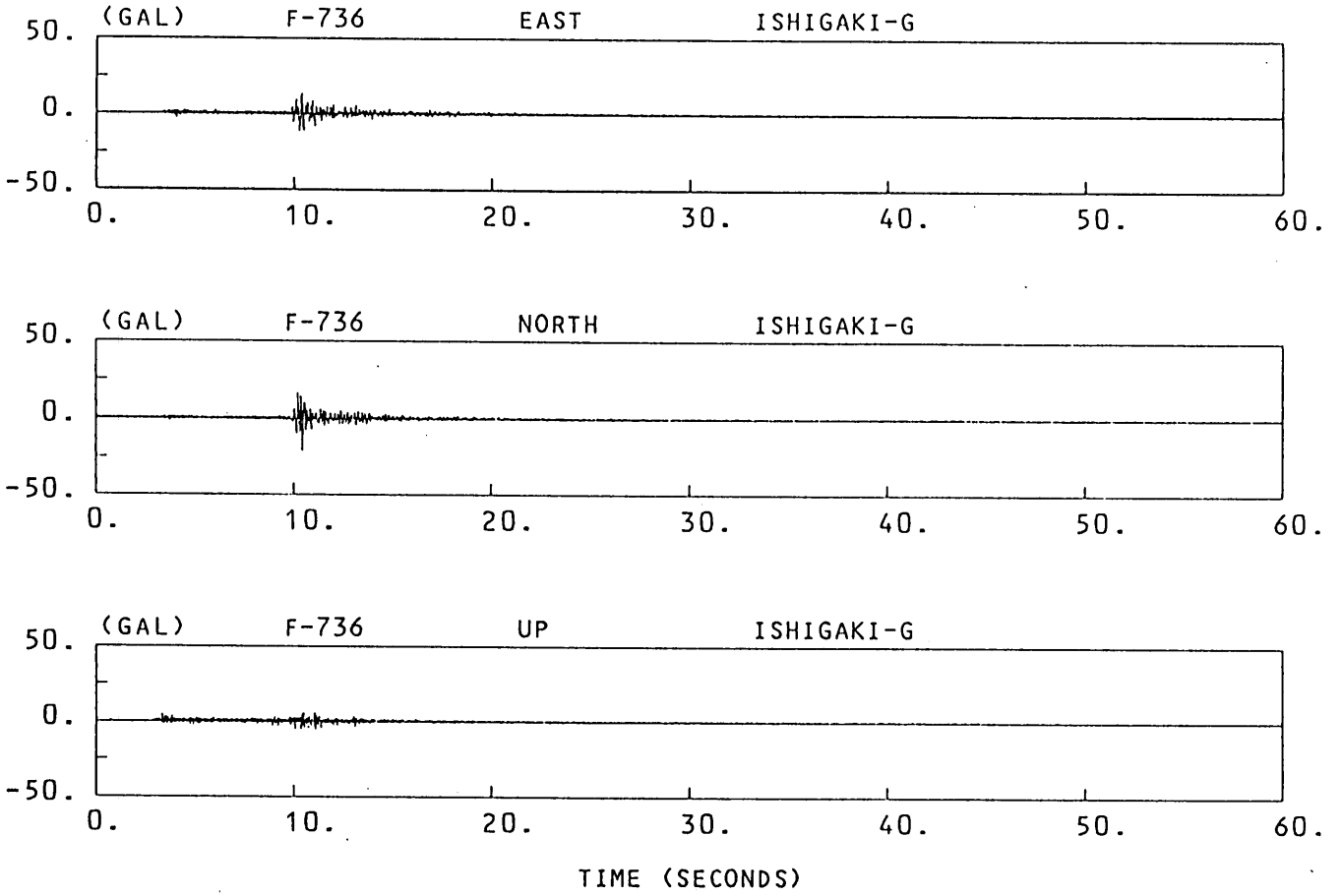


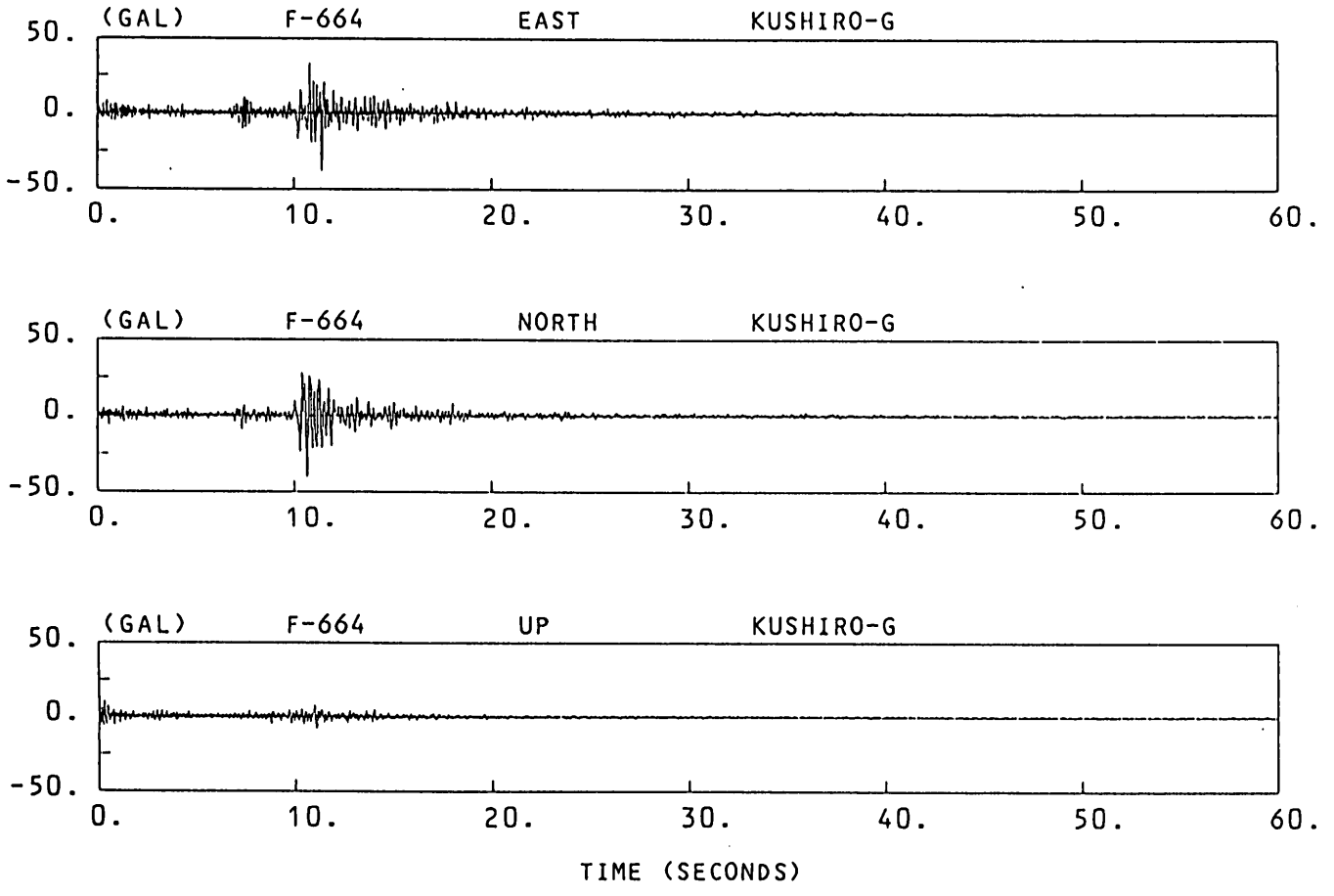
VELOCITY
R=2.0 CM/SEC.
MAX=1.8 CM/SEC.

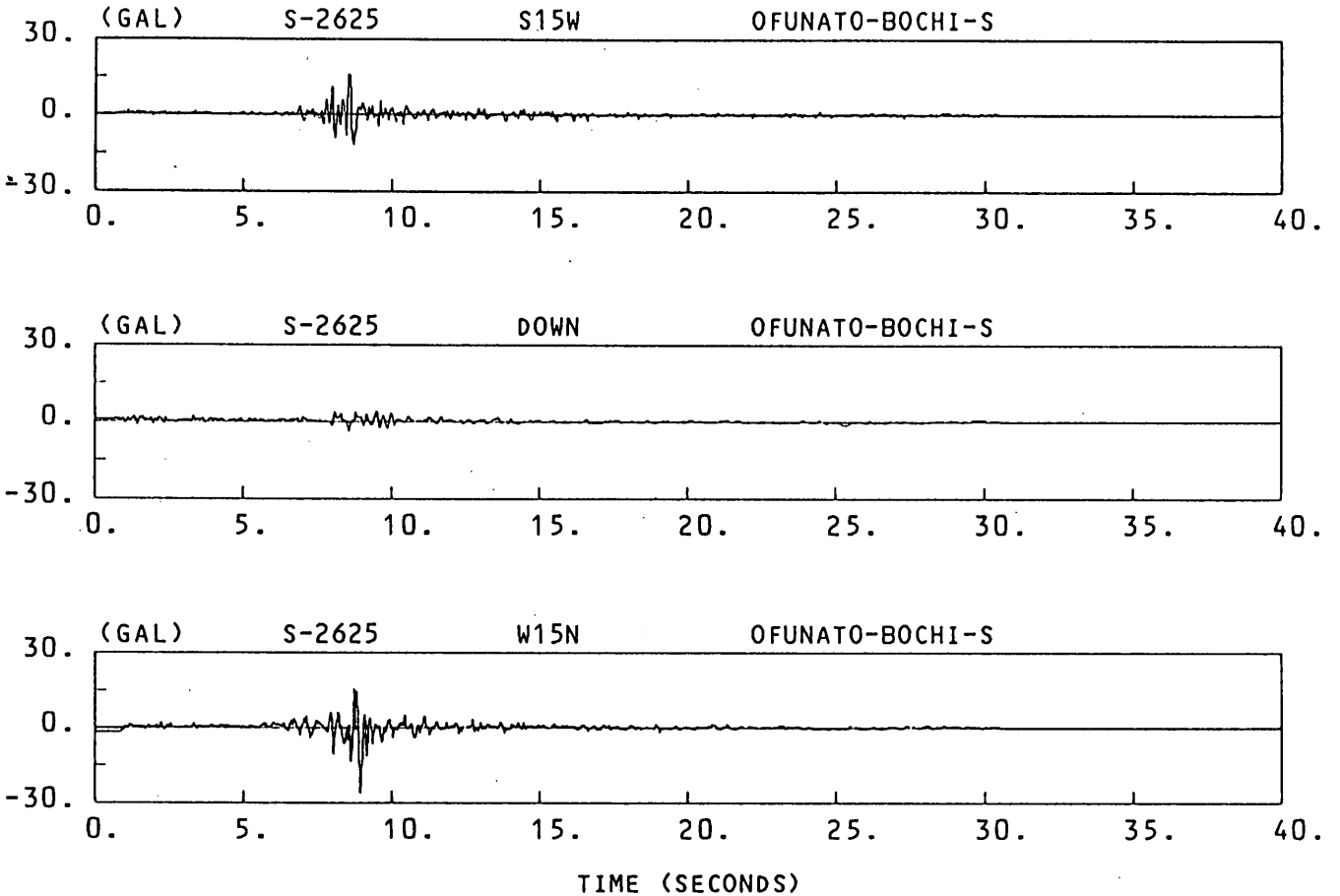


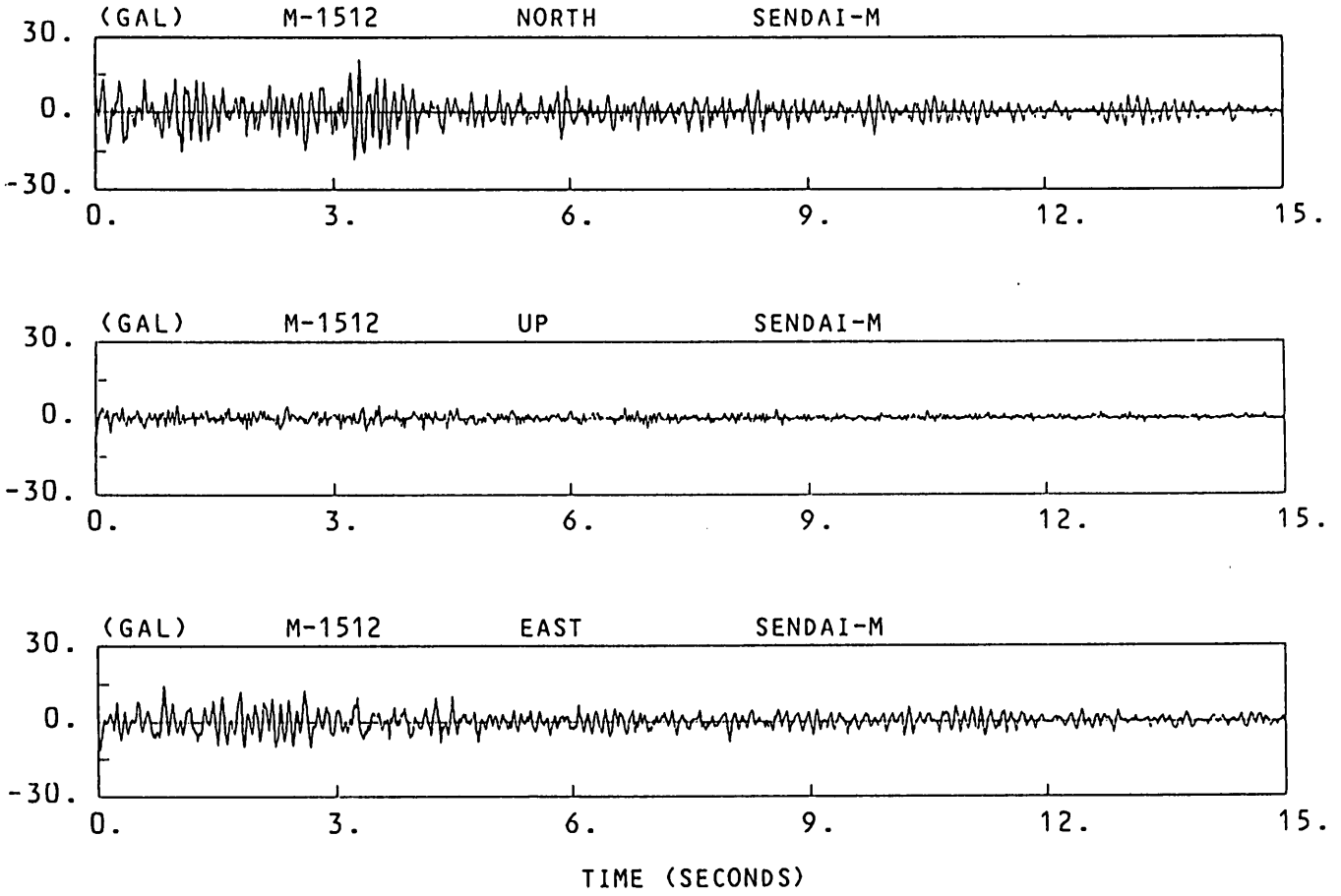
DISPLACEMENT
R=0.10 CM
MAX=0.10 CM

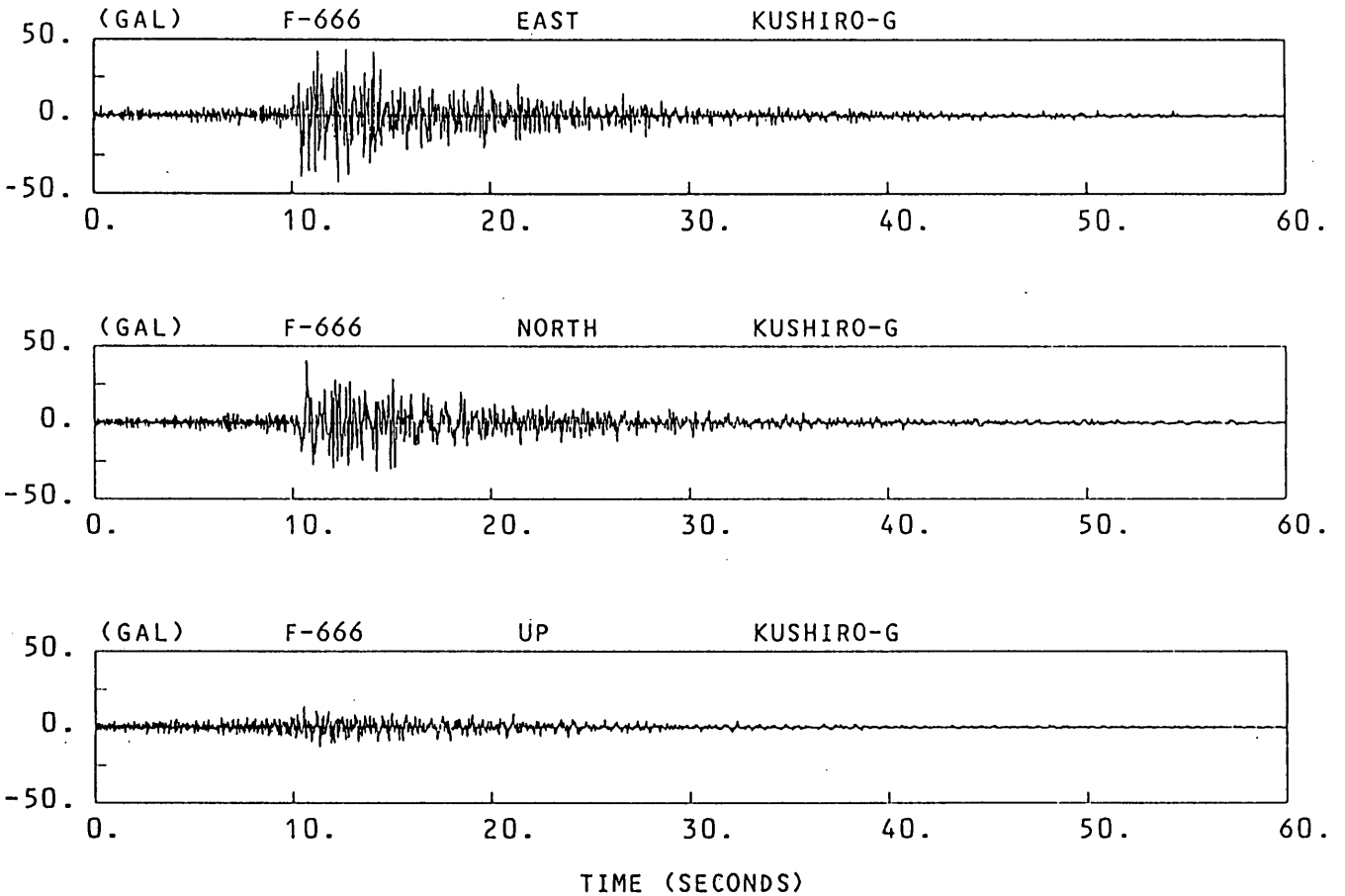

(GAL) S-2571 SOUTH URAKAWA-S
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
(GAL) S-2571 DOWN URAKAWA-S
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
(GAL) S-2571 WEST URAKAWA-S
40.
0.
-40.
0. 5. 10. 15. 20. 25. 30.
TIME (SECONDS)

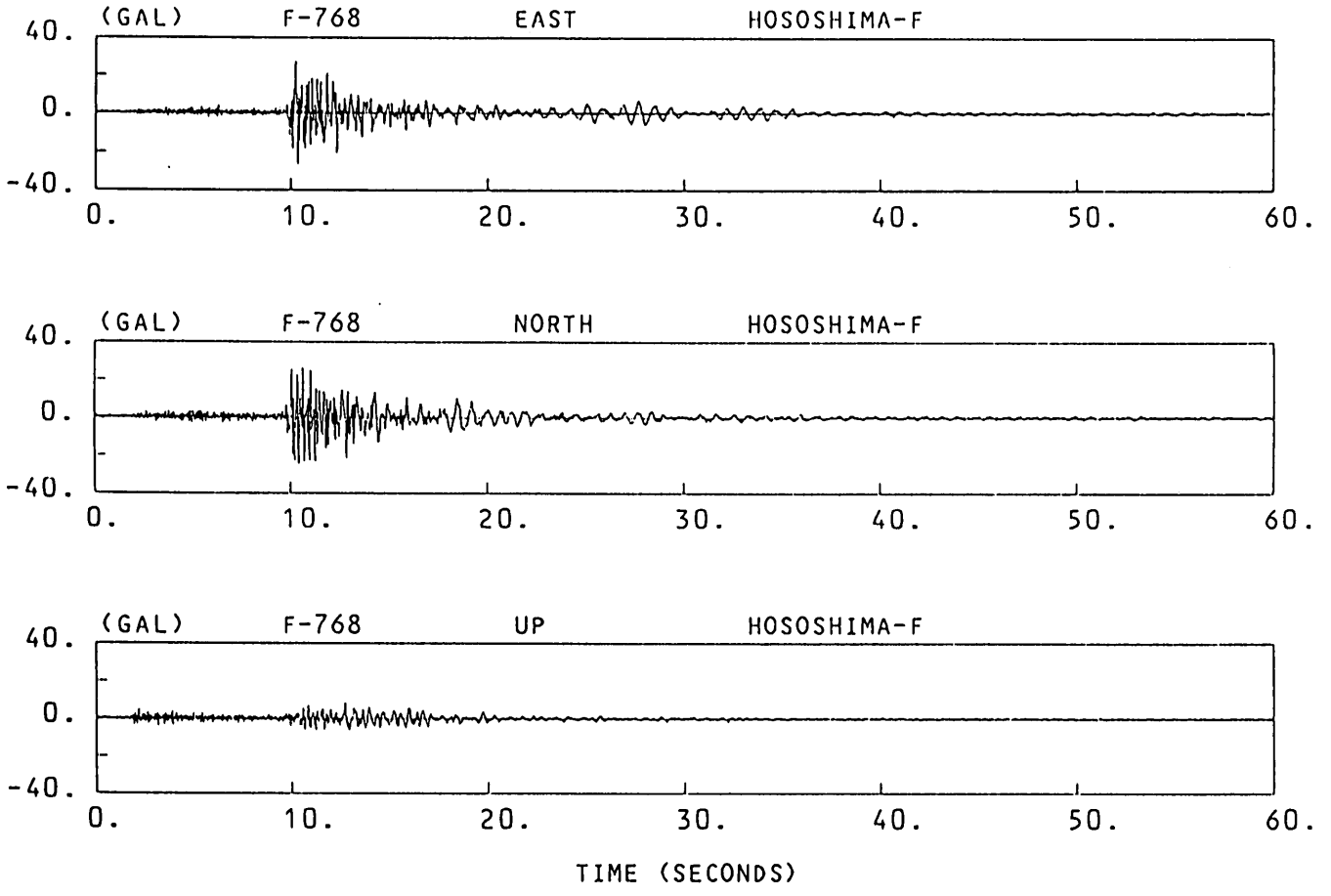

(GAL) F-736 EAST ISHIGAKI-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-736 NORTH ISHIGAKI-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-736 UP ISHIGAKI-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)

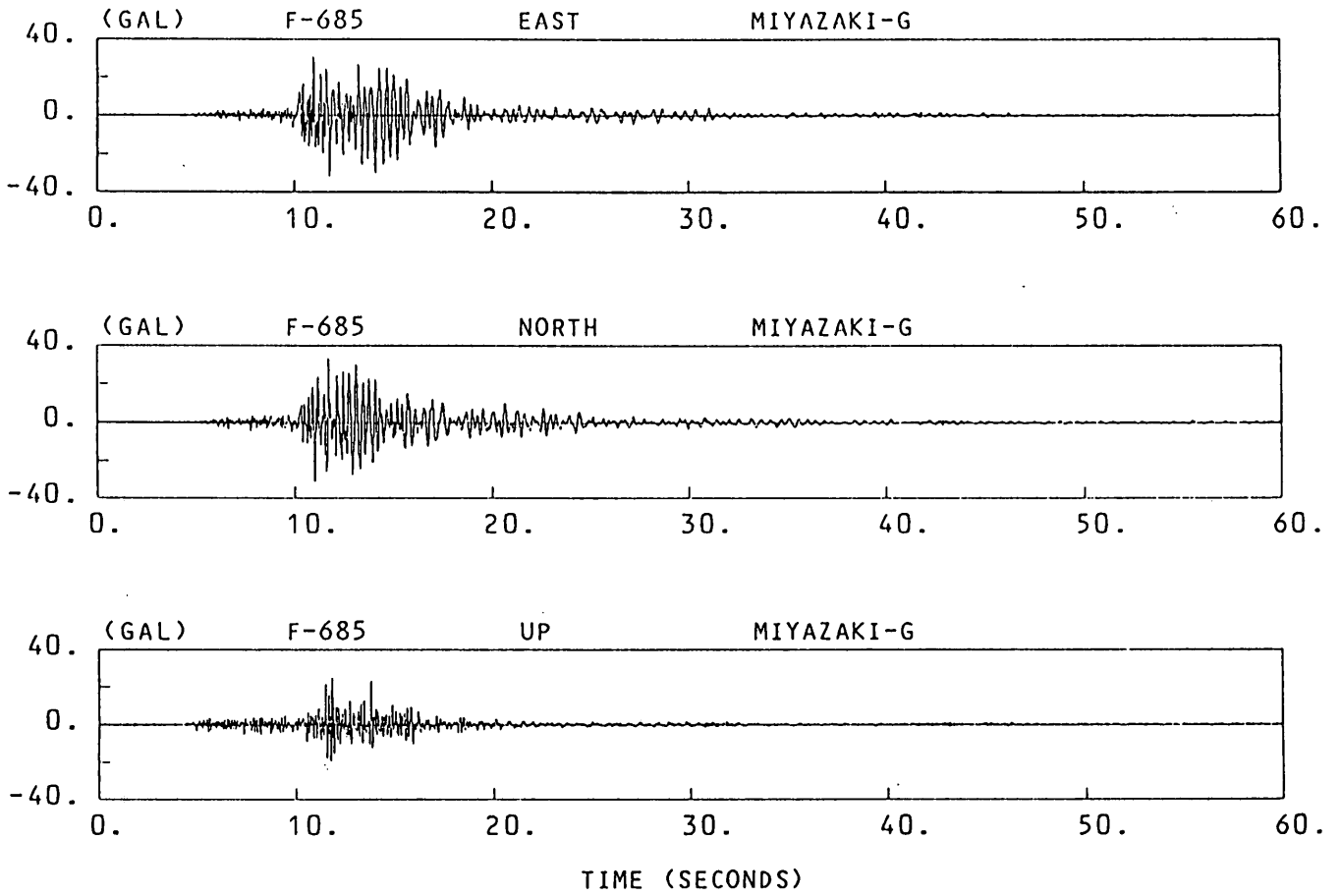

(GAL) F-664 EAST KUSHIRO-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-664 NORTH KUSHIRO-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-664 UP KUSHIRO-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)

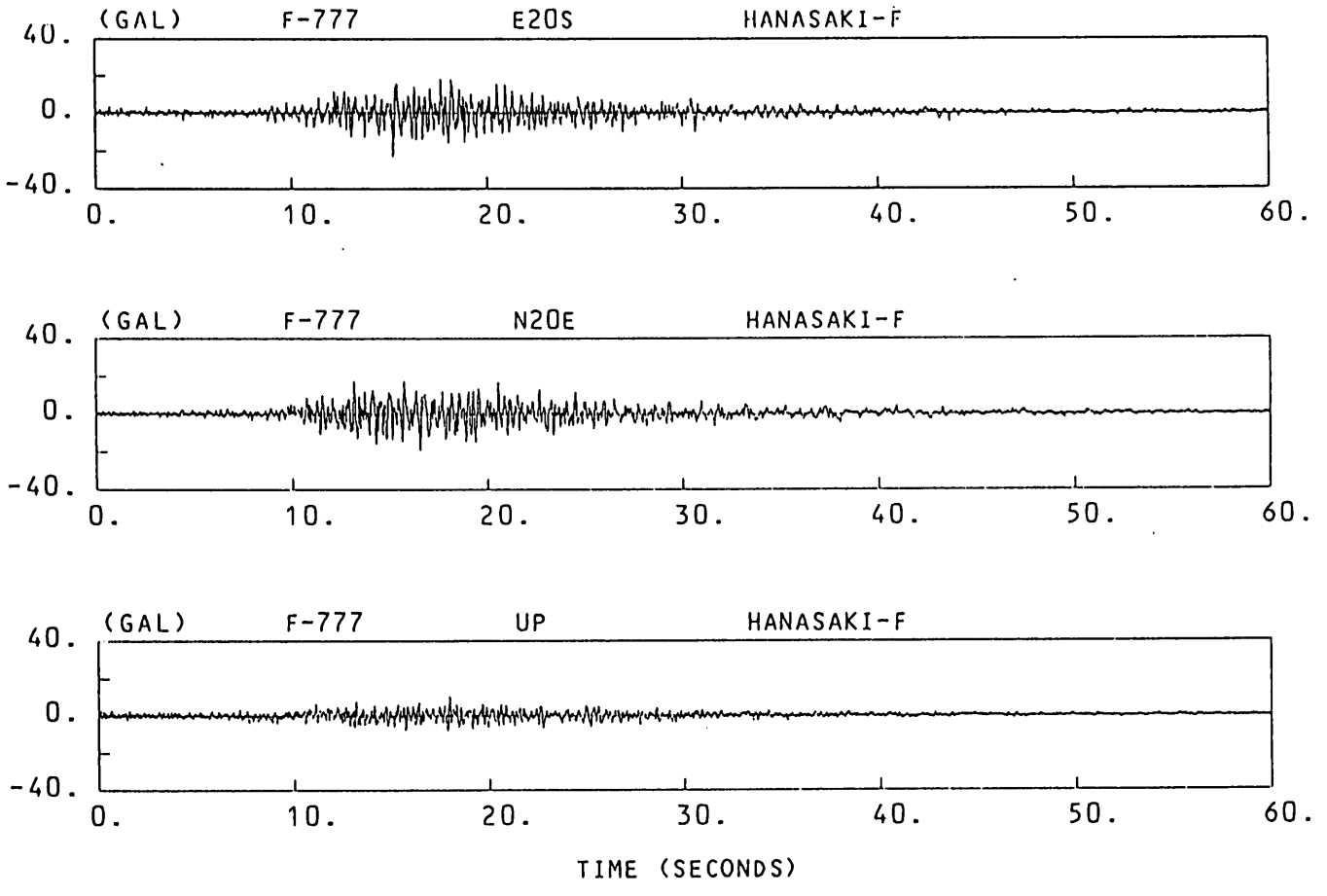

(GAL) S-2625 S15W OFUNATO-BOCHI-S
30.
0.
-30.
0. 5. 10. 15. 20. 25. 30. 35. 40.
(GAL) S-2625 DOWN OFUNATO-BOCHI-S
30.
0.
-30.
0. 5. 10. 15. 20. 25. 30. 35. 40.
(GAL) S-2625 W15N OFUNATO-BOCHI-S
30.
0.
-30.
0. 5. 10. 15. 20. 25. 30. 35. 40.
TIME (SECONDS)


(GAL) M-1512 NORTH SENDAI-M
30.
0.
-30.
0. 3. 6. 9. 12. 15.
(GAL) M-1512 UP SENDAI-M
30.
0.
-30.
0. 3. 6. 9. 12. 15.
(GAL) M-1512 EAST SENDAI-M
30.
0.
-30.
0. 3. 6. 9. 12. 15.
TIME (SECONDS)


(GAL) F-666 EAST KUSHIRO-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-666 NORTH KUSHIRO-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-666 UP KUSHIRO-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


(GAL) F-768 EAST HOSOSHIMA-F
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-768 NORTH HOSOSHIMA-F
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-768 UP HOSOSHIMA-F
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


(GAL) F-685 EAST MIYAZAKI-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-685 NORTH MIYAZAKI-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-685 UP MIYAZAKI-G
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


(GAL) F-777 E20S HANASAKI-F
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-777 N20E HANASAKI-F
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-777 UP HANASAKI-F
40.
0.
-40.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)

RECORD NUMBER : F-715

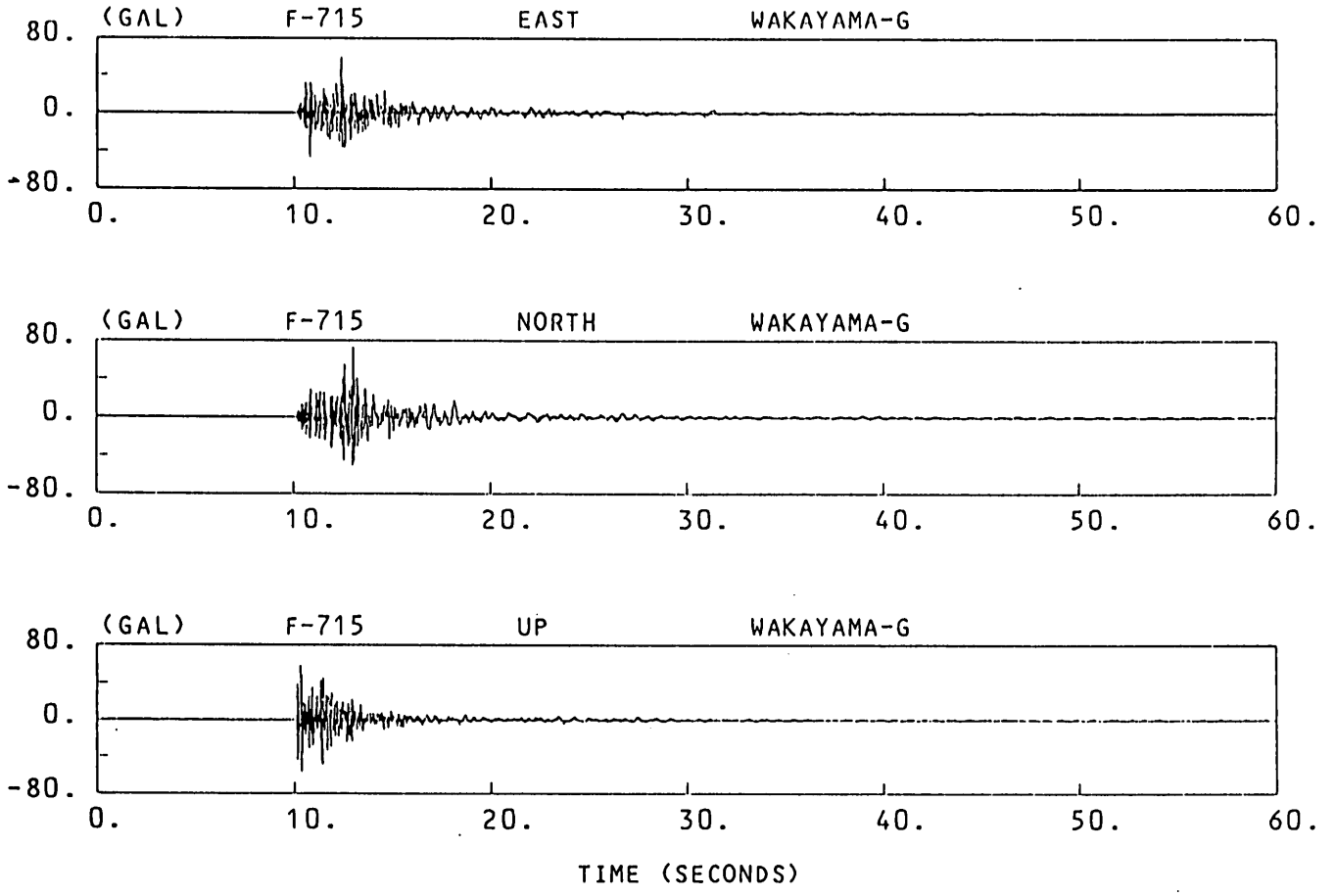
STATION : WAKAYAMA-G

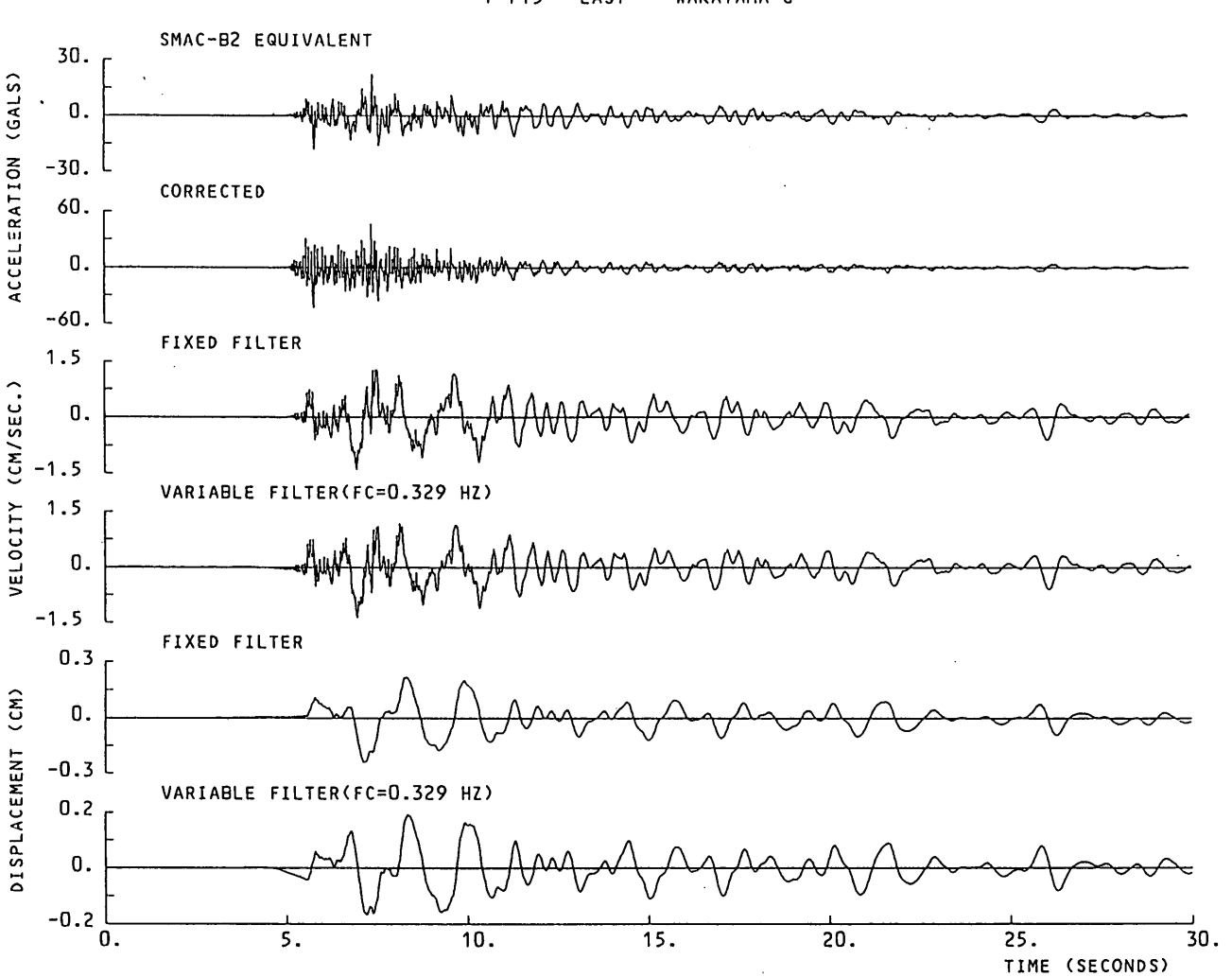
EARTHQUAKE DATA

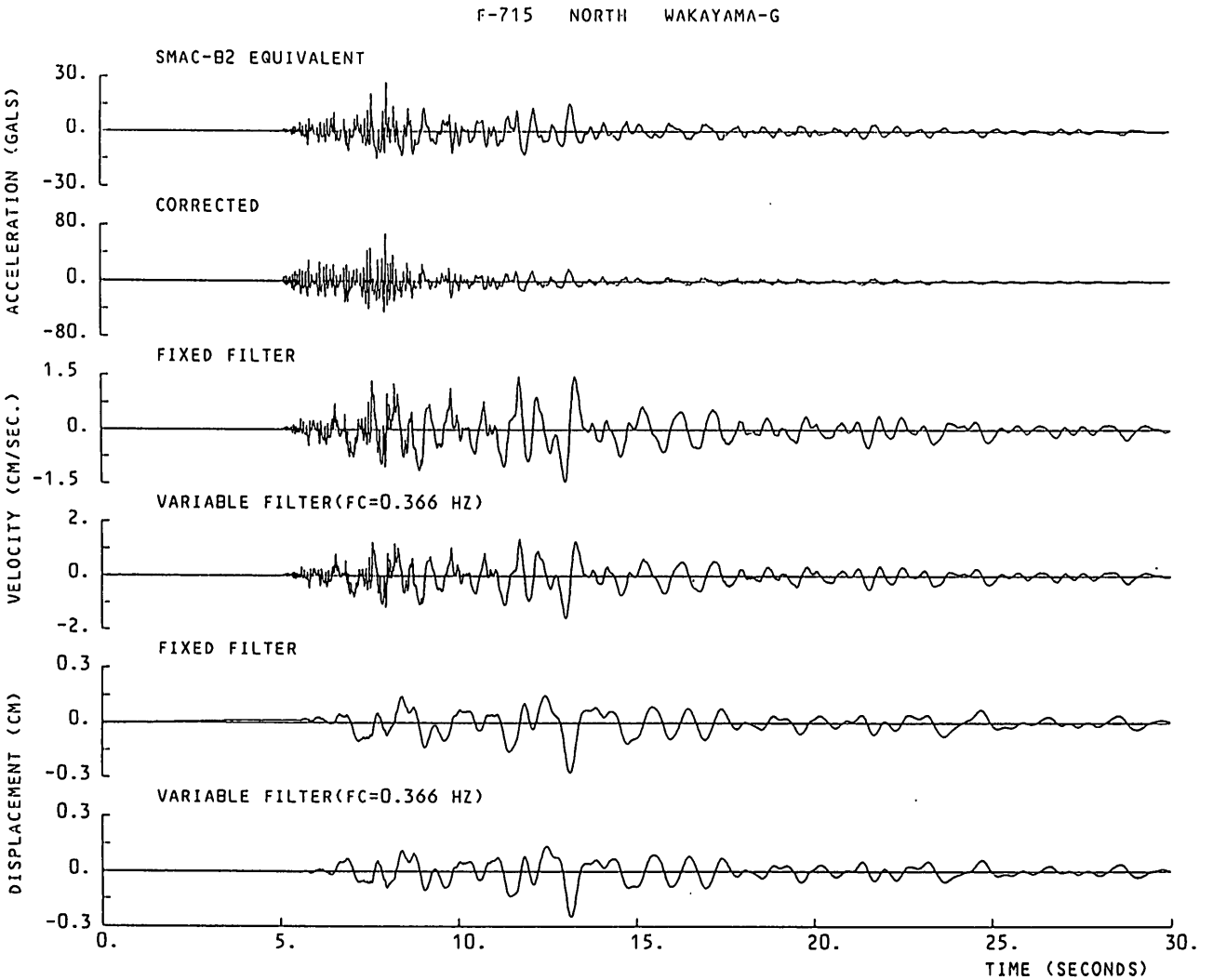
DATE AND TIME	8:21 OCT.16,1994
LOCATION OF HYPOCENTER	
EPICENTRAL REGION	NW WAKAYAMA PREF
LATITUDE	34°12.9' N
LONGITUDE	135°14.0' E
DEPTH	5.9KM
JMA MAGNITUDE	4.4

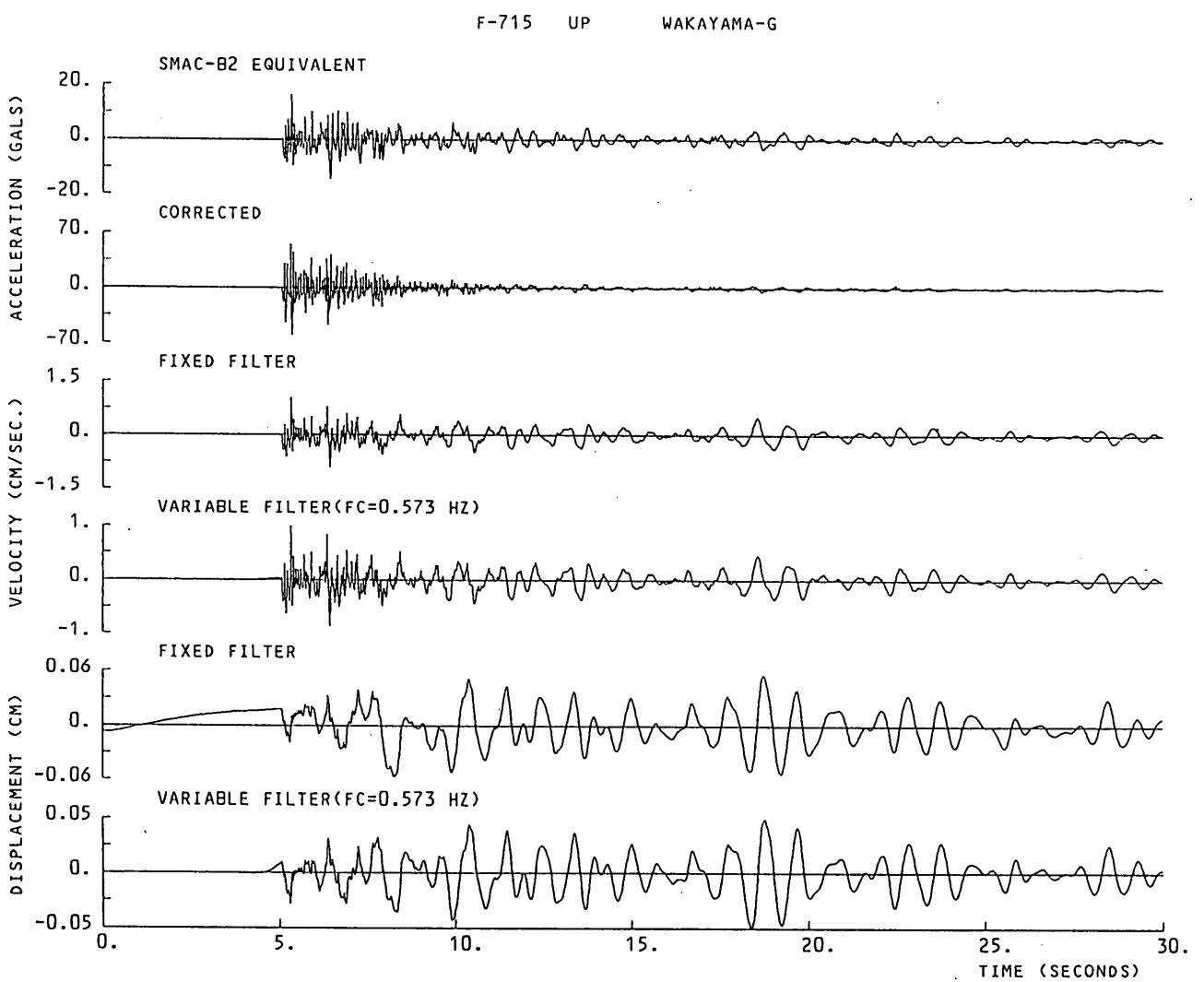
	PEAK VALUES OF COMPONENTS			
	N S	E W	U D	HORIZONTAL*
PARAMETER OF THE VARIABLE FILTER				
FC (HZ)	0.366	0.329	0.573	
MAXIMUM ACCELERATION (GAL)				
SMAC-B2 EQUIVALENT	27.0	22.0	18.8	27.0
ORIGINAL	72.9	59.3	57.8	73.5
CORRECTED	77.9	52.8	60.6	78.1
MAXIMUM VELOCITY (CM/SEC)				
FIXED FILTER	1.47	1.41	1.01	1.61
VARIABLE FILTER	1.58	1.39	0.99	1.67
MAXIMUM DISPLACEMENT (CM)				
FIXED FILTER	0.28	0.24	0.06	0.29
VARIABLE FILTER	0.25	0.19	0.05	0.26

* RESULTANT OF HORIZONTAL COMPONENTS


(GAL) F-715 EAST WAKAYAMA-G
80.
0.
-80.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-715 NORTH WAKAYAMA-G
80.
0.
-80.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-715 UP WAKAYAMA-G
80.
0.
-80.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


F-715 EAST WAKAYAMA-G
SMAC-B2 EQUIVALENT
30.
0.
-30.
ACCELERATION (GALS)
CORRECTED
60.
0.
-60.
FIXED FILTER
1.5
0.
-1.5
VELOCITY (CM/SEC.)
VARIABLE FILTER(FC=0.329 HZ)
1.5
0.
-1.5
FIXED FILTER
0.3
0.
-0.3
DISPLACEMENT (CM)
VARIABLE FILTER(FC=0.329 HZ)
0.2
0.
-0.2
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-715 NORTH WAKAYAMA-G
SMAC-B2 EQUIVALENT
30.
0.
-30.
CORRECTED
80.
0.
-80.
ACCELERATION (GALS)
FIXED FILTER
1.5
0.
-1.5
VARIABLE FILTER(FC=0.366 HZ)
2.
0.
-2.
VELOCITY (CM/SEC.)
FIXED FILTER
0.3
0.
-0.3
VARIABLE FILTER(FC=0.366 HZ)
0.3
0.
-0.3
DISPLACEMENT (CM)
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-715 UP WAKAYAMA-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.573 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.573 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
20.
0.
-20.
70.
0.
-70.
1.5
0.
-1.5
1.
0.
-1.
0.06
0.
-0.06
0.05
0.
-0.05
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

RESPONSE SPECTRUM

RECORD = F-715 COMPONENT = EAST SIGNAL = CORRECTION = STATION = WAKAYAMA-G
DATE AND TIME = 1994.10.16.08.16 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 52.82 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	121.3	0.85	0.008	72.8	0.43	0.005	69.2	0.40	0.004	74.8	0.38	0.005	75.5	0.32	0.005
0.10	416.3	6.58	0.105	144.8	2.21	0.037	102.9	1.74	0.026	84.5	1.50	0.021	69.6	1.05	0.016
0.15	229.0	5.40	0.131	111.2	2.76	0.064	77.2	1.96	0.043	66.9	1.62	0.037	55.8	1.16	0.028
0.20	95.9	3.00	0.097	71.7	2.26	0.073	48.9	1.69	0.050	50.2	1.60	0.049	44.4	1.34	0.036
0.25	135.6	5.27	0.215	51.0	2.20	0.081	48.9	2.02	0.077	42.7	1.91	0.066	31.4	1.55	0.043
0.30	153.9	7.20	0.351	65.4	3.20	0.149	53.3	2.64	0.121	40.7	2.05	0.091	27.1	1.52	0.053
0.35	78.0	4.23	0.242	45.9	2.51	0.142	36.5	2.32	0.112	29.5	2.05	0.089	20.2	1.48	0.053
0.40	72.6	4.59	0.294	38.0	2.36	0.153	33.2	1.94	0.134	26.1	1.79	0.104	17.7	1.37	0.064
0.45	92.1	6.49	0.472	42.7	2.88	0.218	32.4	2.18	0.165	25.1	1.66	0.127	18.0	1.24	0.083
0.50	200.0	15.94	1.267	70.1	5.56	0.443	44.7	3.48	0.281	27.3	2.18	0.169	17.3	1.49	0.097
0.55	79.6	6.96	0.610	44.5	3.99	0.340	36.4	3.33	0.277	25.2	2.46	0.190	15.8	1.62	0.111
0.60	37.8	4.02	0.345	34.0	3.60	0.309	29.7	3.10	0.270	23.1	2.35	0.206	15.9	1.61	0.129
0.65	39.0	3.98	0.417	22.6	2.43	0.241	22.0	2.33	0.234	19.4	2.04	0.201	15.7	1.53	0.143
0.70	57.5	6.37	0.713	26.9	3.13	0.334	23.7	2.56	0.293	19.5	2.07	0.237	15.1	1.63	0.152
0.75	89.1	10.87	1.269	35.6	4.36	0.507	27.7	3.16	0.392	20.8	2.42	0.286	14.1	1.69	0.155
0.80	55.0	7.37	0.892	34.6	4.69	0.559	28.1	3.50	0.452	20.0	2.51	0.315	12.8	1.72	0.154
0.85	63.5	8.63	1.162	32.6	4.40	0.595	24.8	3.57	0.452	17.8	2.61	0.313	11.5	1.71	0.156
0.90	64.4	9.14	1.321	25.7	4.12	0.527	20.2	3.49	0.412	15.1	2.62	0.297	10.2	1.69	0.164
0.95	31.9	4.89	0.729	20.7	3.79	0.473	17.6	3.30	0.401	13.5	2.57	0.297	9.6	1.71	0.179
1.00	31.9	5.18	0.807	17.7	3.17	0.447	15.6	2.78	0.390	12.9	2.34	0.318	9.1	1.70	0.198
1.10	37.0	6.84	1.134	18.8	3.70	0.577	13.4	2.54	0.409	11.1	2.10	0.320	8.6	1.65	0.219
1.20	16.6	3.33	0.607	13.2	3.08	0.480	12.1	2.78	0.437	10.1	2.25	0.357	8.0	1.57	0.225
1.30	26.1	5.39	1.117	12.9	3.05	0.552	11.8	2.73	0.504	9.8	2.25	0.410	7.2	1.62	0.226
1.40	20.9	5.00	1.037	14.4	3.49	0.711	12.3	3.16	0.606	9.4	2.63	0.452	6.5	1.73	0.267
1.50	23.5	5.87	1.340	13.8	4.17	0.787	11.3	3.64	0.640	8.5	2.87	0.474	6.5	1.74	0.306
1.60	18.2	4.93	1.180	13.9	4.18	0.903	11.9	3.61	0.767	9.0	2.81	0.572	6.4	1.71	0.334
1.70	16.7	4.41	1.220	13.8	3.58	1.008	11.6	3.17	0.845	8.7	2.58	0.617	6.2	1.66	0.349
1.80	14.3	4.30	1.175	11.8	3.58	0.963	10.1	3.02	0.819	8.0	2.25	0.634	5.7	1.56	0.359
1.90	20.0	6.04	1.828	10.1	3.54	0.923	8.8	3.09	0.796	7.0	2.49	0.619	5.1	1.55	0.357
2.00	14.6	4.92	1.477	8.2	3.52	0.833	7.2	3.15	0.726	6.1	2.58	0.580	4.6	1.64	0.367
2.20	6.4	2.99	0.790	5.9	2.82	0.715	5.4	2.65	0.652	4.7	2.36	0.549	4.0	1.70	0.361
2.40	4.2	2.55	0.610	3.8	2.38	0.554	3.5	2.22	0.509	3.4	1.95	0.455	3.4	1.63	0.343
2.60	2.8	2.10	0.485	2.7	2.03	0.451	2.5	1.96	0.420	2.3	1.82	0.366	2.8	1.54	0.314
2.80	2.0	1.73	0.396	1.9	1.73	0.378	1.9	1.71	0.361	1.9	1.66	0.330	2.3	1.47	0.283
3.00	1.6	1.57	0.362	1.5	1.55	0.349	1.5	1.55	0.336	1.6	1.53	0.310	2.0	1.44	0.258
3.20	1.3	1.55	0.334	1.3	1.54	0.325	1.3	1.52	0.316	1.4	1.49	0.298	1.7	1.42	0.247
3.40	1.1	1.54	0.311	1.1	1.53	0.305	1.1	1.51	0.299	1.2	1.49	0.285	1.6	1.41	0.244
3.60	0.9	1.53	0.291	0.9	1.52	0.287	0.9	1.51	0.282	1.1	1.48	0.272	1.5	1.42	0.240
3.80	0.7	1.52	0.272	0.7	1.51	0.270	0.8	1.50	0.267	1.0	1.48	0.260	1.4	1.42	0.236
4.00	0.6	1.51	0.255	0.6	1.50	0.254	0.7	1.49	0.253	0.8	1.47	0.250	1.3	1.42	0.232

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

RESPONSE SPECTRUM

RECORD = F-715 COMPONENT = NORTH SIGNAL = CORRECTION = STATION = WAKAYAMA-G
DATE AND TIME = 1994.10.16.08.16 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 77.88 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	149.6	0.77	0.009	115.5	0.55	0.007	103.9	0.49	0.007	99.2	0.48	0.006	98.0	0.46	0.006
0.10	695.8	11.01	0.176	370.0	6.04	0.094	273.6	4.50	0.069	190.1	3.09	0.047	121.8	1.65	0.027
0.15	231.6	5.48	0.132	106.3	2.59	0.060	71.5	2.10	0.041	57.1	1.69	0.032	53.5	1.38	0.025
0.20	105.1	3.49	0.106	79.7	2.64	0.081	63.8	2.05	0.065	45.6	1.49	0.046	35.1	1.24	0.027
0.25	53.3	2.10	0.084	52.3	1.69	0.083	46.8	1.55	0.074	38.1	1.35	0.059	29.6	1.13	0.042
0.30	82.7	3.60	0.188	52.0	2.39	0.118	43.4	1.92	0.098	38.5	1.49	0.087	28.4	1.06	0.056
0.35	186.5	10.17	0.579	77.8	4.36	0.241	57.7	3.33	0.178	40.2	2.28	0.123	26.7	1.42	0.075
0.40	77.5	4.87	0.314	58.4	3.71	0.237	48.2	3.11	0.194	36.3	2.42	0.144	27.0	1.63	0.102
0.45	90.9	6.42	0.466	52.7	3.49	0.270	44.1	3.15	0.225	38.1	2.74	0.192	28.2	1.96	0.133
0.50	260.9	20.75	1.652	100.4	7.81	0.635	68.6	5.28	0.433	46.5	3.39	0.289	28.1	2.10	0.161
0.55	101.1	8.84	0.775	59.3	5.24	0.454	54.7	4.73	0.417	41.5	3.54	0.312	25.7	2.10	0.177
0.60	94.4	8.93	0.860	56.5	5.56	0.515	43.2	4.21	0.392	31.5	2.93	0.280	22.2	2.06	0.179
0.65	78.8	8.07	0.844	41.4	4.22	0.443	37.0	3.66	0.394	28.7	3.11	0.300	19.2	2.12	0.180
0.70	46.9	5.15	0.582	36.5	4.07	0.453	31.6	3.56	0.390	25.1	3.15	0.305	17.8	2.19	0.193
0.75	36.6	4.36	0.521	31.1	3.73	0.442	28.5	3.61	0.403	23.4	3.30	0.326	17.1	2.20	0.211
0.80	94.8	12.23	1.537	48.6	6.34	0.786	35.2	4.92	0.567	24.6	3.53	0.389	16.8	2.12	0.237
0.85	98.4	12.93	1.800	52.3	7.31	0.956	37.6	5.27	0.684	25.0	3.52	0.446	16.4	2.16	0.259
0.90	74.7	10.71	1.532	38.1	5.37	0.781	26.6	4.15	0.543	21.6	3.34	0.433	15.5	2.21	0.272
0.95	71.7	10.78	1.640	36.5	5.69	0.834	26.4	4.03	0.600	17.8	2.99	0.396	14.4	2.18	0.278
1.00	39.1	6.35	0.991	27.5	4.55	0.696	21.5	3.57	0.542	14.8	2.82	0.368	13.2	2.12	0.281
1.10	27.2	4.82	0.833	16.6	3.18	0.509	14.3	2.88	0.434	11.9	2.50	0.350	11.4	2.09	0.287
1.20	16.7	3.38	0.609	13.7	2.82	0.499	11.8	2.60	0.427	10.8	2.29	0.380	10.0	2.12	0.297
1.30	25.2	5.24	1.080	14.0	3.29	0.600	12.3	2.91	0.524	10.4	2.62	0.432	8.9	2.18	0.306
1.40	21.2	5.07	1.050	15.1	3.62	0.750	11.6	3.11	0.572	8.9	2.73	0.428	7.9	2.22	0.307
1.50	15.3	3.77	0.872	11.5	3.06	0.654	9.8	2.72	0.552	7.4	2.60	0.409	6.9	2.24	0.302
1.60	9.7	2.79	0.630	9.2	2.57	0.599	8.3	2.40	0.537	6.6	2.48	0.413	6.0	2.24	0.294
1.70	12.0	3.48	0.880	9.3	2.90	0.677	7.5	2.60	0.544	5.7	2.53	0.405	5.3	2.23	0.282
1.80	15.8	4.61	1.297	9.2	3.16	0.757	7.4	2.92	0.602	5.3	2.63	0.420	4.7	2.21	0.290
1.90	10.0	3.69	0.918	7.6	3.26	0.693	6.1	2.97	0.554	5.0	2.61	0.427	4.6	2.17	0.310
2.00	7.8	3.14	0.794	6.7	2.89	0.672	5.9	2.70	0.585	5.0	2.45	0.471	4.4	2.12	0.325
2.20	5.1	2.56	0.622	4.7	2.28	0.570	4.4	2.13	0.526	4.1	1.98	0.457	4.0	1.97	0.337
2.40	2.5	2.23	0.359	2.6	2.12	0.379	2.8	2.01	0.387	3.0	1.81	0.384	3.5	1.83	0.330
2.60	1.6	1.84	0.275	1.8	1.84	0.301	2.0	1.82	0.318	2.3	1.74	0.334	3.1	1.73	0.318
2.80	1.5	1.73	0.304	1.6	1.74	0.307	1.7	1.73	0.311	1.9	1.69	0.317	2.7	1.66	0.308
3.00	1.4	1.74	0.321	1.4	1.72	0.317	1.5	1.71	0.314	1.7	1.67	0.311	2.4	1.60	0.301
3.20	1.2	1.74	0.319	1.2	1.72	0.315	1.3	1.70	0.311	1.5	1.66	0.307	2.2	1.56	0.295
3.40	1.1	1.74	0.310	1.1	1.72	0.307	1.1	1.70	0.304	1.3	1.65	0.300	2.0	1.53	0.290
3.60	0.9	1.73	0.296	0.9	1.71	0.295	1.0	1.69	0.295	1.2	1.65	0.293	1.9	1.53	0.286
3.80	0.8	1.71	0.280	0.8	1.69	0.283	0.9	1.68	0.284	1.0	1.64	0.286	1.7	1.53	0.282
4.00	0.7	1.69	0.269	0.7	1.67	0.274	0.8	1.66	0.277	0.9	1.63	0.280	1.6	1.54	0.279

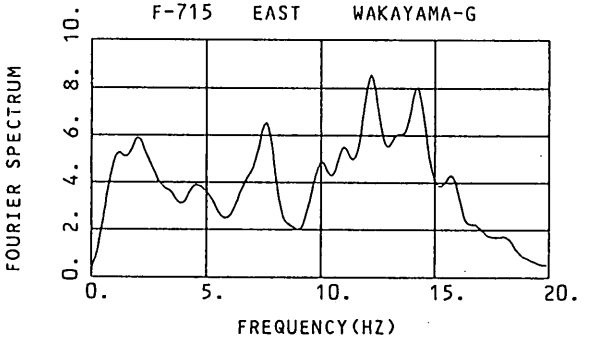
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

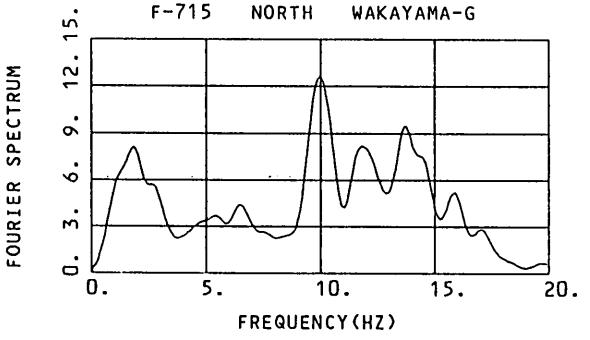
RESPONSE SPECTRUM

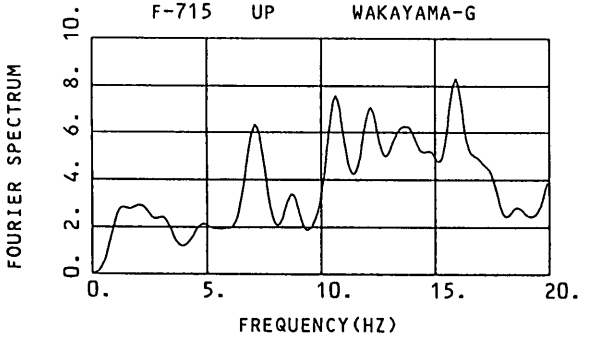
RECORD = F-715 COMPONENT = UP SIGNAL = CORRECTION = STATION = WAKAYAMA-G
DATE AND TIME = 1994.10.16.08.16 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 60.58 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

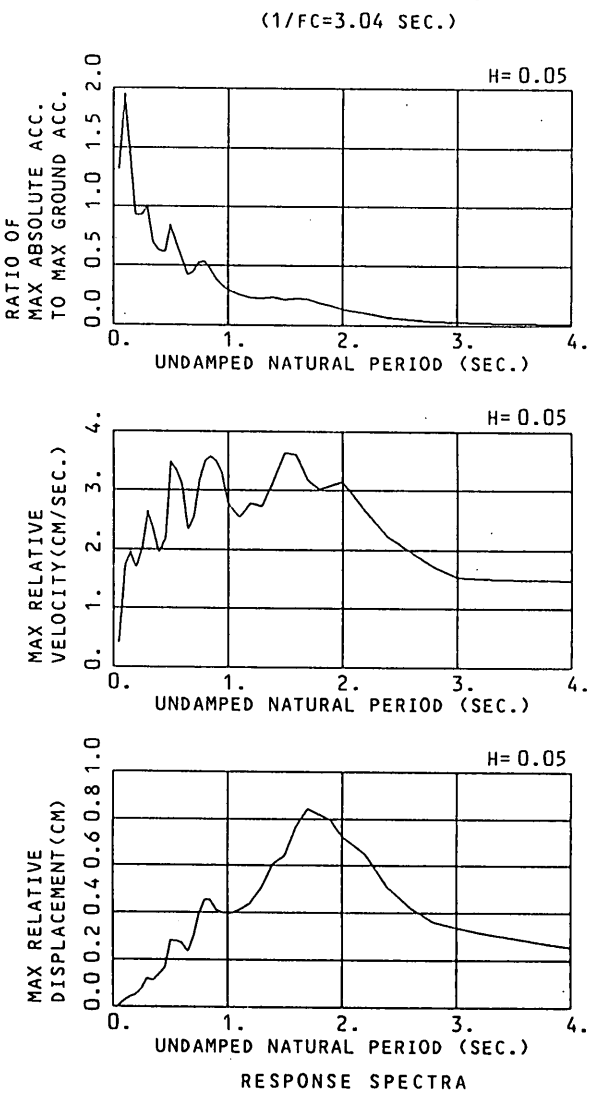
	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	639.8	5.06	0.041	236.3	1.64	0.015	189.9	1.31	0.012	147.0	1.00	0.009	95.3	0.57	0.006
0.10	241.7	3.90	0.061	181.5	2.99	0.046	157.1	2.62	0.040	128.6	2.11	0.031	86.6	1.34	0.019
0.15	199.4	4.73	0.114	115.7	2.97	0.066	85.9	2.21	0.049	59.0	1.53	0.033	38.6	1.14	0.019
0.20	87.4	2.78	0.089	54.5	1.97	0.056	44.8	1.65	0.046	36.5	1.32	0.036	29.4	0.98	0.024
0.25	50.3	1.96	0.080	21.8	1.01	0.034	18.4	0.99	0.029	16.3	0.97	0.025	21.3	0.93	0.025
0.30	69.1	3.23	0.157	34.8	1.71	0.079	24.3	1.26	0.055	16.2	0.97	0.035	17.7	0.89	0.029
0.35	27.3	1.60	0.085	19.9	1.39	0.062	16.7	1.25	0.052	14.4	1.10	0.042	15.7	0.95	0.033
0.40	48.7	3.03	0.198	24.1	1.51	0.098	16.9	1.10	0.068	13.1	1.10	0.052	13.6	1.04	0.036
0.45	40.3	2.84	0.207	25.6	1.84	0.131	20.5	1.57	0.104	14.1	1.37	0.071	11.5	1.12	0.036
0.50	41.3	3.28	0.261	22.3	1.80	0.141	16.7	1.55	0.105	11.6	1.40	0.072	9.4	1.16	0.043
0.55	22.9	1.88	0.176	14.3	1.25	0.110	11.6	1.23	0.089	9.6	1.23	0.073	8.2	1.15	0.048
0.60	51.6	4.86	0.471	16.3	1.66	0.148	12.6	1.36	0.114	9.4	1.20	0.084	7.2	1.13	0.053
0.65	33.7	3.51	0.360	15.8	1.72	0.169	10.8	1.22	0.115	8.1	1.19	0.085	6.4	1.12	0.059
0.70	35.7	3.99	0.444	14.0	1.73	0.174	10.8	1.34	0.134	8.5	1.21	0.102	5.9	1.12	0.063
0.75	22.9	2.86	0.326	13.7	1.75	0.195	10.8	1.34	0.154	8.0	1.20	0.112	5.5	1.12	0.067
0.80	38.1	4.87	0.617	15.5	1.97	0.251	11.9	1.58	0.192	8.6	1.16	0.137	5.2	1.12	0.076
0.85	16.1	2.23	0.295	12.6	1.73	0.231	10.4	1.50	0.190	8.9	1.22	0.159	5.3	1.11	0.086
0.90	35.6	5.17	0.731	17.9	2.67	0.367	13.1	1.92	0.268	9.2	1.28	0.185	5.1	1.11	0.092
0.95	37.1	5.62	0.847	15.7	2.48	0.358	12.2	1.88	0.277	8.6	1.30	0.192	4.8	1.10	0.094
1.00	21.5	3.46	0.544	11.6	1.93	0.292	9.6	1.69	0.241	7.3	1.31	0.179	4.3	1.09	0.093
1.10	10.4	1.95	0.320	7.8	1.51	0.239	6.6	1.32	0.202	5.2	1.09	0.157	3.7	1.08	0.094
1.20	7.0	1.48	0.255	4.9	1.07	0.180	4.4	1.06	0.158	3.9	1.07	0.137	3.2	1.07	0.094
1.30	6.8	1.81	0.291	4.2	1.20	0.181	3.4	1.05	0.146	3.0	1.05	0.121	2.7	1.05	0.090
1.40	4.4	1.16	0.220	3.5	1.02	0.172	2.8	1.03	0.139	2.2	1.03	0.103	2.3	1.04	0.085
1.50	4.2	1.20	0.238	2.6	1.01	0.148	2.2	1.01	0.127	1.8	1.02	0.098	1.9	1.03	0.080
1.60	2.4	1.00	0.158	1.9	1.00	0.122	1.7	1.00	0.106	1.4	1.01	0.085	1.8	1.02	0.075
1.70	1.6	1.00	0.120	1.5	1.00	0.108	1.4	1.00	0.098	1.2	1.01	0.082	1.7	1.02	0.071
1.80	1.1	0.99	0.087	1.1	0.99	0.086	1.1	0.99	0.083	1.0	1.00	0.076	1.6	1.01	0.069
1.90	0.9	0.98	0.085	0.8	0.98	0.075	0.8	0.99	0.071	0.9	0.99	0.069	1.5	1.01	0.067
2.00	0.8	0.97	0.082	0.7	0.97	0.075	0.7	0.98	0.071	0.8	0.99	0.068	1.4	1.00	0.065
2.20	0.5	0.96	0.063	0.5	0.97	0.065	0.5	0.97	0.065	0.6	0.98	0.065	1.3	1.00	0.063
2.40	0.4	0.97	0.063	0.4	0.97	0.062	0.4	0.97	0.062	0.5	0.98	0.062	1.2	0.99	0.061
2.60	0.4	0.97	0.061	0.3	0.97	0.059	0.3	0.97	0.057	0.5	0.98	0.058	1.1	0.99	0.059
2.80	0.3	0.97	0.059	0.3	0.97	0.056	0.3	0.97	0.056	0.5	0.97	0.057	1.0	0.98	0.058
3.00	0.3	0.96	0.062	0.3	0.96	0.058	0.3	0.97	0.057	0.4	0.97	0.056	1.0	0.98	0.057
3.20	0.2	0.96	0.059	0.2	0.96	0.056	0.2	0.96	0.054	0.4	0.97	0.055	0.9	0.98	0.056
3.40	0.2	0.95	0.056	0.2	0.96	0.053	0.2	0.96	0.054	0.4	0.96	0.054	0.8	0.97	0.055
3.60	0.2	0.95	0.058	0.2	0.95	0.055	0.2	0.96	0.055	0.3	0.96	0.054	0.8	0.97	0.055
3.80	0.2	0.95	0.055	0.1	0.95	0.053	0.2	0.96	0.053	0.3	0.96	0.054	0.8	0.97	0.054
4.00	0.1	0.95	0.054	0.1	0.96	0.053	0.2	0.96	0.052	0.3	0.96	0.053	0.7	0.97	0.054

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

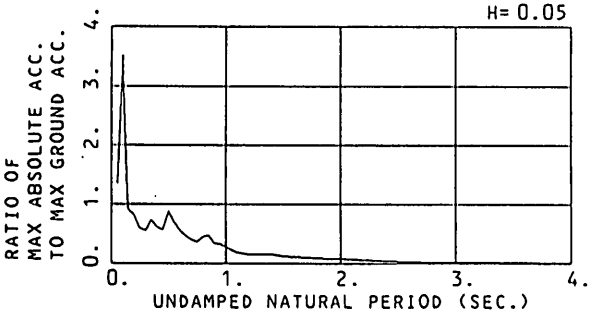

F-715 EAST WAKAYAMA-G
FOURIER SPECTRUM
0. 2. 4. 6. 8. 10.
0. 5. 10. 15. 20.
FREQUENCY(HZ)

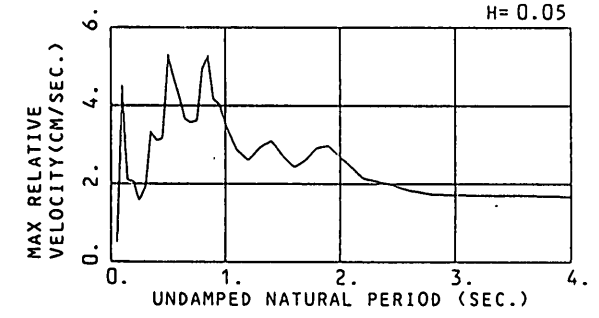

F-715 NORTH WAKAYAMA-G
FOURIER SPECTRUM
0. 3. 6. 9. 12. 15.
0. 5. 10. 15. 20.
FREQUENCY(HZ)

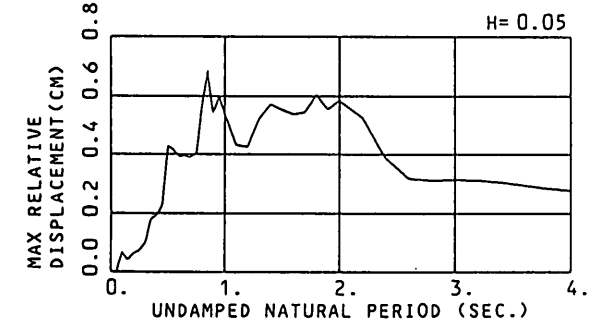

F-715 UP WAKAYAMA-G
FOURIER SPECTRUM
0. 2. 4. 6. 8. 10.
0. 5. 10. 15. 20.
FREQUENCY(HZ)


F-715 EAST WAKAYAMA-G
(1/FC=3.04 SEC.)
H= 0.05
RATIO OF
MAX ABSOLUTE ACC.
TO MAX GROUND ACC.
0.0 0.5 1.0 1.5 2.0
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
H= 0.05
MAX RELATIVE
VELOCITY(CM/SEC.)
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
H= 0.05
MAX RELATIVE
DISPLACEMENT(CM)
0.0 0.2 0.4 0.6 0.8 1.0
UNDAMPED NATURAL PERIOD (SEC.)
RESPONSE SPECTRA

F-715 NORTH WAKAYAMA-G
(1/FC=2.74 SEC.)

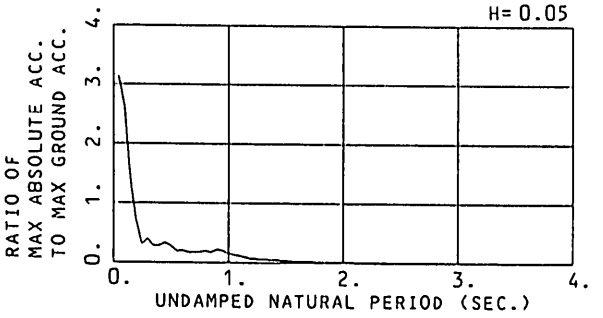


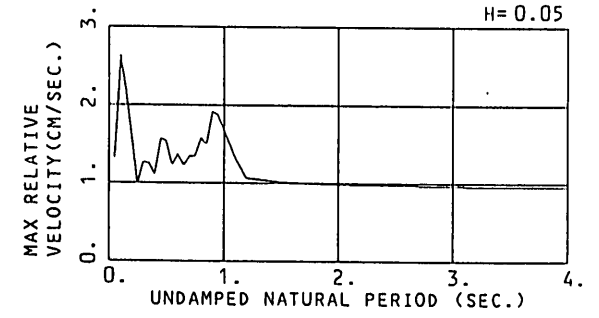


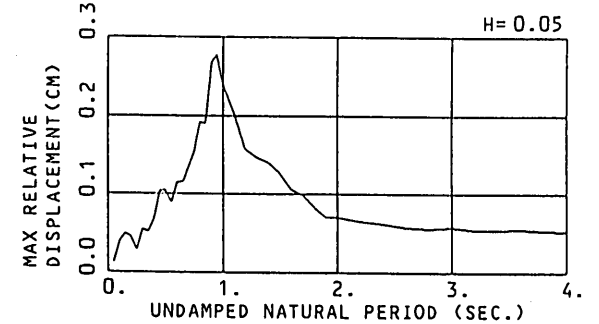


RESPONSE SPECTRA

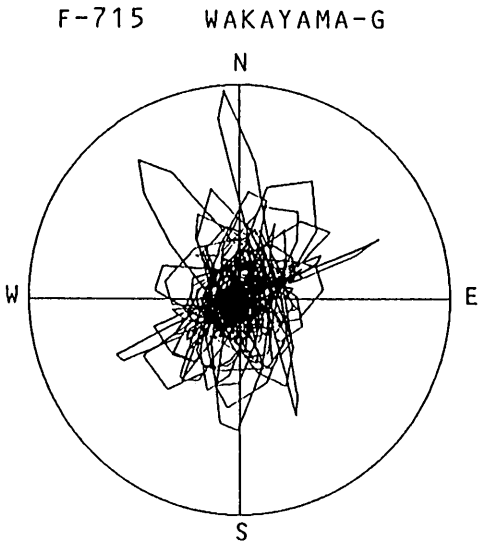
F-715 UP WAKAYAMA-G
(1/FC=1.75 SEC.)



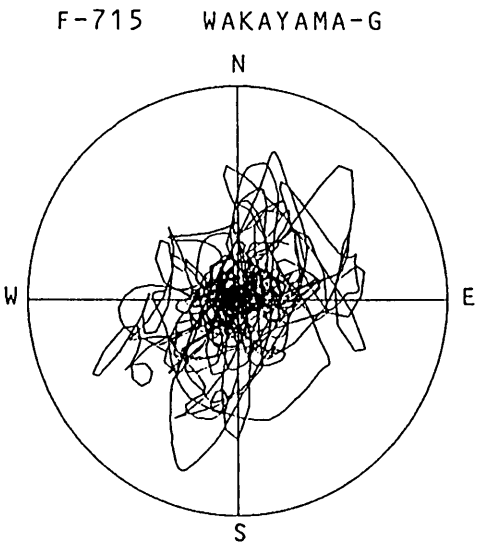




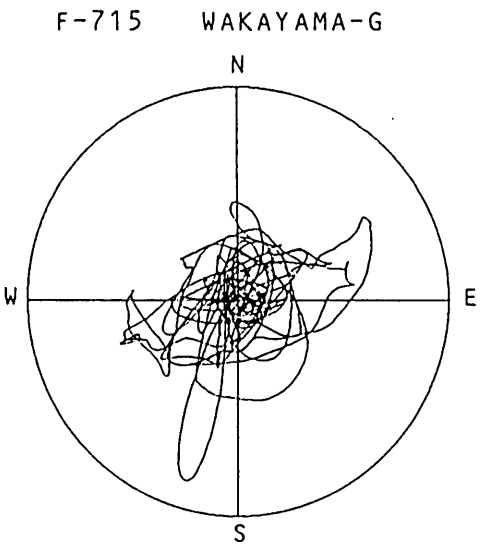
RESPONSE SPECTRA



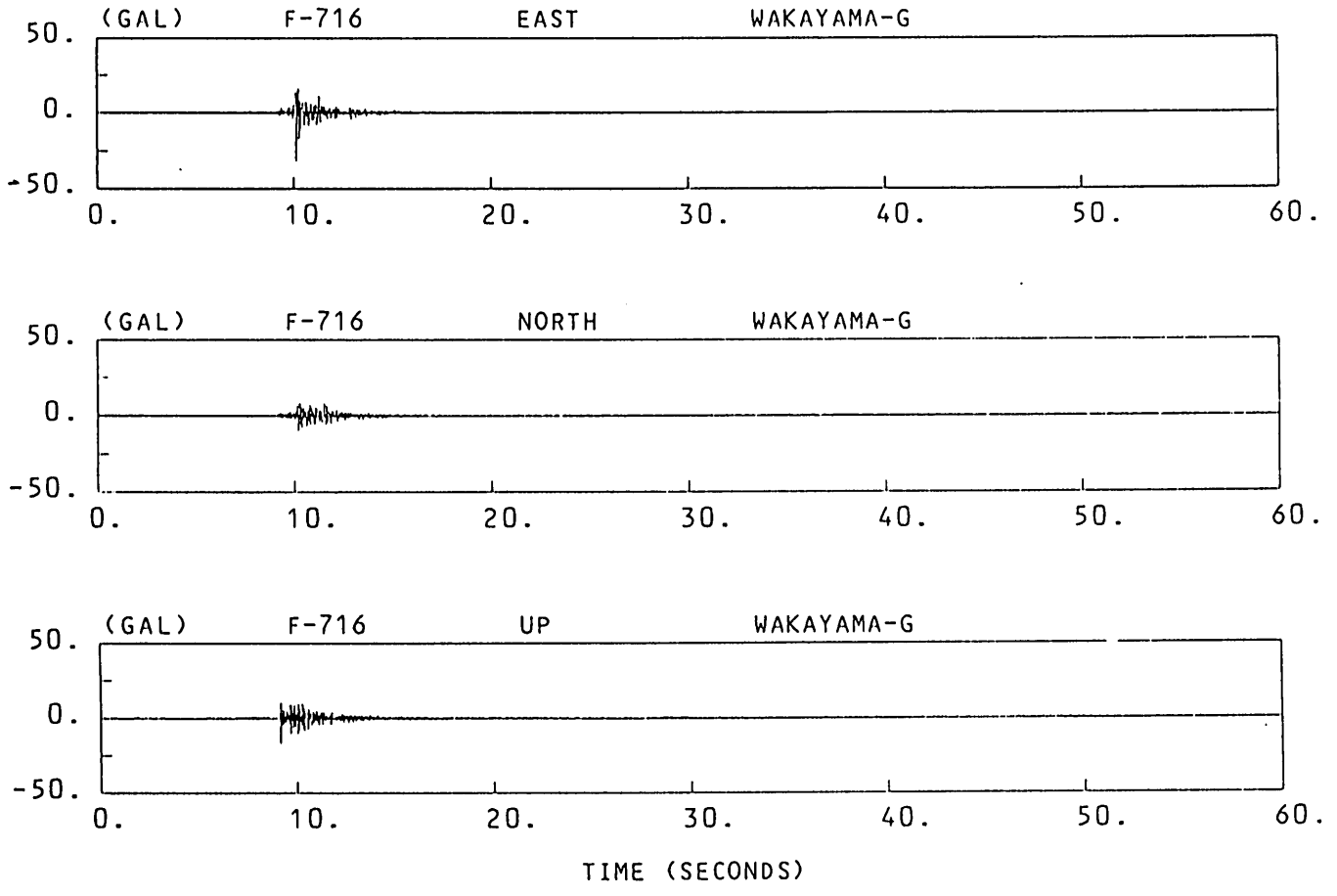
ACCELERATION
R=80.0 GAL
MAX=78.1 GAL



VELOCITY
R=2.0 CM/SEC.
MAX=1.7 CM/SEC.



DISPLACEMENT
R=0.30 CM
MAX=0.26 CM


(GAL) F-716 EAST WAKAYAMA-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-716 NORTH WAKAYAMA-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-716 UP WAKAYAMA-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)

RECORD NUMBER : F-718

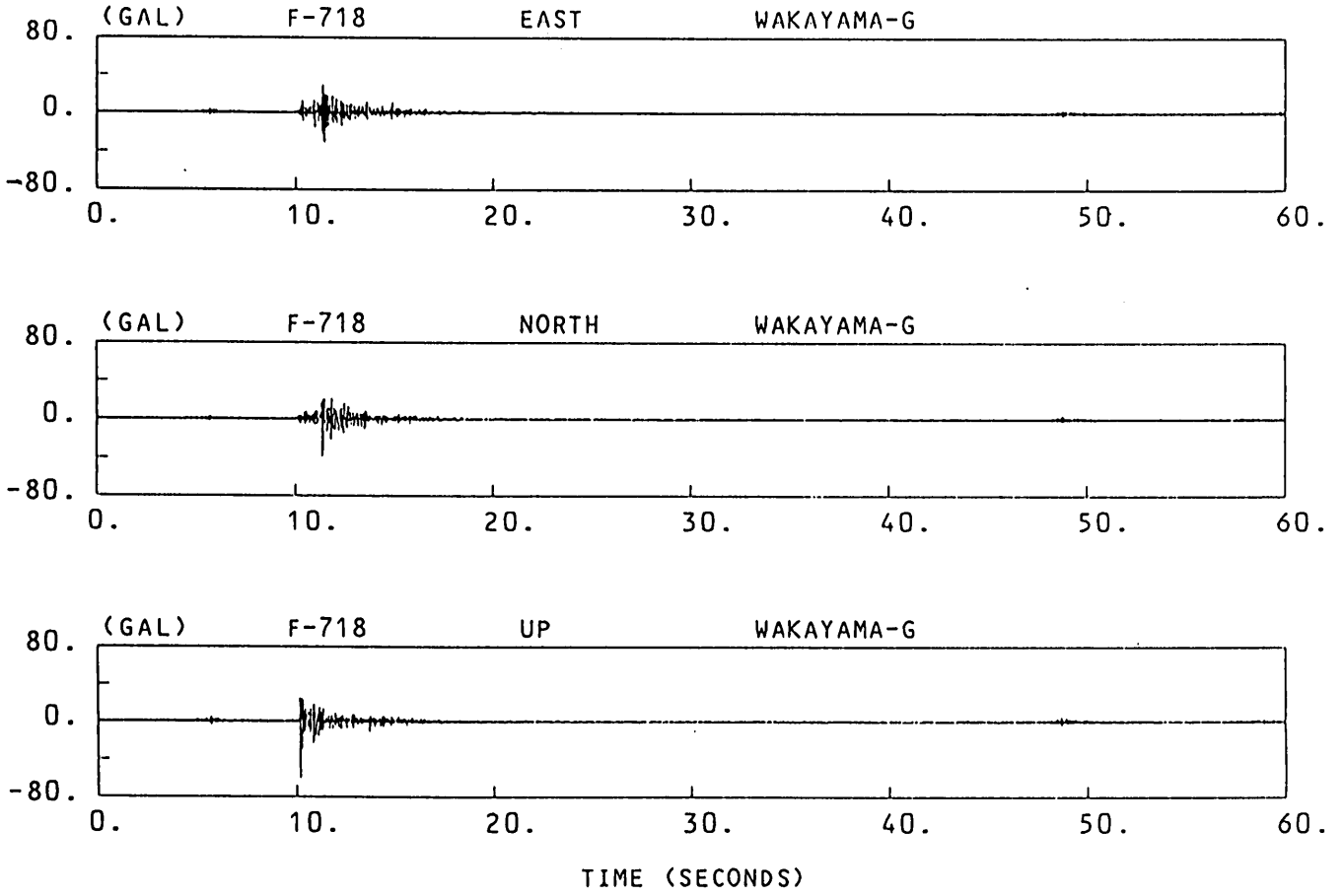
STATION : WAKAYAMA-G

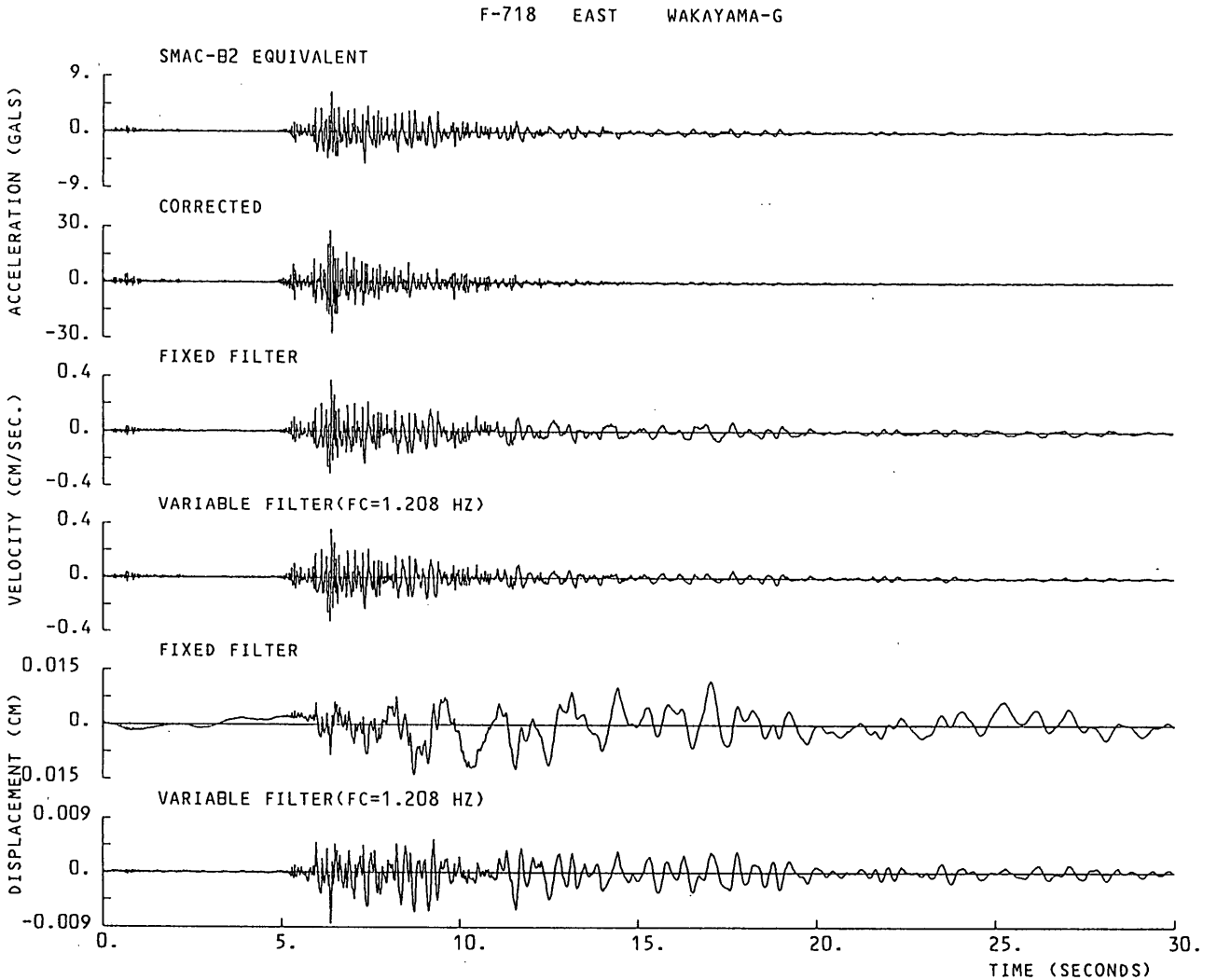
EARTHQUAKE DATA

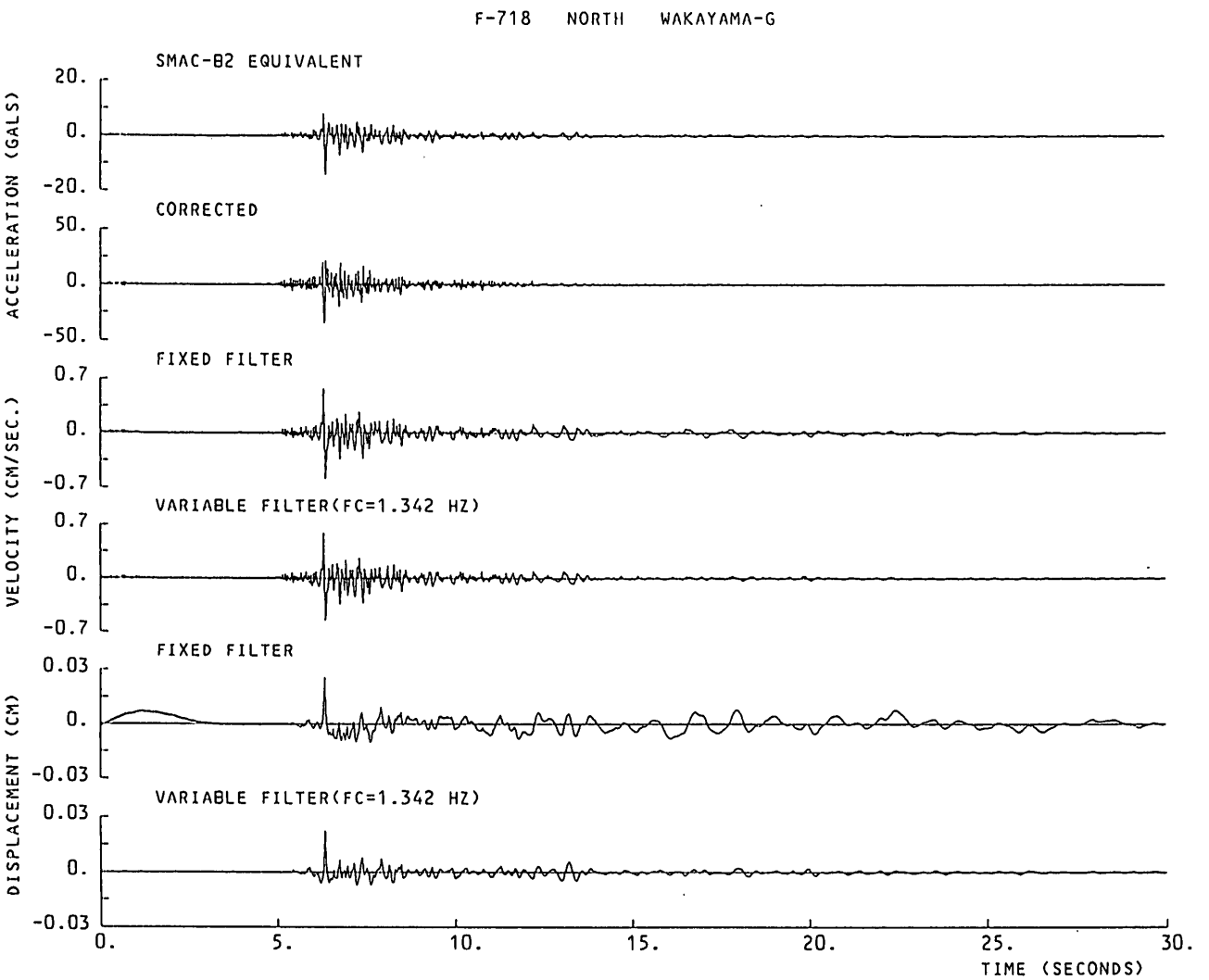
DATE AND TIME	16:50 DEC. 9,1994
LOCATION OF HYPOCENTER	
EPICENTRAL REGION	NW WAKAYAMA PREF
LATITUDE	34° 13.0' N
LONGITUDE	135° 8.2' E
DEPTH	10.3KM
JMA MAGNITUDE	3.4

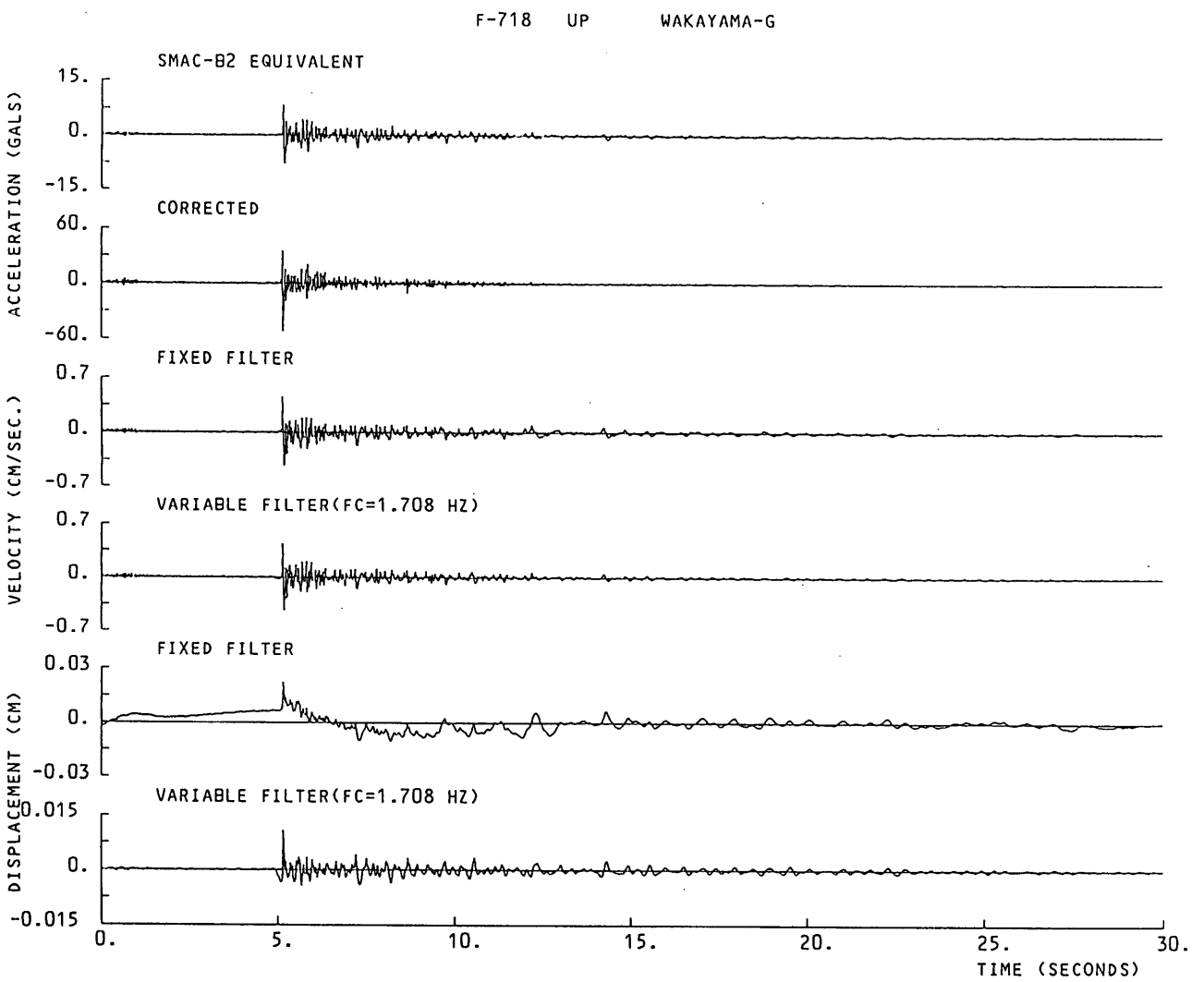
	PEAK VALUES OF COMPONENTS			
	N S	E W	U D	HORIZONTAL*
PARAMETER OF THE VARIABLE FILTER				
FC (HZ)	1.342	1.208	1.708	
MAXIMUM ACCELERATION (GAL)				
SMAC-B2 EQUIVALENT	15.7	8.1	10.2	16.4
ORIGINAL	39.5	31.1	60.1	45.3
CORRECTED	40.9	28.0	52.1	46.2
MAXIMUM VELOCITY (CM/SEC)				
FIXED FILTER	0.68	0.38	0.64	0.73
VARIABLE FILTER	0.64	0.37	0.63	0.70
MAXIMUM DISPLACEMENT (CM)				
FIXED FILTER	0.03	0.01	0.02	0.03
VARIABLE FILTER	0.02	0.01	0.01	0.02

* RESULTANT OF HORIZONTAL COMPONENTS


(GAL) F-718 EAST WAKAYAMA-G
80.
0.
-80.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-718 NORTH WAKAYAMA-G
80.
0.
-80.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-718 UP WAKAYAMA-G
80.
0.
-80.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


F-718 EAST WAKAYAMA-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=1.208 HZ)
FIXED FILTER
VARIABLE FILTER(FC=1.208 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
9.
0.
-9.
30.
0.
-30.
0.4
0.
-0.4
0.4
0.
-0.4
0.015
0.
-0.015
0.009
0.
-0.009
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-718 NORTH WAKAYAMA-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=1.342 HZ)
FIXED FILTER
VARIABLE FILTER(FC=1.342 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
20.
0.
-20.
50.
0.
-50.
0.7
0.
-0.7
0.7
0.
-0.7
0.03
0.
-0.03
0.03
0.
-0.03
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-718 UP WAKAYAMA-G
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=1.708 HZ)
FIXED FILTER
VARIABLE FILTER(FC=1.708 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
15.
0.
-15.
60.
0.
-60.
0.7
0.
-0.7
0.7
0.
-0.7
0.03
0.
-0.03
0.015
0.
-0.015
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

RESPONSE SPECTRUM

RECORD = F-718 COMPONENT = EAST SIGNAL = CORRECTION = STATION = WAKAYAMA-G
DATE AND TIME = 1994.12.09.16.38 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 28.00 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	78.1	0.47	0.005	69.1	0.42	0.004	67.5	0.41	0.004	61.3	0.36	0.004	47.1	0.25	0.003
0.10	85.6	1.42	0.022	56.3	0.87	0.014	44.8	0.78	0.011	37.6	0.74	0.009	32.2	0.55	0.007
0.15	63.8	1.56	0.036	38.1	1.21	0.022	32.2	1.03	0.018	25.1	0.80	0.013	18.7	0.53	0.009
0.20	76.1	2.42	0.077	36.4	1.15	0.037	24.6	0.76	0.025	15.1	0.49	0.015	12.4	0.46	0.009
0.25	34.4	1.36	0.055	18.1	0.79	0.028	13.8	0.63	0.022	10.1	0.50	0.016	8.8	0.46	0.009
0.30	26.4	1.27	0.060	9.2	0.59	0.021	6.7	0.56	0.015	5.7	0.53	0.013	6.4	0.47	0.010
0.35	31.8	1.76	0.099	10.5	0.58	0.032	8.1	0.50	0.025	6.0	0.48	0.018	4.6	0.45	0.011
0.40	10.1	0.68	0.041	6.1	0.46	0.025	5.2	0.42	0.021	4.3	0.42	0.017	3.5	0.43	0.011
0.45	11.1	0.79	0.057	4.9	0.43	0.025	4.1	0.37	0.021	3.2	0.38	0.016	2.9	0.40	0.010
0.50	8.1	0.64	0.051	4.1	0.35	0.026	2.8	0.35	0.018	2.1	0.37	0.013	2.5	0.39	0.009
0.55	4.7	0.42	0.036	2.5	0.37	0.019	2.0	0.37	0.016	1.6	0.37	0.012	2.3	0.38	0.009
0.60	2.8	0.37	0.026	1.9	0.37	0.017	1.7	0.37	0.015	1.5	0.37	0.013	2.1	0.38	0.009
0.65	3.7	0.38	0.040	2.0	0.38	0.021	1.4	0.38	0.015	1.2	0.37	0.012	1.9	0.38	0.009
0.70	3.0	0.38	0.037	1.3	0.38	0.016	1.1	0.37	0.014	1.0	0.37	0.011	1.7	0.38	0.009
0.75	1.5	0.37	0.022	1.2	0.37	0.017	1.0	0.37	0.014	0.8	0.37	0.011	1.6	0.37	0.009
0.80	2.7	0.37	0.043	1.3	0.37	0.021	0.9	0.37	0.015	0.8	0.37	0.011	1.5	0.37	0.008
0.85	1.9	0.37	0.035	1.2	0.37	0.022	0.9	0.37	0.016	0.7	0.37	0.011	1.4	0.37	0.008
0.90	0.9	0.37	0.019	0.8	0.37	0.016	0.7	0.37	0.015	0.7	0.37	0.012	1.3	0.37	0.008
0.95	0.8	0.37	0.018	0.7	0.37	0.015	0.6	0.37	0.014	0.6	0.36	0.011	1.2	0.37	0.008
1.00	1.0	0.36	0.026	0.6	0.36	0.014	0.5	0.36	0.012	0.6	0.36	0.010	1.1	0.37	0.008
1.10	0.4	0.36	0.011	0.3	0.36	0.009	0.4	0.36	0.008	0.5	0.36	0.008	1.0	0.36	0.008
1.20	0.4	0.36	0.015	0.3	0.36	0.011	0.3	0.36	0.009	0.5	0.36	0.008	0.9	0.36	0.008
1.30	0.3	0.36	0.014	0.2	0.36	0.011	0.3	0.36	0.009	0.4	0.36	0.008	0.9	0.36	0.008
1.40	0.2	0.35	0.011	0.2	0.35	0.010	0.3	0.35	0.009	0.4	0.36	0.008	0.8	0.36	0.008
1.50	0.2	0.36	0.012	0.2	0.35	0.011	0.2	0.35	0.010	0.3	0.36	0.008	0.7	0.36	0.008
1.60	0.1	0.36	0.009	0.2	0.36	0.009	0.2	0.35	0.009	0.3	0.35	0.008	0.7	0.36	0.008
1.70	0.1	0.35	0.009	0.1	0.35	0.009	0.2	0.35	0.009	0.3	0.35	0.008	0.6	0.36	0.008
1.80	0.1	0.35	0.009	0.1	0.35	0.008	0.2	0.35	0.008	0.3	0.35	0.008	0.6	0.35	0.008
1.90	0.1	0.35	0.008	0.1	0.35	0.008	0.2	0.35	0.008	0.2	0.35	0.008	0.6	0.35	0.008
2.00	0.1	0.35	0.008	0.1	0.35	0.008	0.1	0.35	0.008	0.2	0.35	0.008	0.5	0.35	0.008
2.20	0.1	0.35	0.009	0.1	0.35	0.009	0.1	0.35	0.009	0.2	0.35	0.009	0.5	0.35	0.008
2.40	0.1	0.35	0.009	0.1	0.35	0.009	0.1	0.35	0.009	0.2	0.35	0.008	0.5	0.35	0.008
2.60	0.0	0.35	0.008	0.1	0.35	0.008	0.1	0.35	0.008	0.2	0.35	0.008	0.4	0.35	0.008
2.80	0.0	0.35	0.007	0.1	0.35	0.008	0.1	0.35	0.008	0.2	0.35	0.008	0.4	0.35	0.008
3.00	0.0	0.35	0.008	0.1	0.35	0.008	0.1	0.35	0.008	0.1	0.35	0.008	0.4	0.35	0.008
3.20	0.0	0.35	0.009	0.1	0.35	0.009	0.1	0.35	0.009	0.1	0.35	0.008	0.3	0.35	0.008
3.40	0.0	0.35	0.009	0.1	0.35	0.009	0.1	0.35	0.009	0.1	0.35	0.009	0.3	0.35	0.008
3.60	0.0	0.35	0.010	0.0	0.35	0.009	0.1	0.35	0.009	0.1	0.35	0.009	0.3	0.35	0.008
3.80	0.0	0.35	0.009	0.0	0.35	0.009	0.1	0.35	0.009	0.1	0.35	0.009	0.3	0.35	0.008
4.00	0.0	0.35	0.009	0.0	0.35	0.009	0.1	0.35	0.009	0.1	0.35	0.009	0.3	0.35	0.008

PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

RESPONSE SPECTRUM

RECORD = F-718 COMPONENT = NORTH SIGNAL = CORRECTION = STATION = WAKAYAMA-G
DATE AND TIME = 1994.12.09.16.38 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 40.91 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	66.5	0.40	0.004	56.5	0.36	0.004	52.7	0.32	0.003	49.4	0.27	0.003	48.5	0.25	0.003
0.10	206.6	3.29	0.052	102.6	1.61	0.026	88.3	1.42	0.022	71.1	1.17	0.018	56.1	0.76	0.013
0.15	73.3	1.75	0.042	49.8	1.24	0.028	44.3	1.09	0.025	39.5	0.95	0.022	37.9	0.74	0.018
0.20	152.3	4.85	0.154	54.0	1.80	0.054	37.7	1.20	0.038	30.6	1.07	0.030	27.4	0.90	0.022
0.25	54.4	2.16	0.086	24.6	1.29	0.039	22.2	1.23	0.035	20.0	1.13	0.031	18.7	0.96	0.023
0.30	31.5	1.51	0.072	13.8	1.06	0.031	12.6	1.05	0.029	11.8	1.02	0.026	12.7	0.92	0.021
0.35	27.3	1.52	0.085	10.5	0.93	0.033	8.5	0.94	0.026	8.2	0.93	0.025	9.2	0.87	0.020
0.40	24.6	1.57	0.100	8.4	0.93	0.034	6.9	0.92	0.028	6.5	0.91	0.025	7.0	0.86	0.020
0.45	7.4	0.92	0.038	5.4	0.92	0.028	5.2	0.91	0.026	5.0	0.89	0.024	6.0	0.84	0.020
0.50	10.9	0.88	0.069	4.8	0.86	0.030	4.3	0.86	0.026	4.5	0.85	0.025	5.4	0.82	0.021
0.55	6.4	0.80	0.049	3.8	0.81	0.029	3.8	0.81	0.028	3.9	0.81	0.026	4.8	0.80	0.022
0.60	3.1	0.74	0.029	3.1	0.75	0.028	3.2	0.76	0.028	3.4	0.77	0.026	4.4	0.77	0.023
0.65	2.6	0.72	0.028	2.6	0.73	0.027	2.7	0.73	0.027	3.0	0.74	0.026	4.0	0.75	0.023
0.70	2.2	0.70	0.028	2.2	0.71	0.027	2.3	0.71	0.026	2.6	0.72	0.026	3.6	0.74	0.023
0.75	1.8	0.68	0.026	1.9	0.69	0.026	2.0	0.70	0.026	2.3	0.71	0.025	3.3	0.73	0.024
0.80	1.6	0.67	0.027	1.7	0.68	0.026	1.7	0.68	0.025	2.0	0.69	0.025	3.1	0.71	0.023
0.85	1.4	0.66	0.026	1.4	0.67	0.025	1.5	0.67	0.025	1.8	0.68	0.025	2.8	0.70	0.023
0.90	1.2	0.66	0.026	1.3	0.66	0.025	1.4	0.67	0.025	1.6	0.68	0.025	2.6	0.70	0.023
0.95	1.1	0.65	0.025	1.1	0.66	0.025	1.2	0.66	0.025	1.5	0.67	0.024	2.5	0.69	0.023
1.00	0.9	0.65	0.024	1.0	0.65	0.024	1.1	0.66	0.024	1.4	0.67	0.024	2.3	0.68	0.023
1.10	0.8	0.64	0.025	0.8	0.64	0.024	0.9	0.65	0.024	1.2	0.66	0.024	2.1	0.68	0.023
1.20	0.6	0.64	0.023	0.7	0.64	0.023	0.8	0.64	0.024	1.0	0.65	0.024	1.8	0.67	0.023
1.30	0.6	0.63	0.025	0.6	0.64	0.024	0.7	0.64	0.024	0.9	0.65	0.023	1.7	0.66	0.023
1.40	0.5	0.63	0.023	0.5	0.63	0.023	0.6	0.64	0.023	0.8	0.64	0.023	1.5	0.66	0.023
1.50	0.4	0.63	0.022	0.4	0.63	0.023	0.5	0.64	0.023	0.7	0.64	0.023	1.4	0.65	0.023
1.60	0.4	0.63	0.024	0.4	0.63	0.024	0.5	0.63	0.023	0.7	0.64	0.023	1.3	0.65	0.023
1.70	0.3	0.62	0.024	0.4	0.63	0.024	0.4	0.63	0.023	0.6	0.64	0.023	1.2	0.65	0.023
1.80	0.3	0.62	0.022	0.3	0.62	0.023	0.4	0.63	0.023	0.6	0.63	0.023	1.1	0.65	0.023
1.90	0.2	0.62	0.021	0.3	0.63	0.022	0.4	0.63	0.022	0.5	0.63	0.023	1.1	0.64	0.023
2.00	0.2	0.63	0.022	0.3	0.63	0.022	0.3	0.63	0.022	0.5	0.63	0.023	1.0	0.64	0.022
2.20	0.2	0.63	0.024	0.2	0.63	0.023	0.3	0.63	0.023	0.4	0.63	0.023	0.9	0.64	0.022
2.40	0.2	0.62	0.023	0.2	0.62	0.023	0.3	0.62	0.023	0.4	0.63	0.023	0.8	0.64	0.022
2.60	0.1	0.62	0.021	0.2	0.62	0.022	0.2	0.62	0.022	0.4	0.63	0.022	0.8	0.64	0.022
2.80	0.1	0.62	0.020	0.1	0.62	0.021	0.2	0.62	0.021	0.3	0.63	0.022	0.7	0.63	0.022
3.00	0.1	0.62	0.021	0.1	0.62	0.022	0.2	0.63	0.022	0.3	0.63	0.022	0.7	0.63	0.022
3.20	0.1	0.62	0.023	0.1	0.62	0.023	0.2	0.62	0.023	0.3	0.63	0.023	0.6	0.63	0.022
3.40	0.1	0.62	0.024	0.1	0.62	0.024	0.2	0.62	0.023	0.3	0.63	0.023	0.6	0.63	0.022
3.60	0.1	0.62	0.025	0.1	0.62	0.024	0.1	0.62	0.024	0.2	0.62	0.023	0.5	0.63	0.022
3.80	0.1	0.62	0.024	0.1	0.62	0.024	0.1	0.62	0.023	0.2	0.62	0.023	0.5	0.63	0.022
4.00	0.1	0.62	0.023	0.1	0.62	0.023	0.1	0.62	0.023	0.2	0.62	0.022	0.5	0.63	0.022

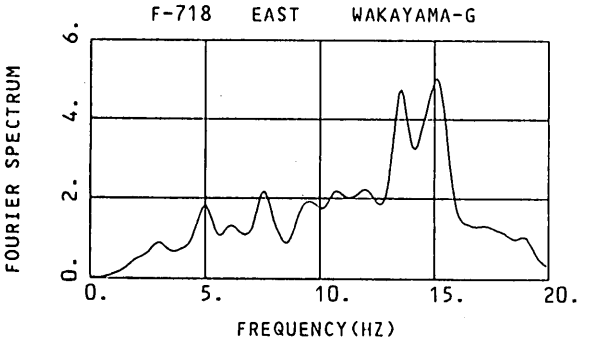
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

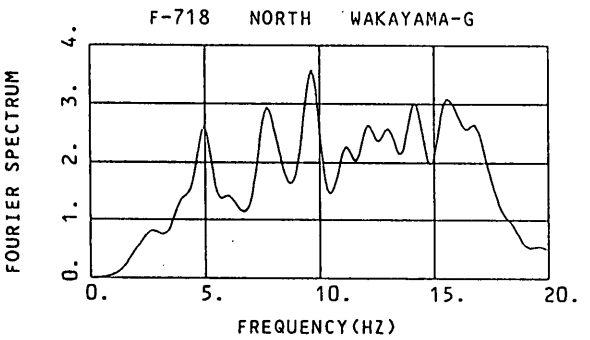
RESPONSE SPECTRUM

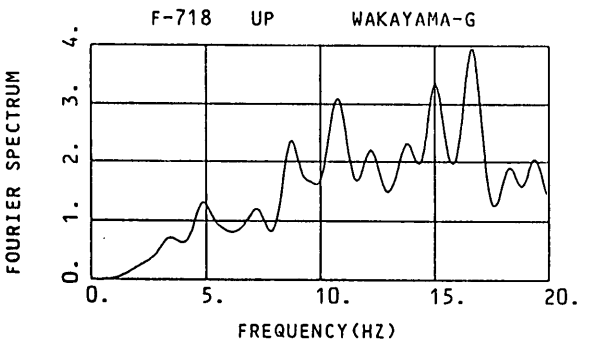
RECORD = F-718 COMPONENT = UP SIGNAL = CORRECTION = STATION = WAKAYAMA-G
DATE AND TIME = 1994.12.09.16.38 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 52.14 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

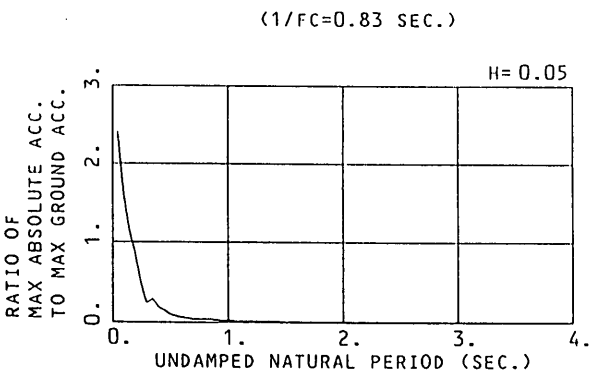
	DAMPING = 0.			DAMPING = 0.025			DAMPING = 0.050			DAMPING = 0.100			DAMPING = 0.250		
PER	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD	AA	RV	RD
0.05	172.3	1.30	0.011	132.0	0.97	0.008	118.1	0.88	0.007	103.9	0.74	0.007	83.5	0.47	0.005
0.10	98.6	1.70	0.025	78.6	1.34	0.020	70.7	1.21	0.018	58.2	0.97	0.014	47.8	0.71	0.011
0.15	56.3	1.35	0.032	29.8	0.94	0.017	27.8	0.91	0.016	26.4	0.86	0.014	24.6	0.73	0.011
0.20	44.0	1.45	0.045	25.2	0.84	0.026	19.9	0.78	0.020	14.2	0.76	0.014	13.7	0.70	0.010
0.25	17.9	0.73	0.028	9.9	0.68	0.016	9.2	0.68	0.014	8.5	0.68	0.013	10.8	0.66	0.011
0.30	20.4	0.97	0.047	8.6	0.61	0.020	6.7	0.62	0.014	6.7	0.62	0.014	8.8	0.61	0.012
0.35	5.4	0.58	0.017	5.1	0.59	0.015	5.2	0.57	0.015	5.4	0.56	0.014	7.4	0.58	0.013
0.40	6.8	0.63	0.027	4.1	0.59	0.017	3.9	0.58	0.014	4.2	0.56	0.014	6.3	0.54	0.013
0.45	6.8	0.60	0.035	3.0	0.59	0.015	3.2	0.59	0.014	3.4	0.57	0.014	5.4	0.53	0.013
0.50	2.9	0.60	0.018	2.4	0.60	0.014	2.6	0.59	0.014	2.9	0.58	0.014	4.8	0.54	0.013
0.55	2.2	0.59	0.017	2.0	0.60	0.014	2.1	0.59	0.014	2.5	0.58	0.014	4.2	0.55	0.013
0.60	2.2	0.60	0.020	1.6	0.60	0.014	1.8	0.59	0.014	2.1	0.58	0.013	3.8	0.55	0.013
0.65	1.6	0.61	0.017	1.4	0.60	0.014	1.5	0.59	0.013	1.9	0.58	0.013	3.4	0.56	0.013
0.70	1.1	0.59	0.013	1.1	0.59	0.013	1.3	0.59	0.013	1.7	0.58	0.013	3.1	0.56	0.012
0.75	0.9	0.61	0.013	1.0	0.60	0.013	1.1	0.59	0.013	1.5	0.58	0.013	2.9	0.56	0.012
0.80	0.8	0.59	0.012	0.9	0.59	0.013	1.0	0.59	0.013	1.4	0.58	0.013	2.7	0.56	0.012
0.85	0.7	0.60	0.013	0.8	0.59	0.013	0.9	0.59	0.013	1.3	0.58	0.012	2.5	0.56	0.012
0.90	0.5	0.60	0.011	0.7	0.59	0.012	0.8	0.59	0.012	1.2	0.58	0.012	2.3	0.57	0.012
0.95	0.5	0.59	0.012	0.6	0.59	0.012	0.7	0.59	0.012	1.1	0.58	0.012	2.2	0.57	0.012
1.00	0.5	0.59	0.013	0.6	0.59	0.012	0.7	0.59	0.012	1.0	0.58	0.012	2.1	0.57	0.012
1.10	0.3	0.59	0.011	0.4	0.59	0.011	0.5	0.59	0.012	0.9	0.58	0.012	1.8	0.57	0.012
1.20	0.3	0.58	0.013	0.4	0.58	0.012	0.5	0.58	0.012	0.8	0.58	0.012	1.7	0.57	0.012
1.30	0.3	0.59	0.012	0.3	0.59	0.012	0.4	0.59	0.012	0.7	0.58	0.012	1.5	0.57	0.012
1.40	0.2	0.59	0.010	0.3	0.58	0.011	0.4	0.58	0.011	0.6	0.58	0.011	1.4	0.57	0.012
1.50	0.2	0.58	0.011	0.3	0.58	0.011	0.4	0.58	0.011	0.6	0.58	0.011	1.3	0.57	0.011
1.60	0.2	0.58	0.013	0.2	0.58	0.012	0.3	0.58	0.012	0.6	0.58	0.012	1.2	0.57	0.011
1.70	0.2	0.59	0.012	0.2	0.59	0.012	0.3	0.58	0.012	0.5	0.58	0.011	1.1	0.57	0.011
1.80	0.1	0.59	0.010	0.2	0.59	0.011	0.3	0.58	0.011	0.5	0.58	0.011	1.1	0.57	0.011
1.90	0.1	0.58	0.009	0.2	0.58	0.010	0.2	0.58	0.010	0.4	0.58	0.011	1.0	0.57	0.011
2.00	0.1	0.58	0.010	0.1	0.58	0.010	0.2	0.58	0.011	0.4	0.58	0.011	1.0	0.57	0.011
2.20	0.1	0.58	0.013	0.1	0.58	0.012	0.2	0.58	0.012	0.4	0.58	0.012	0.9	0.57	0.011
2.40	0.1	0.58	0.013	0.1	0.58	0.013	0.2	0.58	0.012	0.3	0.58	0.012	0.8	0.57	0.011
2.60	0.1	0.59	0.011	0.1	0.59	0.011	0.2	0.58	0.011	0.3	0.58	0.011	0.7	0.57	0.011
2.80	0.0	0.59	0.009	0.1	0.58	0.010	0.2	0.58	0.010	0.3	0.58	0.011	0.7	0.58	0.011
3.00	0.0	0.58	0.008	0.1	0.58	0.009	0.1	0.58	0.009	0.3	0.58	0.010	0.6	0.58	0.011
3.20	0.0	0.58	0.009	0.1	0.58	0.009	0.1	0.58	0.010	0.2	0.58	0.010	0.6	0.58	0.011
3.40	0.0	0.58	0.010	0.1	0.58	0.010	0.1	0.58	0.011	0.2	0.58	0.011	0.6	0.58	0.011
3.60	0.0	0.58	0.012	0.1	0.58	0.012	0.1	0.58	0.012	0.2	0.58	0.012	0.5	0.58	0.011
3.80	0.0	0.58	0.014	0.1	0.58	0.013	0.1	0.58	0.013	0.2	0.58	0.012	0.5	0.58	0.011
4.00	0.0	0.58	0.015	0.1	0.58	0.014	0.1	0.58	0.013	0.2	0.58	0.013	0.5	0.58	0.012

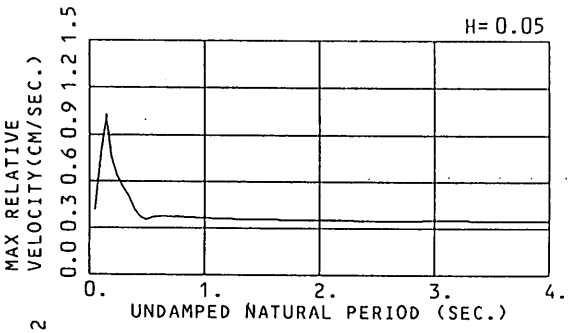
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

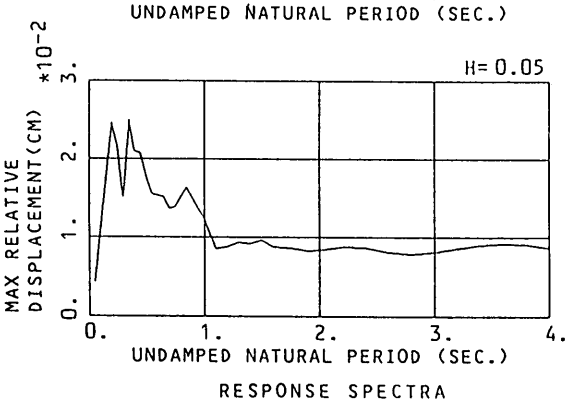

F-718 EAST WAKAYAMA-G
FOURIER SPECTRUM
0. 2. 4. 6.
0. 5. 10. 15. 20.
FREQUENCY(HZ)


F-718 NORTH WAKAYAMA-G
FOURIER SPECTRUM
0. 1. 2. 3. 4.
0. 5. 10. 15. 20.
FREQUENCY(HZ)

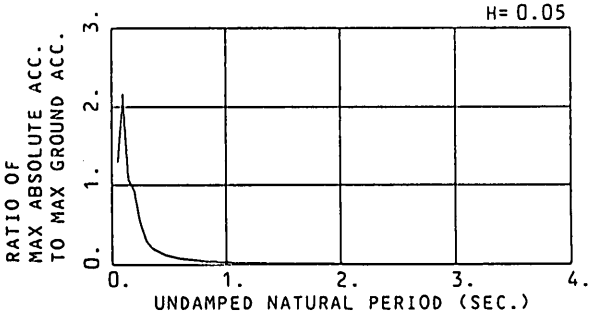

F-718 UP WAKAYAMA-G
FOURIER SPECTRUM
0. 1. 2. 3. 4.
0. 5. 10. 15. 20.
FREQUENCY(HZ)

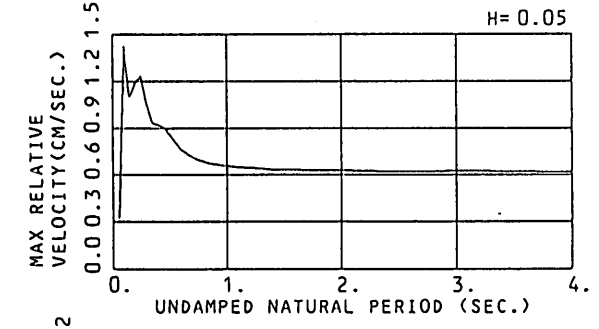

F-718 EAST WAKAYAMA-G
(1/FC=0.83 SEC.)
H= 0.05
RATIO OF
MAX ABSOLUTE ACC.
TO MAX GROUND ACC.
0. 1. 2. 3.
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)

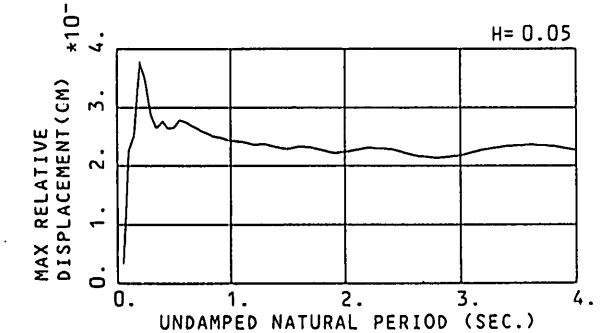

H= 0.05
MAX RELATIVE
VELOCITY(CM/SEC.)
0.0 0.3 0.6 0.9 1.2 1.5
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)


H= 0.05
MAX RELATIVE
DISPLACEMENT(CM)
*10-2
0. 1. 2. 3.
0. 1. 2. 3. 4.
UNDAMPED NATURAL PERIOD (SEC.)
RESPONSE SPECTRA

F-718 NORTH WAKAYAMA-G
(1/FC=0.75 SEC.)

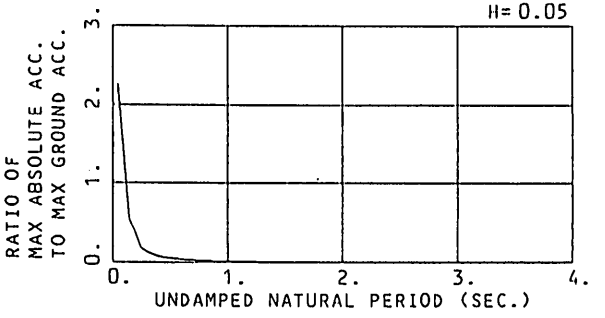


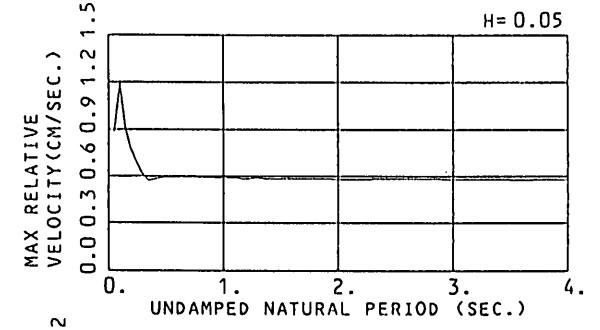


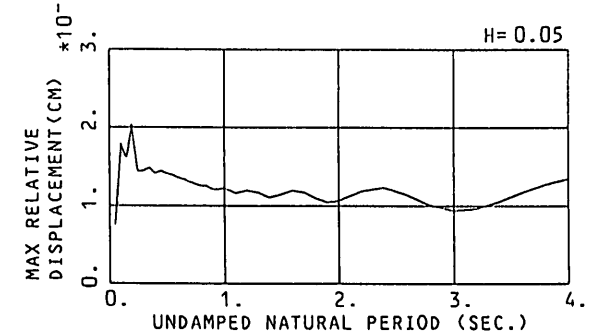


RESPONSE SPECTRA

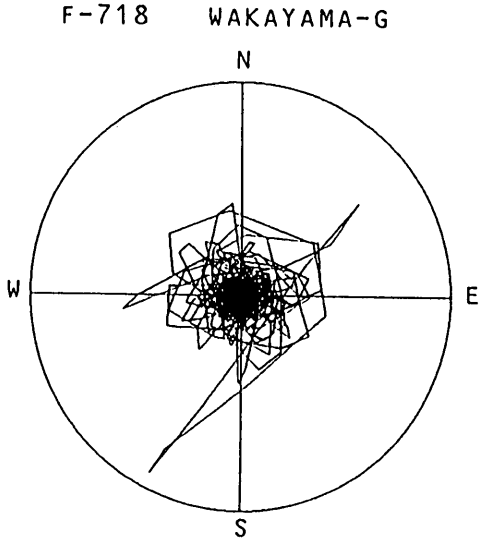
F-718 UP WAKAYAMA-G
(1/FC=0.59 SEC.)



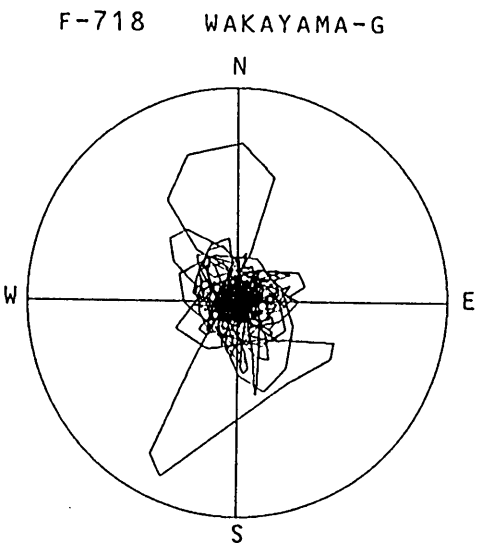




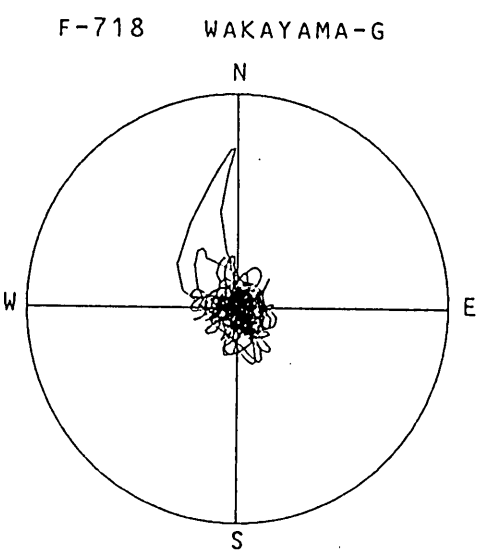
RESPONSE SPECTRA



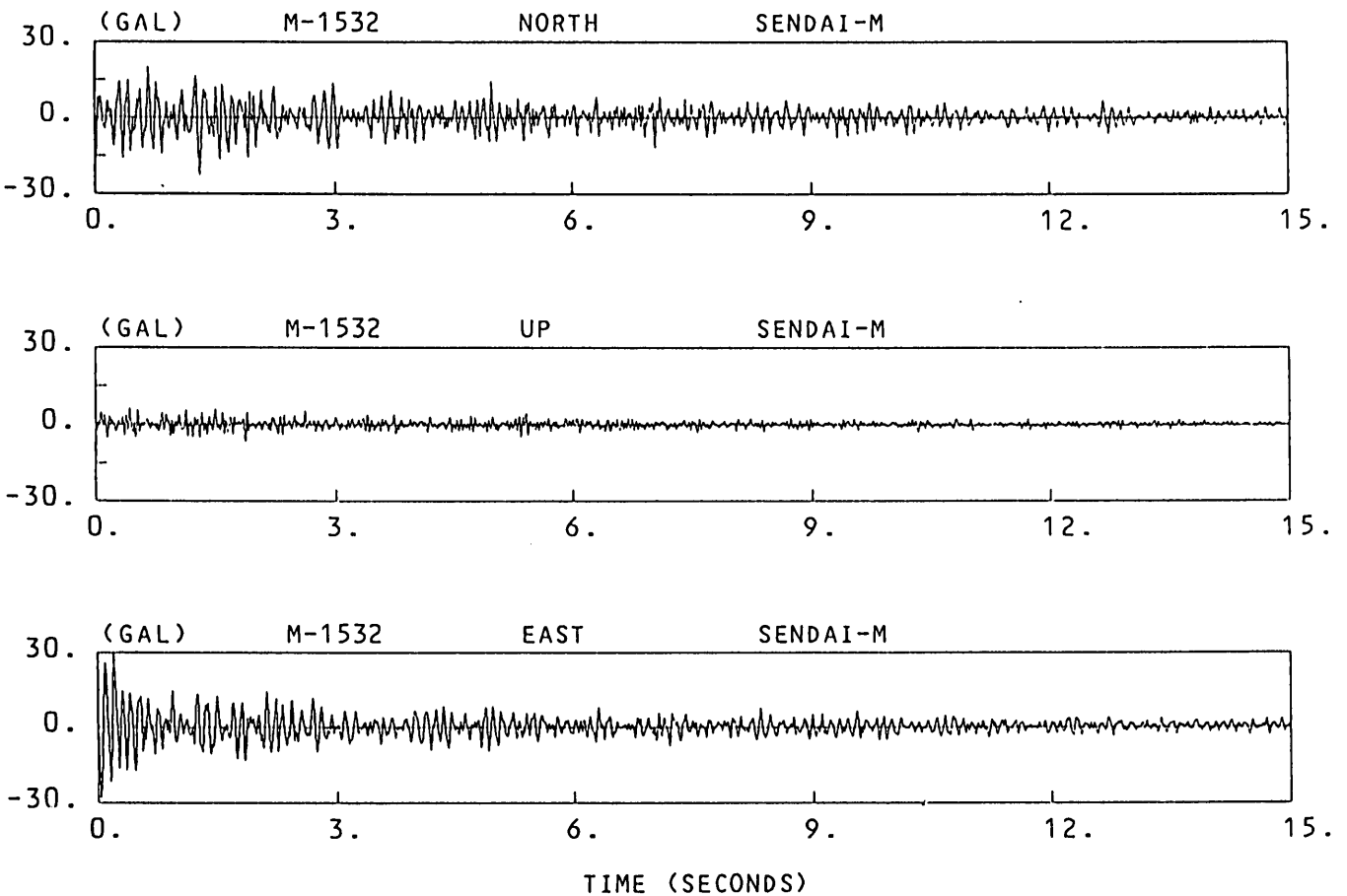
ACCELERATION
R=50.0 GAL
MAX=46.2 GAL

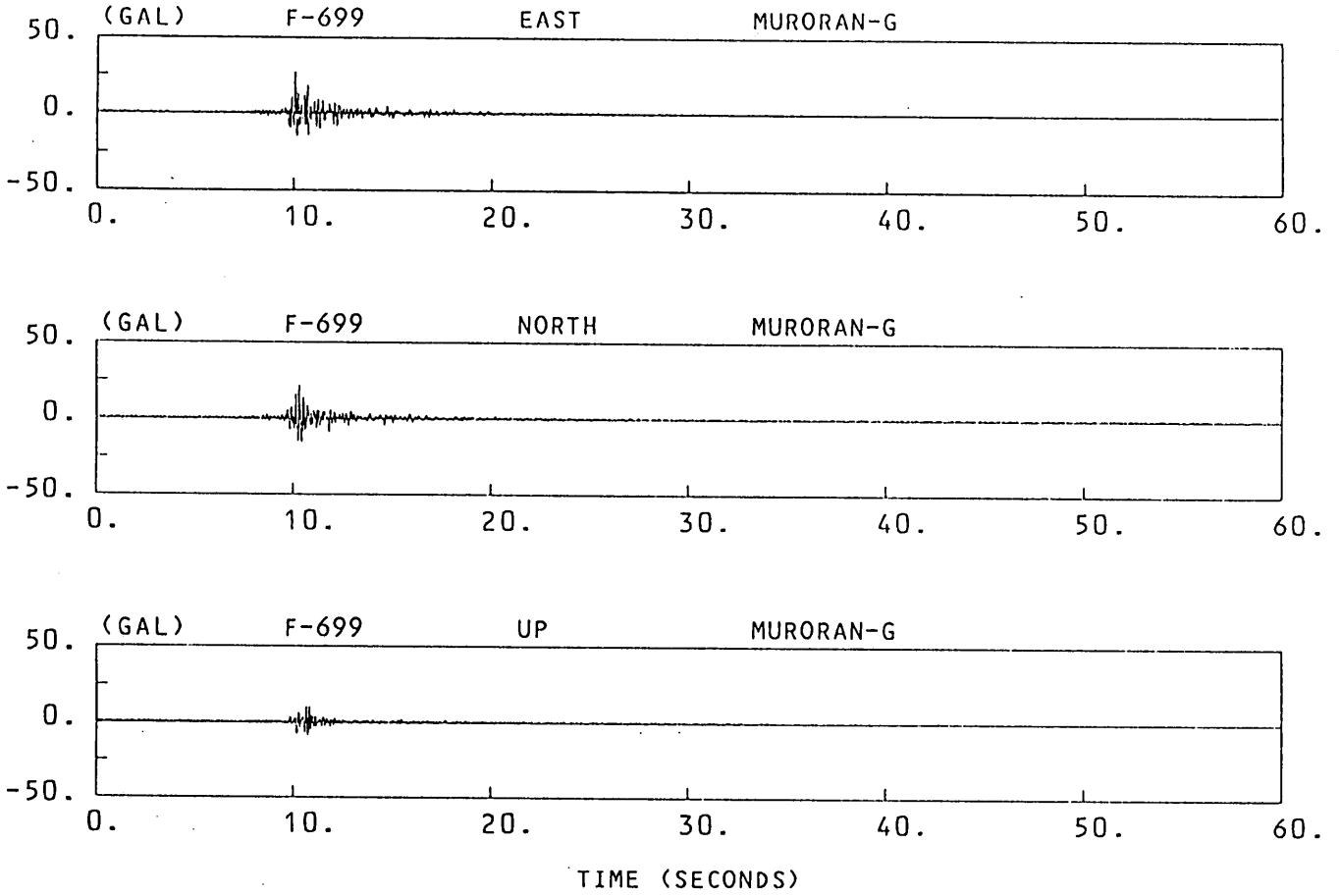


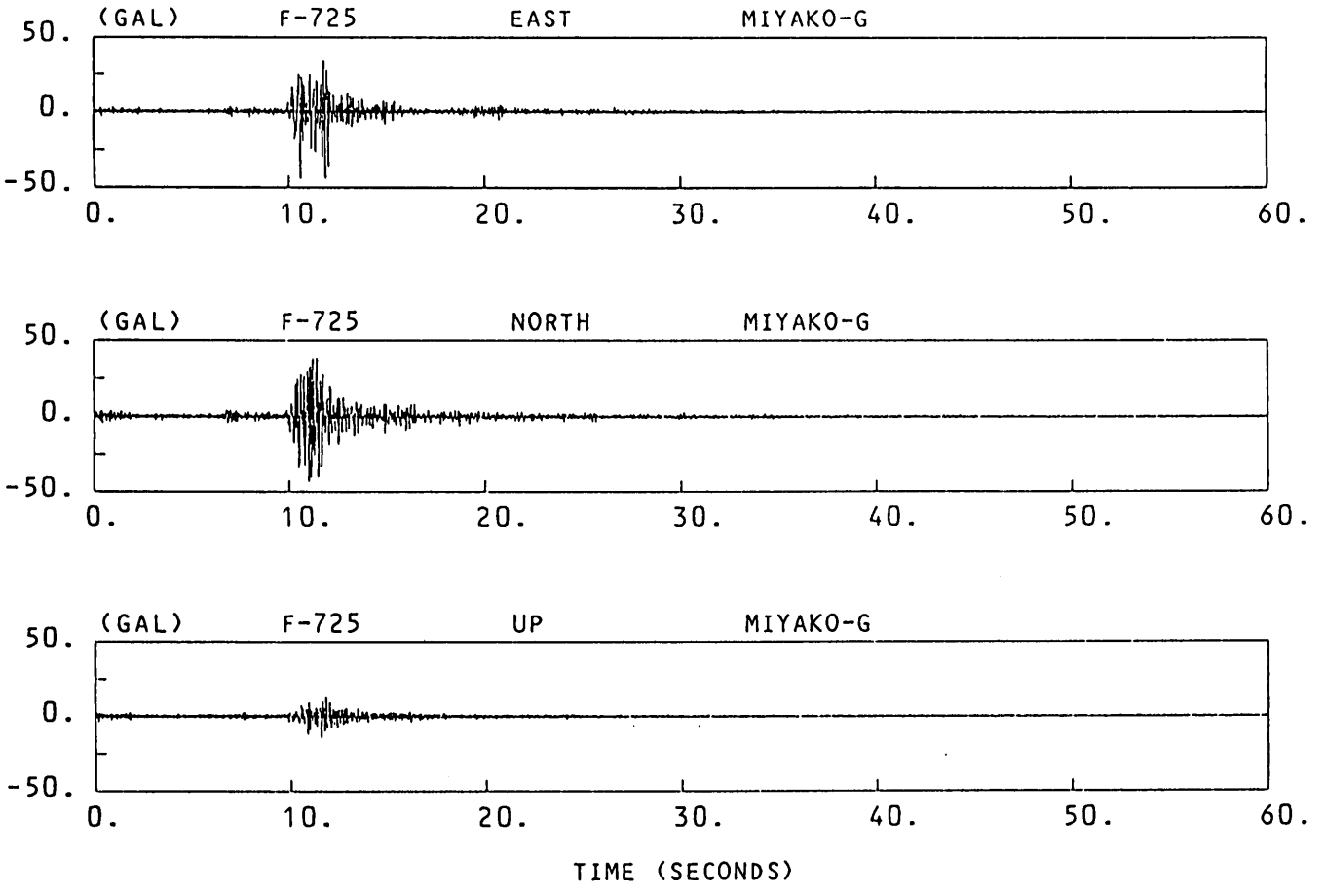
VELOCITY
R=0.8 CM/SEC.
MAX=0.7 CM/SEC.



DISPLACEMENT
R=0.03 CM
MAX=0.02 CM


(GAL) M-1532 NORTH SENDAI-M
30.
0.
-30.
0. 3. 6. 9. 12. 15.
(GAL) M-1532 UP SENDAI-M
30.
0.
-30.
0. 3. 6. 9. 12. 15.
(GAL) M-1532 EAST SENDAI-M
30.
0.
-30.
0. 3. 6. 9. 12. 15.
TIME (SECONDS)


(GAL) F-699 EAST MURORAN-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-699 NORTH MURORAN-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-699 UP MURORAN-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)


(GAL) F-725 EAST MIYAKO-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-725 NORTH MIYAKO-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
(GAL) F-725 UP MIYAKO-G
50.
0.
-50.
0. 10. 20. 30. 40. 50. 60.
TIME (SECONDS)

港湾技研資料 No.840

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