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ANNUAL REPORT ON STRONG-MOTION EARTHQUAKE RECORDS
IN JAPANESE PORTS (1990)

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港湾地域強震観測年報（1990）

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Abbreviations used above:

- AR: Analog record (computer plots of digitized records)
- IR: Integated velocities and displacements (computer plots of digitized records)
- FS: Fourier spectra
- NR: Numerical tables of response spectra
- LO: Loci of accelerations, velocities and displacements

港湾地域強震観測年報(1990)

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要旨

1990年12月現在，港湾地域強震観測網には81台の強震計が54港に設置されていた。このうち60台が地盤上に，15台が構造物上に，6台が地中に設置されていた。使用している強震計はアナログ記録方式のSMAC－B2強震計およびERS－B，C，D強震計と，デジタル記録方式のERS－F強震計である。対象期間に生じた観測網の変動は1箇所で，水俣－Mが1990年3月に観測を停止した。

1990年には津波予報がでた地震および震度Ⅳ以上の地震は20回発生した。これらの地震は北海道十勝沖，新潟県南部，茨城県沖と千葉県沖で7回，神奈川県で2回，伊豆大島近海，滋賀県北西部，鳥取県西部，奄美大島近海，沖縄近海，宮古島近海，石垣島近海，および，サハリン南部や東海地方はるか沖などの遠地で発生した。これらの地震の規模はサハリンで発生したM 7.8以外はM 6.5以下であり，ほとんどの地震はM 6以下の小規模なものであった。有感地震回数は震度4が16回，震度3が87回，震度2が222回，震度1が425回，全有感地震回数は750回あったと報告されている。1990年は比較的地震活動の少ない年であった。

1990年に観測された記録は総数214本であった。74回の地震で得られたものである。

この年報は，前記観測網で1990年に得られた記録について報告する。年報は本文および観測結果からなり，観測結果は，強震観測表，記録波形，速度，変位波形，フーリェスペクトル，応答スペクトル，ディジタル記録，水平面内の加速度，速度および変位軌跡からなる。

強震観測表（Strong－Motion Earthquake Observation Results）には，対象期間中に得られたすべての記録を地震ごとに分類し，地震の資料と最大成分加速度等を示した。ただし，成分の最大加速度が20ガル以下で対応する地震が確認できないものは除いてある。地震資料（Earthquake data）に示すものは，震度（Intensities）を除き，気象庁地震津波監視課発行の「地震月報」によっている。しかし，この年報を編集する時点で地震月報が刊行されていない地震については，地震津波監視課が速報的に発表する「地震火山概況」によっている。その場合には，そのことが地震資料に注記されている。記録番号は記録が港湾技術研究所に到着した順序で付され，Sで始まる番号の記録はSMAC－B2強震計，Mで始まる番号の記録はアナログ記録方式のERS強震計，Fで始まる番号の記録はディジタル記録方式のERS強震計で得られたものである。

記録波形は最大加速度が20ガル以上の記録について示した。これはディジタル記録に関連して後に説明されている手法により記録を数字化し，これを電子計算機により図化したものである。

最大加速度が約20～50ガルの範囲の記録については水平2成分の波形を，50ガル以上の記録については水平2成分と上下成分の計3成分の波形を示した。ただし，ERS－B強震計は鉛直成分を含

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まないので，この強震計の記録では常に水平２成分の波形のみが示される。最大加速度によって振幅の目盛の尺度を変えることがあるので注意されたい。水平成分の方向は真北を基準にして示してある。これは，SMAC−B２強震計の場合，地震動の周期が地震計の振子の固有周期よりも十分に長いときに，地盤の加速度の方向を示すように定めたものである。ERS強震計の場合には，地震動の周期が強震計の振子の固有周期付近であるときに地盤の加速度の方向を示すように定めたものである。

ディジタル記録は次のようにして作られたものである。SMAC−B２強震計の記録の場合には，マイラーベースの感光フィルムを用いて密着印画を作り，これを数字化装置により時間軸に対し，0.1 mm（これは時間にして0.01 秒に対応するが，後記のように円弧誤差を含んでいるので厳密な 0.01 秒でない）ごとに振幅を読取り数字化する。数字化装置の読取範囲の関係から，記録は30〜45 cm ごとに区切って数字化される。数字化された記録は読取区間ごとにゼロ線が設定され，各区間の記録が接続され一本の記録とされる。この際に，円弧誤差，記録紙送り誤差（記録開始時に記録紙の送り速度が徐々に一定値に近づく立上り誤差を含む），記録ペンの軸が加速度ゼロのときに紙送り方向に平行になっていないことによる誤差が補正される。このような補正のために，記録の数字化においては各成分の波形の他に，２本の基線，各成分の記録の前にある点検時に記録した円弧も数字化される。また，記録ごとに記録紙の送り速度が読取られる。円弧補正後の記録の数値の時間間隔は一定値とはなっていないが，直線補間により 0.01 秒間隔の記録に直される。

このようにして得られたものが，この年報でSMAC−B２強震計のディジタル記録として示されている。

ERS−B.C.D強震計の記録の場合には，原記録を用いて，数字化装置により時間軸 0.1mm間隔に振幅を読取り数字化する。ERS−B強震計の記録紙の送り速度（仕様値）は２cm/sでERS−C.D 強震計のそれは４cm/sである。したがって，読取り時間間隔はそれぞれ 0.005 秒および 0.0025 秒である。数字化は約70cmの区間ごとに行われる。各成分の波形の他に基線が１本数字化される。また，記録紙の送り速度が読取られる。得られた記録に区間ごとにゼロ線の設定をおこなった後，記録の一本化，時間間隔の補正，平滑化を行い，0.01 秒間隔の記録とする。このようにして得られたものが，この年報でERS−B.C.D強震計のディジタル記録として示されている。

ディジタル記録の作表様式は表―８のディジタル記録の例に示されているとおりである。数値の配列順序は行の左から右へ，ページの左半分から右半分へと進む。ある数値が記録の先頭から何番目の数値であるかを知るには，その数値を含む行の左端のNo.の値と，その数値の欄の最上行にある（ ）内の数値を加えればよい。１行には10個の数値が含まれており，各データは空白を含めて６字となっている。これはディジタル記録を80欄カードにさん孔するときの便利さを考慮して定めたものである。カード１枚のうち60欄をデータに，残り20欄をカードの判別記号（地震番号，成分，カード番号等）に用いれば１行がカード１枚にさん孔できる。小数点は印字されていないが，数値の末尾にあるとすれば，数値の単位は 0.1 ガルとなる。

以上のようにして得られた等時間間隔のディジタル記録をフーリェ変換し，計器特性を補正する。その結果にフィルター操作を加える。フィルターは２種類のものを用いる。ひとつは，フィルターの定数が固定されているもの（以後固定フィルターと書く）で，他は，フィルターの定数が記録波形のフーリェ変換の特性により修正されているもの（以後パラメタ付フィルターと書く）である。

フィルター操作後，速度および変位に対するフーリェ変換を求め，それぞれのフーリェ逆変換を求めて，補正加速度，速度，変位の波形とした。本報告では，パラメタ付フィルターにより求まった加速度波形を補正加速度波形として示した。また，２種類のフィルターを用いて求まった速度，変位の波形も示した。両フィルターの特性等は本文または別報を参照されたい。[35]

２種類のフィルターを用いた結果を並列して示している理由は次の通りである。第１に，現在のところどのような特性のフィルターが最適であるかを決め難いこと，第２に，求まる速度および変

位の波形はフィルターの特性に著しく依存するが，単一の方法による結果を示した場合には無批判に利用されるおそれがあること、第3に，両フィルターがそれぞれ特長を有していること，などである。

ERS強震計はSMAC－B2強震計に比し，より高い振動数まで感度が一様になっている。そのため，両強震計の記録波形をそのまま比較することは適切でないことがある。それ故，ERS強震計の記録については，SMAC－B2強震計が同一地点にあった場合に求まるであろう波形を求め，これをSMAC－B2等価加速度波形として示してある。

本年報に示されている応答スペクトルは，パラメタ付フィルターによる操作後の補正加速度波形を用いて求めたものである。前記のように，本年報に示すディジタル記録は計器補正の前段階におけるものである。したがって，ディジタル記録をそのまま用いて応答スペクトルを計算しても，本年報に示されているものと同一とはならない。また，1975年以前の年報では，ここに示す記録の補正方法と異なった処理によるディジタル記録および応答スペクトル等が示されていることに留意する必要がある。なお速度，変位波形の計算およびスペクトルの計算において，SMAC－B2強震計の記録の場合は最初の1秒間を無視した。これは，記録紙送りの立上り補正は行ってはいるが，記録の最初の部分における微少な誤差が記録の極く最初の部分の補正に与える影響が大きいことを考慮しての処置である。

本年報に示されているフーリェスペクトルは，高速フーリェ変換により加速度記録の全長に対しフーリェスペクトルを求めた後，このスペクトル値に時間長を乗じて加速度のディメンジョンとし，さらにバンド幅が1ヘルツのParzenウィンドウを用いて平滑化したものである。フーリェスペクトルも応答スペクトルと同様に，それぞれの強震計の計器特性の補正を行った加速度波形から求めたものである。

本年報に示される水平画面内の加速度，速度および変位の軌跡は，各波形の水平2成分を合成したベクトルの先端の移動軌跡を描いたものである。軌跡を描くのに用いた波形の時間長は，その全長とし，長い記録では，記録の先端部および後端部の振幅の小さい部分を除いたものとしている。用いる区間長の選定は観察によっている。軌跡を描くのに用いた加速度波形および変位波形は強震計の計器特性の補正を行ない，パラメタ付フィルターで求めたものである。図中のNは真北を示す。

キーワード：強震観測，数値化加速度記録，応答スペクトル

1990年における港湾地域強震観測には以下の諸機関が関係した。関係機関の協力に謝意を表する。

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

本年報は強震観測担当者の努力に負うところが非常に大きく，これら担当者の努力はこの年報の著者に準ずるものである。担当者各位に敬意と謝意を表する。なお，各観測地点で強震計の点検ならびに記録の取扱いは強震観測担当者によりなされているのでこれら担当者に対し将来，記録について問い合せたい事項等が発生した時に備えるため，全担当者を以下に示す。

平成2年　強震観測担当者（1990）

第一港湾建設局

秋田港工事事務所　　吉井信也，松渕　知
酒田港　〃　　小野寺悌介，高橋幸夫

新潟港	〃	渡辺　孝，本田　隆，増井光男
伏木富山港	〃	関口忠志，橋本正夫，明山竹一，田中　敏，鷹濱　潤
金沢港	〃	末永清和，元波　守，田中　智
敦賀港	〃	西田一彦，慈観　力，

第二港湾建設局

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八戸港	〃	今　国守，田村　勇，中元武直
宮古港	〃	白浜義春，木田幸一
宮古港	〃 釜石工場	佐々木等，原田久志，千葉　仁
塩釜港	〃	氏家正次，菅原豊明，昆　幸三，野沢良一，伊勢　勉
小名浜港	〃	奈良　智，木村岩男
小名浜港	〃 相馬工場	大山幹友，小野出則雄，大野　勝，西塚　登
鹿島港	〃	橋本光壽，菅原泰豊，志鎌幸英，上原正光
鹿島港	〃 常陸那珂工場	松山　治，平野孝雄，田沢稔幸
千葉港	〃	今野頼夫，佐野幸保，似内俊行
京浜港	〃	瀬川　哲，小林茂夫，小原　広

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和歌山港工事事務所		浦　輝孝，大月克己，三浦幸治，加瀬正美
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神戸港	〃 尼崎工場	小泉勝彦，兼得幹也，山田昭光，渡辺隆雄
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小松島港	〃	森岡清見，河村良一，中川富士男
松山港	〃	宮本武紀，高木悌二
高知港	〃	松崎　宏，藤原敏晴
境港	〃	福永幹雄，北尾　進，山田真理，村上信夫

第四港湾建設局

別府港工事事務所		伊藤秀利，大串哲哉
宮崎港	〃	北島正明，大始良幸雄，益留徳郎，宗　勇一
志布志港	〃	村上真彦，矢野米生，木村信之，保利　修
鹿児島港	〃	富田幸晴，大橋　修，稲垣博一，村上和之

第五港湾建設局

清水港工事事務所		込山敏夫，中井　章
清水港	〃 御前崎工場	小栗智明，加藤道康，川上幸一
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三河港	〃	宇野清助，川島好明
名古屋港	〃	古田喜代志

四日市港　〃	神谷一弘，鈴木和政，川端正樹，池谷友之
北海道開発局	
根室港湾建設事業所	野沢邦雄
釧路港　〃	荒井直人，秋葉洋一，大越　孝，佐藤正美，平山裕義
十勝港　〃	佐藤良雄，井上芳郎，前田宗文
浦河港湾建設事務所	大塚寿浩，古川孔二，鈴木久孝，鈴木泰弘
苫小牧港　〃	中島　靖，高橋重夫，伊藤博信，伊勢谷文人，森木　亮
室蘭港　〃	梶原利雄，小山良明，佐藤　亘
小樽港　〃	大倉正憲，北川國廣，川村和彦，橋詰知喜，新井田勝男，松田斉久
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平良港　〃	比嘉静秀，石嶺隆二
石垣港　〃	知念正尚
その他	
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静岡県田子ノ浦港管理事務所	渡辺尚樹，勝又泰宏
宮崎県日向土木事務所	奥松秀樹，新池　卓，黒木育夫

ANNUAL REPORT ON STRONG-MOTION EARTHQUAKE RECORDS IN JAPANESE PORTS (1990)

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Synopsis

In the major ports in Japan, strong-motion earthquakes and earthquake responses of structures have been observed since 1962; and as of December 1990, 4082 accelerograms were accumulated and analysed at the Geotechnical Earthquake Engineering Laboratory. The observation network consisted of 81 strong-motion accelerographs; the 60 accelerographs were on the ground, the 6 accelerographs were in the ground and the rest on the structures. Two types of accelerographs, the SMAC-B2 accelerograph and the ERS accelerograph are being used. The SMAC-B2 accelerograph is of a mechanical type. The ERS accelerograph is of a electrical type. The ERS accelerograph is equipped with either analogue or digital recorder. This report presents all the records obtained in 1990, which are listed in the tables with their maximum accelerations, being classified in accordance with earthquakes. The accelerograms of ground motions with maximum accelerations exceeding 20 Gals are reproduced in from of computer plots. For the ground acceleration records with maximum accelerations greater than 50 Glas, digitized records, Fourier spectra, response spectra, integrated velocities and displacements, and loci of accelerations, velocities and displacements in horizontal plane are presented.

Key Words: Strong-Motion Earthquake Observation, Digitized Acceleration Records, Response Spectra

1. Introduction

The observation of the strong-motion earthquake in major ports was started in 1962 in Japan by the Geotechnical Earthquake Engineering Laboratory of the Port and Harbour Research Institute. The observation network was expanded year by year; and as of December 1990, 81 accelerographs had been installed in 54 ports. Two types of accelerographs were being used, namely the SMAC-B2 accelerograph and the ERS accelerograph.

Until the end of 1990, 4082 accelerograms had been obtained in the network; 2340 accelerograms were obtained in the SMAC-B2 accelerographs and 1742 accelerograms, in the ERS accelerographs. They were collected in the Laboratory for preliminary processing and analyses which would be explained later on. The records from 1963 to 1975 had been published in the preceding annual reports which had similar format to the present one.[1~11]

In 1968, there occured an earthquake of large magnitude, the 1968 Tokachi-Oki Eathquake, and large number of aftershocks followed. The damage took place to buildings, roads, port facilities and many other types of structures. The largest acceleration was recorded

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at Hachinohe Port, which was 259 Gals. Because of the large magnitude of the earthquake and the damage to structures, the records were of great interest and importance. Therefore, the authors published a report of similar format to the annual report. [25] Digitized data of vertical components were not included in those reports; however, the data were reported separately. [12] In the annual report for the records of 1976 and 1977, a new data processing procedure was introduced, and accelerations after instrument correction, integrated velocities and displacements, and response spectra calculated with the instrument corrected accelerations were included. [13] In 1978, Japan was hit by two great earthquakes, the 1978 Izu-Oshima-Kinkai Earthquake (Magnitude 7.0) in January and 1978 Miyagi-Ken-Oki Earthquake (Magnitude 7.4) in June. Records of these earthquakes are compiled respectively into two special reports by the new data processing of similar format to the annual report. [26,27] Port structures were damaged by the 1982 Urakawa-Oki Earthquake and records of the earthquake are also compiled into special report. [28] The 1983 Nipponkai-Chubu Earthquake (Magnitude 7.7) brought about serious damage to port facilities in Akita port and records of the earthquake are compiled into special report. [29] In 1984, an earthquake (Magnitude 7.1) occurred in Hyuga-nada; off east coast of Kyushu and brought slight damages on port facilities. Records of the earthquake are also compiled into special report. [30]
In 1987, an earthquake (Magnitude 6.7) hit the metropolitan area and caused some damages on houses and civil engineering structures such as bridges and embankments reclaimed lands inport area also liquefied slightly by this earthquake. Records of the earthquake are compiled into special report. [31]

The records and the results of the preliminary analyses in those reports have been used very effectively for analyses of the earthquake damage, for analyses of earthquake response of structures and also for designing large piers; and the usefulness of the strong-motion earthquake observation has been perfectly proved. [41]

The present report consists of the Strong-Motion Earthquake Observation Results, reproduced accelerograms, digitized records, response spectra, Fourier spectra, integrated velocities and displacements, and loci of acceleration and displacement in horizontal plane. All the records in 1990 are listed in the Strong-Motion Earthquake Observation Results with their maximum accelerations. The computer plots of digitized records are prepared for the ground acceleration records with maximum accelerations exceeding 20 Gals, and the digitized records and the spectra are provided on records exceeding 50 Gals.

Following organizations are being cooperated with the Port and Harbour Research Institute in the strong-motion earthquake observation:

The Bureau for Ports and Harbours of the Ministry of Transport;
The Regional Bureaus for Port Construction of the Ministry of Transport;
The Port and Harbour Division, Hokkaido Development Bureau of the Hokkaido Development Agency;
The Okinawa General Office of the Okinawa Development Agency;
The Harbour Sections of Shizuoka, and Miyazaki Prefectural Governments; and The Harbour Bureaus of Tokyo and Osaka Municipal Governments.

2. Network and Instruments

(1) Network

The network of the Port and Harbour Research Institute was covering the coast-line of Japan with 81 strong-motion accelerographs in 1990, the location of ports where the accelero-

graphs are installed, are shown in Fig. 1. The numbers attached to the ports in Fig. 1 are corresponding to the numbers in Table 1. In Table 1, being classified in accordance with the ports, the stations are listed with the type of accelerograph, the installation condition, and the reference number. The reference number is showing the number of the Technical Note of the Port and Harbour Research Institute in which the site condition of each station is described. [32 ~ 36)]

The accelerographs at the 51 stations out of the 81 stations were the SMAC-B2 accelerographs and the rest, the ERS accelerographs.

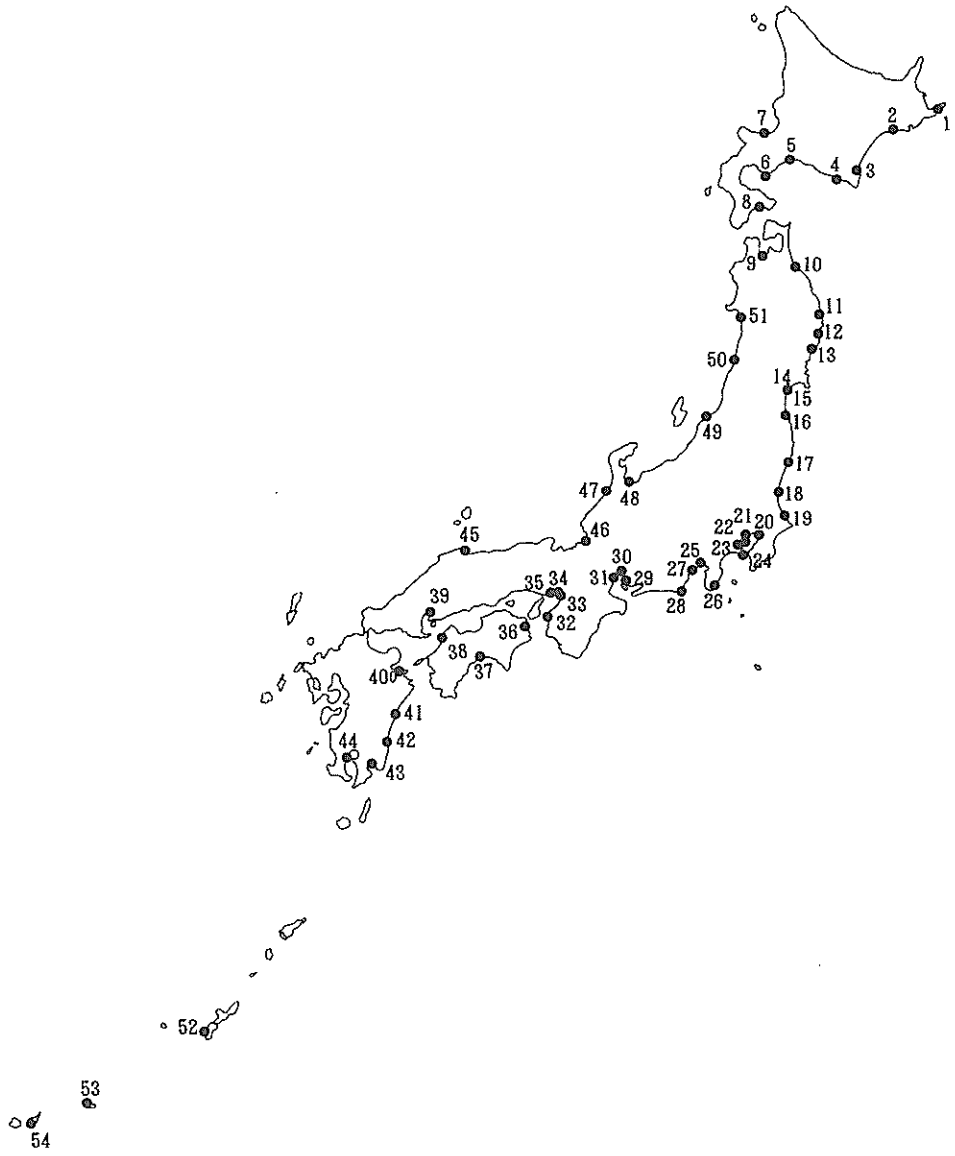

Fig. 1 Location of ports where the accelerographs are installed.
(The numbers to each port are corresponding to the numbers in Table 1)

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

No. of port*	Name of port	Name of station	Type of accelerograph	Installation condition	Ref. No.**
1	Hanasaki	Hanasaki-M	ERS-C	on ground	298
2	Kushiro	Kushiro-ji-S	SMAC-B2	on ground	
3	Tokachi	Tokachi-M	ERS-C	on ground	298
4	Urakawa	Urakawa-S	SMAC-B2	on ground	
5	Tomakomai	Tomakomai-S	SMAC-B2	on ground	107
6	Muroran	Muroran-S	SMAC-B2	on ground	34,107
7	Otaru	Otaru-S	SMAC-B2	on ground	107
8	Hakodate	Hakodate-M	ERS-C	on ground	298
		Hakodate-FB	ERS-F	in ground	
		Hakodate-F	ERS-F	on ground	
		Hakodate-FR	ERS-F	on structure	
9	Aomori	Aomori-S	SMAC-B2	on ground	107,156
10	Hachinohe	Hachinohe-ji-S	SMAC-B2	on ground	34,107
11	Miyako	Miyako-S	SMAC-B2	on ground	34,107
12	Kamaishi	Kamaishi-M	ERS-C	on ground	351
		Kamaishi-MB	ERS-D	in ground	351
13	Ofunato	Ofunato-bochi-S	SMAC-B2	on ground	34,107
		Ofunato-bo-S	SMAC-B2	on structure	34,107
		Ofunato-mound-M	ERS-C	on structure	
14	Shiogama	Shiogama-kojyo-S	SMAC-B2	on ground	34,107,156
15	Sendai	Sendai-M	ERS-C	on ground	351
		Sendai-MB	ERS-D	in ground	351
16	Soma	Soma-S	SMAC-B2	on ground	
17	Onahama	Onahama-ji-S	SMAC-B2	on ground	351
18	Hitachinaka	Hitachinaka-F	ERS-F	on ground	
19	Kashima	Kashima-zokan-S	SMAC-B2	on ground	156
20	Chiba	Chiba-S	SMAC-B2	on ground	107
21	Tokyo	Shinagawa-S	SMAC-B2	on ground	34,107
		Shinagawa-MB	ERS-D	in ground	
22	Kawasaki	Kawasaki-FB	ERS-F	in ground	
		Kawasaki-F	ERS-F	on ground	
		Kawasaki-FR	ERS-F	on structure	
23	Yokohama	Keihin-ji-S	SMAC-B2	on ground	34
		Yamashita-FB	ERS-F	in ground	
		Yamashita-F	ERS-F	on ground	
		Yamashita-FR	ERS-F	on structure	

No. of port*	Name of port	Name of station	Type of accelerograph	Installation condition	Ref. No.**
24	Yokosuka	Koken-S	SMAC-B2	on ground	34
		Koken-M	ERS-C	on ground	34
25	Tagonoura	Tagonoura-S	SMAC-B2	on ground	107
26	Shimoda	Shimoda-F	ERS-F	on ground	
27	Shimizu	Shimizu-kojyo-S	SMAC-B2	on ground	34,156
		Okitsu-S	SMAC-B2	on ground	34,156
		Shimizu-miho-S	SMAC-B2	on ground	298
28	Omaezaki	Omaezaki-M	ERS-C	on ground	351
29	Kinuura	Kinuura-ji-S	SMAC-B2	on ground	298
30	Nagoya	Nagoya-zokan-S	SMAC-B2	on ground	34, 156
		Nagoya-inae-S	SMAC-B2	on structure	34
		Inae-sanbashi-M	ERS-B	on structure	34
		Inae-yaita-M	ERS-B	on structure	34
31	Yokkaichi	Yokka.-chitose-S	SMAC-B2	on ground	107
		Yokka.-sekita-M	ERS-B	on structure	34
		Yokka.-dai2-M	ERS-B	on structure	34
32	Wakayama	Wakayama-S	SMAC-B2	on ground	298
33	Osaka	Osaka-ji-S	SMAC-B2	on ground	34
		Osaka-chuo-S	SMAC-B2	on structure	34
34	Amagasaki	Amagasaki-S	SMAC-B2	on ground	156
35	Kobe	Kobe-ji-S	SMAC-B2	on ground	34
		Kobe-dai6-S	SMAC-B2	on structure	34
		Kobe-dai8-S	SMAC-B2	on structure	34
		Kobe-maya-M	ERS-C	on ground	298
		Maya-dai1-M	ERS-B	on structure	34
		Maya-dai2-M	ERS-B	on structure	34
36	Komatsujima	Komatsujima-S	SMAC-B2	on ground	107
37	Kochi	Kochi-ji-S	SMAC-B2	on ground	298
38	Matsuyama	Matsuyama-S	SMAC-B2	on ground	156
39	Hiroshima	Hiroshima-ji-S	SMAC-B2	on ground	
40	Oita	Oita-S	SMAC-B2	on ground	156
41	Hososhima	Hososhima-S	SMAC-B2	on ground	34
42	Miyazaki	Miyazaki-M	ERS-C	on ground	298
43	Shibushi	Shibushi-S	SMAC-B2	on ground	
44	Kagoshima	Kagoshima-S	SMAC-B2	on ground	34

No. of port*	Name of port	Name of station	Type of accelerograph	Installation condition	Ref. No.**
45	Sakaiminato	Sakaiminato-ji-S	SMAC-B2	on ground	
46	Tsuruga	Tsuruga-S	SMAC-B2	on ground	34
47	Kanazawa	Kanazawa-S	SMAC-B2	on ground	107
48	Toyama	Toyama-S	SMAC-B2	on ground	34
49	Niigata	Nigata-ji-S	SMAC-B2	on ground	298
50	Sakata	Sakata-S	SMAC-B2	on ground	34
51	Akita	Akita-S	SMAC-B2	on ground	34,351
52	Naha	Naha-zokan-S	SMAC-B2	on ground	298
53	Hirara	Hirara-S	SMAC-B2	on ground	298
54	Ishigaki	Ishigaki-S	SMAC-B2	on ground	298

* The number correspond to those in Fig. 1.

** The number correspond to those of the Technical Note of the Port and Harbour Reseach Institute, in which the site condition of the station in given.

(2) Servicing

The installation and the servicing of the instruments have been made by the port construction offices of the previously described organizations under the direction of the Geotechnical Earthquake Engineering Laboratory. It is directed that the instrument should be checked at least twice a month and after an earthquake larger than the intensity II as soon as possible. The accelerogram is sent carefully to the Geotechnical Earthquake Engineering Laboratory by post or in hand, without any treatment or reading in the station, to eliminate possible danger to damage the accelerogram by unaccustomed persons to handle it.

The Geotechnical Earthquake Engineering Laboratory has been offering every year a training course of about 5 days to the persons who take care of the accelerographs at the stations. During the course, the trainees are instructed proper procedure to maintain the instruments and to handle the accelerograms, by the experts from the manufacturing companies of the accelerographs. They also attend introductory lectures to the earthquake engineering by the instructors inside and outside of the Institute.

(3) Stations

In the network, there are three kinds of stations; the first is to record acceleration of the ground surface, the second to record acceleration in the ground, and the third to record the earthquake response of structures. The station to record the earthquake response is always accompanied with another station to record the ground acceleration in its vicinity.

In the stations recording the ground acceleration independently, one of the horizontal components of the instrument is directed to the due north except a few number of instruments which have been installed in parallel with the structures. It is the reason that in the ports where the instruments are installed in parallel to the structures, there are many quay-walls or piers parallel each other, and that it is desirable to record components of the ground acceleration in parallel and perpendicular to the axes of the structures. At the stations recording structural response and the accompanying stations recording the ground acceleration, the instruments are installed parallel to the structures whose earthquake response is needed. Because two horizontal components of the accelerographs are always named NS and EW, the direction of the NS-component makes an angle to the due north direction in some of the accelerographs in the network.

Each station in the network has its own abbreviated name which implies its location, the type of its accelerograph and installation condition, on the ground or on the structure. For instance, the station in Hachinohe Port is named Hachinohe-S in which Hachinohe is the name of the place where the station is located and the capital letter S at the end of the abbreviated name is showing that the accelerograph in the station is the SMAC-B2 accelerograph. If the ERS accelerograph is being used in a station, the name of the place is followed by a capital letter M or MB. As this naming is made to distinguish the stations accurately in the network, it may be a little difficult for the people outside the network to imagine the location from its name, especially for the people who does not understand the Japanese language. The detailed publication on the network will help those people to find the location as well as other necessary data of the station.

(4) Accelerographs

i) SMAC-B2 Accelerograph

The SMAC-B2 accelerograph was developed by the Committee for the Standard Strong

Motion Accelerograph. It is a three component mechanical accelerograph which leaves records on a rolled waxed paper. The specifications, inside view and theoretical frequency characteristics are shown in Table 2 and Figs. 2 and 3 respectively.

In the network of the Port and Harbour Research Institute the SMAC-B2 accelerograph is practically one of the standard accelerographs; it is because at the earlier time of the observation the SMAC-B2 accelerograph was one of the most latest models and suitable for the observation condition in port areas. After the SMAC-B2 accelerograph, several types of accelerograph were developed by the Committee. However, it is inconvenient to use many types of accelerograph in a network from view point of instrument characteristics and maintenance; and the number of the SMAC-B2 accelerograph in the network continued to increase.

The triggering levels of the accelerographs in the network are 5 gals in places where ground noise is small and 8 gals in places where ground noise is relatively large because of heavy motor trucks for construction work or cargo transportation. Exceptionally a few number of the accelerographs located beside roads carrying very heavy traffic are triggered at 11 Gals.

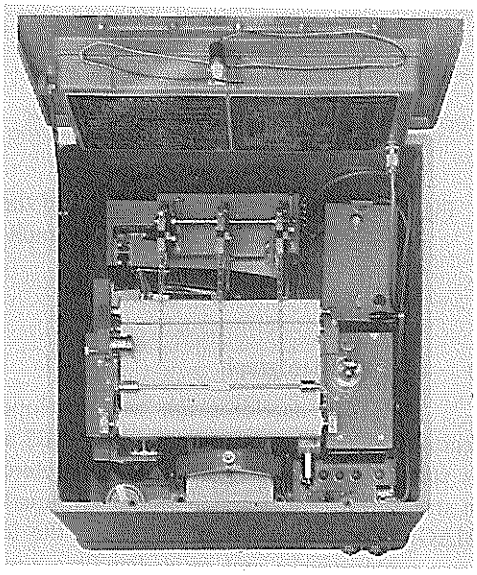

Fig. 2 Inside view of the SMAC-B2 accelerograph

Table 2 Specifications of the SMAC-B2 accelerograph

Component	2 horizontal and 1 vertical
Natural period	0.14 s.
Sensitivity	12.5 Gal/mm
Damping	Critical
Damping mechanism	Air piston
Maximum recording acceleration	500 Gal
Recording speed	10 mm/s.
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 s.
Starter threshold	5 Gal
Auxiliary starter	Mechanical, works at 100 gal
Time marking	1 s.
Power supply	4 dry cells
Size	54 x 54 x 37 in cm
Net weight	100 kg

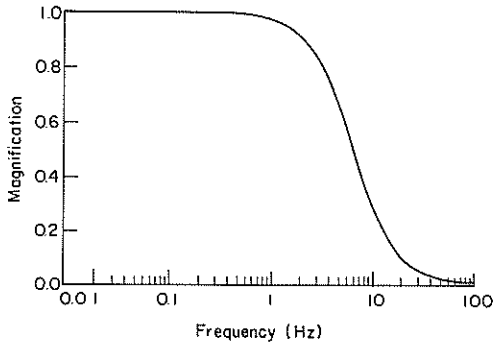

Fig. 3(a) Frequency characteristics of the SMAC-B2 accelerograph (amplitude)

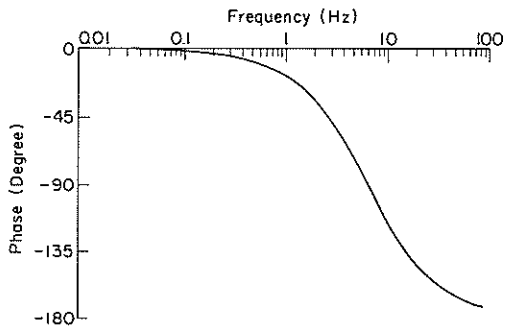

Fig. 3(b) Frequency characteristics of the SMAC-B2 accelerograph (phase)

ii) ERS Accelerograph

The ERS accelerograph was developed by the Geotechnical Earthquake Engineering Laboratory. In the network the SMAC-B2 accelerograph is very widely used. However, there are some places where the SMAC-B2 accelerograph is not convenient to the installed, especially on structures. For instance, if the earthquake response of a pier is going to measured with the SMAC-B2 accelerograph, a house for the instrument will be constructed on the pier where many motor trucks and cargo handling equipments are working. It is almost always difficult to find a place on a port structures for the house. Then, it is considered that transducers and a recorder are separately installed in a member of a pier and in a house which is located in the vicinity of the transducers but not disturbing the cargo handling work.

The ERS accelerograph consists of transducers of moving coil type and a recorder including power supply. Originally magnetic tape data recorders were used; this type of accelerograph is called the ERS-A accelerograph. After some period of operation the magnetic tape data recorders had been replaced by electro magnetic oscillographs. The model with an electro magnetic oscillogaph was named as the ERS-B accelerograph.

A model of similar type, the ERS-C accelerograph, was developed and have been installed at eleven stations in the network. While the ERS-B accelerograph records aceelerations in two horizontal components, the ERS-C accelerograph records acceleration of vertical component as well as accelerations of two horizontal ones.

A new model of similar type, the ERS-D accelerograph, was developed for recording acceleration in the ground and accelerographs of this type have been installed at two stations in the network. The transducers of the ERS-D accelerograph are installed in the bore-holes, but they are the same specifications as those of the ERS-C accelerograph.

In the ERS-B, C and D accelerograph the transducers are almost directly connected with galvanometers in the electro magnetic oscillograph; between them there exists only resistor circuits to adjust sensitivity and impedance matching. Non electronic amplifier is used to attain maximum reliability of the instrument. The overall sensitivity is more than 10 mm per Gal and it is easily adjusted by changing resistors of the circuit. Therefore, the ERS-B, C and D accelerograph has advantage to start the observation in its maximum sensitivity and after obtaining some records to readjust the sensitivity into the appropriate one for the strong-motion accelerograph. It will enable for researchers to obtain the record of sufficient amplitude

to analyze although the real acceleration amplitude is rather small and to start analyses from earlier stage of the observation.

The specifications of the ERS-B accelerograph are listed in Table 3, the transducer and the recorder are shown in Fig. 4 and 5. The corresponding information on the ERS-C accelerograph is given in Table 4 and Figs. 7 and 8. The frequency characteristics are shown in Fig. 6.

The triggering levels of the ERS accelerographs are similar to those of the SMAC-B2 accelerographs.

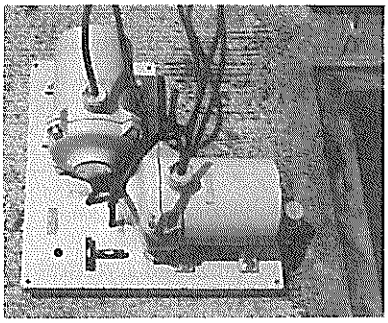

Fig. 4 Transducers of the ERS-A/B accelerograph

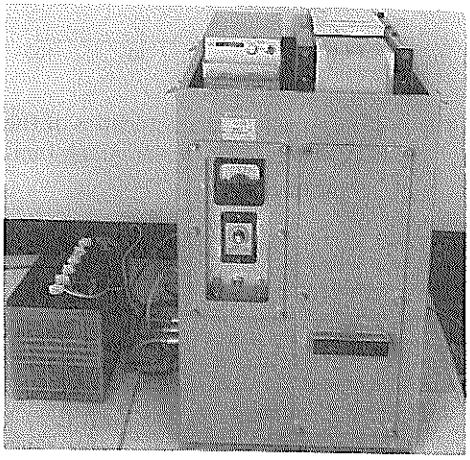

Fig. 5 Recorder of the ERS-B accelerograph

Table 3 Specifications of the ERS-B accelerograph

Transducer	
Type	Moving coil type
Component	2 horizontal
Natural period	0.5 s.
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) x 30 m (length) (visible without processing)
Paper speed	2 cm/s.
Time mark	0.1 s.
Power supply	
Rechargeable battery, charged automatically when it is necessary.	

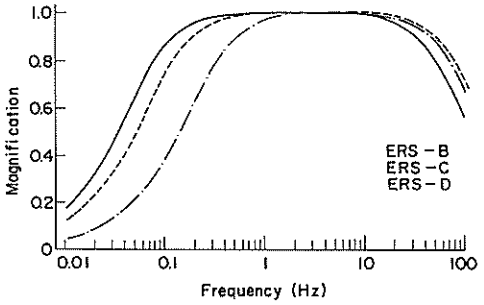

Fig. 6(a) Frequency characteristics of the ERS-B, C, D accelerograph (amplitude)

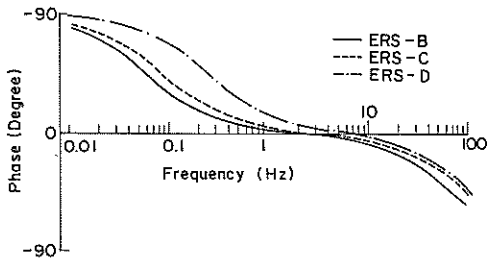

Fig. 6(b) Frequency characteristics of the ERS-B, C, D accelerograph (phase)

Table 4 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 20 kg/cm^2
Recorder	
Type	Electro magnetic oscillograph
Natural frequency of galvanometer	270 Hz
Recording paper	198 mm (width) x 30 m (length) (visible without processing)
Paper speed	4 cm/s.
Time mark	0.1 s.
Sensitivity (overall)	2 Gal/mm, or 10 Gal/mm
Power supply	
Rechargeable battery, charged automatically when it is necessary.	

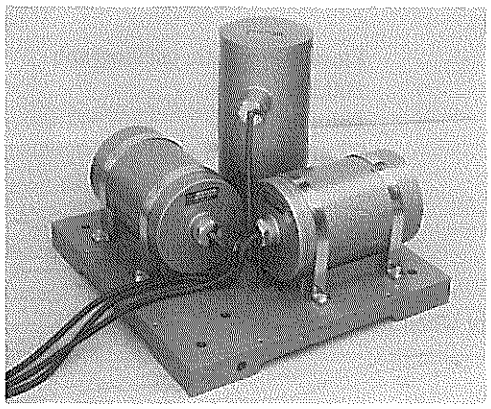

Fig. 7 Transducers of the ERS-C accelerograph

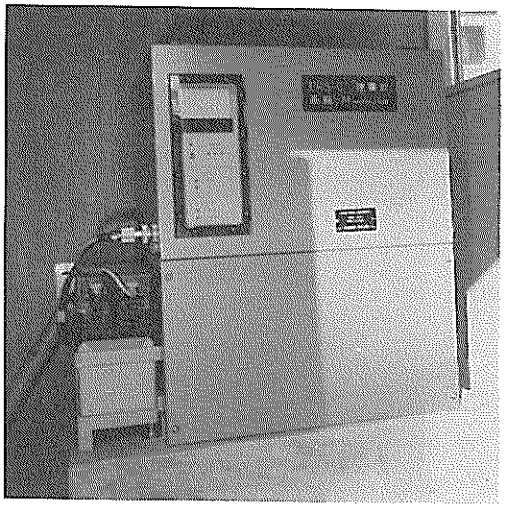

Fig. 8 Recorder of the ERS-C accelerograph

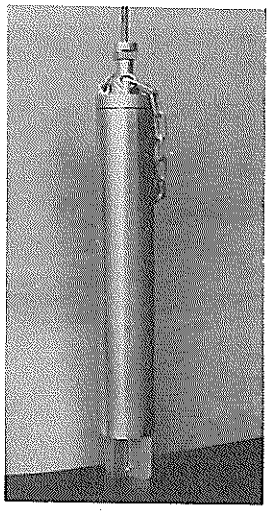

Fig. 9 Transducers of the ERS-D accelerograph

iii) ERS-F Accelerograph

ERS-F Accelerographs are, digital strong-motion accelerographs using non-volatile, solid state magnetic bubble memories. There are several types of the ERS-F Accelerographs: the standard type, as shown in Fig. 10 is a self-contained box type, containing the transducers and the magnetic bubble memories all in one; another has a separate transducer, as shown in Fig. 11, which will be buried in the ground and observe the motion at the base or in the ground; another has a separate transducer, as shown in Fig. 12, which will be attached to the structures.

The recording system of the ERS-F Accelerograph including the magnetic bubble memories is shown in Fig. 13 for the front view. ERS-F Accelerograph is a system shown by the block-diagram in Fig. 14, satisfies the specification shown in Table 5, and has the frequency characteristics shown in Figs. 15, 16.

The main unit of the recording system, shown in Fig. 17, consists of four non-volatile, solid-state magnetic bubble memories and the controlling parts. This unit is contained in a case, shown in Fig. 18, of which dimensions are 240 mm x 240 mm x 35 mm, weighing about one kilogram. The capacity in the memory of the unit is 512 kilobytes. Two of the units can be installed at one recording system, but at present one unit is installed for the accelerographs at Hakodate Port and Hitachinaka Port.

Recording length of the earthquake motions is, at minimum, 65.28 seconds (6528 data/component). The recording length is extended up to 195.84 seconds (19584 data/component) by monitoring the level of the acceleration; the recording length is doubled or trippled if the level of the acceleration monitored after 45 seconds from the triggering is higher than the trigger level of the acceleration. The main unit of the recording system can record, at the maximum, 65.28 seconds in length of three components of ten earthquake motions. If earthquakes occur successively and the earthquake motion data should over flow the recording system, records of the greatest maximum accelerations are secured. One exception to this is

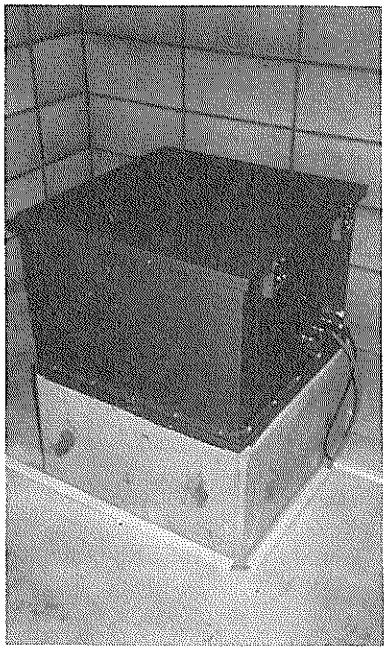

Fig. 10 The ERS-F accelerograph (Standard Type)

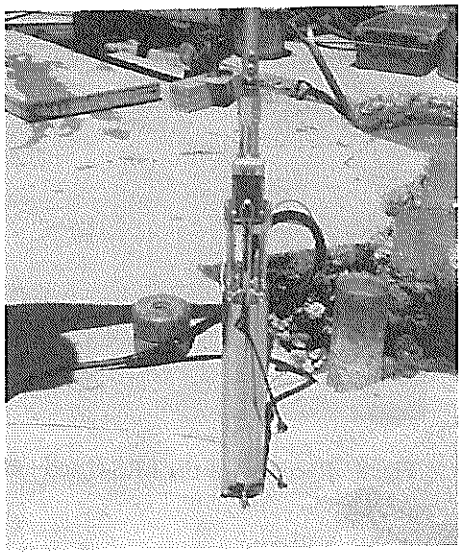

Fig. 11 Transducer installed in borehole (the ERS-F accelerograph)

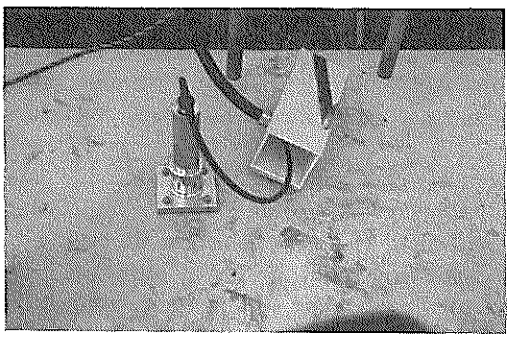

Fig. 12 Transducer attached to structure (the ERS-F accelerograph)

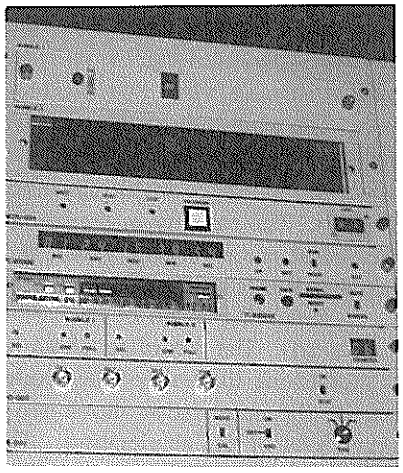

Fig. 13 Recorder of the ERS-F accelerograph

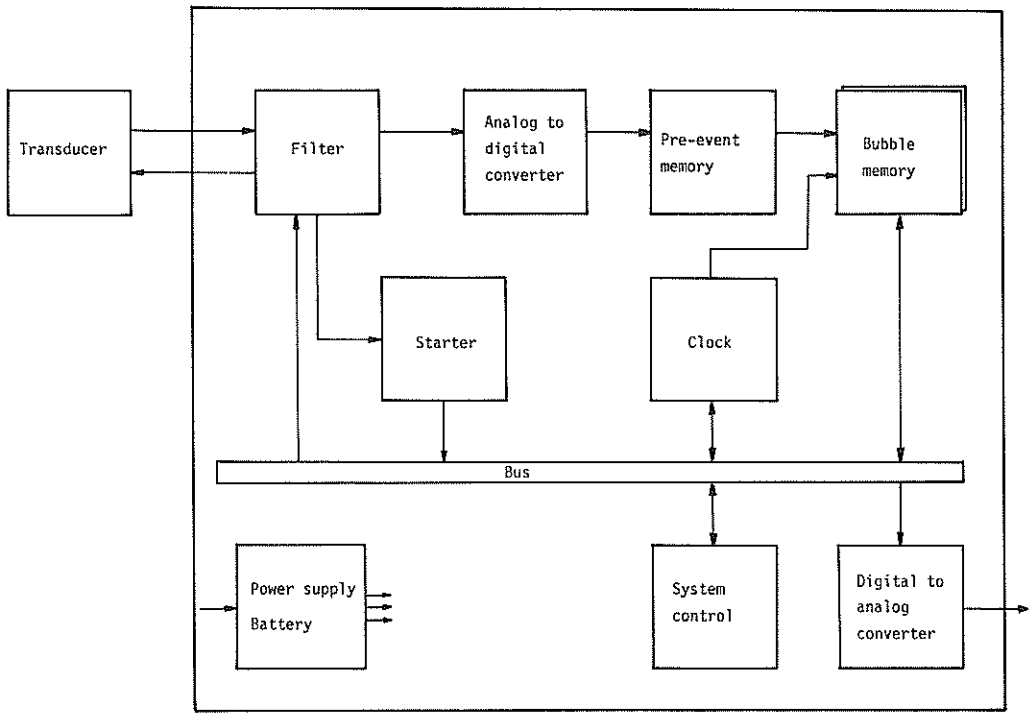

Fig. 14 Block-diagram of the ERS-F accelerograph

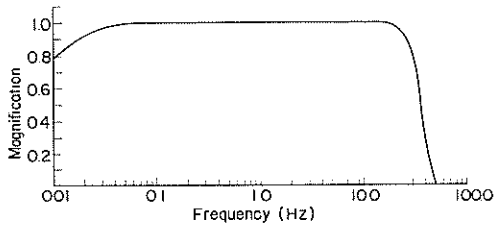

Fig. 15 Frequency characteristics of the ERS-F accelerograph (amplitude)

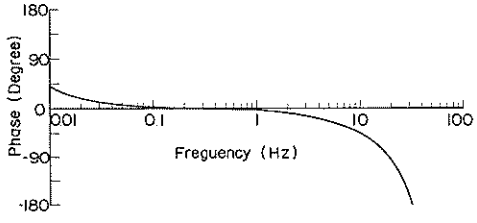

Fig. 16 Frequency characteristics of the ERS-F accelerograph (phase)

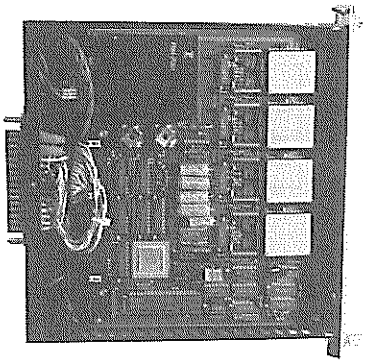

Fig. 17 Inside view of cartridge (ERS-F accelerograph)

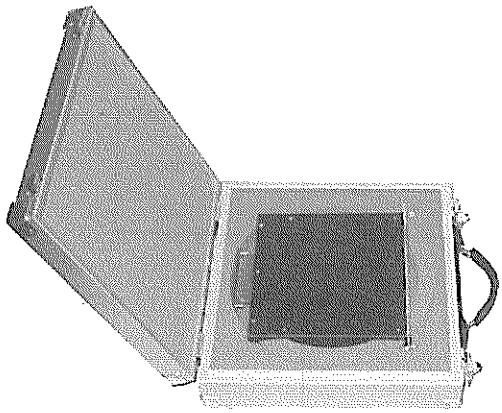

Fig. 18 A container of cartridge (the ERS-F accelerograph)

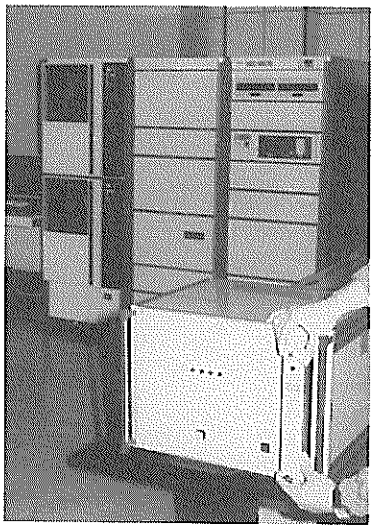

Fig. 19 Reproducer of the ERS-F accelerograph

Table 5 Specifications of the ERS-F accelerograph

Overall capabilities	Maximum acceleration capacity	2G
	Frequency characteristics	0.01 – 35 Hz
	Dynamic range	86 dB over
Transducer	Accelerometer	
	Component	2 horizontal, 1 vertical
	Maximum capacity	2G
	Sensitivity	10^{-5}
	type	Force-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	3-9 records, 1 time signal
	Memory size	512 kwords 16 bit/word
	Record length	1, 2, 3 minutes/record
	Records of greatest maximum acceleration secured	
Related 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 stopage	
Container	Alluminum box, water-proof	
	Size	54(L), 54(W), 38(H) cm

for the records of 195.84 seconds; these records are stored in the first-come first-serve basis.

(5) Foundation and House

All the SMAC-B2 accelerographs in the network are installed on simple shallow foundations which were designed based upon the same idea. It was supposed that the shape and the dimensions of a foundation on which a seismograph is installed affects to the earthquake record obtained by it. However, as there was no convincing idea to design the most suitable foundation, the foundations of almost same size and of same shape were selected for all the accelerographs in the network. This makes it easier to compare accelerograms of an earthquake recorded at several stations. As the most of the harbour structures have shallow foundations and do not rest on bed rock, it was decided to make shallow foundations for the accelerographs, as shown in Fig. 20. The hollow space under the foundation was made 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 is eliminated.

Usually, no pile is used to support the accelerograph and its foundation, but in the stations on very soft soil or loose sand, concrete piles or wooden piles were used. For example, the foundations in the Hachinohe-S station and the Niigata-S station are supported by piles. The foundation is isolated from a house covering the instrument.

In the network only two ERS-B accelerographs are installed on ground, and the standard

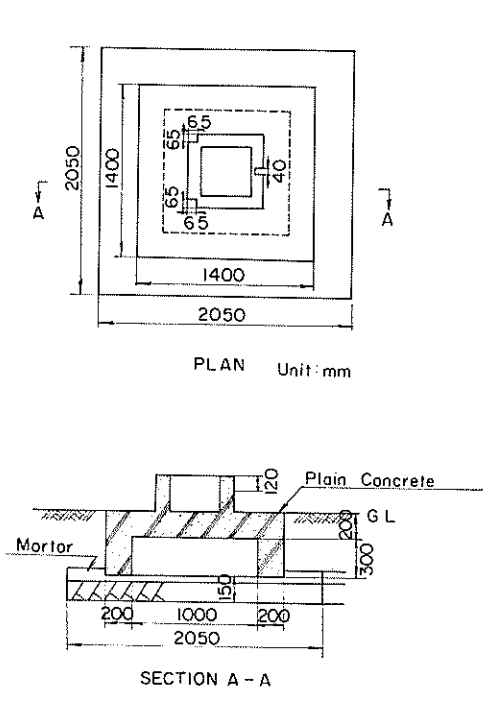

Fig. 20 Foundation for accelerograph (SMAC-B2)

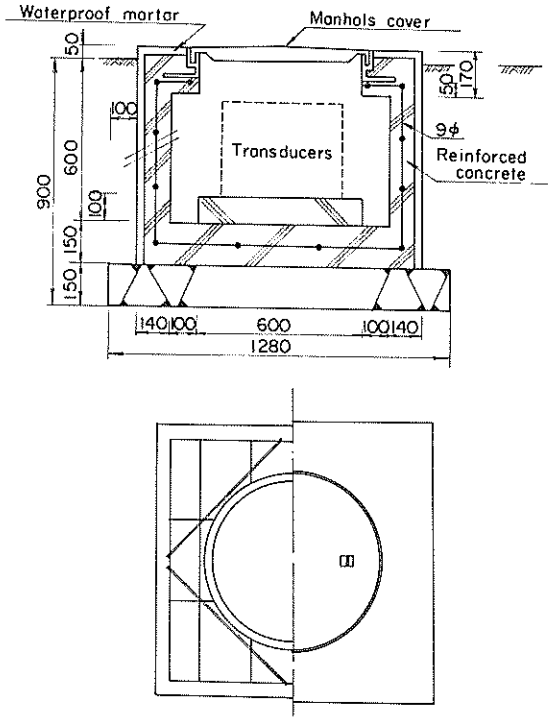

Fig. 21 Foundation for transducers of the ERS-C accelerograph

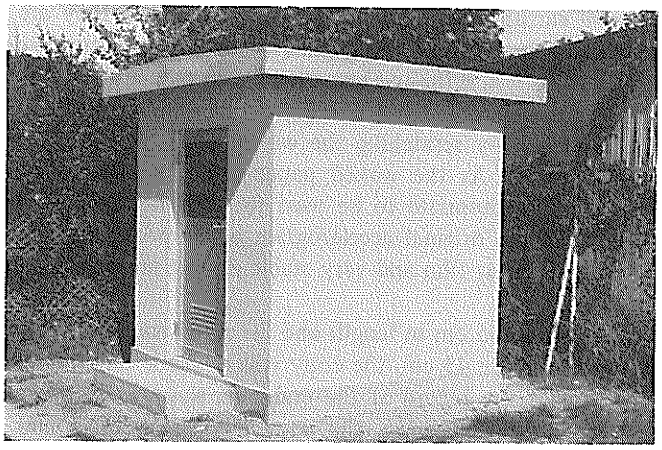

Fig. 22 House of the Onahama-ji-S station

foundation for this accelerograph has not been established. The shapes of the two foundations are shown in the separate reports.[32~36] Shape and size of a standard foundation for transducers of the ERS-C accelerograph are illustrated in Fig. 21.

The most of the accelerographs are covered with houses which were built for the instruments. Some of the accelerographs were installed in houses which had been built for other purposes. The house built for the instruments are made of reinforced concrete or concrete blocks; some are prefabricated houses. In Fig. 22 as an example, the house of the Onahama-ji-S station is shown.

3. Accelerogram Processing

(1) Preliminary Processing

The accelerograms collected at the Geotechnical Earthquake Engineering Laboratory will be listed in the table "Strong-Motion Earthquake Observation Results" through the following 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 from the SMAC-B2 accelerograph begins with a capital letter S, and that from the ERS accelerograph, with a capital letter M.

Then, the earthquake corresponding to the accelerogram is confirmed or determined. Most of the accelerograms are sent from the stations with information on the earthquake for which the accelerograms have been obtained. A few of the accelerograms, however, are sent without such information because the accelerograms have been found in the regular servicings, and at the station it is difficult to find the corresponding earthquake. For the accelerogram without the information, the earthquake is determined considering the possible period of the recording and the earthquakes occurred in that period. The determination or the check is made based on the Seismological Bulletin of the Japan Meteorological Agency. As at the time of compilation of the annual report the Seismological Bulletins on the earthquakes in later months in a year are not available because of time lag of the publication after earthquakes, the preliminary reports (Jishin Kazan Gaikyo published by the Japan Meteorological Agency) are used to check the records in those months. Some of the accelerograms are impossible to deter-

mine their corresponding earthquakes even in the Laboratory and they are treated as earthquake unknown. It will be noted that the reliability of the earthquake determination for accelerograms of small acceleration is limited because of such procedure.

In the SMAC-B2 accelerograph, the recording is made on waxed paper which has dark red background. The recording by scratching the waxed paper with a stylus leaves the semi-translucent trace on the paper. As the waxed paper is not stable against scratchings, the original accelerogram is not appropriate to be used for the digitization. The photographic contact print is made from the original accelerogram on a special photographic sheet. The base of the sheet is made of mylar film and very 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 ~ 45 cm, the copy will be made on two sheets or more; and a portion of about 10 cm of the record at the end of a sheet is overlappedly appearing in the successive sheet. After the processing, the copy has black traces and semi-translucent background. They are in very good contrast for the digitization.

The record from the ERS-B accelerograph is only chemically stabilized before being used for analysis.

From the stabilized original record or the photographic copy, the maximum accelerations of each component are read with the aid of a magnifying glass. In this reading the base-line setting is not so accurate as that made in digitizing the accelerogram, since this is just preliminary processing. The difference between two accuracies in base-line setting may cause a little difference between the maximum accelerations read with the magnifying glass and in the digitized record.

The accelerograms are classified in accordance with the earthquakes, and listed with their maximum accelerations in the tables "Strong-Motion Earthquake Observation Results". The items in the table will be explained in the following sub-sections. The Strong-Motion Earthquake Observation Results are compiled every two months and sent to all the stations. The copy of the accelerogram is also sent with the necessary directions on the maintenance of the instrument to the station where the accelerogram was obtained. The Strong-Motion Earthquake Observation Results are included in the later part of this report.

(2) Earthquake Data

The earthquake data except the remarks in the Strong-Motion Earthquake Observation Results are based upon the Seismological Bulletin of the Japan Meteorological Agency. Because of the reason explained previously regarding the checking of earthquakes, the data on earthquakes in November and December are based upon the preliminary reports. Some of the remarks come from different sources.

The time in the earthquake data refers to the Japan Standard Time (JST) which is earlier than GMT by 9 hours.

The magnitude in the earthquake data is determined using Tsuboi's formula:

$$M = \frac{1}{2}\log\left(A^2{}_N + A^2{}_E\right) + 1.73\log\Delta - 0.83 \cdots\cdots\cdots\cdots\cdots (1)$$

where, M is the magnitude. A_N and A_E are the maximum amplitudes of N- and E-components in micron respectively, and Δ is the epicentral distance in km. Those ground amplitudes are of seismometers with periods of about 5 seconds, and of waves shorter than 5 seconds. The magnitude is the averaged value over magnitudes for every $\sqrt{A^2{}_N + A^2{}_E}$ reported by the

stations of JMA.

The intensity of the shock is estimated according to the scale as shown in Table 6.

Table 6 JMA Seismic Intensity Scale (After Ref. 39)

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) Accelerograph Results

The items in the accelerograph results have been explained previously. The maximum accelerations are those determined by the preliminary processing.

The accelerogram whose earthquake is unknown is not listed in the table, if both of its maximum horizontal accelerations are smaller than 20 Gals. If at least one of the maximum accelerations is larger than 20 Gals, then it is listed in the table, but the earthquake data can not be given.

4. Digitization

(1) Digitizers

Two strong-motion accelerogram digitizers are being used in the Port and Harbour Research Institute; one is for digitization of records by the SMAC-B2 accelerograph and the other for digitization of records by the ERS-B, C, D accelerograph.

a. Digitizer for records by the SMAC-B2 accelerograph

The digitizer being used for the accelerograms obtained by the SMAC-B2 accelerograph is a semiautomatic instrument. The view and the specifications of the digitizer are shown in Fig. 23 and Table 7, respectively.

The digitizer works in the following way. On the digitizer table there is a magnifying glass which can be translated along the Y-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 available from the magnescale. The magnifying glass has a cross mark and a lamp to illuminate the accelerogram within its range. The operator places the cross mark on the trace and pushes a push-switch; 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 X-axis by 0.1 mm.

b. Digitizer for records by the ERS-B, C, D accelerograph

The records obtained by the ERS-B, C, D accelerograph are processed by an on-line

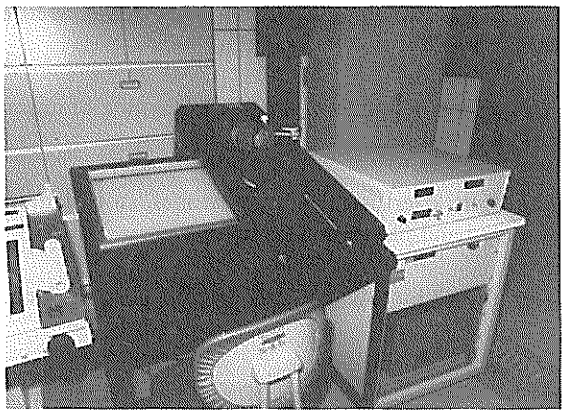

Fig. 23 Digitizer for records by the SMAC-B2 accelerograph

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

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

oscillogram digitizer. The digitizer is connected to a hybrid computer which is combination of a digital and an analog computers. The digitizer and the computer are photographed in Fig. 24 and 25.

The records is placed on the table and an operator traces waves in the records with cursor of the digitizer. The travels of the cursor along X- and Y-axis are digitally counted and at each 0.1 mm increment or decrement of travel along the X-axis, the location counts of the cursor are transferred into memories of the computer. After tracing the necessary segment of the record, digitized values in the memories are processed by appropriate programs. According to the direction given to the computer through the I/O typewriter, output of the digitized records in the memories is available in forms of printed list, magnetic tape and analog reproduction.

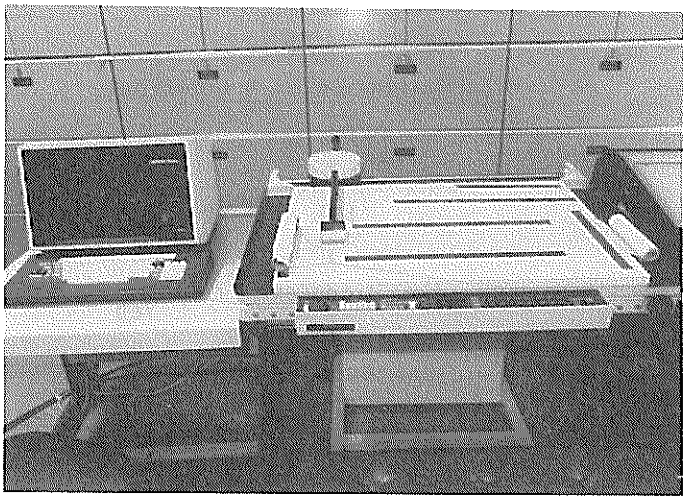

Fig. 24 Digitizer for records by the ERS-B, C, D accelerograph

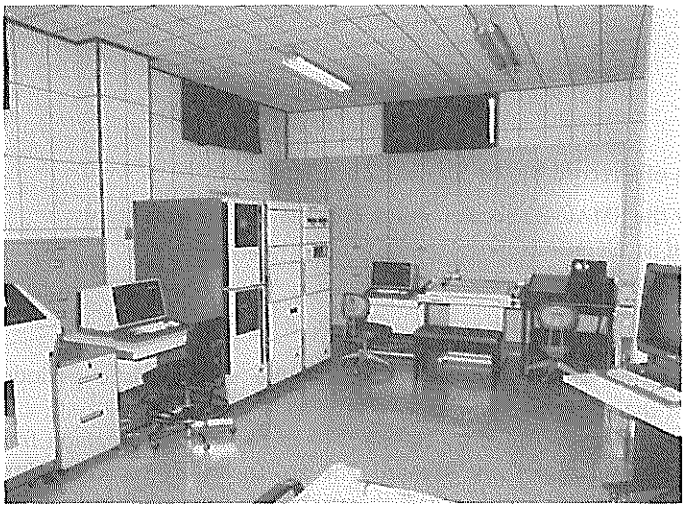

Fig. 25 Hybrid computer controlling the digitizer

(2) Digitization

The digitization procedure described here is applied for records obtained since 1976.

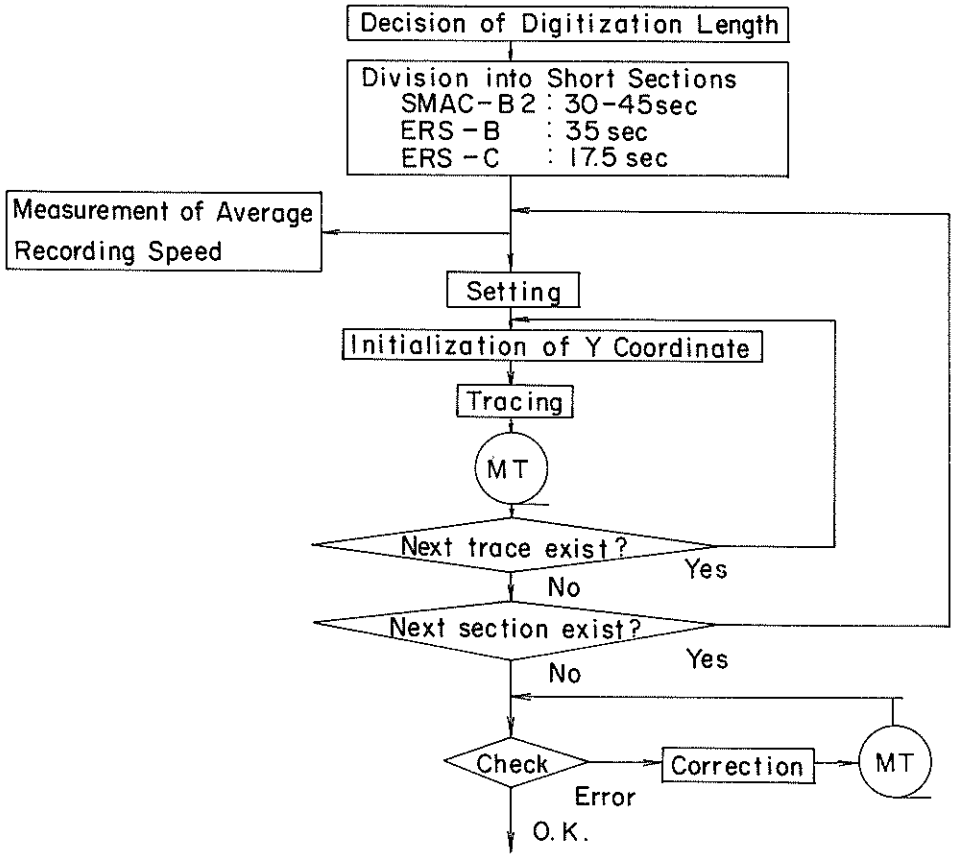

Fig. 26 Digitization procedure

i) Digitization of a record by the SMAC-B2 accelerograph

A recore by the SMAC-B2 accelerograph consists of following traces;

Recorded accelerations
Fixed traces
Timing marks
Arc traces
Free vibration traces for calibration of the characteristic periods and damping factors of the accelerograph

The fixed traces are recorded by the pens fixed to the accelerograph frame. The timing marks are pulses at intervals of one second. The arc traces are recorded manually with the recording pens supported by pivots when the paper drive mechanism is stopped. They show offset of the pens from the normal position where the pens are parallel to the direction of paper driving.

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 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.[37] 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. [37] In order to obtain the average paper speed, length of intervals of 30 pulses is measured by the digitizer for a record by the ERS-B, C, D accelerograph.

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 effective area of the digitizer table. Length of each section is about 30 cm to 45 cm which is almost equivalent to 30 second 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 summarised as follows.

(a) Setting of the copy: A copy of a record to be digitized is fixed with the magnets on the table of the digitizer. The table is rotated by an adjusting screw so that the fixed trace on the copy is parallel to X axis of the digitizer. Two points on the fixed trace located on the both ends of the section are used for this adjustment: Y coordinate value of the two points are made to coincide with each other.

(b) Initialization of Y coordinate: Y coordinate is arbitrarily initialized in the digitization procedure because "Sectional Base-Line Location" described later is to be applied in the standard data processing. Y coordinate of a first point to be digitized is usually set to be zero.

(c) Tracing: The traces are digitized by an operator in the way described in the preceding section. Three accelerations, two fixed traces, and three are traces are digitized at intervals of 0.1 mm along X axis. The intervals are almost equivalent to 0.001 s. Accelerations are, however, recorded in a cylindrical coordinate system so that the digitized amplitude values are not corresponding to equal time intervals.

(d) Recording of Digitized Data: Data punched on a paper tape are recorded in a magnetic tape with such data as record number, component, station, date and time of the earthquake, time intervals, etc.

ii) Digitization of a record by the ERS-B, C, D accelerograph

A record by the ERS-B, C, D accelerograph consists 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.

Portion of the record to be digitized is divided into some sections because of limitation of the effective area 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/D accelerograph.

Procedure of setting of a record by the ERS-B, C, D accelerograph and the initialization of Y 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

degitized at intervals of 0.1 mm, which corresponds to 0.005 s. on a record by the ERS-B accelerograph and about 0.0025 s. on a record by the ERS-C/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/D accelerograph; then the digitized data 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 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/D accelerograph. In the case of the ERS-C/D accelerograph, sensitivities of the galvanometers are calibrated for each recording with calibration currents before resetting paper drive.

Timing marks are used only to measure the average recording speed of the record by the ERS-C/D accelerograph because fluctuation of the timing marks is expected as small as the digital unit of the digitizer (0.1 mm) according to the results of the tests of the ERS-C/D accelerographs.[37] They are pulses of intervals of 0.1 second generated by a crystal timer. In 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 inverter.

(3) Standard Data Processing

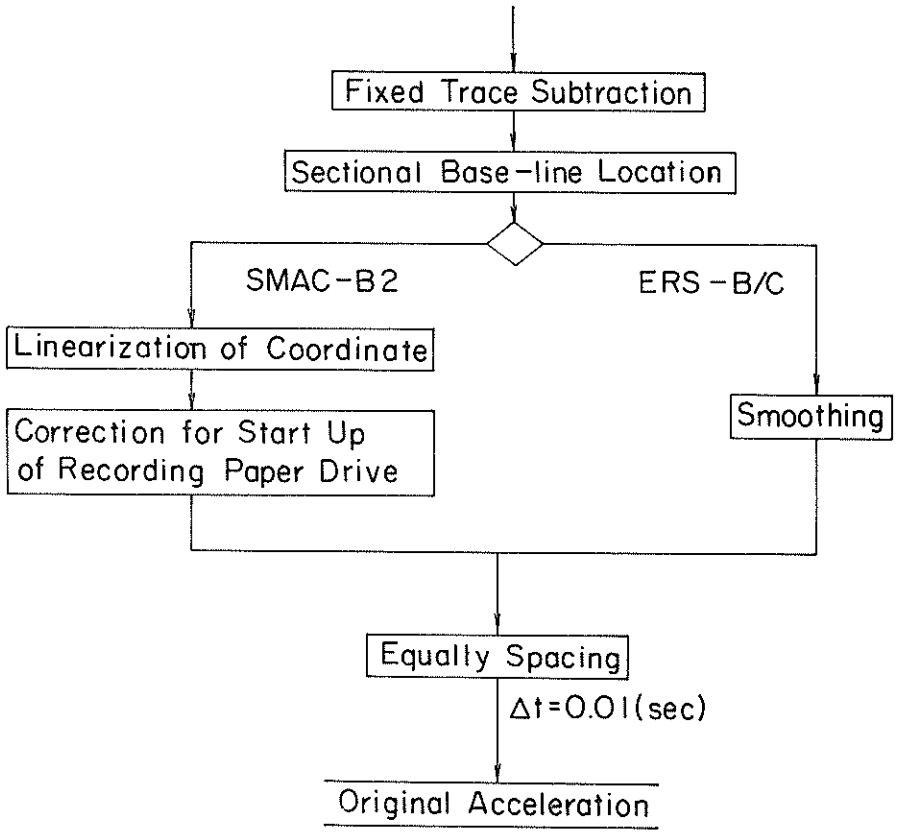

Fig. 27 Procedures of standard data processing

The procedure for the standard data processing described here is 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 after the preceding annual report had been published. For the detailed description, see a separate report.[37] The acceleration processed through the standard data processing will be called "Original Acceleration". The original acceleration is showed in a figure and listed on a table. Data numbers of junctions of sections for digitalization are listed also on the table, if any (See Table 8).

Standard date 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
5. Equally Spacing

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

1. Fixed Trace Subtraction
2. Sectional Base-line Location
3. Smoothing
4. Equally Spacing

Each correction procedure is described briefly as follows.

i) Fixed Trace Subtraction

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

Errors caused by the transverse motion of recording paper in the drive mechanism of the accelerograph

Systematic errors caused by an imperfect mechanical transverse mechanism of the digitizer cross-hair system

Errors of sectional rotation of the record on the table of the digitizer 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 wieght function is defined by

$$w(t) = \begin{cases} \sqrt{\frac{\alpha}{\pi}} \exp\left[-\alpha t^2\right] & \text{if} \quad |t| \geqslant t_0 \\ 0 & \text{otherwise} \end{cases} \qquad \cdots\cdots\cdots\cdots\cdots\cdots (2)$$

where

$$\alpha = \left(\frac{\pi}{2}\right)^2$$

$$t_0 = \sqrt{\alpha / 5} = 0.7 \text{ (s.)}$$

At both ends of a section for digitization, α in the equation (2) is redefined by

$$\alpha = 5 / S^2 \qquad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (3)$$

where S is distance from the end of a section.

This weighted running average corresponds to a 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

Table 8 Example of digitized record

RECORD – S-1043 COMPONENT – W25N
STATION – ONAHAMA-S DATE AND TIME – 1977-12-17-00-10
TOTAL NUMBER OF DATA – 4600
SAMPLING INTERVAL – 0.010 (SEC) UNIT – 0.1 GAL
SIGNAL – GR. ACC. CORRECTION – ARC. ERR.

No.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	-15	-15	-15	-15	-15	-14	-14	-14	-14	-14
10	-13	-13	-13	-13	-13	-12	-12	-12	-11	-11
20	-11	-10	-10	-10	-9	-9	-8	-8	-7	-6
30	-6	-6	-6	-6	-6	-6	-6	-7	-9	-10
40	-9	-8	-7	-7	-7	-8	-9	-10	-12	-14
50	-18	-23	-27	-28	-29	-25	-21	-17	-13	-7
60	-1	1	2	1	0	-3	-6	-8	-11	-14
70	-19	-26	-30	-30	-28	-25	-22	-15	-6	-1
80	3	6	1	-6	-9	-12	-16	-18	-19	-19
90	-13	-6	1	7	6	3	0	2	5	8
100	5	3	-1	-8	-10	-10	-8	-2	1	-1
110	1	8	6	0	7	13	13	12	8	3
120	-1	-4	-6	2	3	3	1	-1	-2	2
130	0	-5	-4	3	10	10	9	3	3	3
140	5	4	3	2	0	-4	-8	-6	-6	-6
150	-8	-12	-15	-15	-12	-9	-10	-12	-14	-18
160	-22	-22	-28	-29	-29	-29	-26	-21	-15	-8
170	0	6	11	15	15	13	9	9	7	4
180	0	-8	-18	-24	-23	-32	-31	-29	-14	-6
190	-7	-4	-10	-11	-9	-4	1	10	11	9
200	8	9	9	11	12	12	9	4	0	-7
210	-3	3	3	1	-2	-8	-11	-10	-3	0
220	0	0	1	4	1	7	13	13	10	7
230	4	-1	-7	-6	-6	-3	0	9	9	9
240	9	9	8	3	-3	-14	-27	-30	-24	-16
250	-10	-6	-3	1	3	6	11	11	8	5
260	5	1	-6	-9	-6	-8	-11	-15	-21	-21
270	-16	-10	-5	-1	0	5	6	2	0	9
280	20	14	16	23	17	12	9	7	4	-2
290	-11	-25	-25	-20	-19	-23	-23	-18	-12	-4
300	3	6	12	21	30	29	27	25	22	17
310	10	1	-4	-10	-19	-25	-24	-18	-11	-2
320	1	-1	0	0	0	4	8	12	16	17
330	19	27	28	24	17	14	6	1	-2	-9
340	-16	-15	-15	-12	-7	0	3	1	2	-1
350	0	-1	2	11	11	10	11	13	10	6
360	-2	-12	-22	-30	-32	-32	-30	-25	-20	-17
370	-16	-16	-17	-17	-14	-7	0	5	5	3
380	-1	-2	-4	-10	-16	-26	-26	-22	-16	-11
390	-9	-4	-1	3	6	4	2	-3	-10	-10
400	-6	-3	0	4	2	5	5	6	13	15
410	17	13	10	10	11	7	-1	-4	0	3
420	9	15	16	14	13	11	11	10	7	6
430	2	-3	-10	-13	-10	-8	-4	4	11	12
440	14	14	8	5	5	0	0	-3	-4	-4
450	0	5	8	13	16	17	18	14	8	5
460	4	6	6	5	2	-1	-6	-10	-21	-30
470	-29	-29	-26	-20	-15	-9	-3	5	16	23
480	25	24	20	15	5	-17	-27	-35	-32	-32
490	-27	-22	-16	-12	-6	-1	10	4	4	1
500	-2	-11	-13	-10	-6	1	6	8	12	18

TO BE CONTINUED

CONTINUED (S-1043 W25N)

No.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
510	22	20	15	6	-2	-6	-6	-6	-5	-4
520	-1	1	4	6	8	8	7	4	2	2
530	5	9	15	20	20	16	13	6	0	-1
540	-2	-8	-3	0	9	12	19	27	30	34
550	34	29	24	19	10	2	-4	-15	-14	-9
560	-4	0	7	7	4	3	0	-2	-4	-9
570	-11	-10	-6	2	14	22	28	27	21	16
580	13	8	0	-4	-13	-19	-18	-16	-18	-16
590	-20	-27	-27	-26	-26	-23	-17	-11	-5	2
600	6	15	22	21	25	24	21	18	14	9
610	4	6	12	19	23	20	18	16	12	8
620	5	-6	-16	-10	0	9	14	20	21	18
630	15	14	16	16	14	10	6	1	-4	-3
640	-2	-2	-4	1	8	1	-4	-7	-4	3
650	11	11	3	-4	-15	-21	-22	-22	-19	-15
660	-8	0	12	23	26	27	26	20	8	3
670	6	10	12	13	16	19	23	25	26	26
680	26	26	25	26	27	24	16	3	-16	-26
690	-40	-47	-53	-56	-49	-43	-30	-20	-27	-42
700	-65	-91	-134	-157	-211	-249	-292	-309	-325	-345
710	-358	-357	-352	-344	-335	-329	-328	-324	-320	-292
720	-258	-210	-153	-99	-48	4	59	118	175	220
730	254	277	293	322	382	439	467	507	535	533
740	522	502	483	471	462	460	465	472	482	483
750	467	441	396	315	220	143	96	70	65	64
760	62	55	46	31	5	-1	11	66	135	173
770	201	223	200	142	62	-90	-278	-393	-485	-671
780	-737	-801	-728	-605	-446	-241	-4	215	368	444
790	492	500	452	372	239	3	-102	-236	-505	-649
800	-696	-711	-700	-676	-601	-508	-397	-253	-105	31
810	135	177	184	176	130	54	-8	-75	-156	-209
820	-234	-239	-215	-168	-103	-31	33	106	177	219
830	246	257	239	202	165	135	113	102	97	120
840	138	151	152	120	65	17	-10	-58	-93	-113
850	-140	-139	-119	-58	-10	45	93	156	229	305
860	328	344	355	342	320	250	182	118	45	-10
870	-44	-70	-91	-103	-94	-63	-32	10	75	125
880	150	163	154	128	95	62	35	11	-15	-35
890	-40	-41	-53	-70	-92	-105	-122	-134	-143	-155
900	-148	-136	-123	-113	-107	-103	-103	-102	-90	-71
910	-52	-24	-4	7	9	14	18	22	31	48
920	82	122	153	176	194	206	211	196	161	123
930	87	48	9	-18	-36	-44	-34	-24	-12	-6
940	-7	-13	-22	-32	-40	-40	-41	-41	-34	-32
950	-34	-37	-43	-44	-47	-54	-64	-62	-58	-53
960	-48	-42	-36	-30	-20	-15	-12	-13	-19	-42
970	-73	-100	-117	-129	-137	-130	-112	-94	-78	-54
980	-23	2	22	36	46	52	55	52	37	9
990	-3	-12	-24	-18	4	21	35	50	53	60
1000	71	91	107	125	146	164	181	189	176	156
1010	134	106	87	70	58	61	71	86	95	96
1020	88	55	7	-37	-72	-113	-150	-176	-200	-216
1030	-226	-224	-212	-200	-188	-179	-173	-164	-153	-142
1040	-132	-120	-106	-89	-46	-16	28	70	100	119

TO BE CONTINUED

by the SMAC-B2 accelerograph, subtraction is made as follows;

An upper trace is corrected with an upper fixed trace.

A lower trace is corrected with a lower fixed trace.

A center trace is corrected with an average of an upper fixed trace and lower one.

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

ii) Sectional Base-line Location

As described previously, base-line is arbitrarily inserted for each section by the initialization of Y coordinate. Sectional translation brings mainly low frequency errors into the accelerogram and produces an unnatural 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 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 difined by

$$u(t) = \sqrt{\frac{\beta}{\pi}} \exp\left[-\beta t^2\right] \quad \cdots\cdots (4)$$

Where $\beta = 20/T^2$, 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 Gals, 5 Hz, 5000 data with time intervals of 0.01 sec 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 methods. 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 Fig. 18(a) and (b) respectively. (10.1 sec 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.

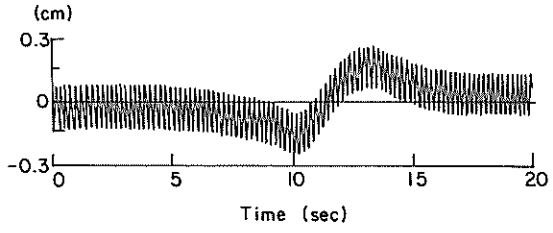

Fig. 28 (a) Integrated displacement from the acceleration with sectionally located base-line by a least square fit scheme

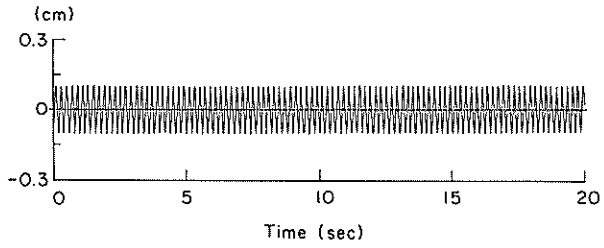

Fig. 28 (b) Integrated displacement from the acceleration with sectionally located base-lines by the proposed method

iii) Linearization of Coordinate

This correction is applied to a record by the SMAC-B2 accelerograph to obtain a corrected X coordinate of each datum. Y coordinate of the pivot of the recording pen is calculated from the digitized arc trace.

Let r (mm) denote the radius of the arc (length of the arm of the recording pen), r (mm) denote Y coordinate of a point whose X coordinate is to be corrected, a (mm) denote Y coordinate of the center of the arc (the pivot of the pen) and e (mm) denote error of X cordinate of the point to be corrected then we have

$$e = r - \sqrt{r^2 - (y-a)^2} \qquad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (5)$$

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

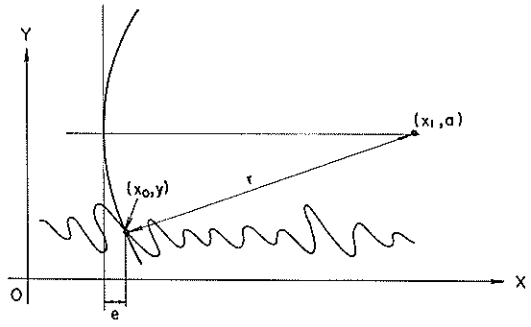

Fig. 29 Linearization of coordinate

iv) Correction for start up of recording paper drive

The variation of recording paper speed of the SMAC-B2 accelerograph is represented by the following equation which is based on the tests made by the authors.

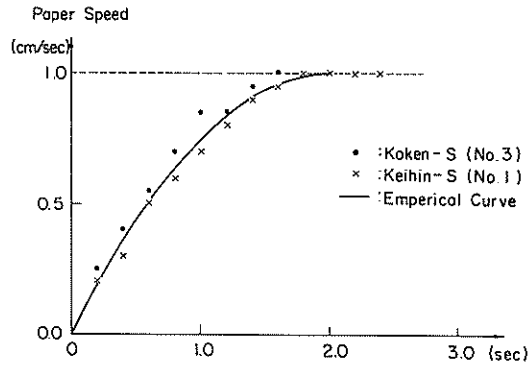

Fig. 30 Variable recording speed on start up of recording paper drive

$$v = [\,1 - \frac{1}{b^2}(t - t_0)^2\,] \cdot v_a \quad \text{if} \quad 0 \leqslant t \leqslant t_0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

$$v = v_a \quad \text{if} \quad t_0 < t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Where; v : paper speed at time t (cm/s.)
v_a : paper speed after reaching constant speed (cm/s.)
t : time after triggering (s.)
t_0 : constant (s.)
b : constant (s.)

If t_0 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, t_0 = 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 t_0 value. For the correction of the most of the digitized records in this report, t_0 = 1.9 s. was used.

v) Smoothing

Smoothing is applied to a record by the ERS-B, C, D accelerograph. A record by the ERS-B, C, D accelerograph is digitized at intervals of 0.1 mm which corresponds to about 0.005 s. on a record by the ERS-B accelerograph and corresponds to about 0.0025 s. on a record by the ERS-C/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 of ground according to the records obtained by the ERS-B, C, D accelerograph so far.

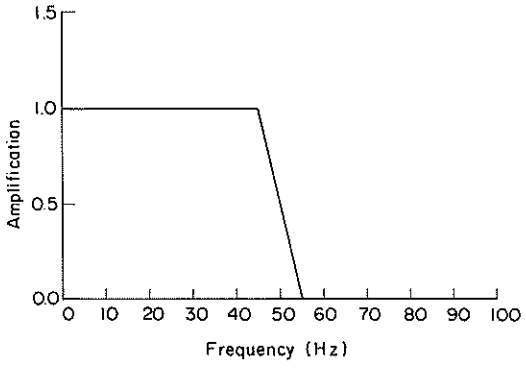

Fig. 31 Filter for the smoothing

The weight function is defined by

$$g(t) = \begin{cases} \dfrac{f_0 + f_1}{2} & \text{if } t = 0 \\ \dfrac{f_1 - f_0}{2} \left[\dfrac{\cos(2\pi f_0 t) - \cos(2\pi f_1 t)}{(2\pi t)^2} \right] & \text{if } 0 < |t| \leqslant \ldots\ldots (8) \\ 0 & \text{otherwise} \end{cases}$$

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

The filer corresponding to this weighted running average is approximately expressed as follows. (Errors of the approximation is less than 0.3%)

$$G(f) = \begin{cases} 1 & \text{if } |f| \leqslant f_0 \\ \dfrac{f_1 - |f|}{f_1 - f_0} & \text{if } f_0 < |f| \leqslant f_1 \ldots\ldots (9) \\ 0 & \text{if } |f| > f_1 \end{cases}$$

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

vi) Equally Spacing

Data are equally spaced at intervals of 0.01 s. 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 date processed through the linearization of coordinate are unequally spaced date, whose intervals of data are longer than 0.01 s. on portions of accelerogram where absolute value of acceleration decreases and intervals of data are shorter than 0.01 s. else where.

A record by the ERS-B, C, D accelerograph is digitized at intervals of 0.1 mm, which corresponds to about 0.005 s. on a record by the ERS-B accelerograph and about 0.0025 s. on a record by the ERS-C/D accelerograph. There is no possibility of aliasing by the equally spacing at intervals of 0.01 sec 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.

(4) Processing of the Data obtained by the ERS-F Accelerograph

The main unit of the recording system, which has recorded the earthquake motions, is drawn out from the box of the recording system of the ERS-F Accelerograph and replaced by the another main unit ready for recording the coming earthquakes. The drawn out unit is packed in a case, shown in Fig. 18, with a static eliminator on the connector of the unit and sent to the Earthquake Resistant Structures Laboratory in the Port and Harbour Research Institute by mail.

In the Geotechnical Earthquake Engineering Laboratory, the unit is set on the reproducer, shown in Fig. 19, which is connected to a computer, and digital time histories of the earthquake motions are reproduced. Absolute time at the trigger of the record is also obtained from the record of the time signal.

As mentioned in Table 5, the recording system has digital delay memory for ten seconds. If the recording started well enough before the first motion of the earthquake, some

of the portion of the record preceding the first motion is omitted.

Data processing and the preliminary analyses for the records by the ERS-F Accelerograph is almost the same as the standard data processing and the preliminary analyses for the record by ERS-B/C/D Accelerograph. The differences are as follows:

i) No smoothing is applied for the data at the standard data processing.
ii) As an instrument correction at the preliminary analyses, correction for the phase is applied but no correction is applied for the amplitude. 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 "consine" shape in frequency domain.
iii) As the high pass filtering at the preliminary analyses, parameter E for the Variable Filter in Eq.(19) is determined by the following equation;

$$E = (p \times 0.001) \times 0.02236 \tag{10}$$

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

The factors in Eq.(10) 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.

Details of the ERS-F Accelerograph and the data processing will be reported in a separate report.

5. Preliminary Analyses

The Standard procedures of preliminary analyses described here is applied for records obtained since 1976. For the detailed description, see separate reports.[35,36] 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 (Fig. 32).

(1) The Method of Correction and Integration

Instrument correction, filtering, integration is applied in frequency space. 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.

$$L > \max\left[\frac{2}{3}T, 10.0\right] \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (11)$$

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 given computer.

i) The Filter for Instrument Correction and the Supplementary Filter

(a) Filters for a Record by the SMAC-B2 Accelerograph
The filter for instrument correction $A_S(f)$ is defined by

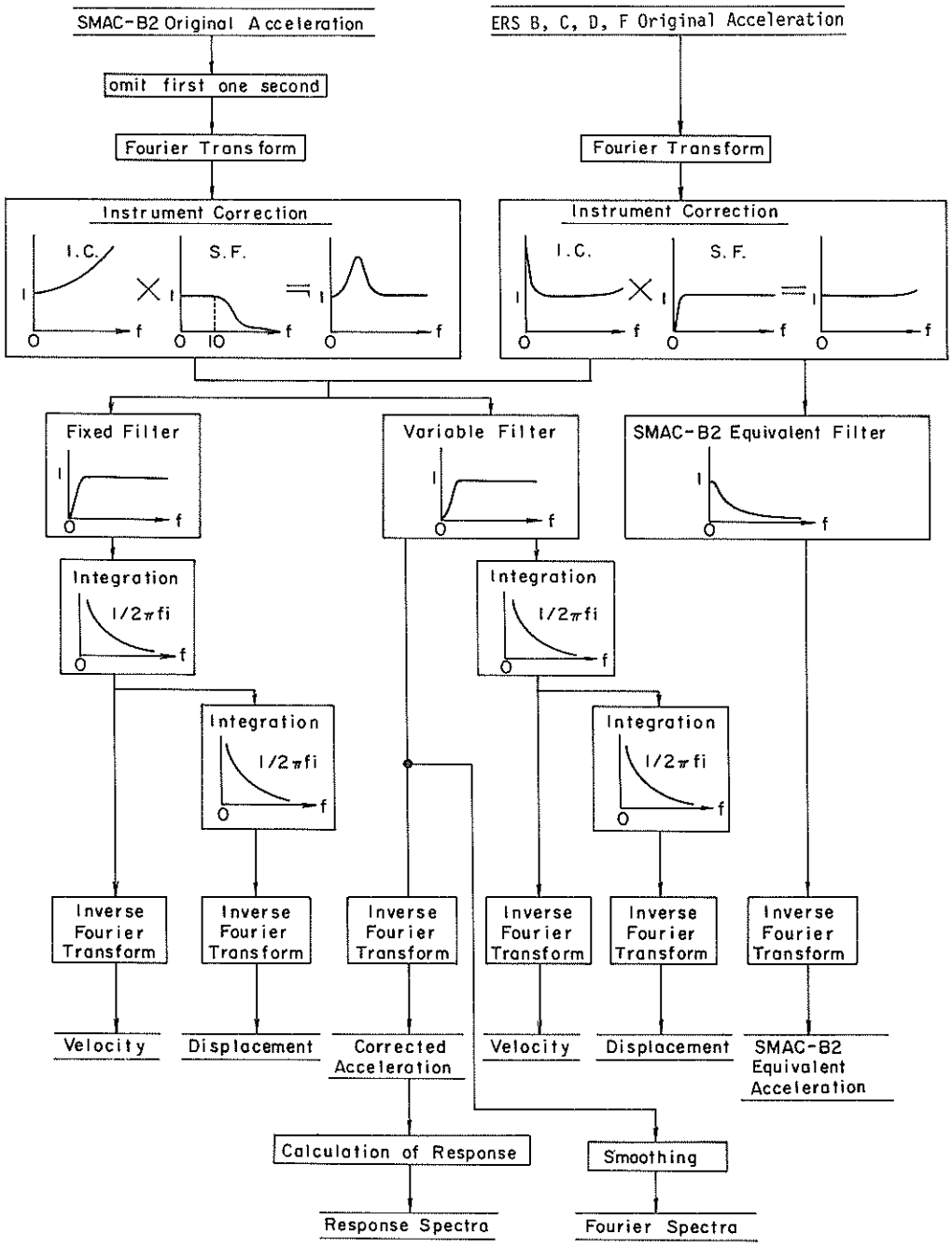

Fig. 32 Procedures of Preliminary Analyses

$$A_S(f) = 1 - (\frac{f}{f_S})^2 + 2h_S(\frac{f}{f_S})\ i \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (12)$$

where $f_S = 1/0.14$ (Hz) and $h_S = 1.0$

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

$$B_S(f) = \begin{cases} 1 \\ [\,1 + (|A_S(f)| - 1)\exp\left\{-\dfrac{(|f| - f_0)^2}{20}\right\}\,]\dfrac{1}{|A_S(f)|} \end{cases} \begin{matrix} \text{if } |f| \leqslant f_0 \\ \text{otherwise} \end{matrix} \quad \cdots (13)$$

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.

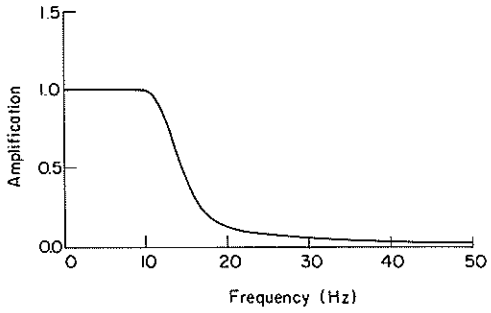

Fig. 33 The Supplementary Filter for a record by the SMAC-B2 accelerograph

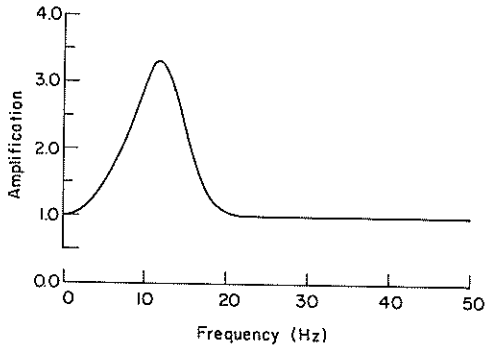

Fig. 34 Combined frequency characteristics of the filter for instrument correction and the supplementary filter for records by the SMAC-B2 accelerograph

(b) Filters for a Record by the ERS-B, C, D Accelerograph

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

$$A_E(f) = A_P(f) \cdot A_G(f)$$

$$A_P(f) = 1 + \frac{i}{2h_P}(\frac{f}{f_P} - \frac{f_P}{f}) \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (14)$$

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

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

and for a record by the ERS-C accelerograph

f_p = 3.0 (Hz), h_p = 17, f_G = 250 (Hz) and h_G = 0.7

and 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

$1/A_P(f)$ is frequency characteristics of the pick up of the accelerograph and $1/A_G(f)$ is those of the galvanometer.

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

$$B_E(f) = \begin{cases} 1 / |A_p(f)| & \text{if } |f| \leqslant f_p \\ 1 & \text{otherwise} \end{cases} \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (15)$$

where $A_P(f)$ is the filter for the instrument correction of the pick up and f_p is the characteristic frequency of the instrument defined above for each type of accelerograph. The supplementary filter is designed to suppress low frequency digitazation errors.

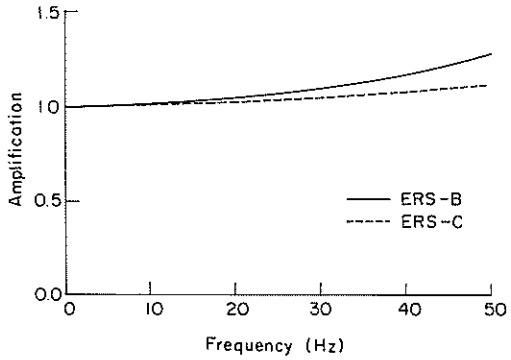

Fig. 35 The Combined Filter of Instrument Correction and Supplementary Filtering for a Record by the ERS-B, C, D Accelerograph

ii) SMAC-B2 Equivalent Filter

Frequency characteristics of SMAC-B2 accelerograph are different from that of ERS-B, C, D, F accelerograph. In order to make it easy to compare the accelerograms by these different types of accelerographs each other, a filter difined in the following equation is applied for a record by the ERS-B, C, D, F accelerograph.

$$S(f) = \frac{1}{1 - (\frac{f}{f_S})^2 + 2h_S(\frac{f}{f_S})\,i} \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (16)$$

where f_S = 1/0.14 (Hz) and h_S = 1.0

The filter has the same frequency characteristics as those of the SMAC-B2 accelerograph.

The filter is applied for the acceleration processed through the filter for instrument correction and the supplementary filter. Acceleration processed through this filter will be called "SMAC-B2 Equivalent Acceleration". This acceleration can be compared with the original acceleration by the SMAC-B2 accelerograph.

iii) The 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 length of a section of an accelerogram devided for digitization.

As a result of the examination of random digitization errors, frequency characteristics of 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

0.552) deployed by the Japan Meteorological Agency of Ministry of Transport.
Cut-off frequency (3 dB down) of this filter is 0.154 Hz.

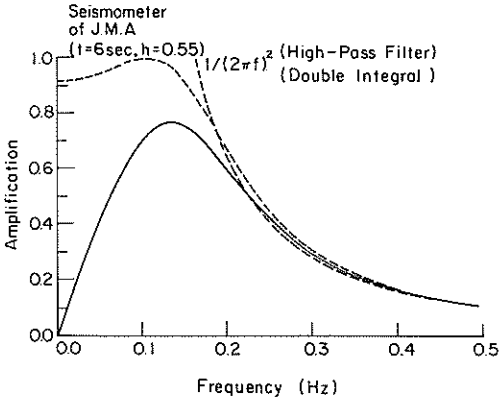

Fig. 36 Combined Frequency Characteristics of the Fixed Filter and Double Integral

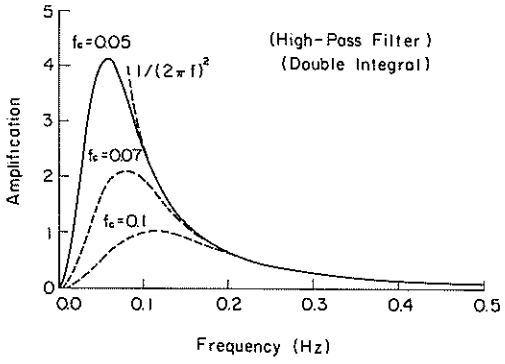

Fig. 37 Combined Frequency Characteristics of the Variable Filter and Double Integral

various view points, the authors proposed two methods of correction of an accelerogram to obtain velocities and displacements; one is a method with a fixed filter and another is a method with a variable filter.

(a) Fixed Filter

This filter is defined by

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

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 s. and h =

(b) Variable Filter

This filter is defined by

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

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

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

where M is length of whole digitized portion
T is a minimum length of a section of accelerogram
$X(f)$ is Fourier Transform of the original acceleration

and E is the value listed below;

E = 0.5 (Gal) for a record by the SMAC-B2 accelerograph

$E = 0.05p$ (Gal) for a record by the ERS-B, C, D accelerograph
where p (Gal/mm) is the sensitivity of ERS-B, C, D accelerograph.

E=(p×0.001)×0.02236 (Gal) for a record by the ERS-F accelegraph
where p (1000 Gal/2^{16}) is the sensitivity of ERS-F accelegraph.

Cut-off frequency (3 dB down) of this filter is $1.36 f_C$.

Decision procedure of f_C is simply illustrated in Fig. 38. f_C 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 f_C 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 f_C 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.

This decision procedure of f_C is, however, a compromise between such a view point as

to keep *SN* ratio over some constant level for every frequency component and such a view point as to keep f_C to be a constant. The reason why we proposed such a compromised method is that the compromise makes decision procedure of f_C 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 the authors proposed a fixed low pass supplementary filter instead of a variable one for a record by the SMAC-B2 accelerograph was 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 disigned to be mild in order to lessen an artificial predominant frequency component around the cut-off frequency.

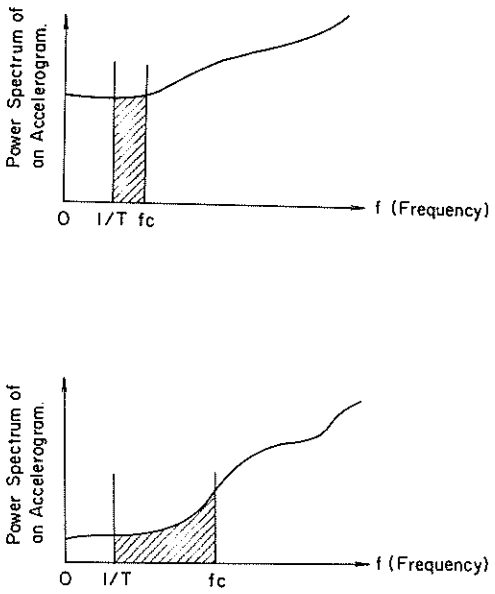

Fig. 38 Simplified illustration of decision procedure of f_C

(2) Corrected Acceleration, SMAC-B2 Equivalent Acceleration, Integrated Velocities and Integrated 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-B, C, D, F 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 their maximum values are listed in a table.

"Corrected acceleration" denotes acceleration processed through the variable filter. "SMAC-B2 equivalent acceleration" denotes acceleration obtained by the SMAC-B2 equivalent filter. Integrated velocities and displacements are calculated with the fixed filter and the variable filter. The parameter f_C of the variable filter is also shown on the figures and the table.

The corrected acceleration of the different types of accelerographs can not necessarily be compared with each other freely 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.

(3) Response Spectra

Response spectra are calculated for the corrected acceleration, which is an acceleration 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 the Runge-Kuta-Gill method to integrate numerically the equation of motion of the oscillator. The response spectra in the present report were calculated with a step by step calculation of the exact solution to the governing differential equation.[40] 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 so 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. The response spectra are provided in numerical tables as well as in the figures.

To calculate the response spectrum, entire length of the record is not necessary; the last part of the record after the maximum response have appeared is practically meaningless in the response 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. The length of the record used for the calculation and the length of the beginning part which is not used are shown in the numerical table as the time length and the skipped length respectively.

Response spectra of the period longer than about $1/f_C$ is influenced by the high pass filter ($1.36/f_C$ is the period of 3 dB down of the filter.); i.e., calculated response spectra is true if real seismic signals do not exist on the period longer than about $1/f_C$ 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.

(4) Fourier Spectrum

The Fourier spectra are calculated by the Fast Fourier Transform for whole length of the record, which are directly obtained at the filtering prosess with the variable filter. But, the spectra in this report are multiplied by the whole length of the record and then smoothed with the Parzen window of 1 Hz band width.

(5) Loci of Acceleration and Displacement

The loci of acceleration and displacement in horizontal plane are included in this report. The records used for calculation are acceleration without instrument correction and displacement processed by the variable filter.

6. Summary of Observation

Since 1962, 4082 records were obtained in the network of the Port and Harbour Research Institute, and most of the important records were analysed by the authors. In Table 9, a statistical summary of the observation is given. In Table 10, record numbers of accelerograms of which the digitized records and the spectra have been published are shown. The number in the parentheses behind each record number is showing the number of the Technical Note of the Port and Harbour Research Institute in which the digitized record appeared.

(Received on March 30, 1991)

Table 9

STATION	TOTAL NUMBER OF RECORDS	NUMBER OF RECORDS EXCEEDING 20 GALS IN MAX.	NUMBER OF RECORDS EXCEEDING 50 GALS IN MAX.
AKITA-S	31	7	2
AMAGASAKI-S	9	2	0
AOMORI-S	40	14	5
CHIBA-S	91	17	4
HACHINOHE-S*	111	16	5
HACHINOHE-JI-S	10	5	3
HAKODATE-FB	4	0	0
HAKODATE-F	4	0	0
HAKODATE-FR	4	0	0
HAKODATE-M	43	12	3
HANASAKI-M	36	21	7
HIRARA-S	5	1	0
HIROSHIMA-S*	9	5	4
HIROSHIMA-JI-S	4	0	0
HITACHINAKA-F	146	72	24
HOSOSHIMA-S	54	19	7
ISHIGAKI-S	5	1	0
INAE-S	18	6	0
INAE-SANBASHI-M	16	7	1
INAE-YAITA-M	23	11	2
KAGOSHIMA-S	26	4	0
KAMAISHI-M	25	8	1
KAMAISHI-MB	24	1	1
KANAZAWA-S	8	2	0
KASHIMA-S*	32	9	3
KASHIMA-JI-S*	30	6	3
KASHIMA-ZOKAN-S	118	28	10
KAWASAKI-CHI-M*	187	22	2
KAWASAKI-KO-M*	107	28	6
KAWASAKI-FB	27	3	2
KAWASAKI-F	27	6	2
KAWASAKI-FR	27	11	3
KEIHIN-JI-S	132	19	2
KINUURA-S*	8	4	2
KINUURA-JI-S	19	4	0
KOBE-DAI6-S	13	3	0
KOBE-DAI8-S	18	2	1
KOBE-JI-S	15	4	0
KOBE-MAYA-DAI1-M	16	5	2
KOBE-MAYA-DAI2-M	20	7	0
KOBE-MAYA-M	22	4	1
KOCHI-S*	21	3	1
KOCHI-JI-S	13	3	0
KOKEN-M	60	5	0
KOKEN-S	33	5	1
KOMATSUJIMA-S	17	2	0
KUSHIRO-S*	49	16	6
KUSHIRO-JI-S	10	5	2
MATSUYAMA-S	25	4	2
MINAMATA-M	3	0	0
MIYAKO-S	43	25	12
MIYAZAKI-M	38	9	4
MURORAN-S	67	14	6
NAGOYA-ZOKAN-S	22	5	2
NAHA-S*	1	0	0
NAHA-ZOKAN-S	2	1	0
NIIGATA-S*	12	1	0
NIIGATA-JI-S	5	1	0

(to be continued)

(Table 9, continued)

STATION	TOTAL NUMBER OF RECORDS	NUMBER OF RECORDS EXCEEDING 20 GALS IN MAX.	NUMBER OF RECORDS EXCEEDING 50 GALS IN MAX.
OFUNATO-S*	21	3	2
OFUNATO-BOCHI-S	64	14	5
OFUNATO-BO-S	103	34	19
OFUNATO-MOUND-M	52	13	4
OITA-S	13	7	4
OKITSU-S	27	4	0
OMAEZAKI-M	24	2	0
ONAHAMA-S*	67	13	4
ONAHAMA-JI-S	27	23	7
OSAKA-CHUO-S	8	1	0
OSAKA-JI-S	11	1	0
OTARU-S	12	0	0
SAKAIMINATO-S*	0	0	0
SAKAIMINATO-JI-S	11	5	2
SAKATA-S	48	6	0
SENDAI-M	69	13	2
SENDAI-MB	68	1	0
SHIBUSHI-S	13	0	0
SHIMIZU-KOJYO-S	24	7	3
SHIMIZU-MIHO-S	25	4	1
SHIM.-SEKITAN-M*	23	11	5
SHIM.-SEKITAN-S*	10	5	2
SHINAGAWA-M*	1	1	1
SHINAGAWA-MB	65	1	0
SHINAGAWA-S	104	26	6
SHIOGAMA-S*	19	1	0
SHIOGAMA-KOJYO-S	84	16	5
SHIMODA-F	7	1	0
SOMA-S	44	11	6
TAGONOURA-S	59	8	0
TOKACHI-M	81	43	15
TOMAKOMAI-S	23	7	4
TOYAMA-S	7	2	1
TSURUGA-S	30	3	1
URAKAWA-S	66	10	2
WAKA.-GANPEKI-S*	7	2	0
WAKAYAMA-S	39	17	3
WAKAYAMA-JI-S*	12	5	4
WAKA.-SUMIKIN-S*	0	0	0
YAMASHI.-DAI7-M*	81	6	1
YAMASHI.-DAI6-S*	102	31	11
YAMASHI.-HEN-M*	199	19	6
YAMASHITA-FB	49	2	0
YAMASHITA-F	49	11	3
YAMASHITA-FR	49	19	9
YAMASHITA-HEN-S*	119	24	8
YOKKA.-CHITOSE-S	10	5	1
YOKKA.-DAI2-M	19	4	2
YOKKA.-SEKITAN-M	47	9	2
YOKKAICHI-JI-S*	5	2	0
TOTAL	4082	948	295
ERS	1742	388	111
SMAC	2340	560	184

Table 10

STATION	RECORDS WHICH HAVE BEEN DIGITIZUED(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)
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)		
HAKODATE-M	M-357(374)	M-523(442)	M-630(458)	M-639(458)
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)	
HOSOSHIMA-S	S-213(98)	S-453(100)	S-544(116)	S-545(116)
	S-1231(338)	S-1625(487)	S-1729(503)	
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)			
KAWASAKI-CHI-M*	M-186(317)	M-220(319)	M-406(374)	
KAWASAKI-F	F-98(619)	F-123(649)		
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-S	S-1046(317)	S-2106(619)		
KOKEN-M	M-170(317)			
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)		
MATSUYAMA-S	S-1303(338)	S-1731(503)	S-1624(487)	
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)	S-2255(676)	
MIYAZAKI-M	M-228(338)	M-877(547)	M-1107(618)	
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)	

(to be continued)

(Table 10, continued)

STATION	RECORDS WHICH HAVE BEEN DIGITIZUED(REF.NO.)
NIIGATA-S*	S-107(62)
NIIGATA-JI-S	S-1203(319)
OFUNATO-S*	S-140(64) S-282(98) S-361(98)
OFUNATO-BOCHI-S	S-554(116) S-786(181) S-1022(287) S-1210(319) S-1120(338)
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-1602(487) S-1633(487) S-1946(588)
SAKAIMINATO-JI-S	S-2248(676) S-2251(676)
SAKATA-S	S-1568(458)
SENDAI-M	M-1127(618)
SHIMIZU-KOJYO-S	S-74(62) S-1063(317) S-1064(317)
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)
SHIOGAMA-S*	S-138(64)
SHIOGAMA-KOJYO-S	S-782(181) S-1118(338) S-1201(319) S-2006(618) S-2029(618)
SOMA-S	S-1872(547) S-2001(618) S-2031(618) S-2051(618) S-2096(618) S-2220(676)
TAGONOURA-S	S-1055(317)
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)
TOMAKOMAI-S	S-877(202) S-1418(426) S-1472(442) S-1977(618)
TOYAMA-S	S-1892(547)
TSURUGA-S	S-1549(487)
URAKAWA-S	S-1978(618) S-2186(676)
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)

* OBSERVATION OF THE STATIONS HAD ALREADY BEEN STOPPED.

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35) Yoshiko Yokoyama and Eiichi Kurata: Site Characteristics of Strong-Motion Earthquake Stations in Ports and Harbours in Japan (Part 4), *Technical Note of the Port and Harbour Research Institute,* No. 298, June 1978, 110p.

36) Yoshiko Yokoyama and Eiichi Kurata: Site Characteristics of Strong-Motion Earthquake Stations in Ports and Harbours in Japan (Part 5), *Technical Note of the Port and Harbour Research Institute,* No. 351, September 1980, 72p.

37) Susumu Iai, Eiichi Kurata and Hajime Tsuchida: Digitization and Correction of Strong-Motion Accelerograms, *Technical Note of the Port and Harbour Research Institute,* No. 286, March 1978, 286p.

38) Susumu Iai and Eiichi Kurata: Integration of Strong-Motion Accelerograms, *Proceedings of the 5th Japan Earthquake Engineering Symposium,* November 1978, 225–232p.

39) The Seismological Bulletin of the Japan Meteorological for January 1991, The Japan Meteorological Agency, 1991.

40) Naba C. Nigam and Paul C. Jennings: Calculation of Response Spectra from Strong-Motion Earthquake Records, *Bulletin of the Seismological Society of America,* Vol. 59, No. 2, April 1969, 909–922p.

41) Hajime Tsuchida: Present State and Outcomes of Strong-Motion Earthquake Observation in Port Areas in Japan, *Proceedings of the Annual Research Conference of the Port and Harbour Research Institute,* December 1979, 127–195p.

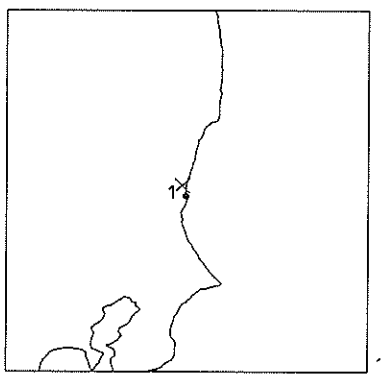
Observation Results
and
Preliminary Analyses

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

18:03 JAN. 1 ,1990
NORTHERN IBARAKI PREF
EPICENTER : 36°27.9'N 140°35.4'E
DEPTH : 55.3KM MAGNITUDE : 4.3

JMA INTENSITIES

Ⅲ : MITO,KAKIOKA,MITO,
KAKIOKA
Ⅱ : UTSUNOMIYA,NIKKO,
UTSUNOMIYA,NIKKO
Ⅰ : ONAHAMA,CHICHIBU,
KUMAGAYA,ONAHAMA,
CHICHIBU,KUMAGAYA



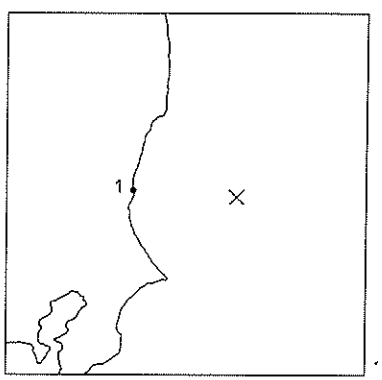
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 336	31	33	43	9

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

21:16 JAN. 4 ,1990
FAR E OFF IBARAKI PREF
EPICENTER : 36°16.3'N 141°33.6'E
DEPTH : 39.2KM MAGNITUDE : 4.6

JMA INTENSITIES

Ⅱ : MITO,KAKIOKA
Ⅰ : SHIRAKAWA,UTSUNOMIYA,
CHOSHI,TOKYO



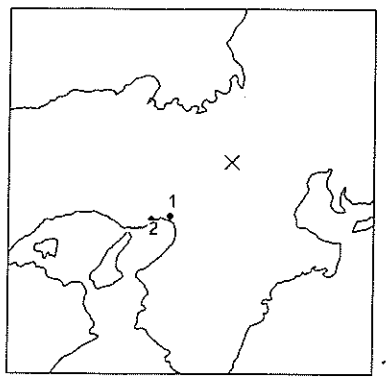
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 337	4	4	2	85

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

20:10 JAN. 11,1990
NW SHIGA PREF
EPICENTER : 35°6.6 'N 135°58.7'E
DEPTH : 11.2KM MAGNITUDE : 4.9

JMA INTENSITIES

Ⅳ : NARA
Ⅲ : KYOTO,UENO,YOKKAICHI, TSU
Ⅱ : HIKONE,OSAKA,GIFU, NAGOYA,KOBE
Ⅰ : FUKUI,OKAYAMA



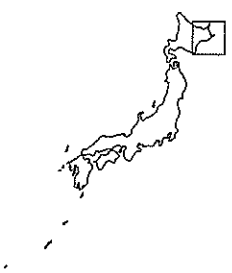
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	AMAGASAKI-S	ON GROUND	S-2271	26	17	2	68
2	KOBE-MAYA-DAI2-M	ON STRUC.	M-1301	18	24		82
2	KOBE-MAYA-M	ON GROUND	M-1299	10	11	1	83
2	KOBE-MAYA-DAI1-M	ON STRUC.	M-1300	43	17		83
2	KOBE-DAI8-S	ON STRUC.	S-2274	6	8	4	83
2	KOBE-DAI6-S	ON STRUC.	S-2273	14	16	4	84
2	KOBE-JI-S	ON GROUND	S-2272	9	8	3	84

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

12:15 JAN. 30,1990
OFF NEMURO PENINSULA
EPICENTER : 42°56.3'N 145°27.1'E
DEPTH : 43.2KM MAGNITUDE : 5.3

JMA INTENSITIES

Ⅲ : KUSHIRO
Ⅱ : NEMURO,HIROO



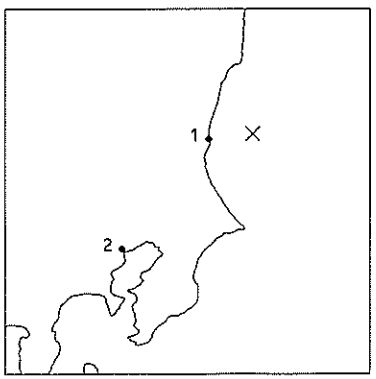
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HANASAKI-M	ON GROUND	M-1302	29	22	8	39
2	KUSHIRO-JI-S	ON GROUND	S-2275	6	18	3	89

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

02:46 FEB. 12,1990
E OFF IBARAKI PREF
EPICENTER : 36°24.1'N 141°1.2 'E
DEPTH : 38.3KM MAGNITUDE : 5.3

JMA INTENSITIES

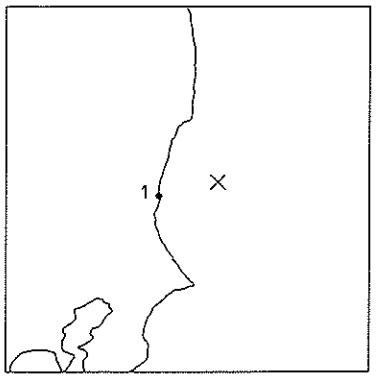
Ⅳ : MITO
Ⅲ : CHIBA,ONAHAMA,KAKIOKA
Ⅱ : TOKYO,YOKOHAMA,CHOSHI,
UTSUNOMIYA
Ⅰ : FUKUSHIMA,TATEYAMA,
SENDAI,NIKKO



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 339	68	54	30	36
2	SHINAGAWA-MB	IN GROUND	M-1303	1	1	1	142
2	SHINAGAWA-S	ON GROUND	S-2276	3	4	1	142

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

17:04 FEB. 13,1990
E OFF IBARAKI PREF
EPICENTER : 36°27.4'N 141°9.5 'E
DEPTH : 43.5KM MAGNITUDE : 4.7



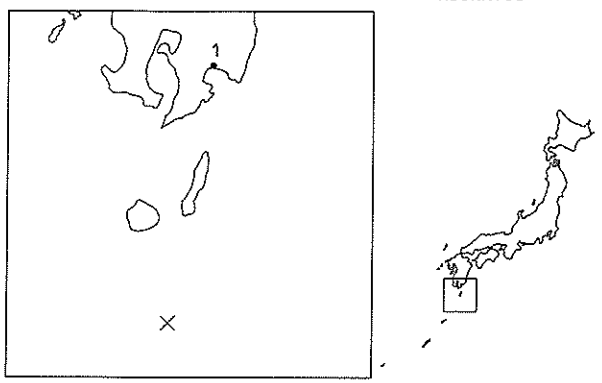
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 340	39	27	12	49

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

11:28 FEB. 17,1990
NEAR AMAMI-OSHIMA ISLAND
EPICENTER : 29°33.1'N 130°45.3'E
DEPTH : 72.0KM MAGNITUDE : 6.0

JMA INTENSITIES

Ⅲ : YAKUSHIMA,TANEGASHIMA,
NAGO
Ⅰ : OITA,KAGOSHIMA,MIYAZAKI,
ABURATSU



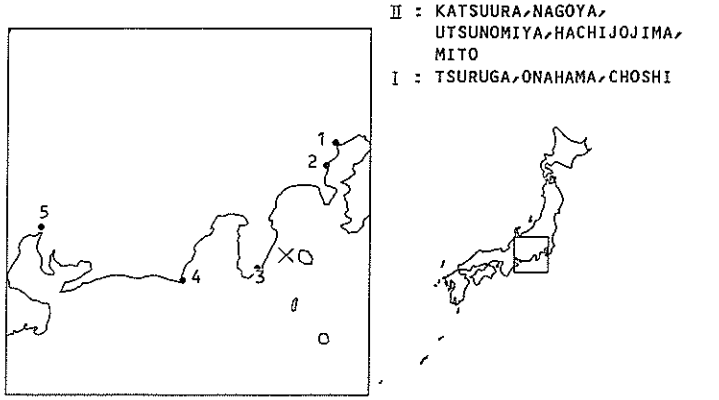
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SHIBUSHI-S	ON GROUND	S-2277	2	2	1	216

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

15:53 FEB. 20,1990
NEAR IZU-OSHIMA ISLAND
EPICENTER : 34°45.6'N 139°14.0'E
DEPTH : 5.8KM MAGNITUDE : 6.5

JMA INTENSITIES

Ⅳ : TOKYO,YOKOHAMA,TATEYAMA,
OSHIMA,IROZAKI
Ⅲ : CHIBA,OMAEZAKI,AJIRO
Ⅱ : KATSUURA,NAGOYA,
UTSUNOMIYA,HACHIJOJIMA,
MITO
Ⅰ : TSURUGA,ONAHAMA,CHOSHI

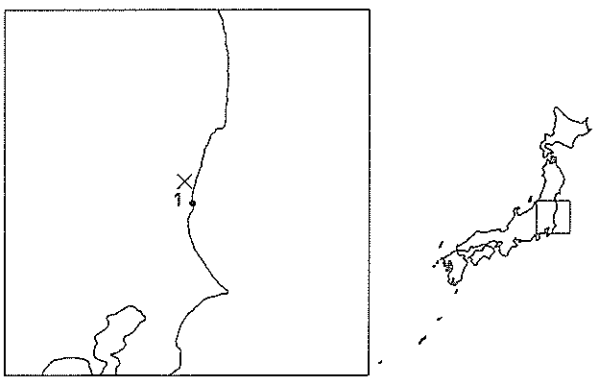


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SHINAGAWA-MB	IN GROUND	M-1305	3	2	3	107
1	SHINAGAWA-S	ON GROUND	S-2278	6	6	3	107
2	YAMASHITA-FR	ON STRUC.	F- 353	56	66	10	85
2	YAMASHITA-F	ON GROUND	F- 352	26	23	11	85
2	YAMASHITA-FB	IN GROUND	F- 351	10	8	7	85
2	KEIHIN-JI-S	ON GROUND	S-2279	22	23	8	85
3	SHIMODA-F	ON GROUND	F- 407	43	25	24	27
4	OMAEZAKI-M	ON GROUND	M-1304	25	19	8	94
5	INAE-SANBASHI-M	ON STRUC.	M-1307		13		218
5	INAE-S	ON STRUC.	S-2283	3	5	1	218
5	INAE-YAITA-M	ON STRUC.	M-1308	10	13		218

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

06:41 FEB. 22,1990
NORTHERN IBARAKI PREF
EPICENTER : 36°33.2'N 140°33.7'E
DEPTH : 56.4KM MAGNITUDE : 3.7

JMA INTENSITIES
Ⅲ : MITO
Ⅱ : KAKIOKA
Ⅰ : UTSUNOMIYA

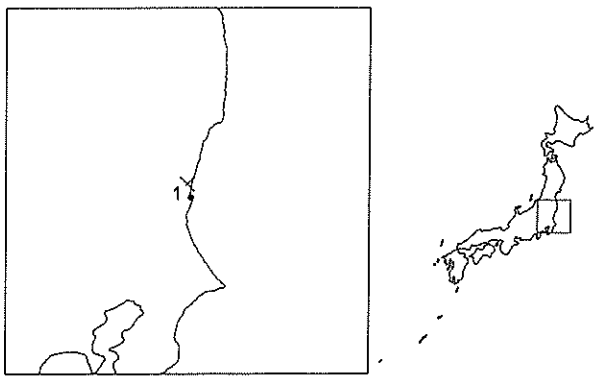


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 341	15	14	15	19

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

05:41 FEB. 23,1990
NORTHERN IBARAKI PREF
EPICENTER : 36°29.4'N 140°35.6'E
DEPTH : 53.3KM MAGNITUDE : 3.8

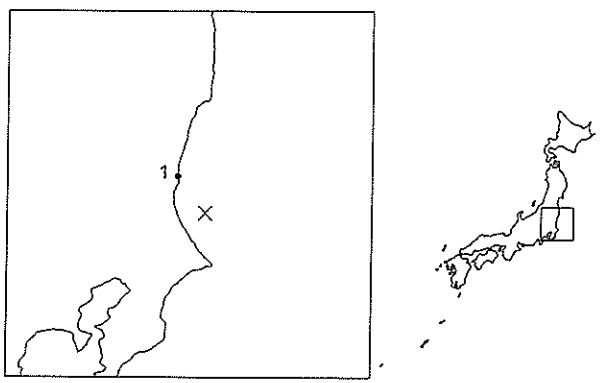
JMA INTENSITIES
Ⅲ : MITO
Ⅱ : KAKIOKA
Ⅰ : UTSUNOMIYA



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 342	22	25	21	11

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

10:35 FEB. 24,1990
E OFF IBARAKI PREF
EPICENTER : 36°5.9 'N 140°50.5'E
DEPTH : 85.7KM MAGNITUDE :



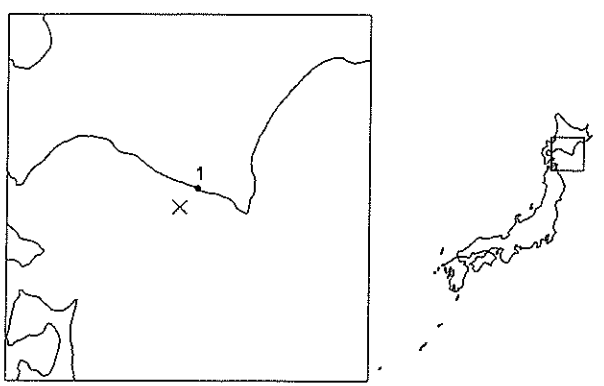
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 343	8	9	4	37

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

19:30 FEB. 25,1990
S OFF URAKAWA
EPICENTER : 42°2.3 'N 142°34.6'E
DEPTH : 71.7KM MAGNITUDE : 4.0

JMA INTENSITIES

I : URAKAWA



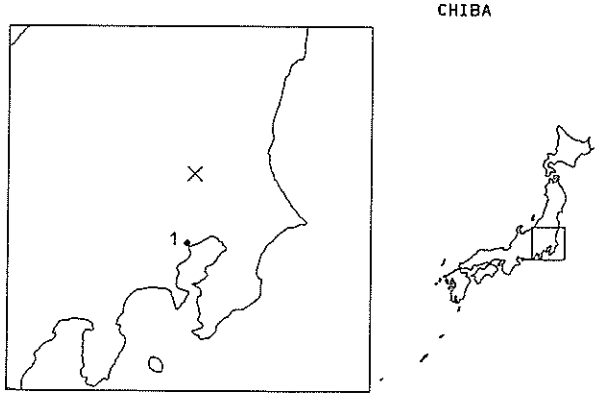
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2280	2	1	1	21

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

00:07 MAR. 3 ,1990
SW IBARAKI PREF
EPICENTER : 36°8.3 'N 139°52.2'E
DEPTH : 59.5KM MAGNITUDE : 4.3

JMA INTENSITIES

Ⅲ : KAKIOKA,UTSUNOMIYA
Ⅱ : MITO,TOKYO,NIKKO
I : SHIRAKAWA,YOKOHAMA,
CHIBA



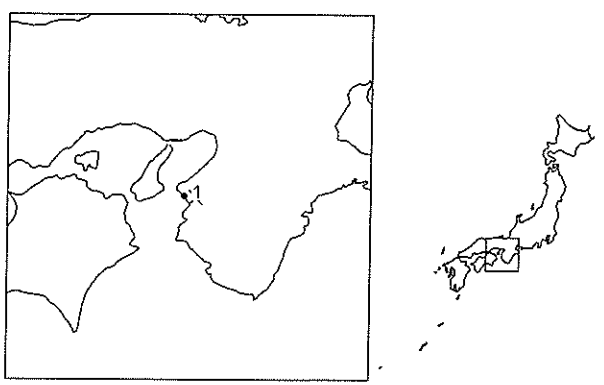
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SHINAGAWA-MB	IN GROUND	M-1306	1	1	1	58
1	SHINAGAWA-S	ON GROUND	S-2281	6	6	3	58

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

14:03 MAR. 11,1990
NW WAKAYAMA PREF
EPICENTER : 34°12.2'N 135°15.2'E
DEPTH : 9.1KM MAGNITUDE : 4.3

JMA INTENSITIES

Ⅲ : WAKAYAMA
Ⅱ : KOBE,SUMOTO
I : OWASE



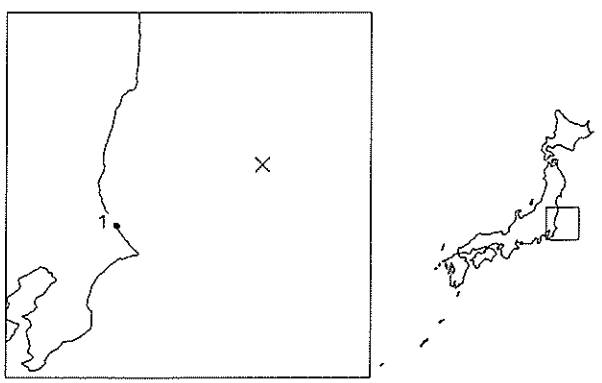
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-S	ON GROUND	S-2282	38	28	8	9

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

13:34 APR. 8 ,1990
FAR E OFF IBARAKI PREF
EPICENTER : 36°17.5'N 142°3.7 'E
DEPTH : 20.7KM MAGNITUDE : 5.0

JMA INTENSITIES

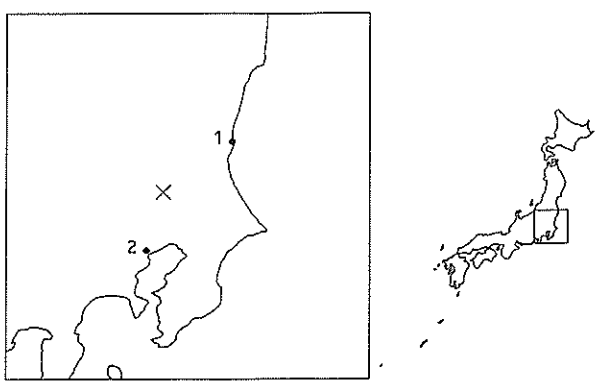
Ⅱ : MITO
Ⅰ : FUKUSHIMA,CHIBA,ONAHAMA,
CHOSHI,KAKIOKA



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KASHIMA-ZOKAN-S	ON GROUND	S-2286	6	3	2	129

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

00:52 APR. 9 ,1990
SW IBARAKI PREF
EPICENTER : 36°3.4 'N 139°57.0'E
DEPTH : 55.5KM MAGNITUDE : 4.6



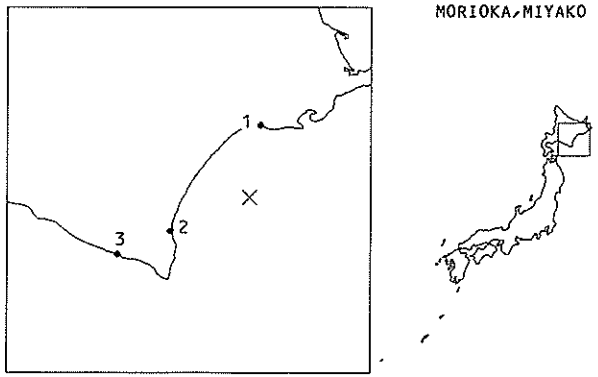
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 344	52	40	13	70
2	SHINAGAWA-MB	IN GROUND	M-1311	3	2	2	51
2	SHINAGAWA-S	ON GROUND	S-2287	8	10	4	51

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

16:53 APR. 11,1990
SE OFF TOKACHI
EPICENTER : 42°28.6'N 144°9.9 'E
DEPTH : 69.4KM MAGNITUDE : 5.6

JMA INTENSITIES

Ⅳ : KUSHIRO
Ⅲ : OBIHIRO,HIROO
Ⅱ : NEMURO,HACHINOHE
Ⅰ : URAKAWA,TOMAKOMAI,
MORIOKA,MIYAKO



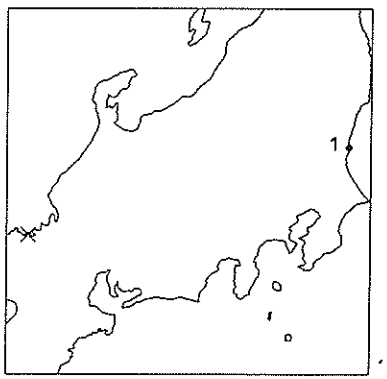
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KUSHIRO-JI-S	ON GROUND	S-2284	15	26	3	59
2	TOKACHI-M	ON GROUND	M-1310	49	61	21	72
3	URAKAWA-S	ON GROUND	S-2285	4	4	2	119

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

05:51 APR. 12,1990
WESTERN FUKUI PREF
EPICENTER : 35°31.0'N 135°38.5'E
DEPTH : 367.9KM MAGNITUDE : 6.4

JMA INTENSITIES

Ⅱ : MITO,UTSUNOMIYA,ONAHAMA,
MIYAKO
Ⅰ : TOKYO,YOKOHAMA,TATEYAMA,
MIYAKEJIMA

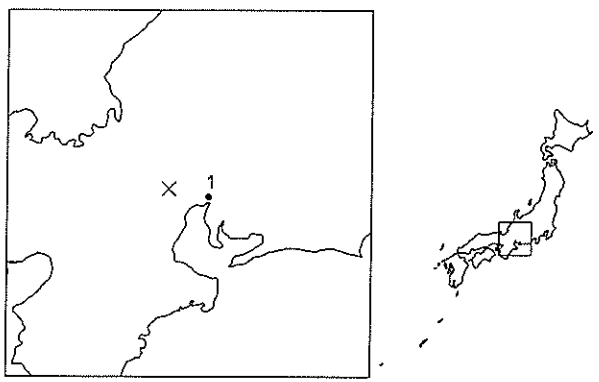


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 357	6	7	3	458

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

13:01 APR. 13,1990
SHIGA GIFU BORDER REGION
EPICENTER : 35°9.2 'N 136°30.8'E
DEPTH : 39.6KM MAGNITUDE : 4.4

JMA INTENSITIES
II : YOKKAICHI,KYOTO,NAGOYA
I : OSAKA

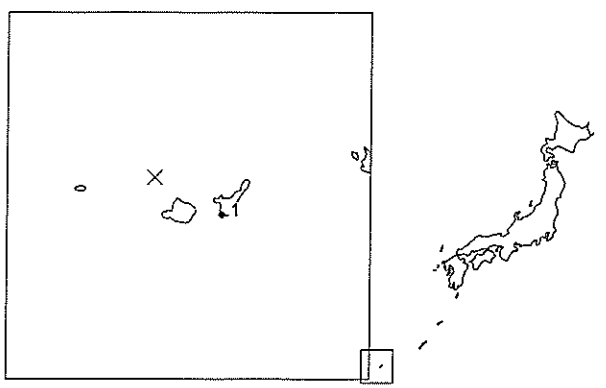


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	INAE-SANBASHI-M	ON STRUC.	M-1312		11		33
1	INAE-S	ON STRUC.	S-2288	3	3	3	33
1	INAE-YAITA-M	ON STRUC.	M-1313	7	12		33

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

11:24 APR. 25,1990
NW OFF ISHIGAKIJIMA IS
EPICENTER : 24°34.0'N 123°35.6'E
DEPTH : 7.0KM MAGNITUDE : 5.1

JMA INTENSITIES
IV : IRIOMOTEJIMA
III : ISHIGAKIJIMA



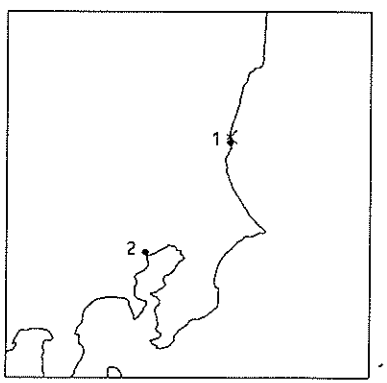
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	ISHIGAKI-S	ON GROUND	S-2290	8		3	62

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

16:45 MAY 3 ,1990
NORTHERN IBARAKI PREF
EPICENTER : 36°26.0'N 140°36.8'E
DEPTH : 58.0KM MAGNITUDE : 5.2

JMA INTENSITIES

Ⅳ : MITO
Ⅲ : TOKYO,CHOSHI,ONAHAMA,
UTSUNOMIYA
Ⅱ : CHIBA,YOKOHAMA,MIYAKO
Ⅰ : FUKUSHIMA,OSHIMA,
TATEYAMA,KANAZAWA



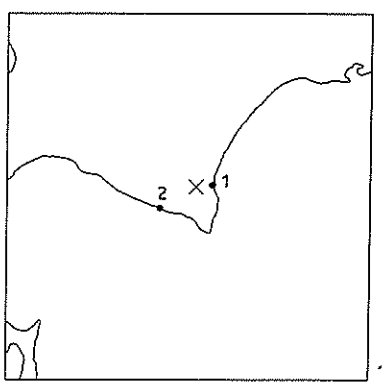
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 358	78	109	50	5
2	SHINAGAWA-MB	IN GROUND	M-1314	2	1	1	118

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

07:19 MAY 8 ,1990
HIDAKA MOUNTAINS REGION
EPICENTER : 42°17.5'N 143°9.6 'E
DEPTH : 65.9KM MAGNITUDE : 4.3

JMA INTENSITIES

Ⅲ : HIROO
Ⅱ : URAKAWA



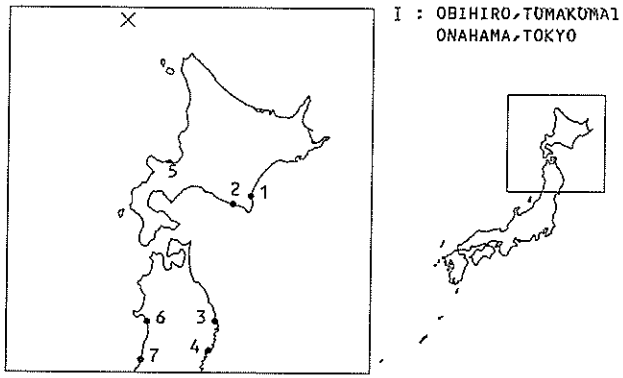
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	TOKACHI-M	ON GROUND	M-1315	14	16	7	13
2	URAKAWA-S	ON GROUND	S-2289	5	3	1	34

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

13:50 MAY 12,1990
SOUTH SAKHALIN
EPICENTER : 49°15.7'N 142°13.7'E
DEPTH : 594.3KM MAGNITUDE : 7.8

JMA INTENSITIES

Ⅲ : URAKAWA,KUSHIRO,
HACHINOHE
Ⅱ : OTARU,HIROO,MIYAKO,
SAKATA,YOKOHAMA
Ⅰ : OBIHIRO,TOMAKOMAI,
ONAHAMA,TOKYO



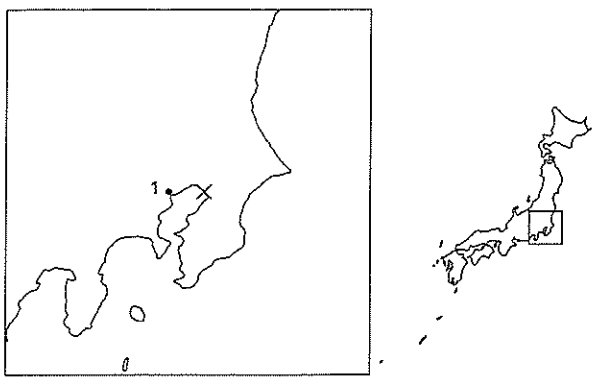
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	TOKACHI-M	ON GROUND	M-1316	5	7	10	779
2	URAKAWA-S	ON GROUND	S-2291	1	1	1	790
3	MIYAKO-S	ON GROUND	S-2293	5	4	3	1069
4	OFUNATO-MOUND-M	ON STRUC.	M-1318	5	4	4	1139
4	OFUNATO-BO-S	ON STRUC.	S-2297	6	8	2	1139
4	OFUNATO-MOUND-M	ON STRUC.	M-1317	5	3	4	1139
4	OFUNATO-BO-S	ON STRUC.	S-2295	10	9	3	1139
4	OFUNATO-BOCHI-S	ON GROUND	S-2296	1	1	1	1140
4	OFUNATO-BOCHI-S	ON GROUND	S-2294	3	1	3	1140
5	OTARU-S	ON GROUND	S-2292	1	2	2	682
6	AKITA-S	ON GROUND	S-2309	2	3	3	1071
7	SAKATA-S	ON GROUND	S-2310	1	2	2	1164

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

17:14 MAY 14,1990
CENTRAL CHIBA PREF
EPICENTER : 35°36.5'N 140°4.7 'E
DEPTH : 81.3KM MAGNITUDE : 4.2

JMA INTENSITIES

Ⅰ : TOKYO,AJIRO,CHIBA



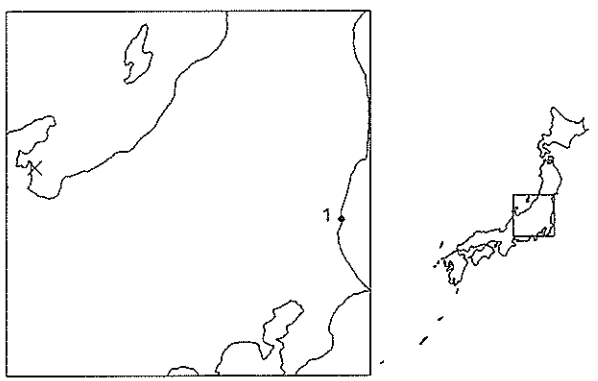
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SHINAGAWA-MB	IN GROUND	M-1320	1	1	1	28
1	SHINAGAWA-S	ON GROUND	S-2300	5	4	3	28

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

10:04 MAY 17,1990
TOYAMA BAY REGION
EPICENTER : 37°2.9 'N 137°6.3 'E
DEPTH : 271.9KM MAGNITUDE : 5.8

JMA INTENSITIES

II : MIYAKO,MITO,YOKOHAMA
I : CHOSHI,TOKYO,TATEYAMA,
OSHIMA,KUSHIRO



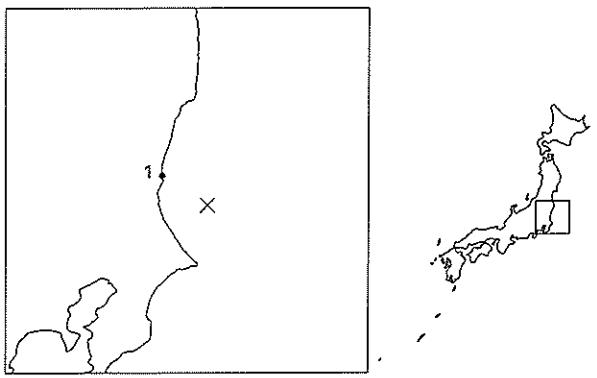
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 359	6	7	3	321

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

15:14 MAY 28,1990
E OFF IBARAKI PREF
EPICENTER : 36°8.6 'N 141°0.1 'E
DEPTH : 37.9KM MAGNITUDE : 3.6

JMA INTENSITIES

I : MITO



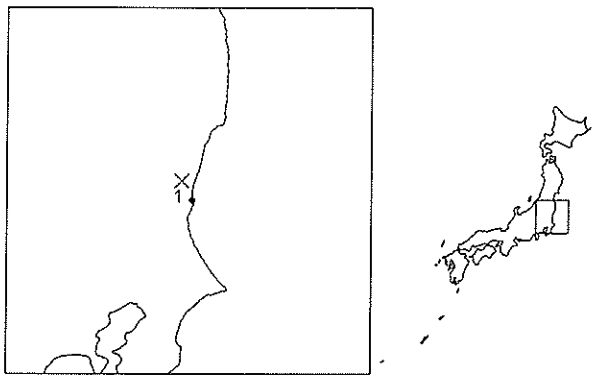
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 360	15	17	7	43

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

23:23 MAY 29,1990
NORTHERN IBARAKI PREF
EPICENTER : 36°32.5'N 140°32.0'E
DEPTH : 51.5KM MAGNITUDE : 4.1

JMA INTENSITIES

Ⅱ : MITO,UTSUNOMIYA,KAKIOKA
Ⅰ : TOKYO,ONAHAMA,SHIRAKAWA



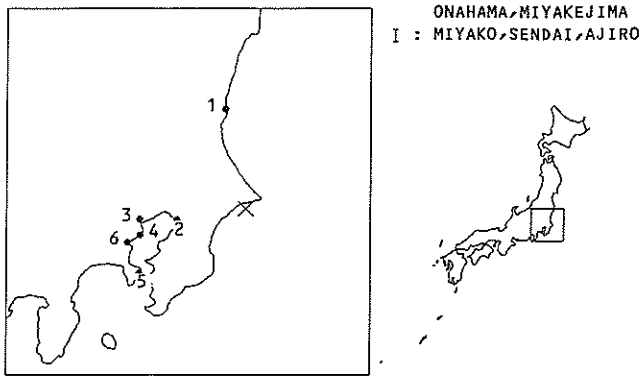
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 361	37	93	19	18

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

10:22 JUNE 1 ,1990
NEAR CHOSHI CITY
EPICENTER : 35°38.5'N 140°43.8'E
DEPTH : 59.3KM MAGNITUDE : 6.0

JMA INTENSITIES

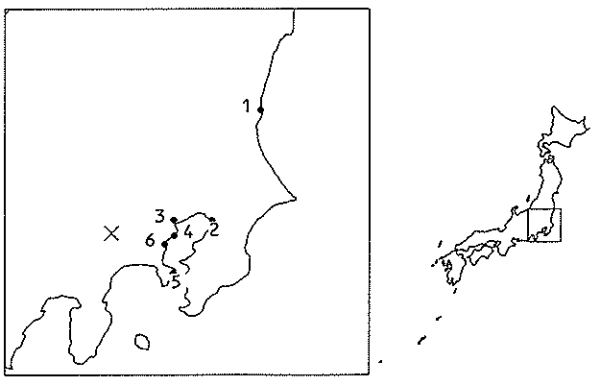
Ⅳ : CHOSHI,CHIBA
Ⅲ : MITO,UTSUNOMIYA,
YOKOHAMA,TOKYO
Ⅱ : OSHIMA,FUKUSHIMA,
ONAHAMA,MIYAKEJIMA
Ⅰ : MIYAKO,SENDAI,AJIRO



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 362	20	17	9	83
2	CHIBA-S	ON GROUND	S-2301	14	15	6	56
3	SHINAGAWA-MB	IN GROUND	M-1319	3	3	2	87
3	SHINAGAWA-S	ON GROUND	S-2299	8	8	3	87
4	KAWASAKI-FR	ON STRUC.	F- 347	10	11	3	89
4	KAWASAKI-F	ON GROUND	F- 346	9	9	4	89
4	KAWASAKI-FB	IN GROUND	F- 345	3	3	2	89
5	KOKEN-S	ON GROUND	S-2298	6	6	3	102
6	KEIHIN-JI-S	ON GROUND	S-2302	6	8	3	101

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

22:42 JUNE 5 ,1990
KANAGAWA PREF
EPICENTER : 35°33.2'N 139°11.8'E
DEPTH : 122.8KM MAGNITUDE : 5.4

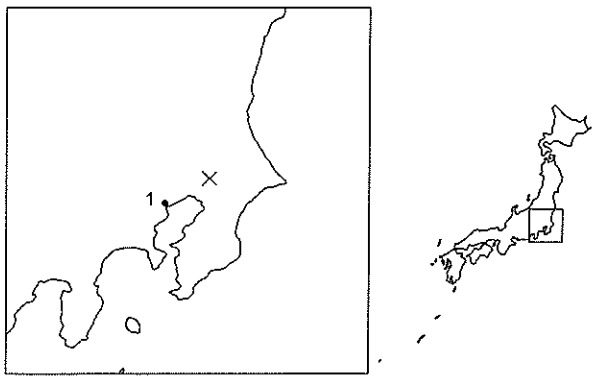


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 363	7	7	4	157
2	CHIBA-S	ON GROUND	S-2304	4	4	2	82
3	SHINAGAWA-MB	IN GROUND	M-1321	2	2	2	51
3	SHINAGAWA-S	ON GROUND	S-2306	6	5	3	51
4	KAWASAKI-FR	ON STRUC.	F- 350	21	31	7	51
4	KAWASAKI-F	ON GROUND	F- 349	14	14	7	51
4	KAWASAKI-FB	IN GROUND	F- 348	8	8	2	51
5	KOKEN-S	ON GROUND	S-2303	3	4	2	60
6	YAMASHITA-FR	ON STRUC.	F- 356	11	16	3	44
6	YAMASHITA-F	ON GROUND	F- 355	7	7	4	44
6	YAMASHITA-FB	IN GROUND	F- 354	3	2	2	44
6	KEIHIN-JI-S	ON GROUND	S-2305	6	5	1	40

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

22:05 JUNE 15,1990
NORTHERN CHIBA PREF
EPICENTER : 35°47.1'N 140°10.7'E
DEPTH : 77.5KM MAGNITUDE : 4.2

JMA INTENSITIES
Ⅱ : TOKYO
Ⅰ : UTSUNOMIYA,MITO,
YOKOHAMA,CHIBA



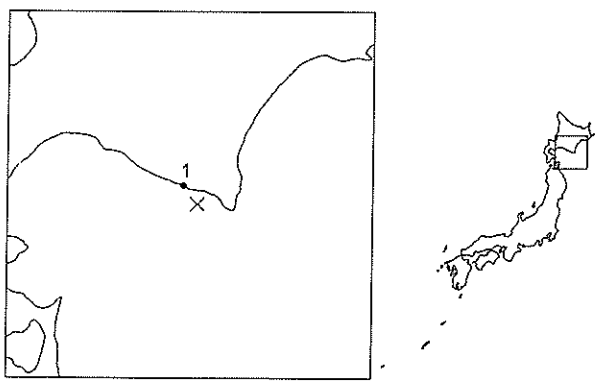
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SHINAGAWA-MB	IN GROUND	M-1322	1			41
1	SHINAGAWA-S	ON GROUND	S-2307	2	3	2	41

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

20:49 JUNE 20,1990
S OFF URAKAWA
EPICENTER : 42°0.9 'N 142°53.8'E
DEPTH : 44.0KM MAGNITUDE : 4.4

JMA INTENSITIES

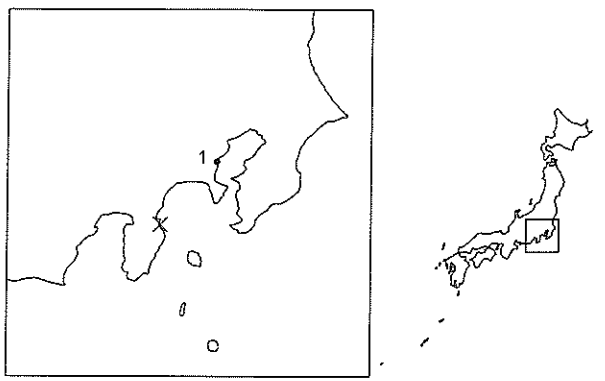
Ⅲ : URAKAWA
Ⅰ : HIROO



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2308	11	12	3	19

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

06:54 JUNE 27,1990
E OFF IZU PENINSULA
EPICENTER : 35°0.1 'N 139°7.0 'E
DEPTH : 148.0KM MAGNITUDE : 5.4



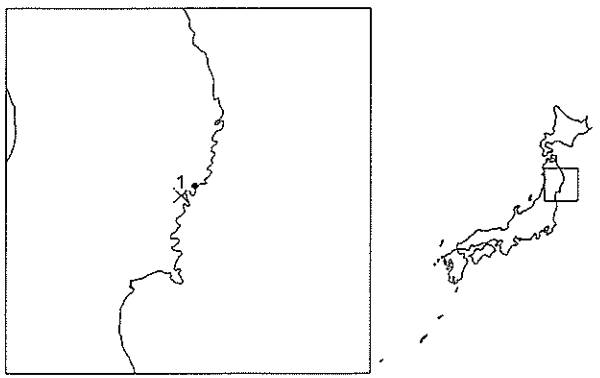
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	YAMASHITA-FR	ON STRUC.	F- 369	5	10	2	70
1	YAMASHITA-F	ON GROUND	F- 368	4	6	3	70
1	YAMASHITA-FB	IN GROUND	F- 367	1	1	1	70

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

08:25 JUNE 29,1990
NORTHERN MIYAGI PREF
EPICENTER : 38°57.4'N 141°35.8'E
DEPTH : 69.6KM MAGNITUDE : 3.9

JMA INTENSITIES

II : OFUNATO,MIYAKO
I : MORIOKA



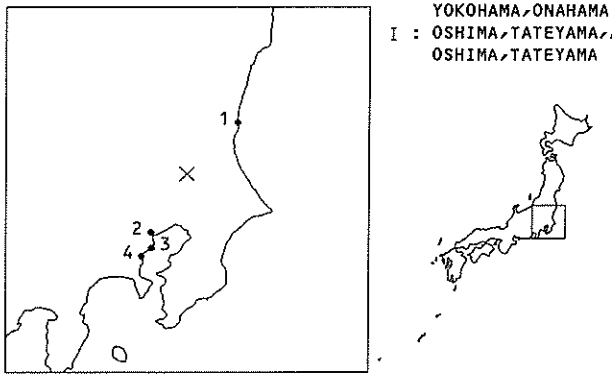
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	OFUNATO-MOUND-M	ON STRUC.	M-1323	5	2	3	13
1	OFUNATO-BO-S	ON STRUC.	S-2312	3	5	1	13

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

03:32 JULY 4 ,1990
SOUTHERN IBARAKI PREF
EPICENTER : 36°2.4 'N 140°7.2 'E
DEPTH : 76.0KM MAGNITUDE : 5.1

JMA INTENSITIES

III : MITO,UTSUNOMIYA,KAKIOKA,
MITO,UTSUNOMIYA,KAKIOKA
II : TOKYO,CHIBA,YOKOHAMA,
ONAHAMA,TOKYO,CHIBA,
YOKOHAMA,ONAHAMA
I : OSHIMA,TATEYAMA,AJIRO,
OSHIMA,TATEYAMA



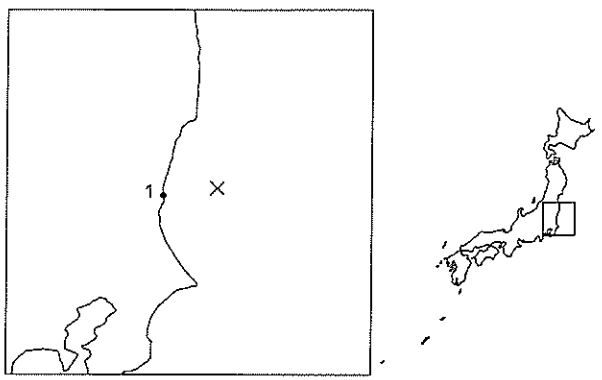
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 379	18	19	8	58
2	SHINAGAWA-MB	IN GROUND	M-1327	1	2	1	56
2	SHINAGAWA-S	ON GROUND	S-2316	6	6	3	56
3	KAWASAKI-FR	ON STRUC.	F- 366	8	15	3	67
3	KAWASAKI-F	ON GROUND	F- 365	6	10	3	67
3	KAWASAKI-FB	IN GROUND	F- 364	3	3	1	67
4	YAMASHITA-FR	ON STRUC.	F- 372	5	7	2	77
4	YAMASHITA-F	ON GROUND	F- 371	4	5	3	77
4	YAMASHITA-FB	IN GROUND	F- 370	2	2	1	77
4	KEIHIN-JI-S	ON GROUND	S-2311	1	2	1	78

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

05:45 JULY 7 ,1990
E OFF IBARAKI PREF
EPICENTER : 36°24.6'N 141°7.5 'E
DEPTH : 43.3KM MAGNITUDE : 4.0

JMA INTENSITIES

Ⅱ : MITO
Ⅰ : UTSUNOMIYA,KAKIOKA



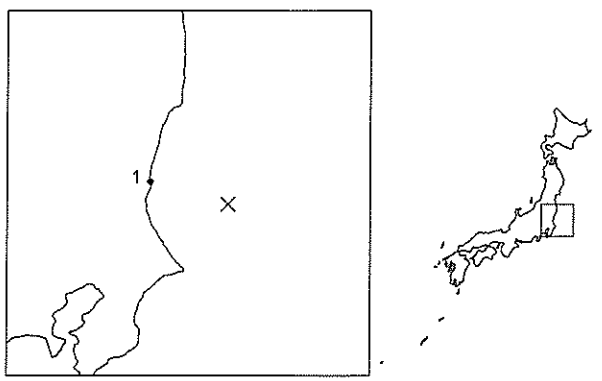
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 380	12	18	7	45

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

19:08 JULY 16,1990
FAR E OFF IBARAKI PREF
EPICENTER : 36°10.3'N 141°19.7'E
DEPTH : 33.6KM MAGNITUDE : 5.0

JMA INTENSITIES

Ⅲ : MITO
Ⅱ : CHOSHI,KAKIOKA



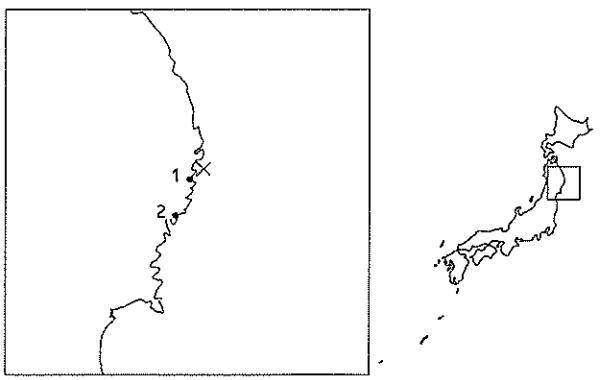
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 381	13	17	5	68

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

21:35 JULY 16,1990
E OFF IWATE PREF
EPICENTER : 39°20.2'N 142°2.7 'E
DEPTH : 52.2KM MAGNITUDE : 4.8

JMA INTENSITIES

Ⅲ : MIYAKO,OFUNATO
Ⅱ : MORIOKA
Ⅰ : HACHINOHE



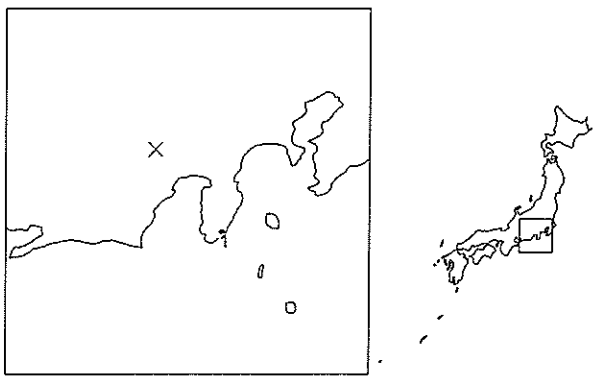
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KAMAISHI-MB	IN GROUND	M-1326	7	9	6	14
1	KAMAISHI-M	ON GROUND	M-1325	18	22	12	14
2	OFUNATO-MOUND-M	ON STRUC.	M-1324	7	6	5	44
2	OFUNATO-BO-S	ON STRUC.	S-2313	8	9	1	44

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

09:59 JULY 23,1990
AKAISHI MOUNTAINS REG
EPICENTER : 35°19.0'N 138°23.0'E
DEPTH : 28.3KM MAGNITUDE : 4.3

JMA INTENSITIES

Ⅱ : SHIZUOKA,MISHIMA
Ⅰ : AJIRO,YOKOHAMA

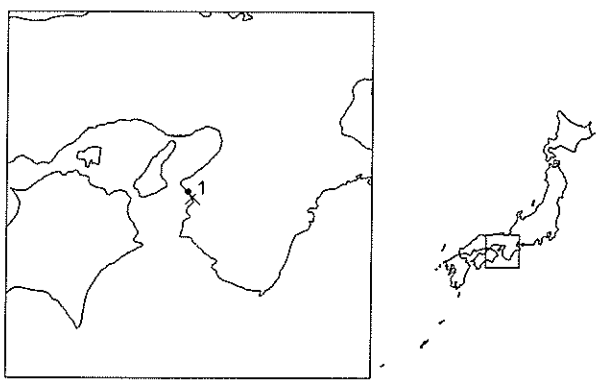


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SHIMODA-F	ON GROUND	F- 408	7	7	4	88

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

20:20 JULY 24,1990
NW WAKAYAMA PREF
EPICENTER : 34°10.4'N 135°11.1'E
DEPTH : 6.0KM MAGNITUDE : 3.5

JMA INTENSITIES
Ⅲ : WAKAYAMA

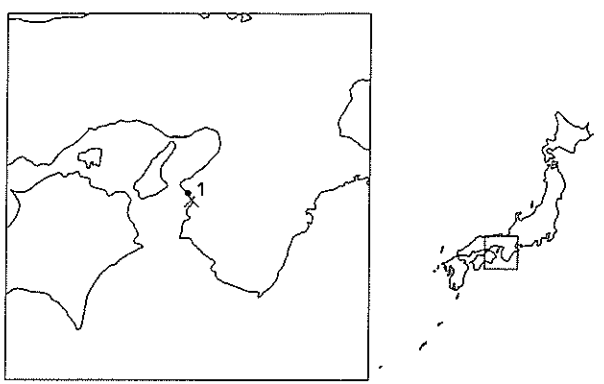


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-S	ON GROUND	S-2315	13	31	10	5

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

21:14 JULY 24,1990
NW WAKAYAMA PREF
EPICENTER : 34°10.0'N 135°10.7'E
DEPTH : 6.2KM MAGNITUDE : 3.7

JMA INTENSITIES
Ⅲ : WAKAYAMA,WAKAYAMA



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-S	ON GROUND	S-2314	11	10	8	5

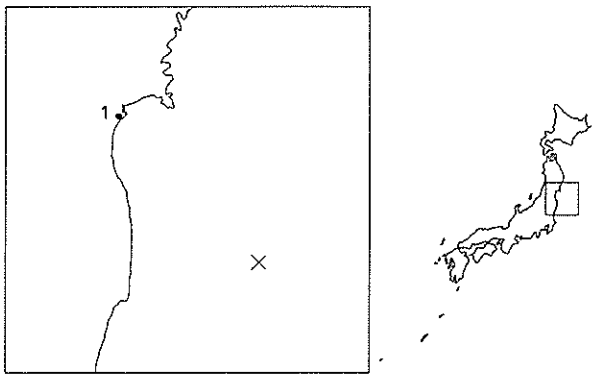
STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

13:00 JULY 28,1990

EPICENTER : 37°7.0 'N 142°13.0'E
DEPTH : 3.0KM MAGNITUDE : 5.2
* JISHIN KAZAN GAIKYO *

JMA INTENSITIES

II : SENDAI,ONAHAMA,
FUKUSHIMA
I : MITO,UTSUNOMIYA,TOKYO



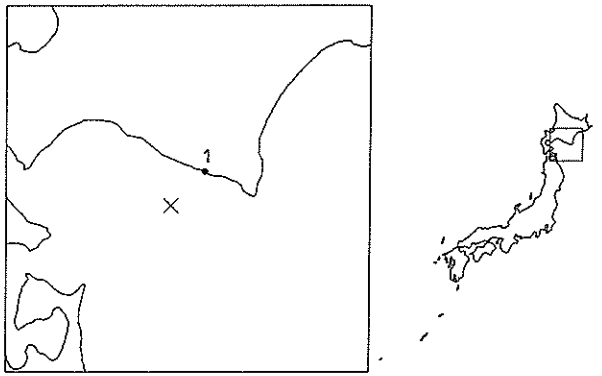
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SENDAI-MB	IN GROUND	M-1329			1	167
1	SENDAI-M	ON GROUND	M-1328	3	5	3	167

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

08:15 JULY 30,1990
S OFF URAKAWA
EPICENTER : 41°56.3'N 142°24.3'E
DEPTH : 69.5KM MAGNITUDE : 4.8

JMA INTENSITIES

II : URAKAWA,HIROO
I : MURORAN,HAKODATE



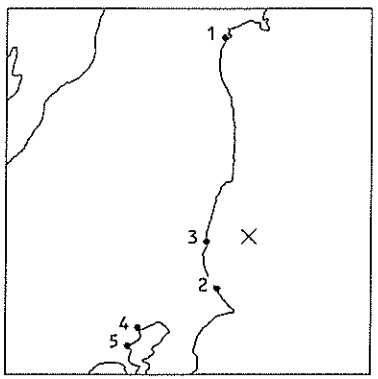
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2317	10	5	3	39

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

12:36 AUG. 5 ,1990
E OFF IBARAKI PREF
EPICENTER : 36°24.1'N 141°6.6 'E
DEPTH : 39.1KM MAGNITUDE : 5.8

JMA INTENSITIES

Ⅳ : MITO,CHOSHI
Ⅲ : FUKUSHIMA,ONAHAMA,
UTSUNOMIYA
Ⅱ : CHIBA,TOKYO,SENDAI,
YOKOHAMA
Ⅰ : TATEYAMA,SAKATA,
KATSUURA



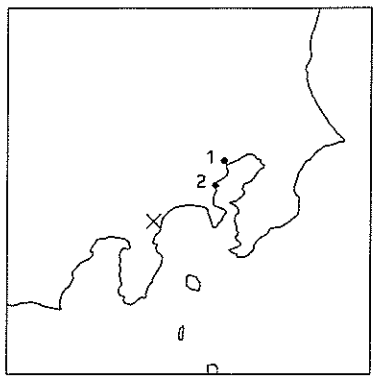
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SENDAI-MB	IN GROUND	M-1331	2	2	1	209
1	SENDAI-M	ON GROUND	M-1330	5	4	1	209
2	KASHIMA-ZOKAN-S	ON GROUND	S-2322	21	16	7	64
3	HITACHINAKA-F	ON GROUND	F- 382	75	83	30	44
4	SHINAGAWA-MB	IN GROUND	M-1332	1	1	1	149
4	SHINAGAWA-S	ON GROUND	S-2318	5	5	2	149
5	KEIHIN-JI-S	ON GROUND	S-2320	1	2	3	169

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

16:13 AUG. 5 ,1990
HAKONE REGION
EPICENTER : 35°12.4'N 139°5.7 'E
DEPTH : 13.6KM MAGNITUDE : 5.1

JMA INTENSITIES

Ⅳ : TATEYAMA
Ⅲ : TOKYO,YOKOHAMA,AJIRO
Ⅱ : UTSUNOMIYA,CHIBA,
MISHIMA
Ⅰ : SHIZUOKA,KAKIOKA



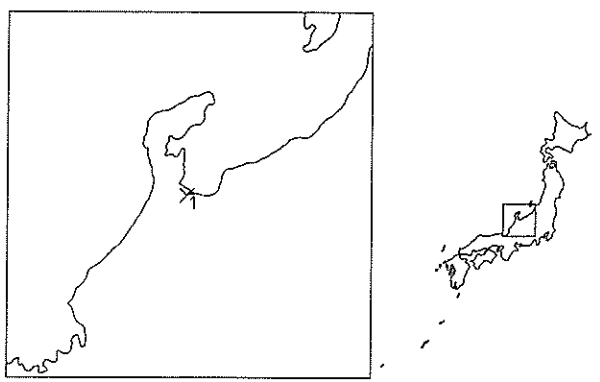
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SHINAGAWA-MB	IN GROUND	M-1333	1	1	2	76
1	SHINAGAWA-S	ON GROUND	S-2319	4	4	2	76
2	YAMASHITA-FR	ON STRUC.	F- 391	15	8	4	58
2	YAMASHITA-F	ON GROUND	F- 390	12	8	4	58
2	YAMASHITA-FB	IN GROUND	F- 389	4	3	2	58
2	KEIHIN-JI-S	ON GROUND	S-2321	4	3	2	56

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

08:16 AUG. 13,1990
TOYAMA PREF
EPICENTER : 36°45.9'N 137°4.5 'E
DEPTH : 4.3KM MAGNITUDE : 3.5

JMA INTENSITIES

Ⅲ : FUSHIKI



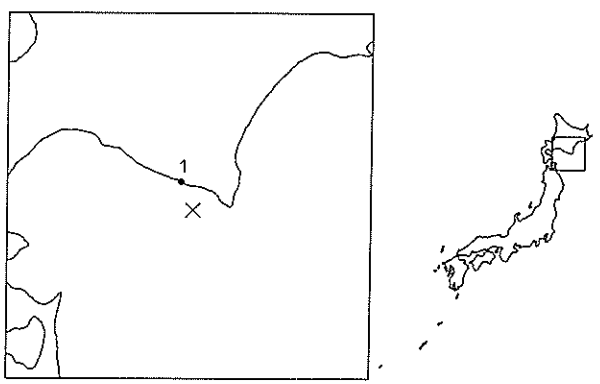
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	TOYAMA-S	ON GROUND	S-2324	5	6	3	3

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

14:45 AUG. 17,1990
S OFF URAKAWA
EPICENTER : 41°56.6'N 142°51.9'E
DEPTH : 54.5KM MAGNITUDE : 3.8

JMA INTENSITIES

Ⅱ : URAKAWA,HIROO



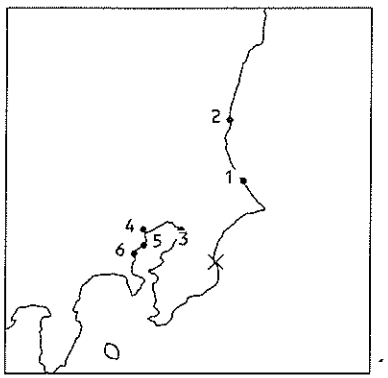
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2323	2	2	1	25

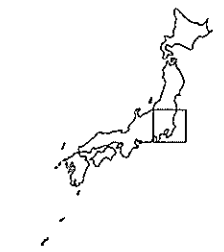
STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

08:47 AUG. 23,1990
KUJUKURI COAST BOSO PEN
EPICENTER : 35°20.7'N 140°23.8'E
DEPTH : 49.9KM MAGNITUDE : 5.4

JMA INTENSITIES

Ⅳ : CHIBA
Ⅲ : TOKYO,TATEYAMA,YOKOHAMA
Ⅱ : MITO,CHOSHI,UTSUNOMIYA,
AJIRO
Ⅰ : HACHIJOJIMA,SHIZUOKA

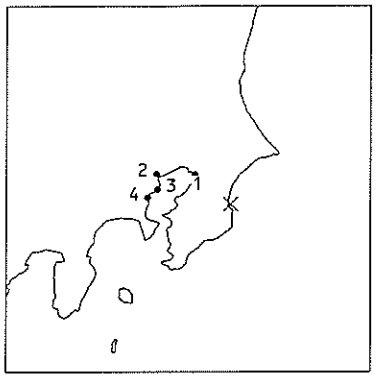




	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KASHIMA-ZOKAN-S	ON GROUND	S-2359	24	22	8	70
2	HITACHINAKA-F	ON GROUND	F- 383	8	7	3	117
3	CHIBA-S	ON GROUND	S-2329	24	35	14	38
4	SHINAGAWA-MB	IN GROUND	M-1334	3	2	2	65
4	SHINAGAWA-S	ON GROUND	S-2325	10	18	4	65
5	KAWASAKI-FR	ON STRUC.	F- 375	39	12	6	60
5	KAWASAKI-F	ON GROUND	F- 374	21	12	9	60
5	KAWASAKI-FB	IN GROUND	F- 373	10	5	2	60
6	YAMASHITA-FR	ON STRUC.	F- 394	33	23	4	67
6	YAMASHITA-F	ON GROUND	F- 393	14	14	6	67
6	YAMASHITA-FB	IN GROUND	F- 392	5	5	2	67
6	KEIHIN-JI-S	ON GROUND	S-2327	5	6	2	70

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

11:44 AUG. 23,1990
KUJUKURI COAST BOSO PEN
EPICENTER : 35°21.5'N 140°24.3'E
DEPTH : 49.5KM MAGNITUDE : 5.2

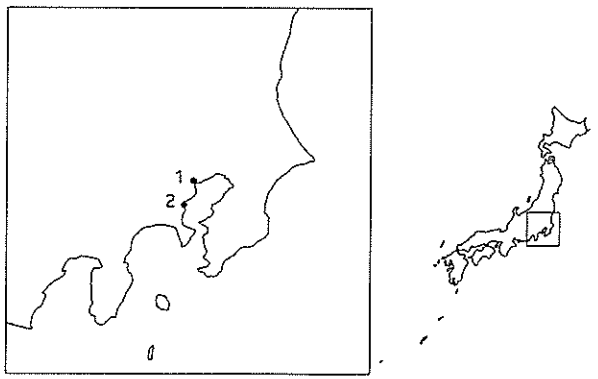


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	CHIBA-S	ON GROUND	S-2330	8	9	4	37
2	SHINAGAWA-MB	IN GROUND	M-1335	2	2	2	65
2	SHINAGAWA-S	ON GROUND	S-2326	6	5	2	65
3	KAWASAKI-FR	ON STRUC.	F- 378	20	7	4	60
3	KAWASAKI-F	ON GROUND	F- 377	13	5	5	60
3	KAWASAKI-FB	IN GROUND	F- 376	5	2	1	60
4	YAMASHITA-FR	ON STRUC.	F- 397	15	26	3	67
4	YAMASHITA-F	ON GROUND	F- 396	8	12	7	67
4	YAMASHITA-FB	IN GROUND	F- 395	3	3	2	67
4	KEIHIN-JI-S	ON GROUND	S-2328	2	2	1	70

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

22:11 AUG. 24,1990
TOKYO PREF
EPICENTER : 35°39.7'N 139°38.9'E
DEPTH : 41.9KM MAGNITUDE : 3.7

JMA INTENSITIES
I : TOKYO

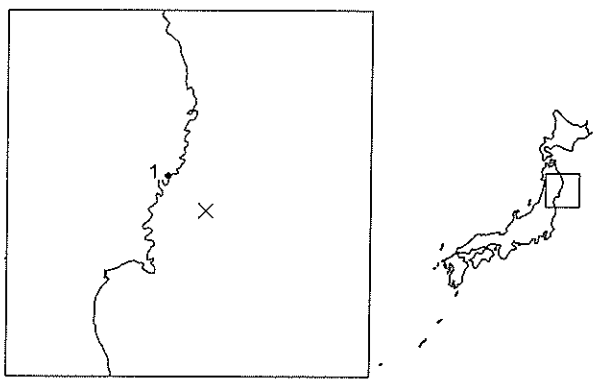


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SHINAGAWA-MB	IN GROUND	M-1344	1	1	1	11
1	SHINAGAWA-S	ON GROUND	S-2339	6	5	3	11
2	YAMASHITA-FR	ON STRUC.	F- 400	11	5	3	24
2	YAMASHITA-F	ON GROUND	F- 399	7	3	3	24
2	YAMASHITA-FB	IN GROUND	F- 398	2	1	1	24

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

14:45 SEP. 5 ,1990
E OFF MIYAGI PREF
EPICENTER : 38°44.4'N 142°4.0 'E
DEPTH : 62.3KM MAGNITUDE : 4.3

JMA INTENSITIES
Ⅲ : OFUNATO
Ⅱ : MIYAKO,MORIOKA
Ⅰ : ISHINOMAKI



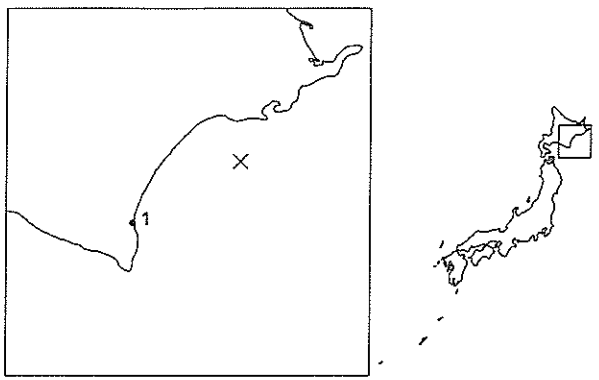
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	OFUNATO-MOUND-M	ON STRUC.	M-1336	5	3	3	41
1	OFUNATO-BO-S	ON STRUC.	S-2331	2	5	1	41
1	OFUNATO-BOCHI-S	ON GROUND	S-2332	1	1	1	41

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

14:04 SEP. 15,1990
SE OFF TOKACHI
EPICENTER : 42°39.2'N 144°28.1'E
DEPTH : 70.3KM MAGNITUDE : 4.8

JMA INTENSITIES

Ⅲ : KUSHIRO
Ⅱ : OBIHIRO,HIROO
Ⅰ : NEMURO,HACHINOHE



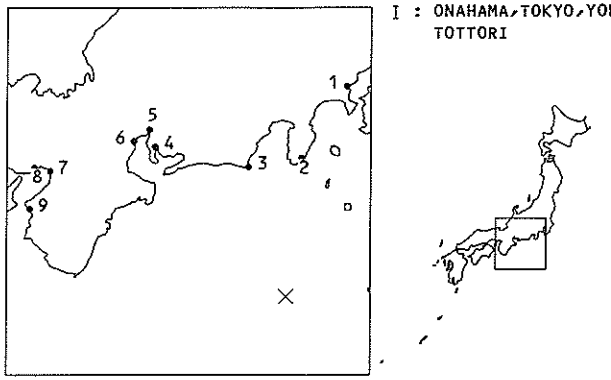
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	TOKACHI-M	ON GROUND	M-1337	7	5	4	102

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

06:13 SEP. 24,1990
FAR S OFF TOKAI DISTRICT
EPICENTER : 33°6.2 'N 138°38.0'E
DEPTH : 60.0KM MAGNITUDE : 6.6

JMA INTENSITIES

Ⅲ : HACHIJOJIMA,YOKKAICHI, OSAKA
Ⅱ : NAGOYA,TATEYAMA,TSURUGA, OMAEZAKI
Ⅰ : ONAHAMA,TOKYO,YOKOHAMA, TOTTORI



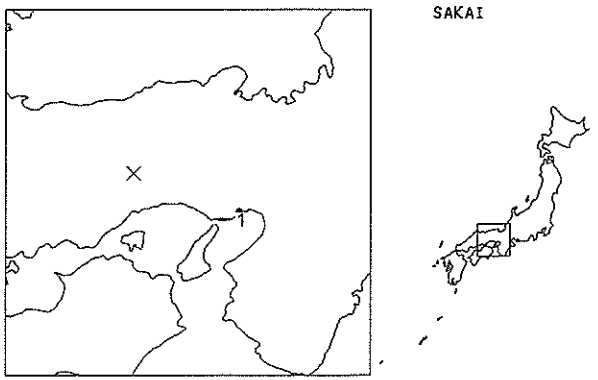
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KEIHIN-JI-S	ON GROUND	S-2340	2	3	4	277
2	SHIMODA-F	ON GROUND	F- 409	5	5	5	176
3	OMAEZAKI-M	ON GROUND	M-1338	6	7	3	171
4	KINUURA-JI-S	ON GROUND	S-2337	18	16	7	251
5	INAE-SANBASHI-M	ON STRUC.	M-1347	22	24		272
5	INAE-S	ON STRUC.	S-2344	6	8	5	272
5	INAE-YAITA-M	ON STRUC.	M-1348	13	22		273
5	NAGOYA-ZOKAN-S	ON GROUND	S-2345	6	8	5	273
6	YOKKA.-DAI2-M	ON STRUC.	M-1340		26		275
6	YOKKA.-CHITOSE-S	ON GROUND	S-2334	9	9	5	275
6	YOKKA.-SEKITAN-M	ON STRUC.	M-1339	37	37		275
7	OSAKA-JI-S	ON GROUND	S-2338	8	9	6	340
8	KOBE-MAYA-DAI2-M	ON STRUC.	M-1342	12	22		360
8	KOBE-MAYA-M	ON GROUND	M-1343	1	1		360
8	KOBE-MAYA-DAI1-M	ON STRUC.	M-1341	21	23		360
8	KOBE-DAI8-S	ON STRUC.	S-2336	6	6	3	361
8	KOBE-DAI6-S	ON STRUC.	S-2335	6	6	6	361
9	WAKAYAMA-S	ON GROUND	S-2333	13	11	6	345

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

07:57 SEP. 29,1990
SW HYOGO PREF
EPICENTER : 34°59.5'N 134°17.3'E
DEPTH : 11.4KM MAGNITUDE : 5.2

JMA INTENSITIES

Ⅲ : TOYOOKA,HIMEJI
Ⅱ : KOCHI,OKAYAMA,OSAKA,MATSUE
Ⅰ : TAKAMATSU,KYOTO,KOBE,SAKAI



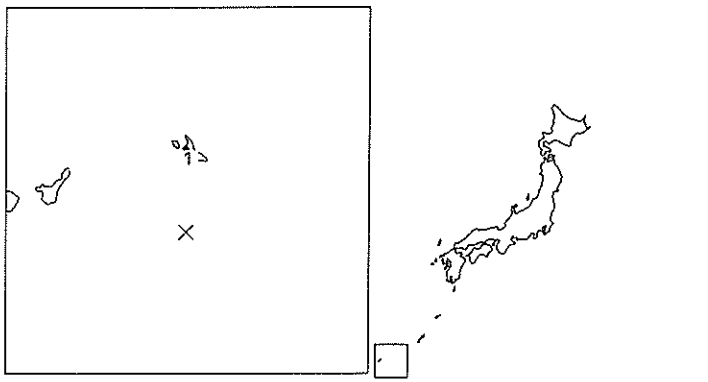
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KOBE-MAYA-DAI2-M	ON STRUC.	M-1345	7	19		92

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

04:05 OCT. 1 ,1990
NEAR MIYAKOJIMA ISLAND
EPICENTER : 24°11.1'N 125°19.6'E
DEPTH : 45.0KM MAGNITUDE : 6.1

JMA INTENSITIES

Ⅲ : ISHIGAKIJIMA,MIYAKOJIMA



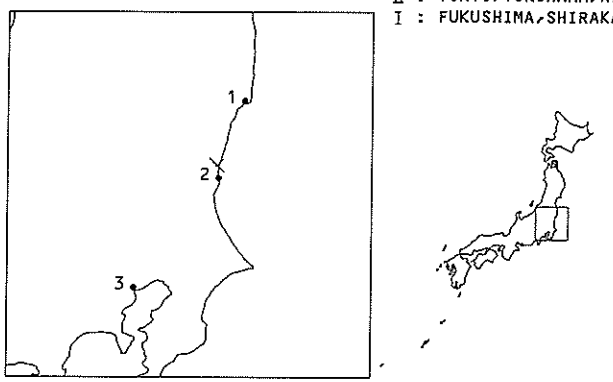
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HIRARA-S	ON GROUND	S-2341	13	14	8	68

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

23:33 OCT. 6 ,1990
NORTHERN IBARAKI PREF
EPICENTER : 36°29.1'N 140°36.8'E
DEPTH : 50.8KM MAGNITUDE : 5.0

JMA INTENSITIES

Ⅳ : MITO
Ⅲ : CHIBA,UTSUNOMIYA,CHOSHI,
ONAHAMA
Ⅱ : TOKYO,YOKOHAMA,NIKKO
Ⅰ : FUKUSHIMA,SHIRAKAWA



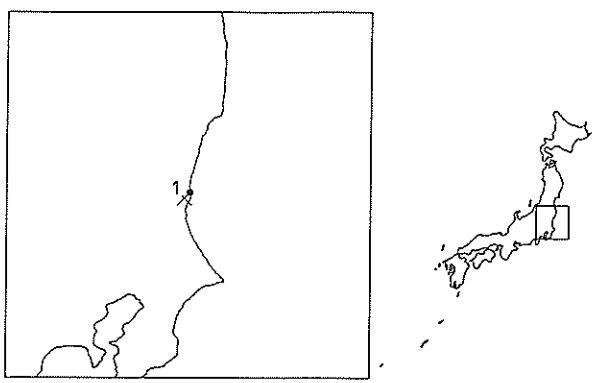
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	ONAHAMA-JI-S	ON GROUND	S-2343	31	28	22	57
2	HITACHINAKA-F	ON GROUND	F- 384	142	178	71	10
3	SHINAGAWA-MB	IN GROUND	M-1346	1	1	1	122
3	SHINAGAWA-S	ON GROUND	S-2342	6	8	5	122

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

20:27 OCT. 24,1990
NORTHERN IBARAKI PREF
EPICENTER : 36°20.8'N 140°33.6'E
DEPTH : 99.5KM MAGNITUDE : 4.6

JMA INTENSITIES

Ⅱ : SHIRAKAWA,MITO
Ⅰ : ONAHAMA,UTSUNOMIYA



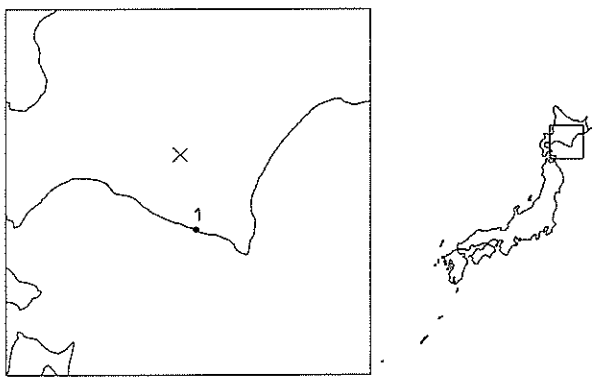
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 385	27	21	12	6

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

06:20 NOV. 1 ,1990
HIDAKA MOUNTAINS REGION
EPICENTER : 42°43.7'N 142°42.1'E
DEPTH : 99.2KM MAGNITUDE : 4.5

JMA INTENSITIES

I : OBIHIRO,URAKAWA,KUSHIRO



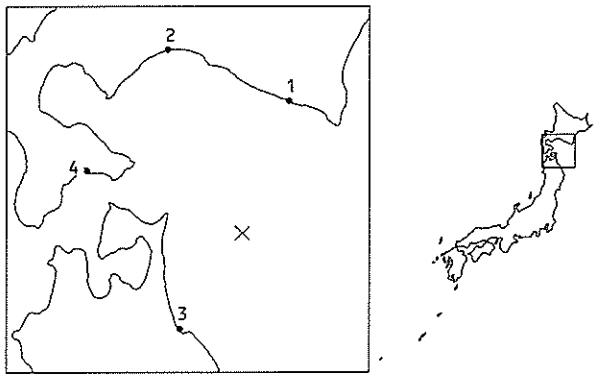
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2347	3	3	2	63

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

21:50 NOV. 2 ,1990
E OFF AOMORI PREF
EPICENTER : 41°13.2'N 142°11.3'E
DEPTH : 71.9KM MAGNITUDE : 5.7

JMA INTENSITIES

Ⅲ : MURORAN,TOMAKOMAI, HACHINOHE
Ⅱ : HAKODATE,OBIHIRO
I : URAKAWA,KUSHIRO,OFUNATO



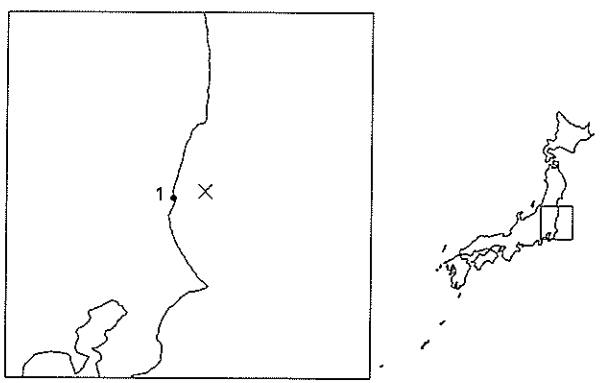
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2348	6	6	5	115
2	TOMAKOMAI-S	ON GROUND	S-2346	8	6	3	163
3	HACHINOHE-JI-S	ON GROUND	S-2349	22	18	8	94
4	HAKODATE-FR	ON STRUC.	F- 388	8	8	3	136
4	HAKODATE-F	ON GROUND	F- 387	9	11	5	136
4	HAKODATE-FB	IN GROUND	F- 386	6	5	3	136

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

03:57 NOV. 14,1990
E OFF IBARAKI PREF
EPICENTER : 36°25.1'N 140°55.0'E
DEPTH : 36.6KM MAGNITUDE : 3.6

JMA INTENSITIES

Ⅱ : MITO



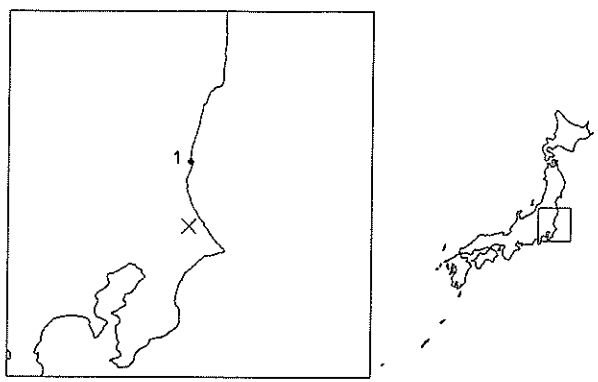
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 401	27	34	7	27

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

04:15 NOV. 18,1990
SOUTHERN IBARAKI PREF
EPICENTER : 35°54.8'N 140°33.2'E
DEPTH : 36.1KM MAGNITUDE : 4.3

JMA INTENSITIES

Ⅱ : CHIBA,MITO
Ⅰ : TOKYO,CHOSHI



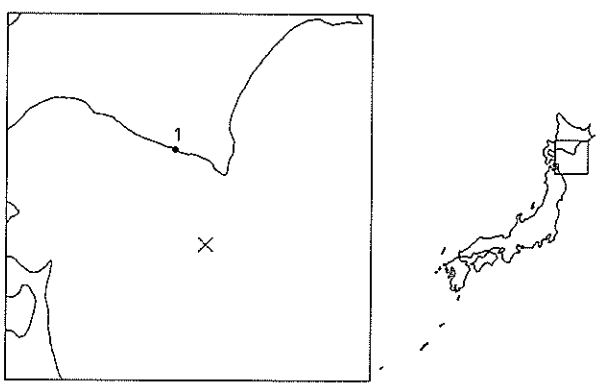
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 402	15	10	4	52

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

20:30 NOV. 18,1990
E OFF AOMORI PREF
EPICENTER : 41°26.3'N 142°58.7'E
DEPTH : 74.2KM MAGNITUDE : 5.1

JMA INTENSITIES

II : HIROO,HACHINOHE
I : URAKAWA,HAKODATE,AOMORI



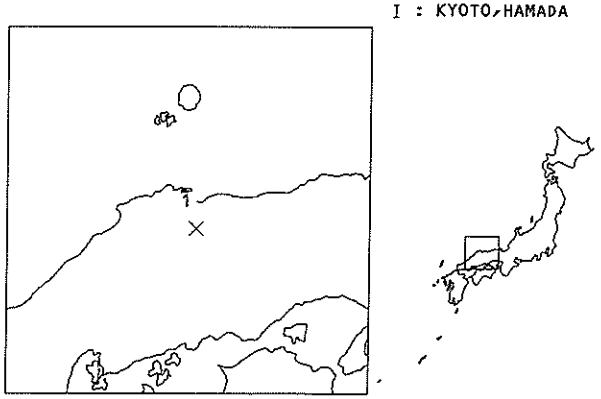
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	URAKAWA-S	ON GROUND	S-2350	6	6	5	82

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

19:33 NOV. 23,1990
WESTERN TOTTORI PREF
EPICENTER : 35°16.2'N 133°21.8'E
DEPTH : 14.0KM MAGNITUDE : 5.2

JMA INTENSITIES

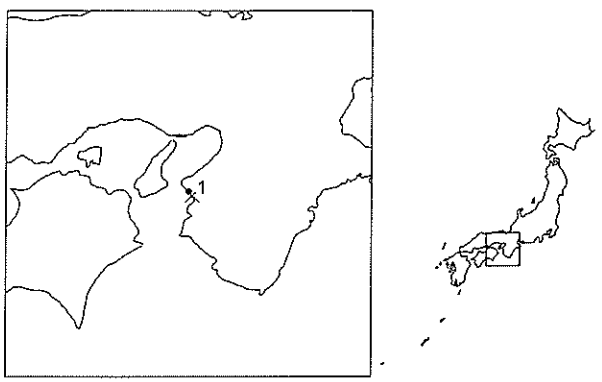
IV : YONAGO
III : SAKAI,MATSUE
II : OKAYAMA,HIROSHIMA
I : KYOTO,HAMADA



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SAKAIMINATO-JI-S	ON GROUND	S-2351	16	36	6	31

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

01:43 NOV. 25/1990
NW WAKAYAMA PREF
EPICENTER : 34°10.9'N 135°10.5'E
DEPTH : 7.2KM MAGNITUDE : 3.0

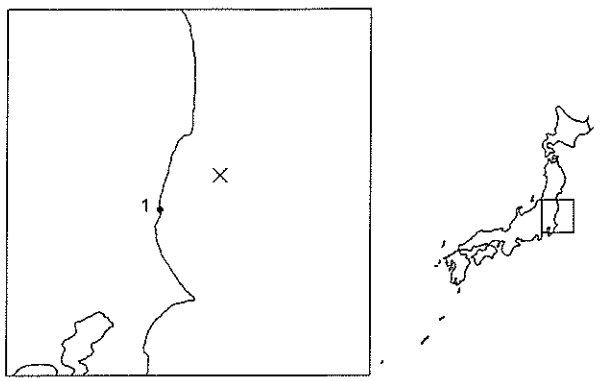


	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	WAKAYAMA-S	ON GROUND	S-2357	6	6	5	4

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

03:10 NOV. 28/1990
E OFF IBARAKI PREF
EPICENTER : 36°36.2'N 141°12.2'E
DEPTH : 46.3KM MAGNITUDE : 4.2

JMA INTENSITIES
Ⅱ : FUKUSHIMA/ONAHAMA
Ⅰ : UTSUNOMIYA/MITO



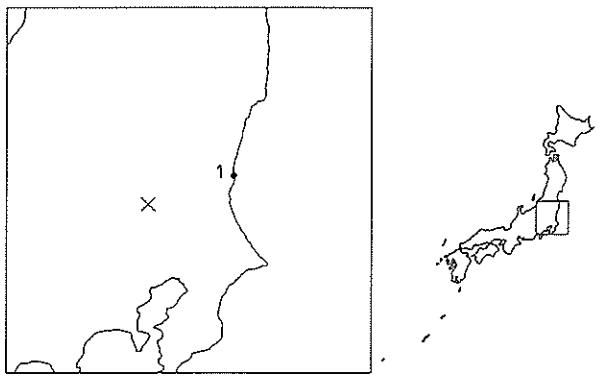
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 403	11	13	5	57

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

04:35 DEC. 8 ,1990
SW IBARAKI PREF
EPICENTER : 36°13.6'N 139°48.6'E
DEPTH : 65.1KM MAGNITUDE : 4.1

JMA INTENSITIES

Ⅲ : MITO
Ⅱ : UTSUNOMIYA,KAKIOKA
Ⅰ : KUMAGAYA,CHICHIBU



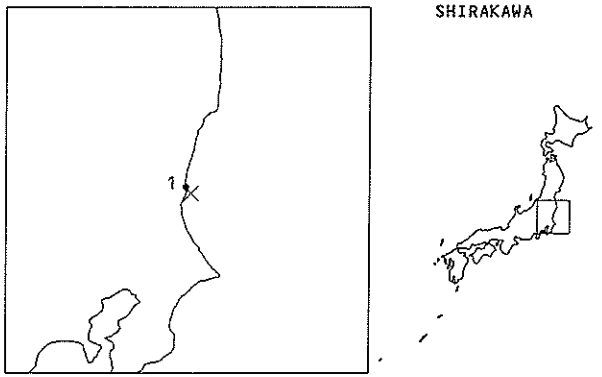
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 404	7	11	3	74

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

12:40 DEC. 9 ,1990
E OFF IBARAKI PREF
EPICENTER : 36°20.3'N 140°39.7'E
DEPTH : 98.2KM MAGNITUDE : 4.7

JMA INTENSITIES

Ⅲ : MITO
Ⅱ : UTSUNOMIYA,ONAHAMA,
KAKIOKA
Ⅰ : OFUNATO,FUKUSHIMA,
SHIRAKAWA



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	HITACHINAKA-F	ON GROUND	F- 405	101	89	34	6

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

16:27 DEC. 10,1990
OFF NEMURO PENINSULA
EPICENTER : 42°56.5'N 145°26.6'E
DEPTH : 44.2KM MAGNITUDE : 5.1

JMA INTENSITIES

Ⅲ : NEMURO,KUSHIRO
Ⅰ : URAKAWA,HIROO

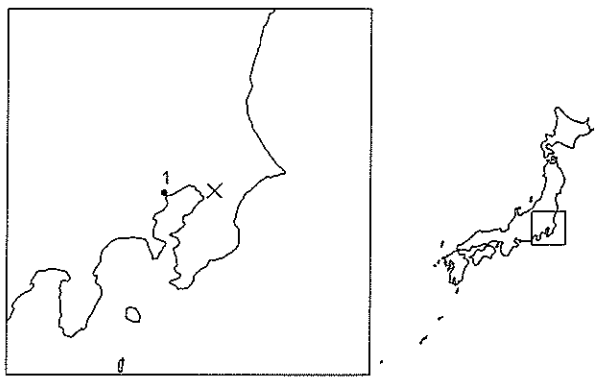
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	KUSHIRO-JI-S	ON GROUND	S-2352	9	6	5	88

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

14:23 DEC. 16,1990
CENTRAL CHIBA PREF
EPICENTER : 35°36.8'N 140°13.2'E
DEPTH : 77.3KM MAGNITUDE : 4.6

JMA INTENSITIES

Ⅲ : TOKYO
Ⅱ : YOKOHAMA,OSHIMA,CHIBA,KOFU
Ⅰ : MIYAKEJIMA,UTSUNOMIYA



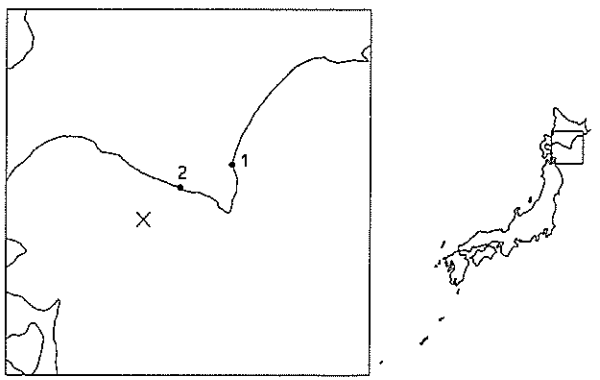
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	SHINAGAWA-S	ON GROUND	S-2353	6	5	4	41
1	SHINAGAWA-MB	IN GROUND	M-1350	1	1	1	41

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

06:09 DEC. 25,1990
S OFF URAKAWA
EPICENTER : 41°57.4'N 142°22.6'E
DEPTH : 67.3KM MAGNITUDE : 4.9

JMA INTENSITIES

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



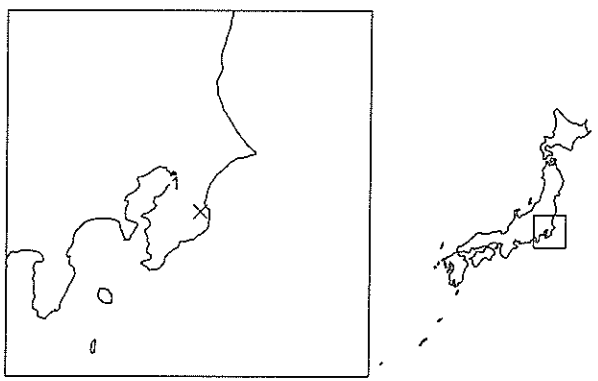
	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	TOKACHI-M	ON GROUND	M-1351	17	14	10	86
2	URAKAWA-S	ON GROUND	S-2354	14	9	3	40

STRONG-MOTION EARTHQUAKE OBSERVATION RESULTS

18:34 DEC. 30,1990
KUJUKURI COAST BOSO PEN
EPICENTER : 35°18.7'N 140°20.1'E
DEPTH : 36.8KM MAGNITUDE : 4.8

JMA INTENSITIES

Ⅱ : MITO,CHIBA,KATSUURA
Ⅰ : TATEYAMA,TOKYO,KAKIOKA



	STATION	CONDITION	RECORD NUMBER	MAX.ACC.(GAL) (NS)	(EW)	(UD)	DIST. (KM)
1	CHIBA-S	ON GROUND	S-2355	6	5	3	38

RECORD NUMBER F-358
STATION HITACHINAKA-F

EARTHQUAKE DATA

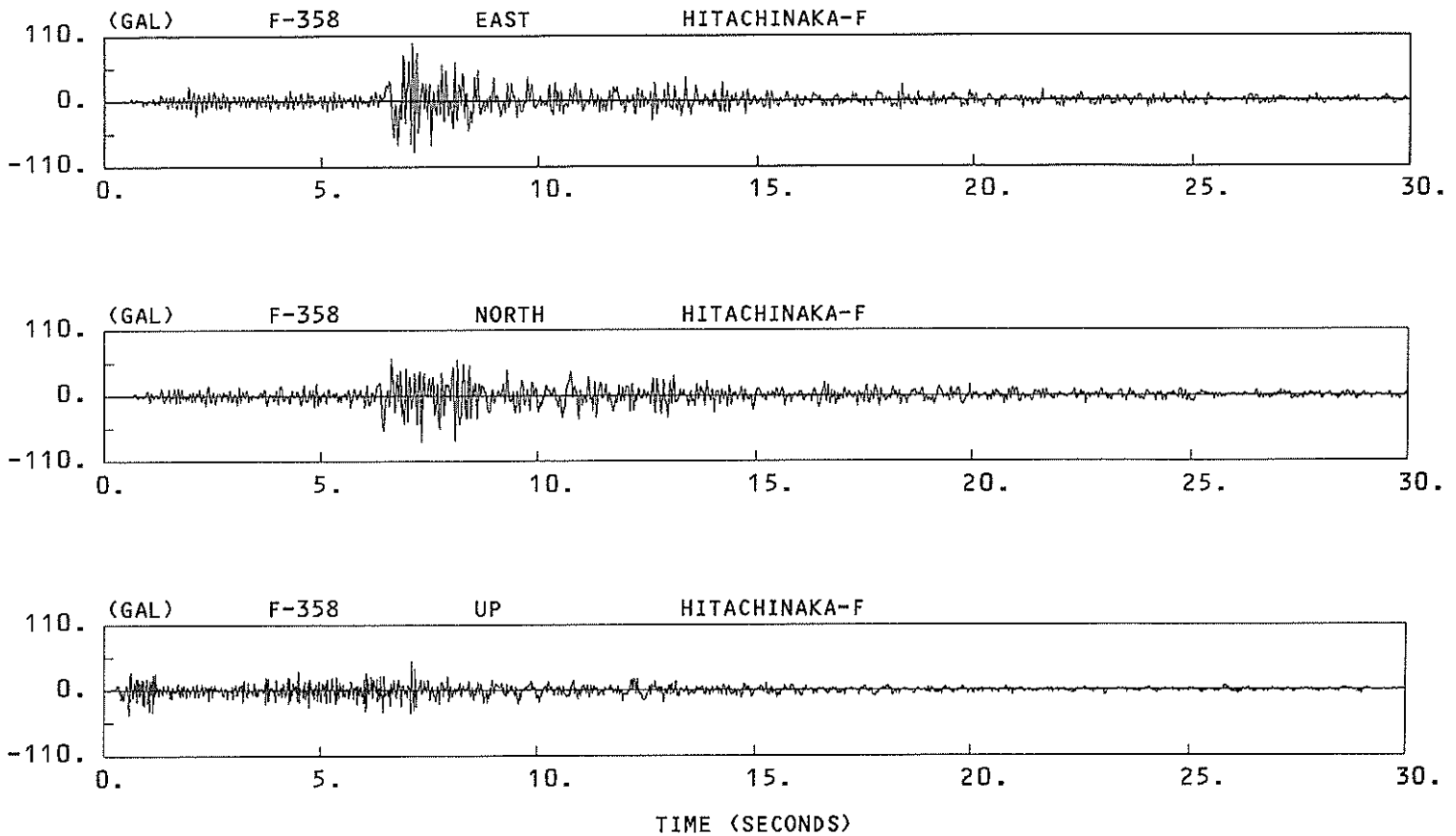
****

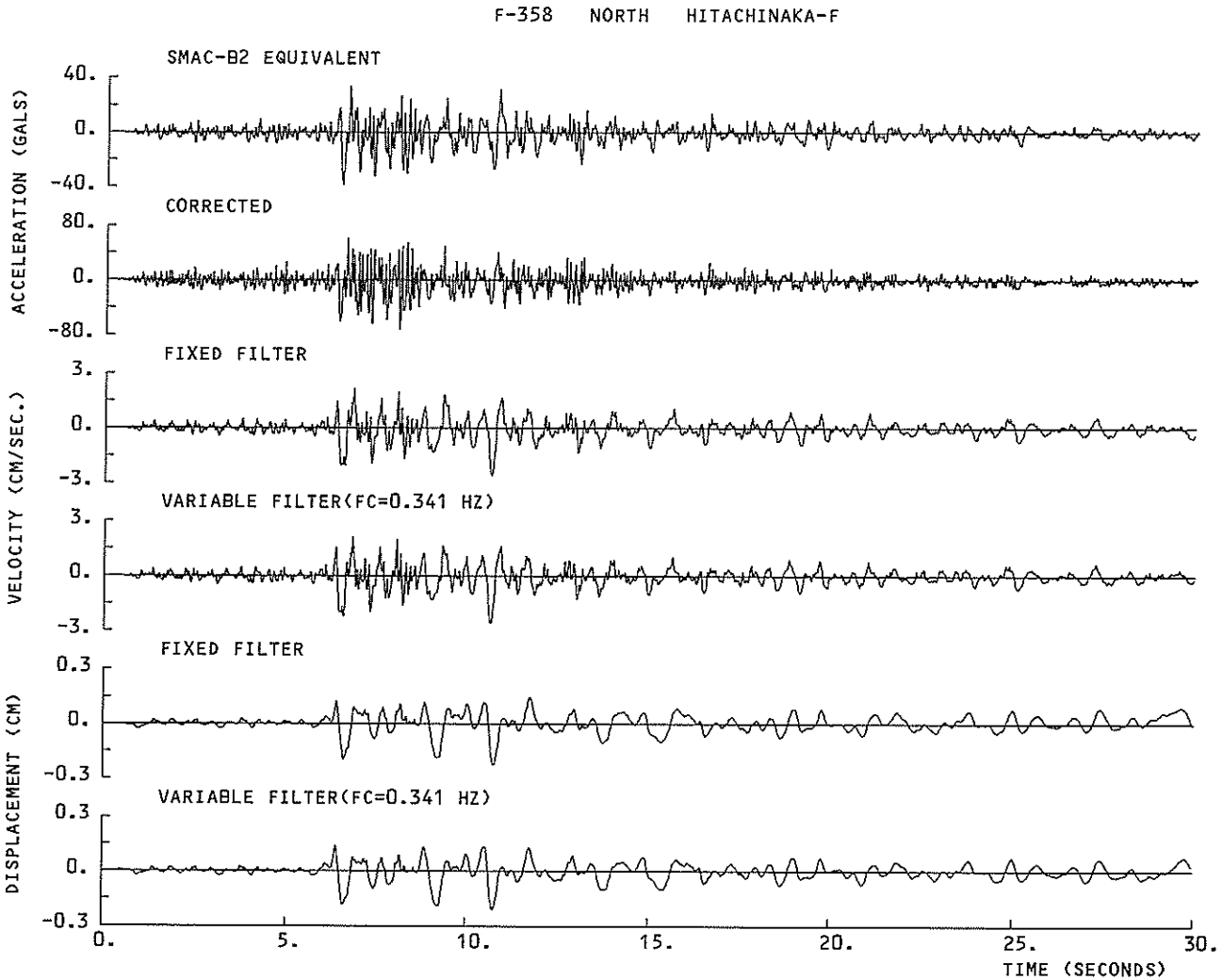
DATA AND TIME 16:45 MAY 3,1990
LOCATION OF HYPOCENTER
EPCENTRAL REGION NORTHERN IBARAKI PREF
LATITUDE 36°26.0' N
LONGITUDE 140°36.8' E
DEPTH 58.0KM
MAGNITUDE 5.2

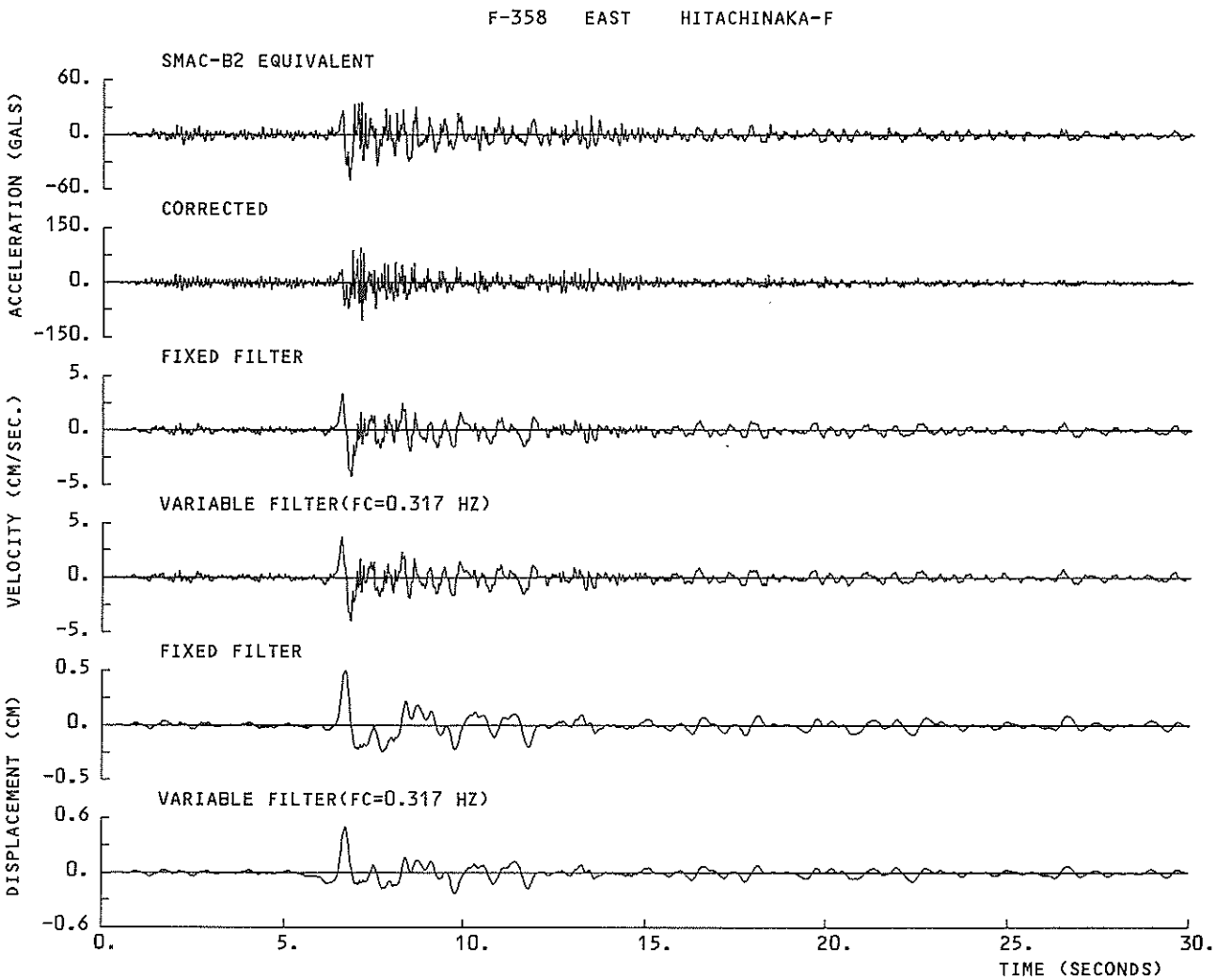
****

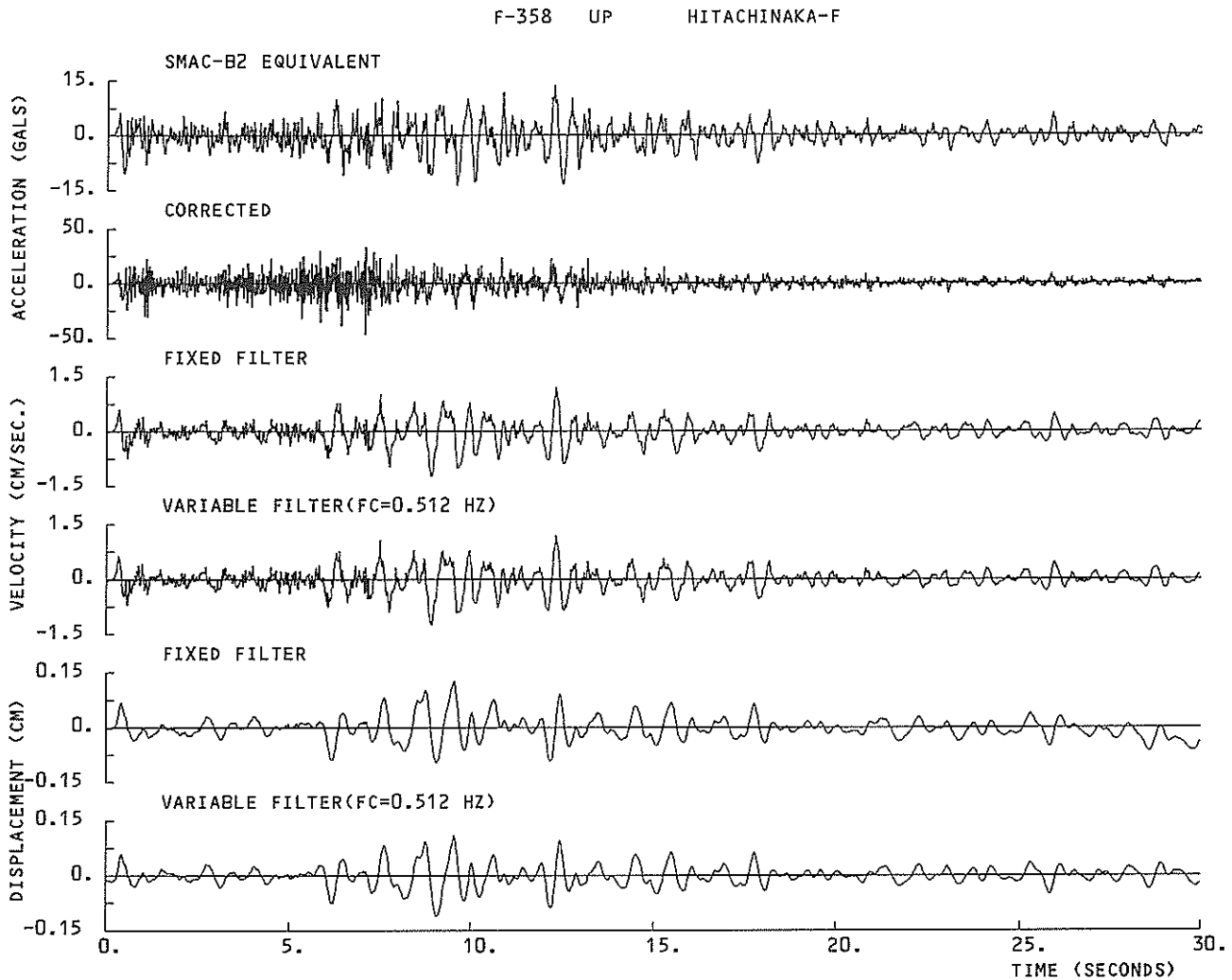
	PEAK VALUES OF COMPONENTS			
	N S	E W	U D	HORIZONTAL*
PARAMETER OF THE VARIABLE FILTER				
FC (HZ)	0.341	0.317	0.512	
MAXIMUM ACCELERATION (GAL)				
SMAC-B2 EQUIVALENT	38.9	50.2	14.3	52.0
ORIGINAL	77.6	108.5	50.1	110.9
CORRECTED	78.6	105.6	47.2	107.9
MAXIMUM VELOCITY (CM/SEC)				
FIXED FILTER	2.61	4.46	1.25	4.73
VARIABLE FILTER	2.62	4.14	1.25	4.44
MAXIMUM DISPLACEMENT (CM)				
FIXED FILTER	0.228	0.498	0.128	0.518
VARIABLE FILTER	0.211	0.503	0.111	0.525

* RESULTANT OF HORIZONTAL COMPONENTS

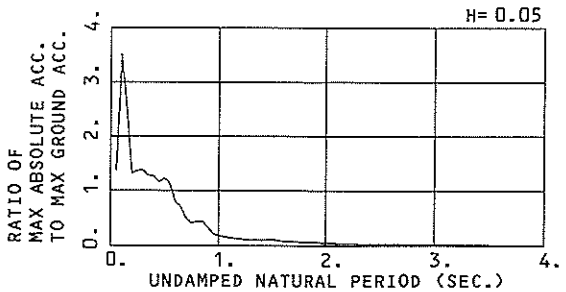

(GAL) F-358 EAST HITACHINAKA-F
110.
0.
-110.
0. 5. 10. 15. 20. 25. 30.
(GAL) F-358 NORTH HITACHINAKA-F
110.
0.
-110.
0. 5. 10. 15. 20. 25. 30.
(GAL) F-358 UP HITACHINAKA-F
110.
0.
-110.
0. 5. 10. 15. 20. 25. 30.
TIME (SECONDS)

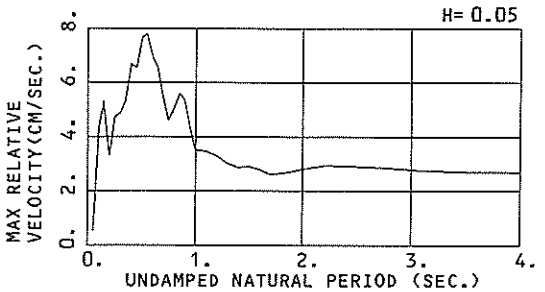

F-358 NORTH HITACHINAKA-F
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.341 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.341 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
40.
0.
-40.
80.
0.
-80.
3.
0.
-3.
3.
0.
-3.
0.3
0.
-0.3
0.3
0.
-0.3
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

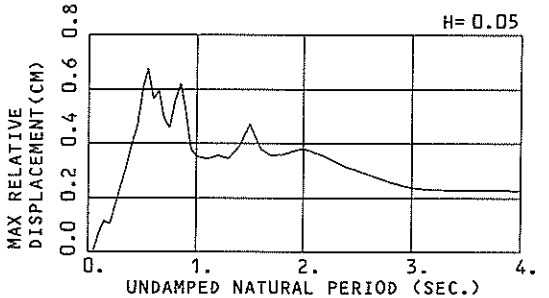

F-358 EAST HITACHINAKA-F
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.317 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.317 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
60.
0.
-60.
150.
0.
-150.
5.
0.
-5.
5.
0.
-5.
0.5
0.
-0.5
0.6
0.
-0.6
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-358 UP HITACHINAKA-F
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)
15.
0.
-15.
50.
0.
-50.
1.5
0.
-1.5
1.5
0.
-1.5
0.15
0.
-0.15
0.15
0.
-0.15
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

F-358 NORTH HITACHINAKA-F
(1/FC=2.93 SEC.)

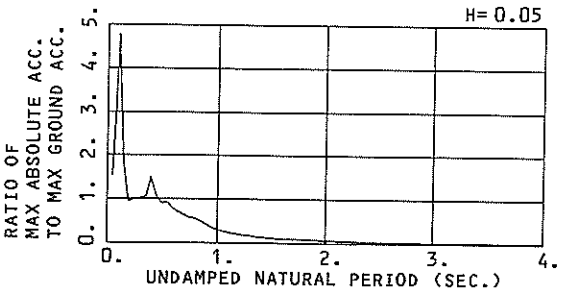


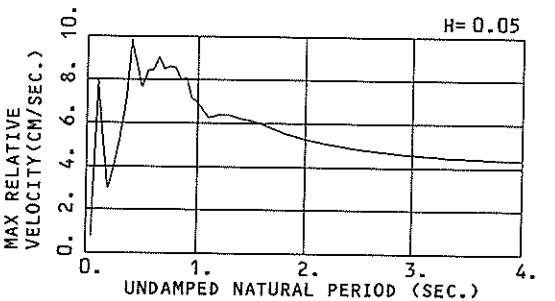


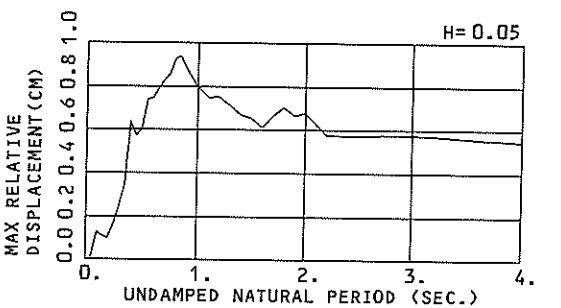


RESPONSE SPECTRA

F-358 EAST HITACHINAKA-F
(1/FC=3.16 SEC.)

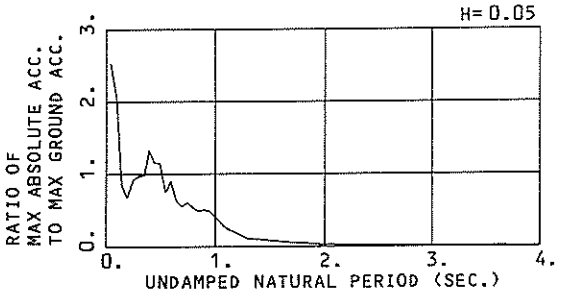


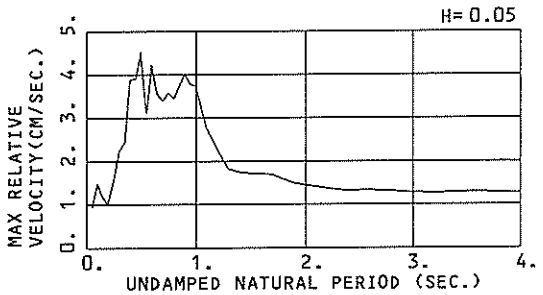


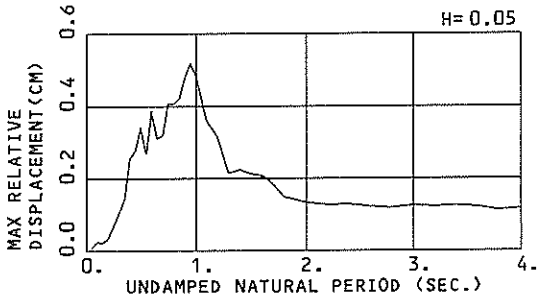


RESPONSE SPECTRA

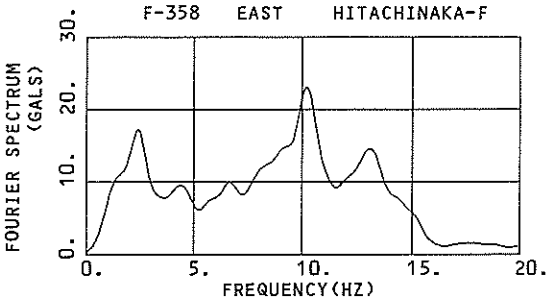
F-358 UP HITACHINAKA-F
(1/FC=1.95 SEC.)

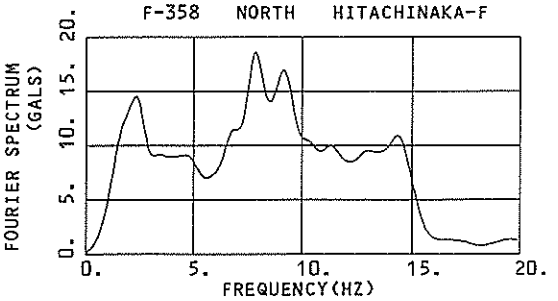


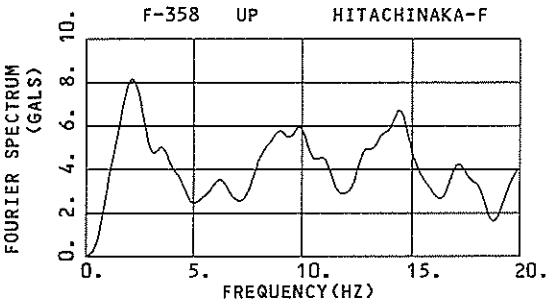




RESPONSE SPECTRA







RESPONSE SPECTRUM

RECORD = F-358 COMPONENT = NORTH SIGNAL = GR. ACC. CORRECTION = STATION = HITACHINAKA-F
DATE AND TIME = 1990- 5- 3-16-45 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 78.59 (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	208.3	1.44	0.013	117.5	0.60	0.007	107.7	0.52	0.007	101.6	0.47	0.006	98.8	0.40	0.006
0.10	839.6	12.93	0.213	381.4	5.96	0.096	277.6	4.32	0.071	206.0	3.10	0.052	136.0	1.78	0.031
0.15	794.1	19.00	0.453	279.7	7.16	0.160	204.6	5.30	0.115	152.4	3.82	0.085	95.8	2.13	0.048
0.20	319.9	10.09	0.324	108.0	3.78	0.110	103.2	3.32	0.105	96.8	2.78	0.096	81.0	2.01	0.075
0.25	265.8	10.63	0.421	124.9	5.80	0.198	108.0	4.71	0.171	93.9	3.40	0.145	72.5	2.20	0.103
0.30	286.8	13.24	0.654	134.8	5.76	0.306	108.6	4.86	0.247	93.6	3.94	0.209	65.3	2.55	0.133
0.35	223.6	12.39	0.694	113.4	5.83	0.351	101.4	5.31	0.311	84.1	4.48	0.254	58.7	2.98	0.157
0.40	394.4	24.84	1.599	149.5	9.33	0.606	99.0	6.70	0.397	71.8	4.63	0.286	52.9	3.28	0.188
0.45	356.0	25.55	1.826	118.5	8.90	0.608	91.3	6.52	0.465	68.5	5.32	0.346	48.2	3.32	0.226
0.50	208.7	17.15	1.322	117.7	9.46	0.746	96.8	7.67	0.610	73.0	5.83	0.455	45.1	3.72	0.256
0.55	127.8	11.24	0.979	104.6	9.45	0.802	89.1	7.81	0.678	65.7	5.99	0.491	39.8	3.79	0.272
0.60	256.5	24.46	2.339	83.1	9.39	0.755	62.5	6.94	0.566	44.6	4.55	0.393	34.0	3.53	0.272
0.65	121.9	13.02	1.305	75.1	8.62	0.802	56.1	6.53	0.597	39.2	4.41	0.409	29.6	3.29	0.268
0.70	92.2	10.75	1.144	55.6	6.71	0.689	40.2	5.53	0.495	29.7	4.31	0.354	26.3	3.13	0.265
0.75	61.7	7.73	0.879	38.1	5.07	0.543	32.3	4.61	0.457	28.3	3.85	0.385	23.5	3.02	0.261
0.80	97.9	12.87	1.588	43.2	6.01	0.699	34.4	5.03	0.556	25.3	4.11	0.400	21.3	2.88	0.264
0.85	89.8	12.42	1.643	45.3	7.24	0.827	34.3	5.60	0.623	24.4	4.09	0.429	19.4	2.78	0.266
0.90	43.6	8.68	0.895	31.5	6.57	0.645	25.9	5.34	0.525	20.4	4.07	0.398	17.6	2.87	0.263
0.95	26.1	4.63	0.596	20.3	4.43	0.462	16.8	4.31	0.379	15.1	3.83	0.324	16.0	2.91	0.258
1.00	30.8	5.13	0.779	15.0	3.57	0.379	14.0	3.50	0.353	12.8	3.49	0.299	14.4	2.89	0.250
1.10	21.0	4.30	0.642	12.6	3.75	0.384	11.3	3.46	0.342	9.9	3.18	0.285	11.9	2.78	0.239
1.20	18.3	4.00	0.666	11.4	3.43	0.415	10.0	3.29	0.356	8.8	3.08	0.296	10.1	2.64	0.237
1.30	10.9	3.30	0.466	9.3	3.15	0.399	8.1	3.01	0.345	7.5	2.93	0.292	9.0	2.62	0.237
1.40	20.0	4.96	0.993	11.1	3.05	0.552	7.9	2.87	0.389	6.3	2.80	0.267	8.1	2.58	0.235
1.50	18.1	5.02	1.034	11.0	3.10	0.627	8.3	2.92	0.472	5.9	2.71	0.314	7.4	2.54	0.233
1.60	10.1	3.46	0.652	7.1	2.90	0.461	5.9	2.80	0.379	5.2	2.63	0.303	6.7	2.50	0.249
1.70	6.3	2.75	0.462	5.4	2.65	0.390	5.0	2.62	0.357	5.0	2.57	0.323	6.3	2.47	0.264
1.80	4.5	2.73	0.369	4.5	2.70	0.368	4.5	2.66	0.359	4.7	2.60	0.334	6.0	2.50	0.275
1.90	6.0	2.72	0.551	4.3	2.73	0.385	4.2	2.72	0.371	4.3	2.67	0.343	5.7	2.54	0.282
2.00	5.4	2.91	0.544	4.1	2.86	0.405	4.0	2.81	0.382	4.0	2.74	0.348	5.4	2.57	0.286
2.20	3.1	3.09	0.374	3.0	3.00	0.365	3.1	2.93	0.354	3.3	2.83	0.333	4.8	2.63	0.287
2.40	2.2	2.98	0.315	2.2	2.95	0.316	2.3	2.91	0.314	2.7	2.84	0.308	4.3	2.67	0.281
2.60	1.7	2.95	0.289	1.7	2.92	0.287	1.9	2.89	0.286	2.2	2.83	0.284	3.8	2.68	0.272
2.80	1.3	2.90	0.249	1.3	2.87	0.255	1.5	2.85	0.259	1.9	2.80	0.263	3.5	2.69	0.262
3.00	1.1	2.81	0.248	1.1	2.80	0.241	1.2	2.79	0.238	1.6	2.77	0.247	3.2	2.68	0.254
3.20	0.9	2.75	0.242	0.9	2.75	0.236	1.0	2.75	0.231	1.4	2.74	0.238	2.9	2.68	0.248
3.40	0.8	2.72	0.231	0.8	2.72	0.228	0.9	2.72	0.228	1.3	2.72	0.234	2.7	2.67	0.242
3.60	0.7	2.71	0.226	0.7	2.71	0.227	0.8	2.71	0.228	1.2	2.70	0.232	2.5	2.66	0.239
3.80	0.6	2.70	0.227	0.7	2.70	0.227	0.8	2.70	0.228	1.1	2.69	0.230	2.4	2.66	0.236
4.00	0.6	2.69	0.224	0.6	2.69	0.225	0.7	2.69	0.226	1.0	2.68	0.228	2.2	2.65	0.233

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

RESPONSE SPECTRUM

RECORD = F-358 COMPONENT = EAST SIGNAL = GR. ACC. CORRECTION = STATION = HITACHINAKA-F
DATE AND TIME = 1990- 5- 3-16-45 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 105.61 (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	332.4	2.22	0.021	167.8	0.80	0.011	160.7	0.72	0.010	159.9	0.74	0.010	150.1	0.68	0.009
0.10	2093.3	33.24	0.530	669.7	10.56	0.170	505.6	8.07	0.127	346.1	5.47	0.086	191.2	2.78	0.043
0.15	751.1	17.96	0.428	232.1	6.31	0.133	193.9	5.28	0.111	144.6	3.91	0.082	91.5	2.28	0.046
0.20	329.2	10.50	0.334	114.4	3.43	0.116	98.3	2.97	0.100	91.4	2.71	0.090	78.2	2.13	0.069
0.25	346.2	13.77	0.548	127.3	4.78	0.201	107.3	4.05	0.168	86.5	3.27	0.135	69.2	2.47	0.097
0.30	233.6	11.00	0.533	131.1	6.15	0.299	107.5	5.19	0.244	88.7	4.24	0.196	65.1	3.37	0.142
0.35	212.8	11.85	0.660	131.3	7.36	0.406	111.7	6.91	0.345	91.6	6.04	0.280	72.5	4.35	0.207
0.40	527.3	33.58	2.137	243.4	15.46	0.987	158.2	9.87	0.637	96.7	6.93	0.383	72.8	4.93	0.265
0.45	221.6	17.15	1.137	146.4	11.47	0.749	112.4	8.76	0.572	94.4	7.03	0.469	69.0	4.96	0.315
0.50	268.6	21.17	1.701	104.9	8.46	0.664	95.5	7.66	0.602	82.1	6.38	0.502	64.0	4.63	0.368
0.55	214.2	18.94	1.641	112.0	9.96	0.859	97.5	8.44	0.741	79.8	7.08	0.595	59.9	4.73	0.420
0.60	144.5	13.91	1.318	84.9	8.47	0.770	82.5	8.47	0.744	72.5	7.62	0.634	57.5	5.28	0.463
0.65	138.3	14.66	1.480	85.7	9.98	0.916	73.9	9.06	0.790	64.2	7.81	0.658	54.8	5.53	0.499
0.70	103.1	11.70	1.279	79.6	9.30	0.985	67.2	8.50	0.827	58.1	7.59	0.688	51.5	5.52	0.524
0.75	102.9	12.44	1.467	74.5	9.47	1.060	60.4	8.62	0.854	52.3	7.37	0.707	47.7	5.40	0.539
0.80	104.6	13.44	1.695	68.2	9.85	1.104	57.5	8.55	0.926	46.3	7.44	0.712	43.8	5.26	0.545
0.85	84.5	11.97	1.546	62.8	9.05	1.146	51.8	8.01	0.940	40.3	7.17	0.723	40.0	5.35	0.545
0.90	121.0	17.35	2.483	51.5	9.65	1.056	43.5	8.10	0.881	36.5	6.73	0.731	36.5	5.39	0.539
0.95	103.7	15.91	2.370	51.1	8.55	1.166	37.0	7.17	0.841	33.1	6.33	0.733	33.3	5.39	0.546
1.00	44.9	8.19	1.136	37.1	7.46	0.937	31.9	6.96	0.800	29.3	6.29	0.718	30.3	5.35	0.551
1.10	29.1	6.06	0.893	25.9	6.23	0.791	24.7	6.27	0.748	23.3	6.08	0.683	25.4	5.27	0.553
1.20	37.2	7.17	1.356	25.4	6.56	0.926	21.0	6.37	0.751	19.8	6.06	0.684	21.6	5.20	0.551
1.30	18.3	6.74	0.784	17.4	6.55	0.738	17.0	6.37	0.714	16.6	6.06	0.663	18.5	5.24	0.544
1.40	14.7	6.37	0.728	14.2	6.31	0.700	13.8	6.21	0.670	13.8	5.98	0.629	16.0	5.27	0.529
1.50	12.9	6.39	0.738	12.3	6.25	0.692	11.7	6.12	0.654	11.5	5.90	0.592	14.0	5.27	0.510
1.60	16.2	6.23	1.052	10.0	6.10	0.637	9.7	5.98	0.611	9.5	5.78	0.563	12.3	5.24	0.486
1.70	13.5	5.89	0.990	10.9	5.84	0.797	9.1	5.77	0.663	8.4	5.64	0.530	10.9	5.20	0.461
1.80	12.6	5.60	1.038	10.4	5.60	0.847	8.8	5.57	0.705	7.6	5.49	0.535	9.8	5.14	0.468
1.90	11.7	5.42	1.070	8.6	5.42	0.781	7.4	5.41	0.668	6.9	5.36	0.537	9.0	5.09	0.475
2.00	11.1	5.30	1.120	7.9	5.29	0.794	6.8	5.28	0.678	6.4	5.25	0.540	8.5	5.03	0.481
2.20	7.3	5.08	0.894	5.6	5.08	0.682	4.8	5.08	0.578	5.4	5.06	0.546	7.5	4.93	0.489
2.40	4.9	4.90	0.715	4.4	4.91	0.632	4.1	4.92	0.572	4.7	4.92	0.551	6.8	4.84	0.496
2.60	3.8	4.77	0.642	3.5	4.78	0.589	3.5	4.79	0.574	4.1	4.80	0.555	6.1	4.75	0.502
2.80	3.0	4.66	0.598	3.0	4.67	0.587	3.1	4.68	0.577	3.7	4.70	0.558	5.6	4.68	0.507
3.00	2.6	4.56	0.598	2.6	4.57	0.587	2.7	4.59	0.577	3.3	4.61	0.559	5.1	4.62	0.511
3.20	2.3	4.47	0.591	2.3	4.49	0.582	2.4	4.51	0.573	2.9	4.54	0.557	4.7	4.57	0.513
3.40	2.0	4.40	0.581	2.0	4.43	0.573	2.1	4.45	0.566	2.7	4.48	0.553	4.4	4.52	0.515
3.60	1.7	4.36	0.569	1.8	4.38	0.564	1.9	4.40	0.559	2.4	4.43	0.548	4.1	4.48	0.516
3.80	1.5	4.32	0.560	1.6	4.34	0.557	1.7	4.36	0.553	2.2	4.40	0.544	3.8	4.45	0.516
4.00	1.4	4.30	0.554	1.4	4.32	0.552	1.5	4.34	0.549	2.0	4.37	0.541	3.6	4.42	0.516

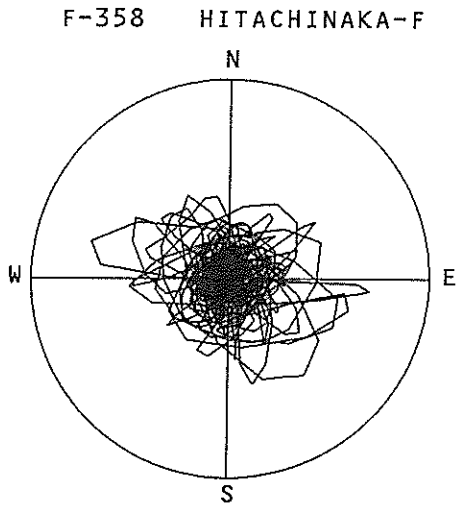
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

RESPONSE SPECTRUM

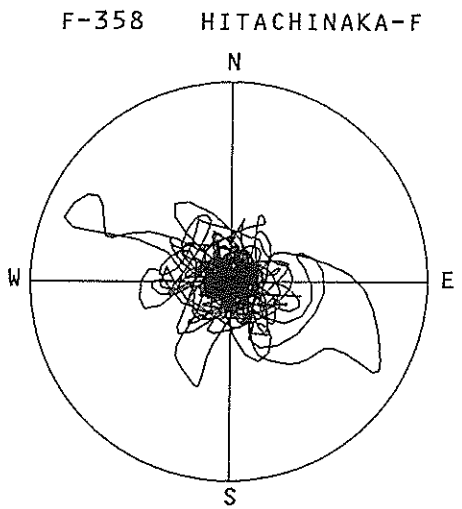
RECORD = F-358 COMPONENT = UP SIGNAL = GR. ACC. CORRECTION = STATION = HITACHINAKA-F
DATE AND TIME = 1990- 5- 3-16-45 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 47.16 (GAL)
TIME LENGTH = 29.99 (SEC) SKIPPED LENGTH = 0.00 (SEC)

	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	673.3	5.36	0.043	139.4	1.03	0.009	119.6	0.94	0.008	108.4	0.83	0.007	82.3	0.50	0.005
0.10	690.2	10.93	0.175	148.9	2.35	0.038	97.1	1.50	0.024	61.3	0.95	0.015	42.3	0.63	0.009
0.15	149.3	3.53	0.085	52.5	1.47	0.030	40.4	1.19	0.023	30.3	0.93	0.017	25.6	0.69	0.013
0.20	93.1	2.78	0.094	37.4	1.26	0.038	31.8	1.01	0.031	28.4	0.89	0.028	23.2	0.65	0.021
0.25	113.7	4.25	0.180	62.7	2.30	0.099	43.4	1.56	0.068	33.1	1.14	0.052	22.6	0.78	0.033
0.30	169.2	8.07	0.386	60.6	3.00	0.138	45.7	2.23	0.104	33.2	1.64	0.075	23.7	1.03	0.050
0.35	120.5	6.50	0.374	59.5	3.20	0.185	46.2	2.43	0.143	36.2	1.79	0.111	26.6	1.10	0.077
0.40	226.0	14.45	0.916	92.3	5.83	0.374	63.1	3.89	0.254	39.3	2.38	0.156	28.1	1.31	0.104
0.45	149.1	10.67	0.765	67.0	4.92	0.344	54.5	3.89	0.278	41.4	2.92	0.209	27.6	1.56	0.127
0.50	228.4	18.10	1.446	76.1	6.23	0.481	54.4	4.54	0.343	38.9	3.21	0.240	25.7	1.77	0.142
0.55	81.1	7.08	0.621	45.6	3.88	0.350	35.2	3.12	0.268	29.8	2.90	0.225	22.4	1.89	0.147
0.60	185.5	17.75	1.692	66.9	6.58	0.610	42.9	4.23	0.389	28.9	2.96	0.257	19.0	1.92	0.150
0.65	66.4	6.84	0.711	36.8	4.47	0.394	29.3	3.54	0.311	23.8	2.97	0.250	16.3	1.92	0.155
0.70	30.3	3.71	0.376	26.5	3.57	0.328	26.0	3.39	0.320	23.2	2.87	0.279	15.9	1.83	0.170
0.75	107.7	12.83	1.535	35.8	4.46	0.509	28.8	3.58	0.408	22.7	2.71	0.313	15.0	1.73	0.177
0.80	26.4	3.83	0.428	27.1	3.58	0.438	25.3	3.45	0.407	20.6	2.91	0.324	13.6	1.82	0.186
0.85	51.1	6.82	0.935	26.7	4.13	0.487	23.2	3.74	0.421	18.7	3.06	0.334	12.7	1.88	0.201
0.90	35.1	5.95	0.720	27.6	4.75	0.565	23.6	4.03	0.482	18.5	3.09	0.370	12.0	1.85	0.209
0.95	45.3	6.75	1.036	27.3	4.47	0.622	22.8	3.78	0.519	17.2	2.90	0.383	11.1	1.78	0.212
1.00	48.9	8.13	1.239	23.6	4.41	0.596	19.4	3.75	0.488	14.8	2.94	0.363	10.0	1.85	0.207
1.10	15.1	3.60	0.464	12.5	2.98	0.382	11.8	2.74	0.359	9.9	2.46	0.295	8.2	1.82	0.187
1.20	13.5	3.32	0.492	10.2	2.62	0.372	8.8	2.27	0.316	7.6	1.90	0.264	7.2	1.69	0.188
1.30	7.3	2.11	0.311	4.7	1.74	0.201	5.1	1.83	0.215	5.6	1.78	0.224	6.2	1.55	0.185
1.40	6.0	1.89	0.297	4.8	1.78	0.240	4.6	1.74	0.224	4.6	1.69	0.210	5.3	1.46	0.179
1.50	3.6	1.73	0.206	3.8	1.74	0.216	3.8	1.72	0.214	3.9	1.67	0.202	4.7	1.47	0.172
1.60	3.8	1.80	0.248	3.5	1.75	0.223	3.3	1.71	0.209	3.3	1.64	0.192	4.1	1.46	0.165
1.70	2.9	1.90	0.210	2.7	1.76	0.194	2.6	1.69	0.185	2.7	1.61	0.175	3.7	1.45	0.158
1.80	2.4	1.62	0.200	2.0	1.61	0.166	1.9	1.58	0.150	2.2	1.55	0.156	3.3	1.43	0.151
1.90	1.7	1.45	0.151	1.7	1.49	0.149	1.6	1.49	0.141	1.8	1.49	0.143	3.0	1.41	0.145
2.00	1.5	1.48	0.148	1.4	1.47	0.139	1.4	1.46	0.133	1.6	1.45	0.134	2.7	1.40	0.139
2.20	1.2	1.37	0.146	1.1	1.38	0.135	1.1	1.38	0.128	1.2	1.38	0.122	2.3	1.36	0.131
2.40	1.0	1.29	0.146	0.9	1.31	0.135	0.9	1.32	0.129	1.0	1.33	0.122	2.0	1.33	0.126
2.60	0.8	1.36	0.133	0.7	1.34	0.126	0.8	1.33	0.123	0.9	1.32	0.121	1.8	1.31	0.123
2.80	0.6	1.33	0.124	0.6	1.32	0.119	0.7	1.31	0.120	0.8	1.30	0.119	1.6	1.30	0.121
3.00	0.6	1.27	0.139	0.6	1.28	0.131	0.6	1.28	0.126	0.7	1.28	0.121	1.5	1.29	0.120
3.20	0.5	1.26	0.131	0.5	1.27	0.126	0.5	1.27	0.123	0.6	1.27	0.119	1.4	1.28	0.119
3.40	0.5	1.29	0.138	0.5	1.29	0.130	0.5	1.28	0.125	0.6	1.27	0.121	1.3	1.27	0.118
3.60	0.4	1.31	0.131	0.4	1.30	0.126	0.4	1.29	0.122	0.5	1.27	0.119	1.2	1.27	0.117
3.80	0.3	1.31	0.116	0.3	1.30	0.113	0.4	1.29	0.113	0.5	1.27	0.115	1.1	1.26	0.116
4.00	0.3	1.28	0.125	0.3	1.28	0.119	0.3	1.27	0.118	0.5	1.26	0.116	1.1	1.26	0.116

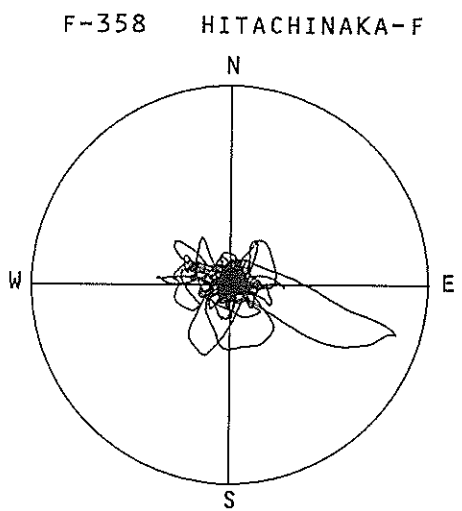
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)



ACCELERATION
R=150.0GAL
MAX=107.9GAL



VELOCITY
R=5.0 CM/SEC.
MAX=4.4 CM/SEC.



DISPLACEMENT
R=0.60 CM
MAX=0.52 CM

RECORD NUMBER F-384
STATION HITACHINAKA-F

EARTHQUAKE DATA

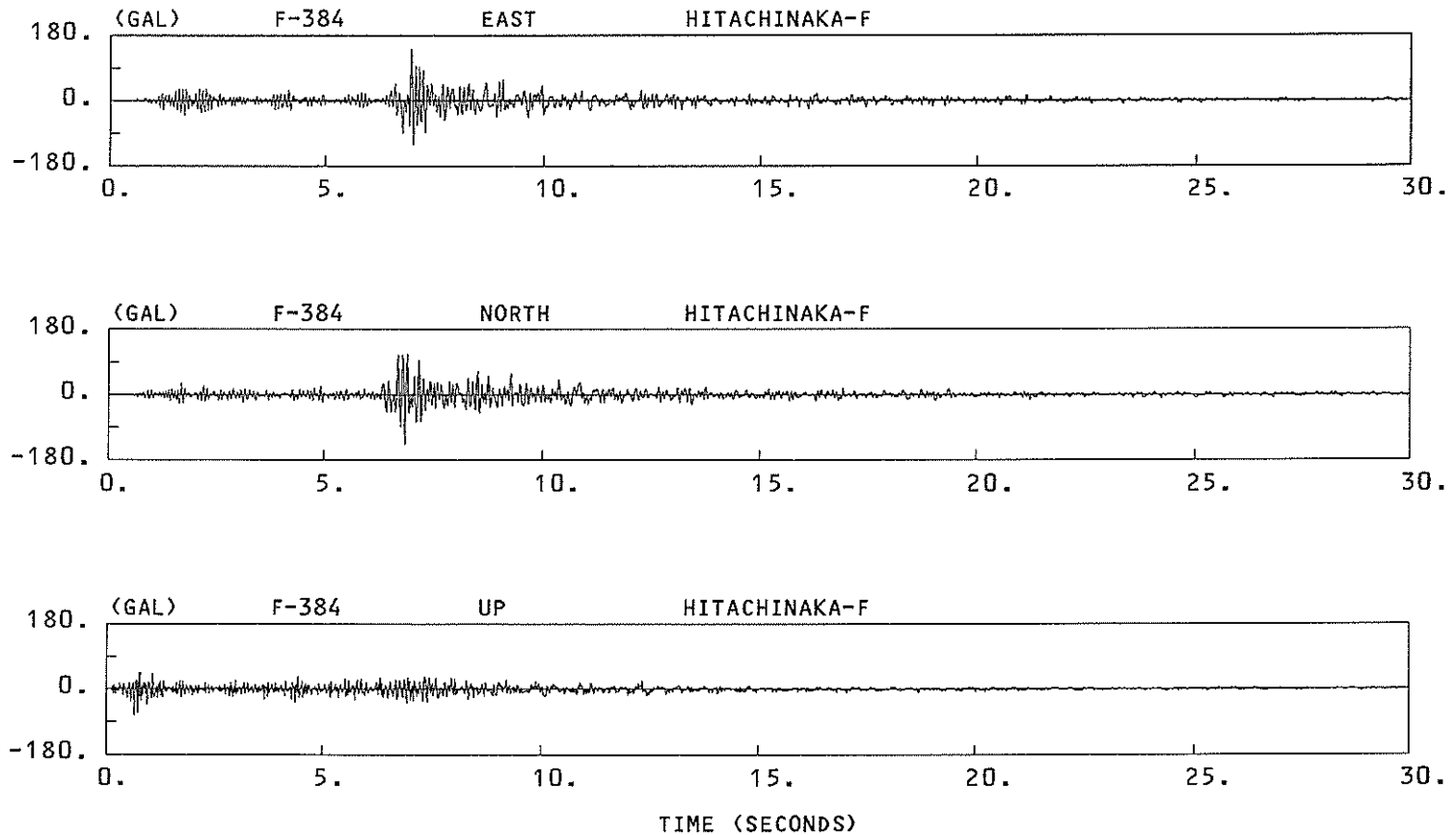
****

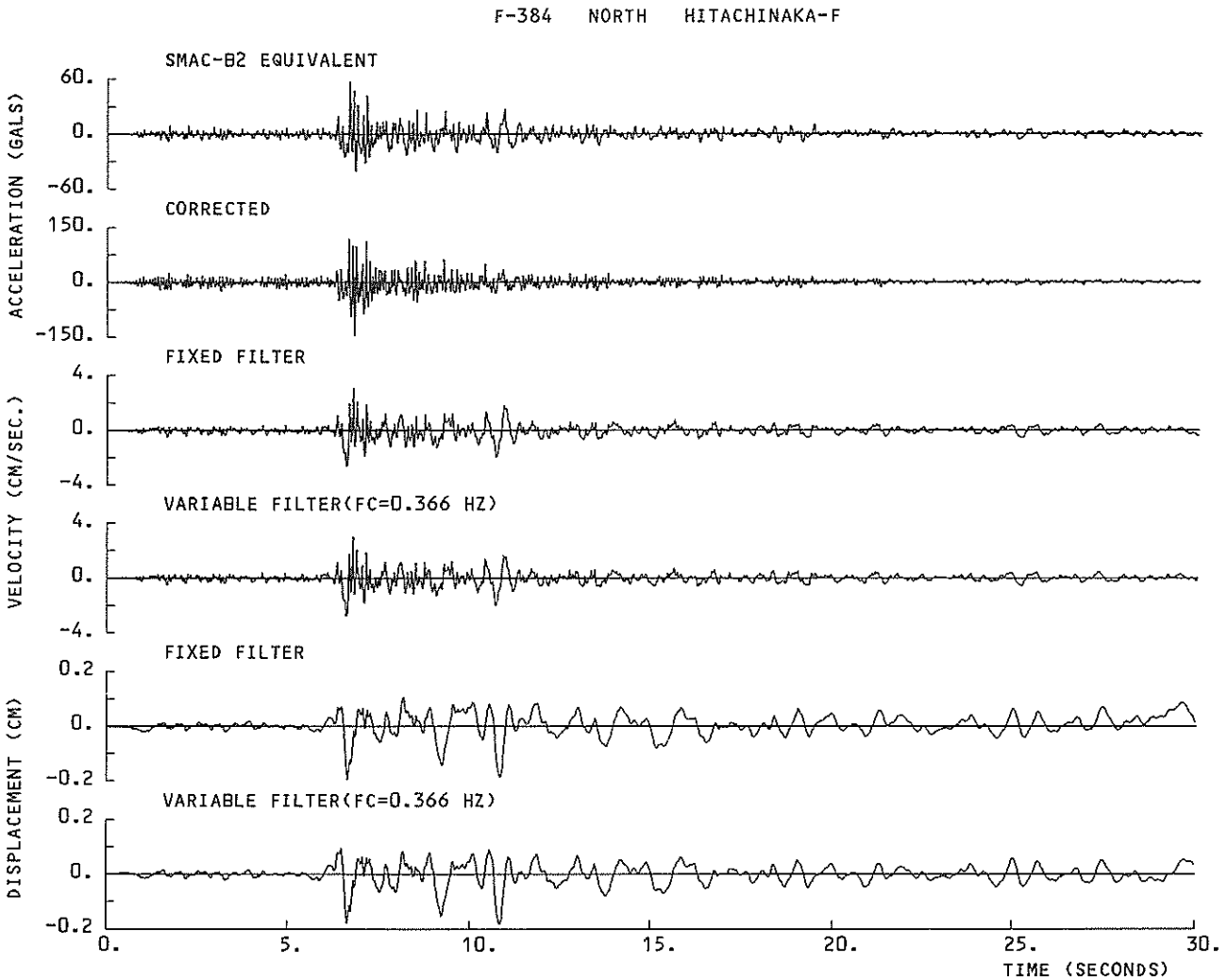
DATA AND TIME 23:33 OCT. 6,1990
LOCATION OF HYPOCENTER
EPCENTRAL REGION NORTHERN IBARAKI PREF
LATITUDE 36°29.1' N
LONGITUDE 140°36.8' E
DEPTH 50.8KM
MAGNITUDE 5.0

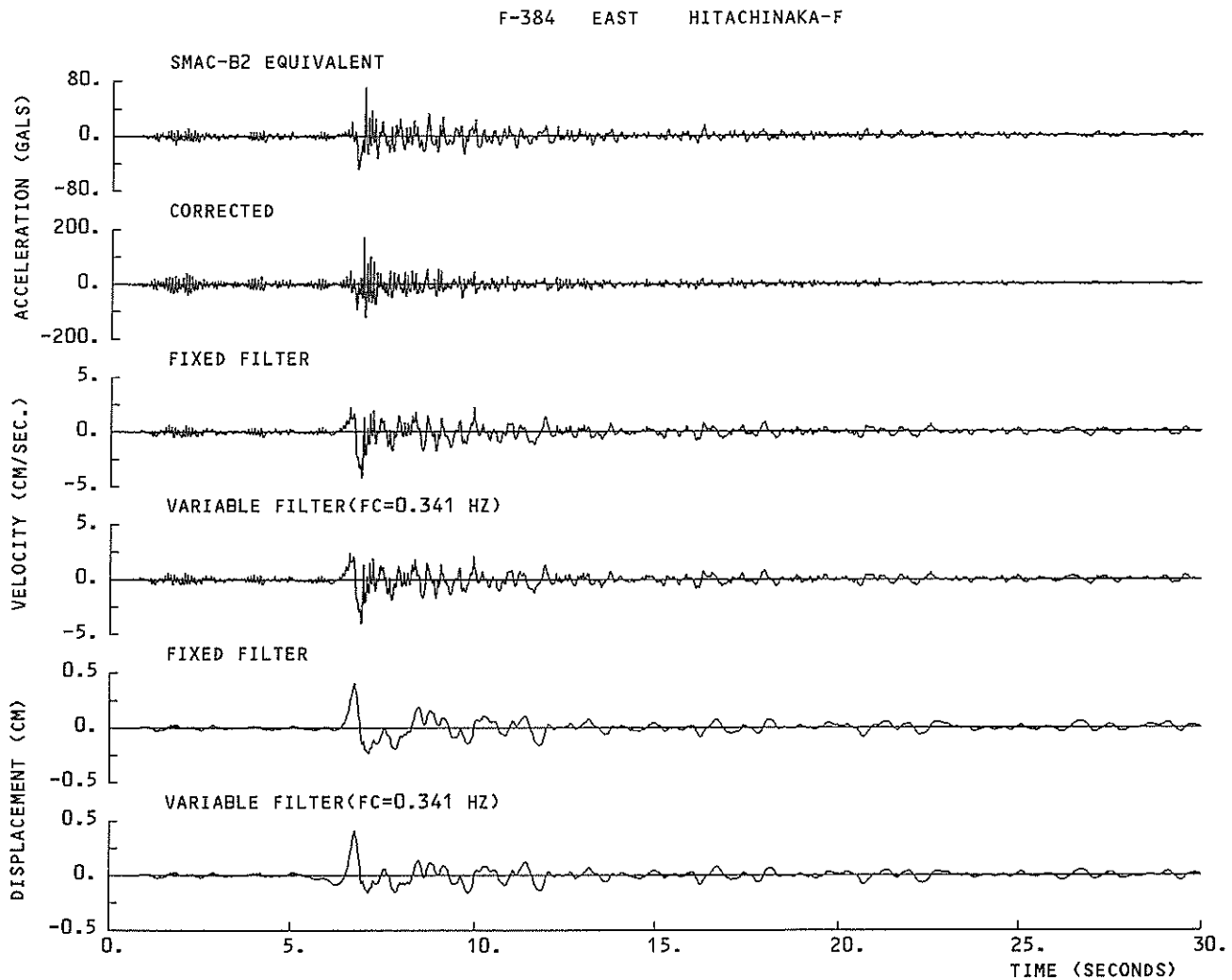
****

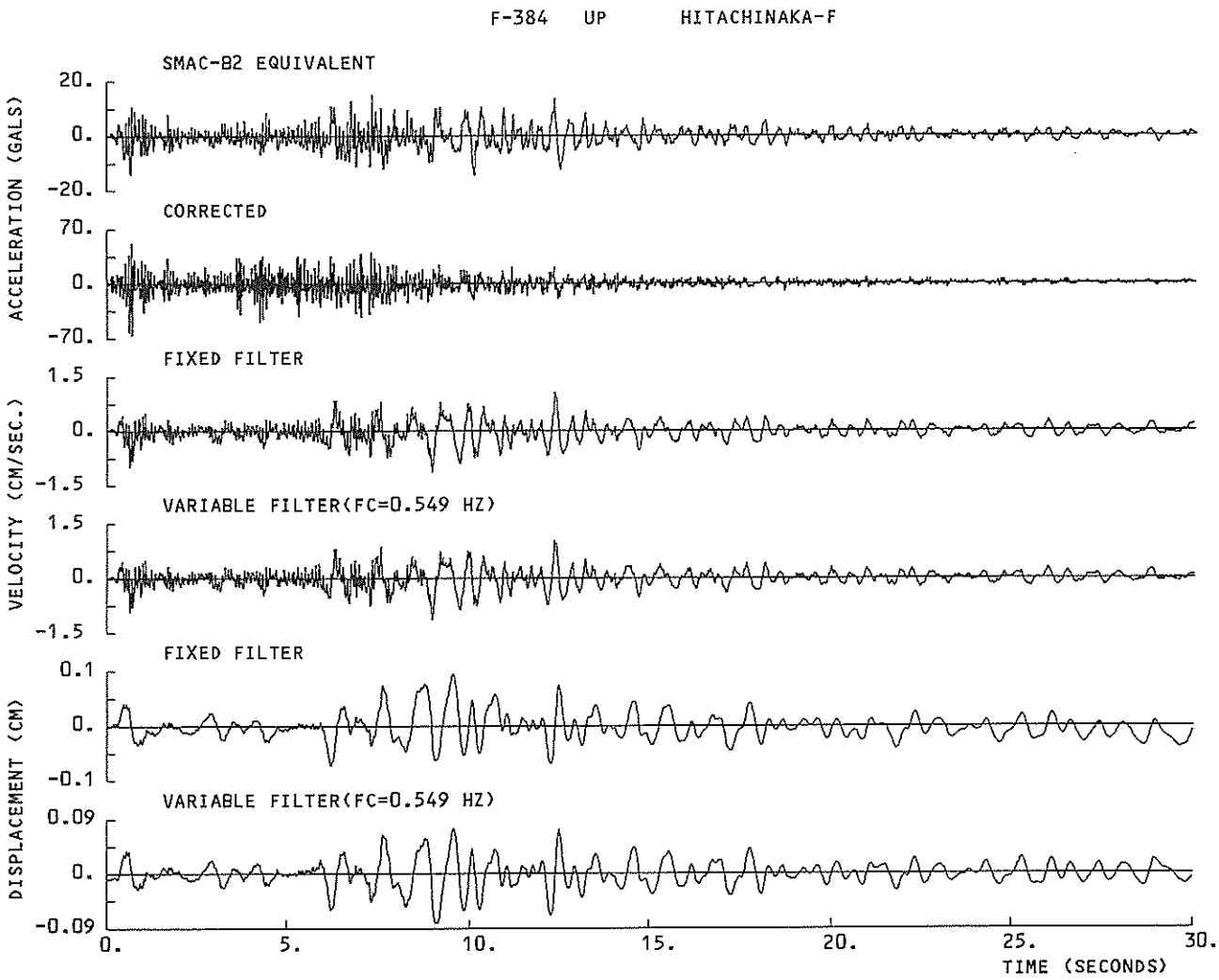
	PEAK VALUES OF COMPONENTS			
	N S	E W	U D	HORIZONTAL*
PARAMETER OF THE VARIABLE FILTER				
FC (HZ)	0.366	0.341	0.549	
MAXIMUM ACCELERATION (GAL)				
SMAC-B2 EQUIVALENT	59.1	70.9	16.2	72.4
ORIGINAL	142.1	177.6	71.4	179.7
CORRECTED	147.0	172.4	66.2	173.5
MAXIMUM VELOCITY (CM/SEC)				
FIXED FILTER	3.10	4.40	1.17	4.72
VARIABLE FILTER	3.02	4.28	1.20	4.62
MAXIMUM DISPLACEMENT (CM)				
FIXED FILTER	0.196	0.407	0.095	0.425
VARIABLE FILTER	0.185	0.414	0.082	0.431

* RESULTANT OF HORIZONTAL COMPONENTS

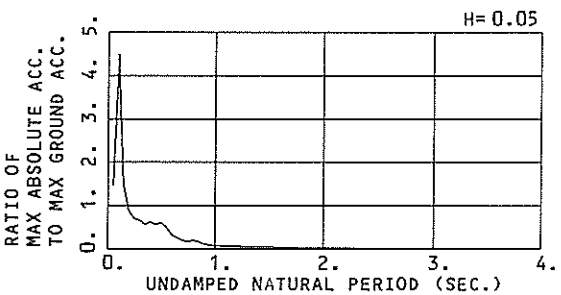

(GAL) F-384 EAST HITACHINAKA-F
180.
0.
-180.
0. 5. 10. 15. 20. 25. 30.
(GAL) F-384 NORTH HITACHINAKA-F
180.
0.
-180.
0. 5. 10. 15. 20. 25. 30.
(GAL) F-384 UP HITACHINAKA-F
180.
0.
-180.
0. 5. 10. 15. 20. 25. 30.
TIME (SECONDS)

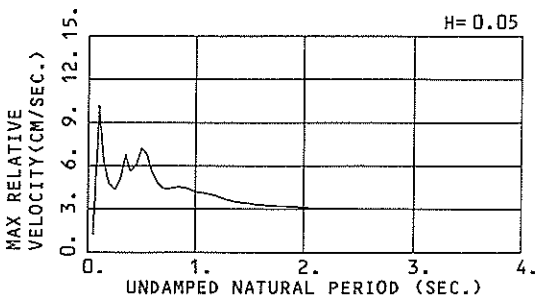

F-384 NORTH HITACHINAKA-F
SMAC-B2 EQUIVALENT
CORRECTED
FIXED FILTER
VARIABLE FILTER(FC=0.366 HZ)
FIXED FILTER
VARIABLE FILTER(FC=0.366 HZ)
ACCELERATION (GALS)
VELOCITY (CM/SEC.)
DISPLACEMENT (CM)
60.
0.
-60.
150.
0.
-150.
4.
0.
-4.
4.
0.
-4.
0.2
0.
-0.2
0.2
0.
-0.2
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

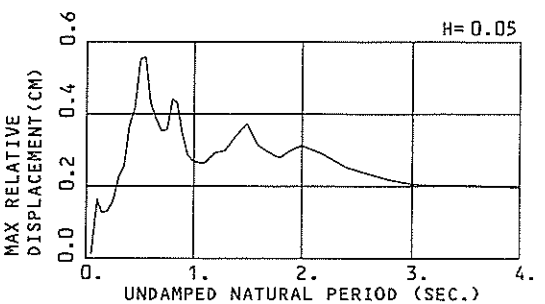

F-384 EAST HITACHINAKA-F
SMAC-B2 EQUIVALENT
80.
0.
-80.
CORRECTED
200.
0.
-200.
ACCELERATION (GALS)
FIXED FILTER
5.
0.
-5.
VARIABLE FILTER(FC=0.341 HZ)
5.
0.
-5.
VELOCITY (CM/SEC.)
FIXED FILTER
0.5
0.
-0.5
VARIABLE FILTER(FC=0.341 HZ)
0.5
0.
-0.5
DISPLACEMENT (CM)
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)


F-384 UP HITACHINAKA-F
SMAC-B2 EQUIVALENT
20.
0.
-20.
ACCELERATION (GALS)
CORRECTED
70.
0.
-70.
FIXED FILTER
1.5
0.
-1.5
VELOCITY (CM/SEC.)
VARIABLE FILTER(FC=0.549 HZ)
1.5
0.
-1.5
FIXED FILTER
0.1
0.
-0.1
DISPLACEMENT (CM)
VARIABLE FILTER(FC=0.549 HZ)
0.09
0.
-0.09
0.
5.
10.
15.
20.
25.
30.
TIME (SECONDS)

F-384 NORTH HITACHINAKA-F
(1/FC=2.74 SEC.)

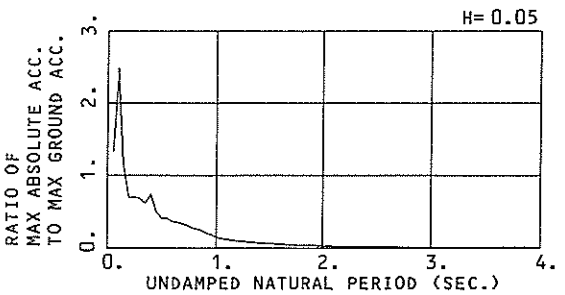


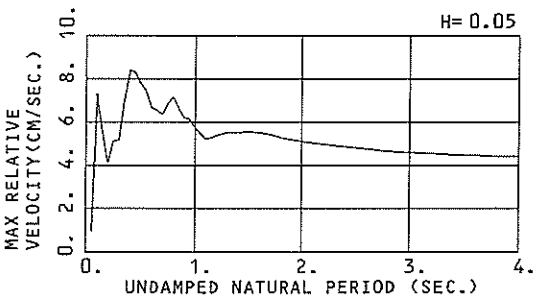


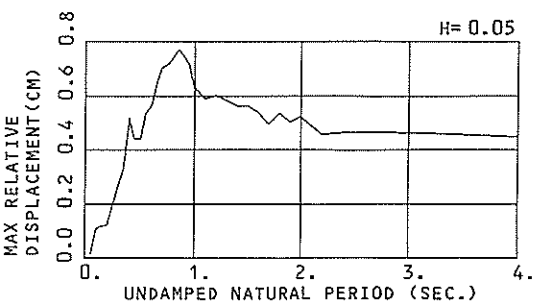


RESPONSE SPECTRA

F-384 EAST HITACHINAKA-F
(1/FC=2.93 SEC.)

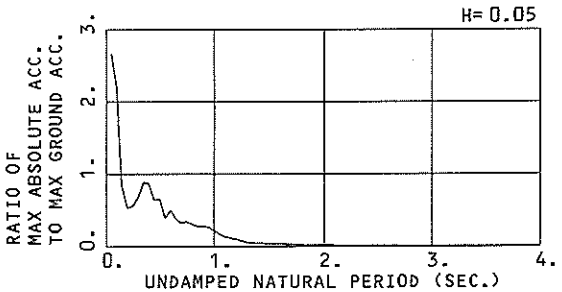


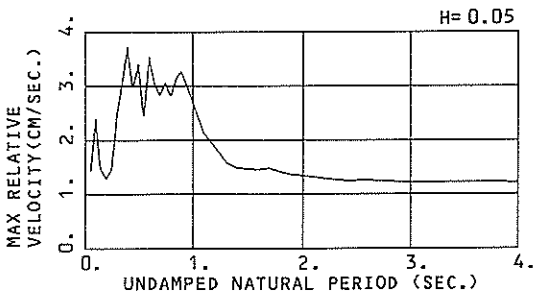


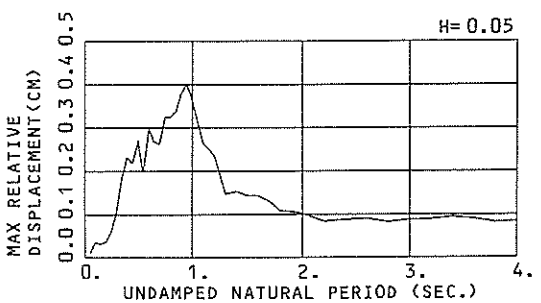


RESPONSE SPECTRA

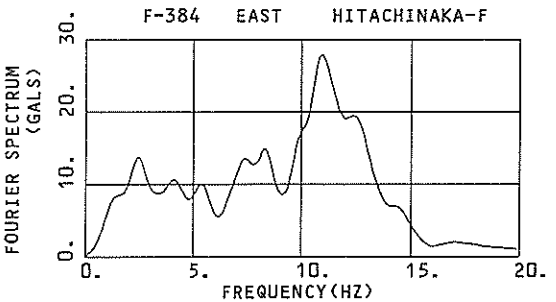
F-384 UP HITACHINAKA-F
(1/FC=1.82 SEC.)

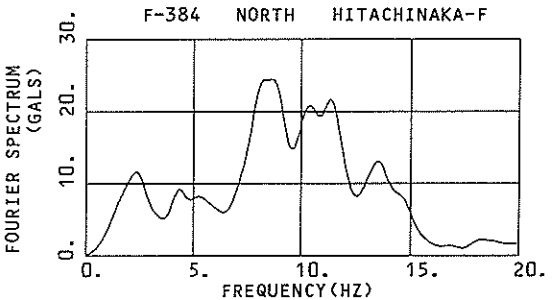


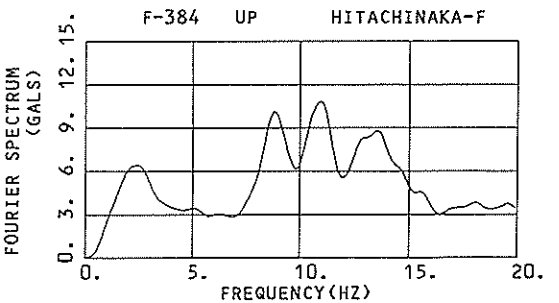




RESPONSE SPECTRA







RESPONSE SPECTRUM

RECORD = F-384 COMPONENT = NORTH SIGNAL = GR. ACC. CORRECTION = STATION = HITACHINAKA-F
DATE AND TIME = 1990-10- 6-23-33 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 146.97 (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	306.3	2.27	0.019	227.2	1.37	0.014	214.3	1.24	0.014	202.1	1.06	0.013	189.6	0.82	0.012
0.10	1840.2	29.27	0.466	822.2	12.76	0.207	661.5	10.22	0.166	479.1	7.33	0.119	272.3	3.83	0.062
0.15	383.5	10.11	0.219	263.9	7.21	0.150	223.1	6.32	0.127	174.2	5.19	0.097	129.6	3.51	0.066
0.20	393.0	12.27	0.398	140.2	5.04	0.142	130.5	4.80	0.131	123.1	4.57	0.123	110.9	3.61	0.097
0.25	188.2	6.99	0.298	121.8	5.07	0.193	102.0	4.37	0.159	98.3	3.90	0.149	92.7	3.15	0.122
0.30	171.7	8.12	0.392	104.8	5.22	0.238	98.7	5.05	0.223	89.6	4.60	0.197	78.8	3.71	0.143
0.35	244.9	13.69	0.760	93.0	7.53	0.288	83.5	6.76	0.257	71.9	5.66	0.213	62.4	4.12	0.146
0.40	330.9	21.35	1.341	128.9	8.44	0.522	90.8	5.62	0.366	63.3	5.27	0.251	49.4	4.31	0.167
0.45	211.9	15.40	1.087	101.2	7.33	0.520	82.1	6.08	0.418	65.1	4.96	0.329	48.2	4.26	0.197
0.50	183.2	14.55	1.160	106.8	9.02	0.675	87.9	7.26	0.552	65.8	5.18	0.406	43.7	4.09	0.224
0.55	90.1	7.74	0.691	87.0	7.84	0.666	73.2	6.77	0.557	54.8	5.07	0.410	38.4	3.89	0.239
0.60	154.9	14.95	1.412	64.5	7.14	0.587	47.7	5.59	0.432	38.2	4.45	0.338	33.6	3.71	0.239
0.65	81.2	8.31	0.869	48.5	5.98	0.519	36.4	4.78	0.386	25.5	4.11	0.266	29.5	3.57	0.233
0.70	59.1	6.69	0.734	35.1	4.88	0.435	28.7	4.44	0.354	24.7	4.18	0.296	26.0	3.54	0.230
0.75	48.0	5.75	0.683	28.1	4.44	0.399	25.1	4.39	0.355	22.9	4.21	0.317	23.1	3.63	0.225
0.80	71.5	9.41	1.159	34.3	5.14	0.556	27.5	4.48	0.442	20.8	4.25	0.327	20.5	3.69	0.217
0.85	64.7	8.71	1.185	31.8	5.34	0.581	23.8	4.53	0.432	16.6	4.28	0.295	18.3	3.73	0.205
0.90	32.7	6.10	0.671	22.1	4.70	0.453	16.9	4.48	0.343	14.1	4.26	0.266	16.4	3.75	0.210
0.95	22.7	4.73	0.519	16.0	4.52	0.366	12.7	4.39	0.288	12.8	4.20	0.254	15.0	3.76	0.216
1.00	26.6	4.40	0.673	12.5	4.23	0.316	11.2	4.20	0.269	11.8	4.11	0.254	14.2	3.74	0.221
1.10	19.3	4.19	0.591	9.9	4.11	0.301	9.2	4.06	0.264	10.1	3.97	0.258	12.8	3.70	0.228
1.20	15.6	4.08	0.568	9.4	3.99	0.340	8.6	3.93	0.292	9.0	3.84	0.269	11.5	3.63	0.233
1.30	9.7	3.49	0.414	8.2	3.59	0.349	7.1	3.63	0.300	7.8	3.65	0.262	10.4	3.56	0.234
1.40	16.1	4.11	0.798	9.0	3.49	0.448	7.0	3.50	0.341	6.7	3.52	0.276	9.5	3.48	0.233
1.50	14.9	3.89	0.847	9.0	3.40	0.512	6.7	3.41	0.375	5.9	3.42	0.263	8.6	3.42	0.231
1.60	8.7	3.23	0.562	6.3	3.27	0.407	4.9	3.30	0.314	5.2	3.34	0.240	7.9	3.37	0.228
1.70	5.7	3.18	0.419	4.8	3.22	0.349	4.1	3.24	0.294	4.6	3.28	0.233	7.3	3.32	0.226
1.80	4.0	3.19	0.326	3.6	3.20	0.296	3.5	3.21	0.279	4.2	3.24	0.249	6.8	3.28	0.223
1.90	4.6	3.18	0.417	3.5	3.18	0.321	3.4	3.18	0.301	3.8	3.20	0.267	6.3	3.24	0.221
2.00	3.9	3.12	0.394	3.4	3.13	0.339	3.2	3.14	0.313	3.5	3.17	0.276	5.9	3.21	0.218
2.20	2.5	3.09	0.310	2.5	3.05	0.300	2.5	3.06	0.289	3.0	3.10	0.267	5.2	3.17	0.219
2.40	1.7	3.04	0.255	1.8	3.02	0.256	1.9	3.03	0.255	2.5	3.07	0.247	4.7	3.13	0.218
2.60	1.4	3.01	0.238	1.4	3.02	0.236	1.6	3.03	0.235	2.2	3.05	0.231	4.2	3.10	0.214
2.80	1.1	3.01	0.213	1.1	3.02	0.216	1.4	3.02	0.218	2.0	3.04	0.219	3.9	3.08	0.210
3.00	0.9	3.00	0.199	1.0	3.01	0.204	1.3	3.01	0.207	1.8	3.03	0.210	3.6	3.07	0.206
3.20	0.8	2.99	0.201	0.9	2.99	0.202	1.1	3.00	0.204	1.7	3.02	0.205	3.3	3.06	0.203
3.40	0.7	2.97	0.204	0.8	2.98	0.203	1.0	2.99	0.203	1.5	3.01	0.203	3.1	3.05	0.200
3.60	0.6	2.97	0.203	0.7	2.98	0.202	0.9	2.99	0.202	1.4	3.00	0.201	2.9	3.04	0.198
3.80	0.5	2.97	0.199	0.6	2.97	0.199	0.8	2.98	0.199	1.3	3.00	0.199	2.7	3.03	0.197
4.00	0.5	2.97	0.196	0.6	2.97	0.196	0.8	2.98	0.197	1.2	2.99	0.197	2.6	3.02	0.196

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

RESPONSE SPECTRUM

RECORD = F-384 COMPONENT = EAST SIGNAL = GR. ACC. CORRECTION = STATION = HITACHINAKA-F
DATE AND TIME = 1990-10- 6-23-33 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 172.43 (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	223.6	1.47	0.014	236.7	0.92	0.015	230.9	0.96	0.015	225.4	0.97	0.014	219.3	0.88	0.013
0.10	2166.8	34.50	0.549	483.9	8.14	0.123	430.0	7.32	0.108	360.1	5.71	0.089	246.0	3.56	0.056
0.15	740.3	17.64	0.422	219.6	6.09	0.125	203.2	5.71	0.116	186.2	5.05	0.102	164.7	4.00	0.080
0.20	171.6	5.43	0.174	146.5	4.37	0.149	120.1	4.11	0.120	96.1	3.96	0.093	110.6	3.48	0.092
0.25	294.7	11.54	0.467	177.2	7.06	0.281	120.7	5.10	0.191	106.3	4.54	0.162	101.1	3.46	0.132
0.30	289.7	14.00	0.660	127.1	6.40	0.289	118.1	5.16	0.265	107.4	4.92	0.234	94.4	4.35	0.166
0.35	272.5	15.28	0.846	121.6	7.31	0.376	106.7	7.00	0.329	93.8	6.42	0.280	81.1	5.23	0.184
0.40	359.5	23.08	1.457	197.5	12.69	0.801	129.3	8.44	0.521	77.0	7.57	0.307	63.2	5.89	0.206
0.45	169.5	12.40	0.869	116.3	8.64	0.597	86.5	8.30	0.441	71.1	7.69	0.351	52.6	6.21	0.239
0.50	169.1	13.37	1.071	81.4	8.03	0.513	69.9	7.79	0.439	59.4	7.38	0.363	49.2	6.22	0.269
0.55	145.9	12.76	1.118	79.9	8.29	0.610	70.6	7.45	0.535	59.4	7.00	0.439	45.9	6.05	0.310
0.60	127.7	12.30	1.164	65.1	7.11	0.593	62.4	6.67	0.563	54.9	6.46	0.479	42.9	5.77	0.356
0.65	94.9	9.87	1.016	68.1	7.07	0.727	60.8	6.54	0.645	50.2	5.87	0.526	42.3	5.41	0.397
0.70	80.8	9.11	1.002	64.3	7.01	0.796	57.2	6.35	0.702	48.6	5.63	0.579	41.2	4.99	0.429
0.75	99.8	12.07	1.421	59.4	8.06	0.845	50.8	6.87	0.714	44.2	5.89	0.594	39.5	4.56	0.457
0.80	107.4	13.96	1.742	54.1	8.41	0.876	45.9	7.18	0.738	40.8	5.99	0.612	37.5	4.27	0.475
0.85	69.3	9.69	1.268	53.3	6.96	0.974	42.5	6.61	0.771	36.8	5.90	0.618	35.2	4.34	0.485
0.90	111.9	16.08	2.296	42.7	7.37	0.875	36.7	6.22	0.749	33.0	5.65	0.612	32.9	4.31	0.488
0.95	81.5	12.56	1.863	41.3	7.33	0.943	31.6	6.12	0.716	29.2	5.30	0.596	30.6	4.25	0.487
1.00	34.9	6.86	0.883	28.6	6.10	0.724	25.0	5.72	0.631	25.5	5.12	0.564	28.4	4.14	0.484
1.10	28.7	5.32	0.880	20.3	5.21	0.620	19.4	5.20	0.588	20.0	4.96	0.522	24.5	4.14	0.471
1.20	31.2	7.07	1.138	21.3	5.53	0.776	16.7	5.36	0.602	16.9	5.07	0.538	21.4	4.26	0.455
1.30	15.1	5.93	0.645	14.3	5.72	0.607	14.1	5.53	0.583	14.1	5.20	0.536	18.8	4.40	0.436
1.40	12.4	5.74	0.615	12.0	5.64	0.590	11.7	5.52	0.563	11.8	5.25	0.521	16.7	4.51	0.426
1.50	11.1	5.84	0.635	10.6	5.68	0.595	10.1	5.54	0.563	10.1	5.28	0.508	14.8	4.59	0.417
1.60	13.3	5.82	0.865	8.8	5.66	0.562	8.6	5.52	0.537	8.6	5.27	0.493	13.3	4.63	0.404
1.70	10.2	5.62	0.750	8.2	5.51	0.600	7.1	5.41	0.496	7.2	5.21	0.467	12.0	4.66	0.390
1.80	9.6	5.41	0.789	7.9	5.36	0.644	6.6	5.29	0.535	6.1	5.14	0.441	10.8	4.66	0.376
1.90	9.0	5.28	0.822	6.4	5.24	0.583	5.6	5.19	0.503	5.3	5.07	0.421	9.9	4.66	0.367
2.00	7.9	5.20	0.802	6.0	5.16	0.608	5.3	5.11	0.523	4.8	5.01	0.427	9.1	4.65	0.372
2.20	5.6	5.05	0.685	4.1	5.01	0.498	4.0	4.98	0.457	4.2	4.90	0.437	7.8	4.62	0.386
2.40	3.7	4.90	0.540	3.3	4.88	0.475	3.4	4.85	0.465	3.7	4.80	0.445	6.8	4.58	0.396
2.60	2.8	4.77	0.484	2.9	4.76	0.475	3.0	4.75	0.466	3.2	4.71	0.449	6.1	4.54	0.404
2.80	2.4	4.68	0.480	2.5	4.67	0.473	2.6	4.66	0.465	2.9	4.63	0.450	5.5	4.51	0.409
3.00	2.1	4.60	0.477	2.1	4.60	0.470	2.3	4.59	0.463	2.5	4.58	0.450	5.0	4.48	0.412
3.20	1.8	4.54	0.473	1.9	4.54	0.467	2.0	4.54	0.461	2.3	4.53	0.449	4.6	4.45	0.415
3.40	1.6	4.49	0.469	1.7	4.49	0.463	1.8	4.49	0.458	2.1	4.48	0.448	4.3	4.42	0.417
3.60	1.4	4.45	0.464	1.5	4.46	0.459	1.6	4.46	0.455	1.9	4.45	0.446	4.0	4.40	0.418
3.80	1.3	4.42	0.459	1.3	4.42	0.456	1.4	4.42	0.452	1.7	4.42	0.444	3.7	4.38	0.419
4.00	1.1	4.40	0.455	1.2	4.40	0.452	1.3	4.40	0.449	1.6	4.40	0.442	3.5	4.37	0.420

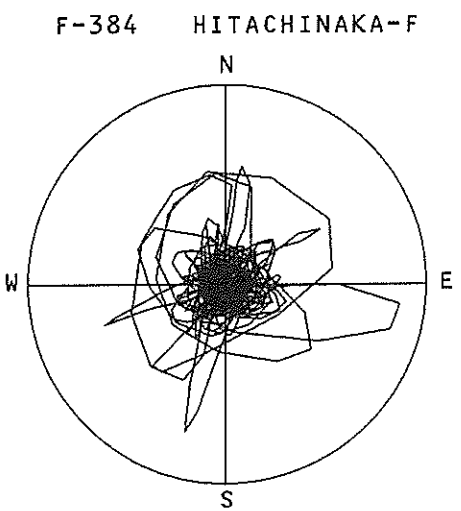
PER = RERIOD (SEC) AA = ABSOLUTE ACC. (GAL) RV = RELATIVE VELOCITY (CM/SEC) RD = RELATIVE DISPLACEMENT (CM)

RESPONSE SPECTRUM

RECORD = F-384 COMPONENT = UP SIGNAL = GR. ACC. CORRECTION = STATION = HITACHINAKA-F
DATE AND TIME = 1990-10- 6-23-33 SAMPRING INTERVAL = 0.0100(SEC) MAX.GROUND ACC. = 66.16 (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	468.4	3.72	0.030	224.5	1.77	0.014	176.7	1.43	0.011	127.5	1.00	0.008	100.9	0.65	0.006
0.10	265.8	4.31	0.067	182.9	3.01	0.046	145.0	2.40	0.036	113.9	1.81	0.028	73.8	1.17	0.016
0.15	100.9	2.61	0.057	58.3	1.55	0.033	56.1	1.47	0.032	50.8	1.36	0.029	44.0	1.05	0.021
0.20	93.1	2.90	0.094	42.6	1.52	0.043	35.5	1.29	0.036	28.6	1.17	0.029	25.4	0.98	0.022
0.25	60.7	2.49	0.096	48.8	1.89	0.077	36.9	1.45	0.058	29.9	1.08	0.046	21.9	0.85	0.032
0.30	81.0	4.00	0.185	60.9	3.12	0.139	45.9	2.48	0.104	32.3	1.77	0.072	24.6	0.96	0.051
0.35	167.1	9.22	0.518	80.6	4.34	0.249	59.1	3.06	0.182	40.8	1.95	0.124	25.7	1.10	0.072
0.40	182.7	11.66	0.740	80.7	5.26	0.326	57.7	3.72	0.232	38.2	2.39	0.152	24.1	1.29	0.088
0.45	97.1	6.99	0.498	51.3	3.71	0.263	42.9	2.98	0.219	31.8	2.24	0.159	21.8	1.48	0.101
0.50	165.9	13.27	1.051	61.8	4.89	0.391	43.1	3.41	0.272	29.2	2.39	0.181	19.6	1.57	0.107
0.55	56.7	4.98	0.434	33.2	3.01	0.255	25.9	2.45	0.197	22.0	2.16	0.164	16.7	1.66	0.110
0.60	116.7	11.20	1.064	46.5	4.90	0.424	33.2	3.55	0.301	23.5	2.53	0.208	15.2	1.76	0.116
0.65	44.5	4.94	0.477	28.1	3.48	0.300	25.3	3.06	0.269	20.5	2.65	0.213	14.0	1.79	0.126
0.70	29.5	3.37	0.366	22.9	2.98	0.284	21.2	2.83	0.261	18.7	2.47	0.227	13.1	1.74	0.140
0.75	84.8	10.11	1.208	28.2	3.73	0.401	23.0	3.07	0.326	18.4	2.37	0.253	12.2	1.59	0.148
0.80	25.2	3.48	0.409	21.6	2.88	0.349	20.2	2.81	0.324	16.7	2.42	0.261	11.3	1.57	0.147
0.85	30.1	4.05	0.550	21.5	3.48	0.392	18.6	3.15	0.338	14.5	2.59	0.258	9.9	1.64	0.155
0.90	28.2	4.92	0.578	22.0	3.86	0.450	18.6	3.28	0.378	14.5	2.57	0.287	9.5	1.64	0.162
0.95	32.6	5.14	0.744	21.2	3.54	0.483	17.7	2.99	0.401	13.2	2.28	0.294	9.0	1.58	0.163
1.00	41.3	6.78	1.047	17.7	3.31	0.448	14.6	2.72	0.366	11.1	2.15	0.274	8.1	1.51	0.159
1.10	10.3	2.70	0.317	9.1	2.37	0.278	8.7	2.12	0.264	7.8	1.84	0.225	6.8	1.46	0.150
1.20	10.5	2.72	0.382	7.7	2.15	0.281	6.6	1.86	0.236	5.8	1.54	0.200	6.0	1.35	0.148
1.30	5.2	1.64	0.222	3.9	1.56	0.167	3.5	1.58	0.147	4.1	1.49	0.161	5.2	1.30	0.142
1.40	3.8	1.57	0.190	3.3	1.50	0.162	3.1	1.48	0.152	3.3	1.43	0.148	4.5	1.26	0.135
1.50	2.4	1.48	0.134	2.5	1.48	0.141	2.6	1.46	0.143	2.8	1.41	0.141	4.0	1.23	0.129
1.60	2.6	1.50	0.170	2.4	1.48	0.153	2.3	1.46	0.143	2.4	1.41	0.134	3.6	1.24	0.123
1.70	2.1	1.63	0.151	1.9	1.54	0.139	1.8	1.48	0.131	2.0	1.40	0.124	3.2	1.24	0.117
1.80	1.8	1.45	0.145	1.5	1.44	0.119	1.4	1.42	0.109	1.7	1.37	0.112	2.9	1.24	0.112
1.90	1.2	1.34	0.110	1.2	1.36	0.110	1.2	1.36	0.106	1.4	1.34	0.103	2.7	1.24	0.108
2.00	1.1	1.37	0.115	1.1	1.35	0.107	1.1	1.34	0.102	1.3	1.32	0.098	2.4	1.23	0.104
2.20	0.9	1.29	0.105	0.7	1.29	0.089	0.7	1.29	0.084	1.0	1.28	0.090	2.1	1.22	0.098
2.40	0.7	1.23	0.100	0.6	1.24	0.093	0.6	1.25	0.088	0.9	1.25	0.089	1.9	1.21	0.095
2.60	0.6	1.28	0.099	0.6	1.26	0.093	0.6	1.25	0.090	0.8	1.24	0.089	1.7	1.20	0.092
2.80	0.4	1.26	0.083	0.4	1.25	0.082	0.5	1.24	0.083	0.7	1.23	0.086	1.5	1.20	0.091
3.00	0.4	1.20	0.099	0.4	1.21	0.092	0.4	1.22	0.087	0.7	1.22	0.086	1.4	1.19	0.090
3.20	0.4	1.20	0.094	0.4	1.21	0.091	0.4	1.21	0.089	0.6	1.21	0.088	1.3	1.19	0.089
3.40	0.4	1.23	0.105	0.3	1.23	0.098	0.4	1.22	0.093	0.6	1.21	0.089	1.2	1.19	0.088
3.60	0.3	1.25	0.098	0.3	1.24	0.093	0.3	1.23	0.090	0.5	1.22	0.087	1.1	1.19	0.087
3.80	0.3	1.25	0.093	0.3	1.24	0.086	0.3	1.23	0.082	0.5	1.21	0.083	1.1	1.19	0.086
4.00	0.2	1.22	0.097	0.2	1.22	0.089	0.3	1.21	0.084	0.4	1.21	0.080	1.0	1.19	0.086

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



ACCELERATION
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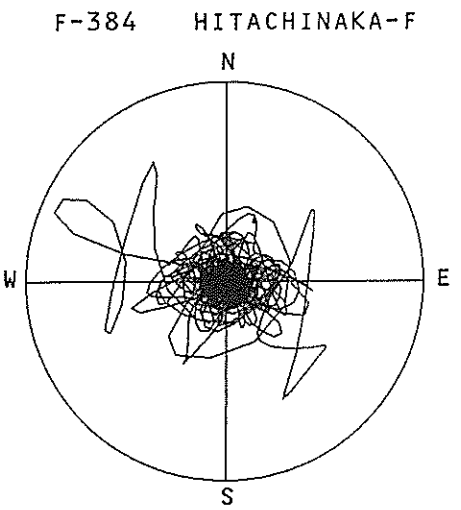
MAX=173.5GAL



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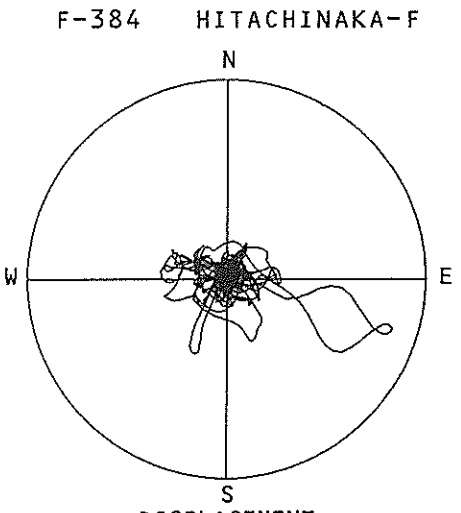
MAX=4.6 CM/SEC.



DISPLACEMENT
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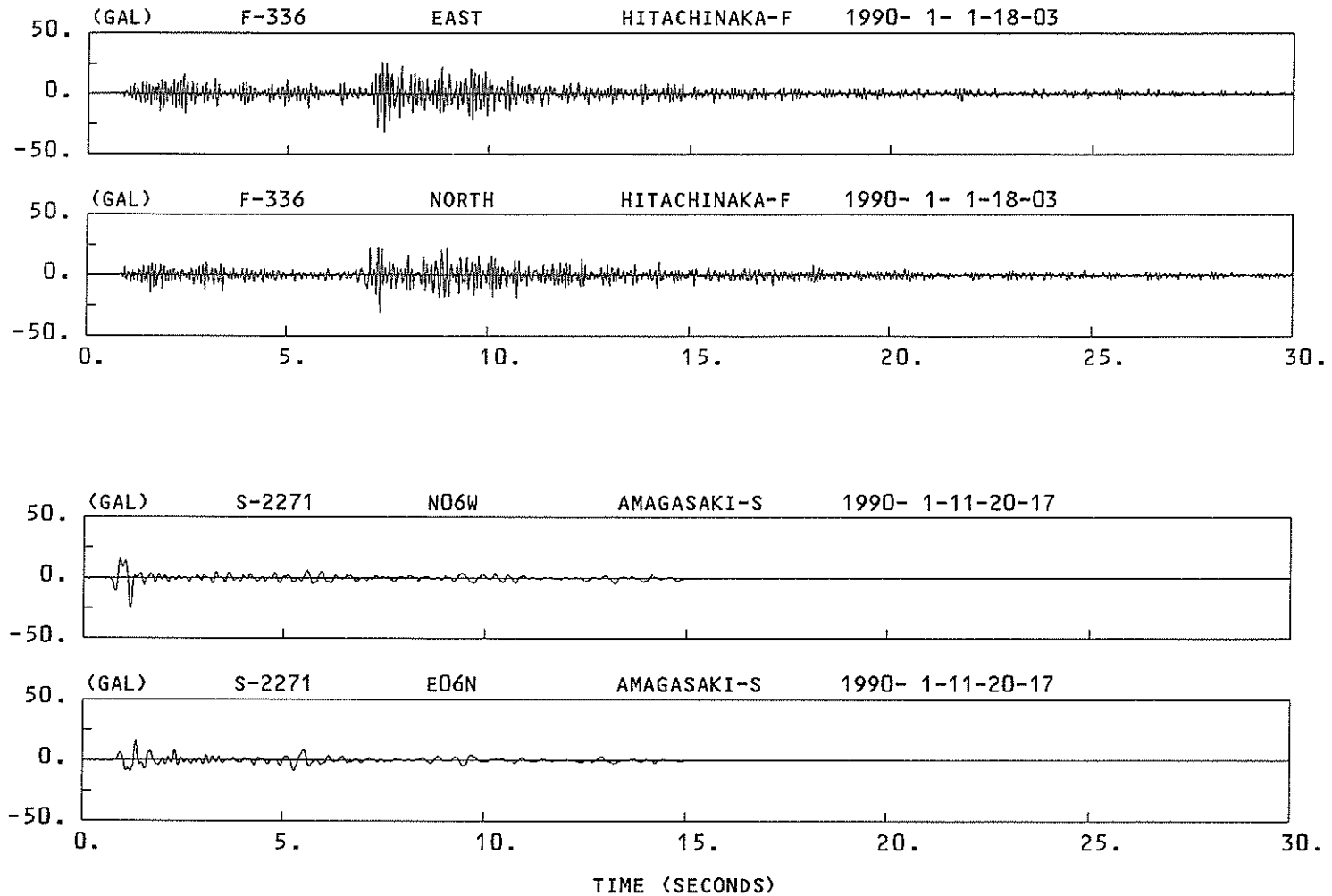
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(GAL) S-2271 N06W AMAGASAKI-S 1990- 1-11-20-17
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(GAL) S-2271 E06N AMAGASAKI-S 1990- 1-11-20-17
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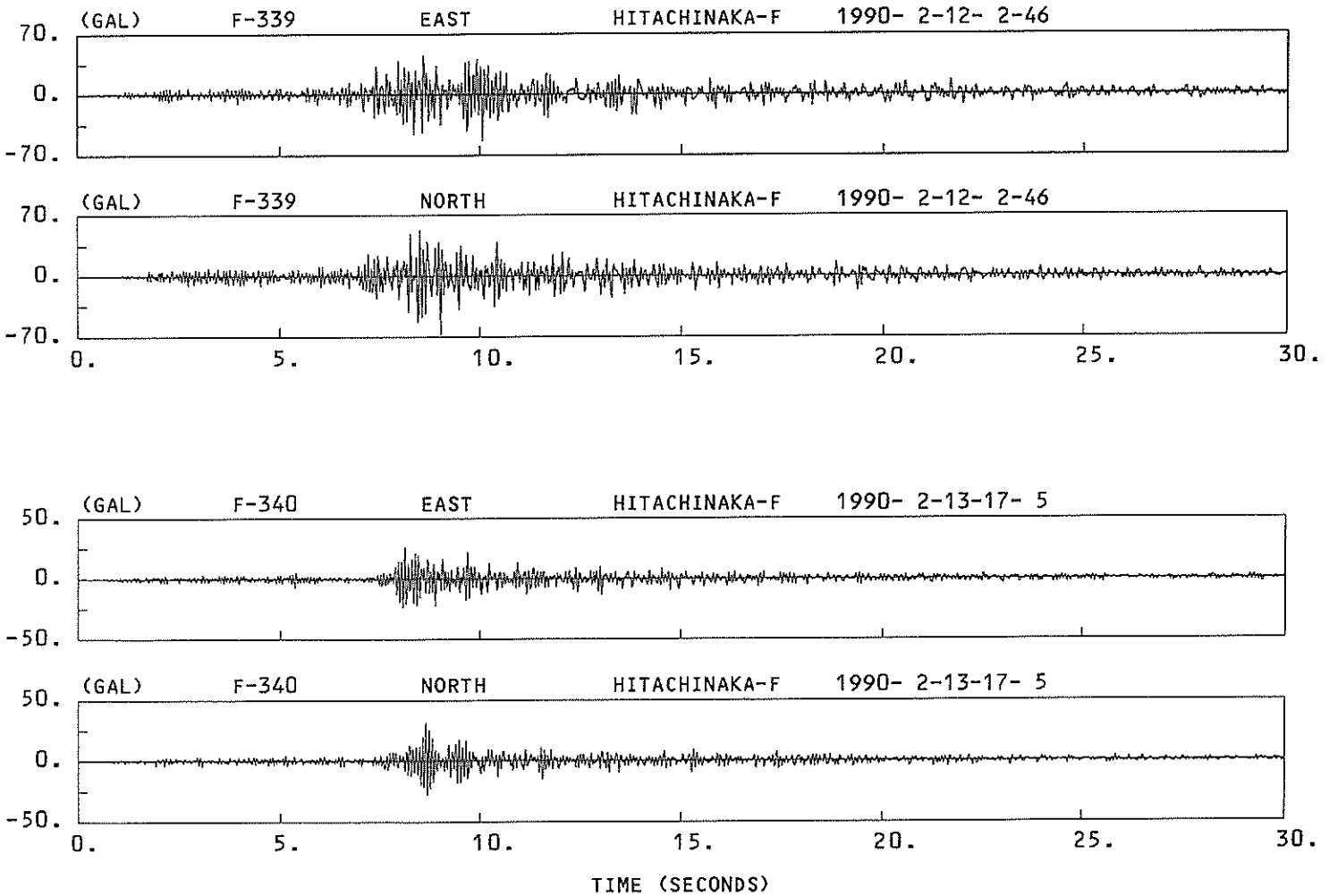
TIME (SECONDS)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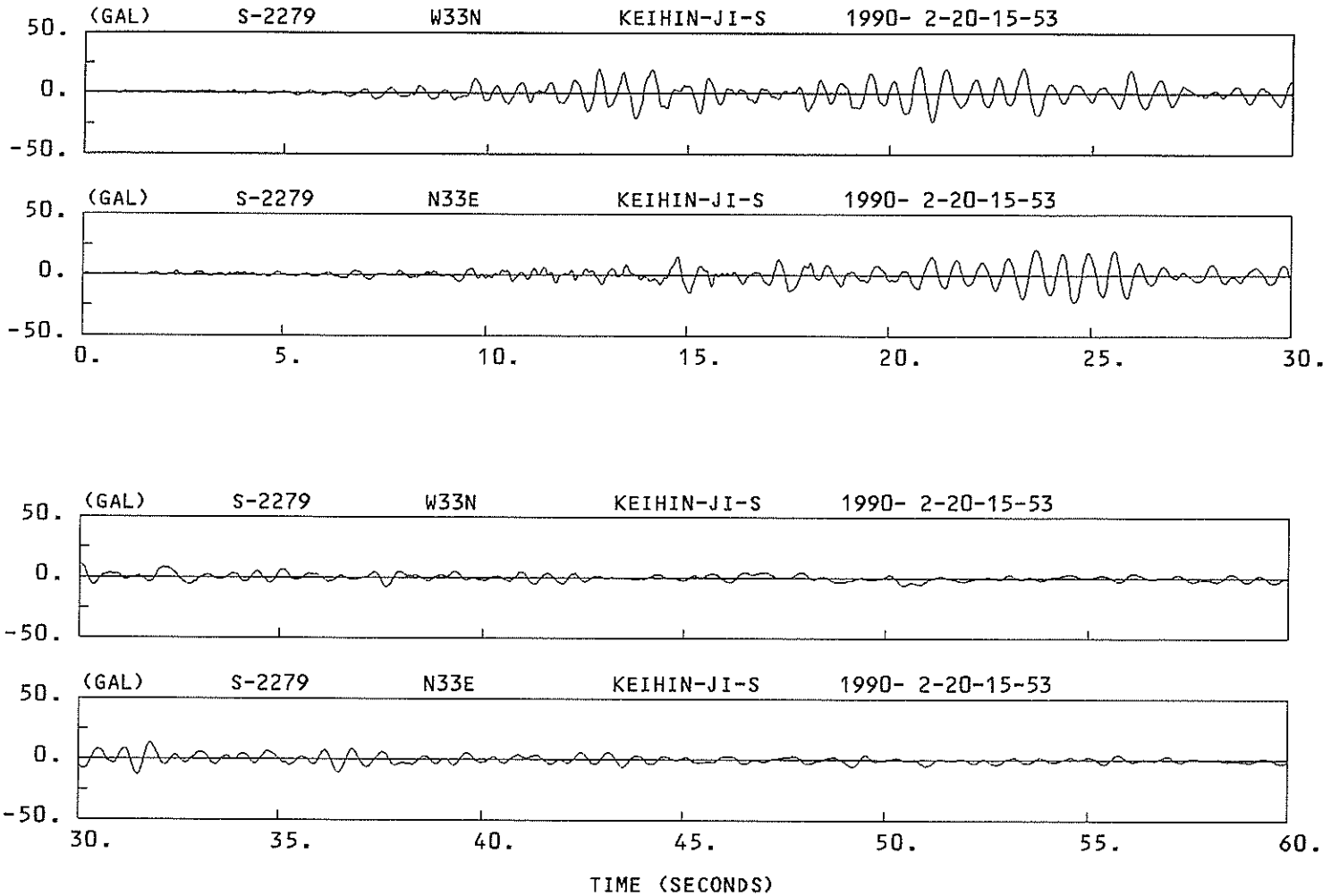
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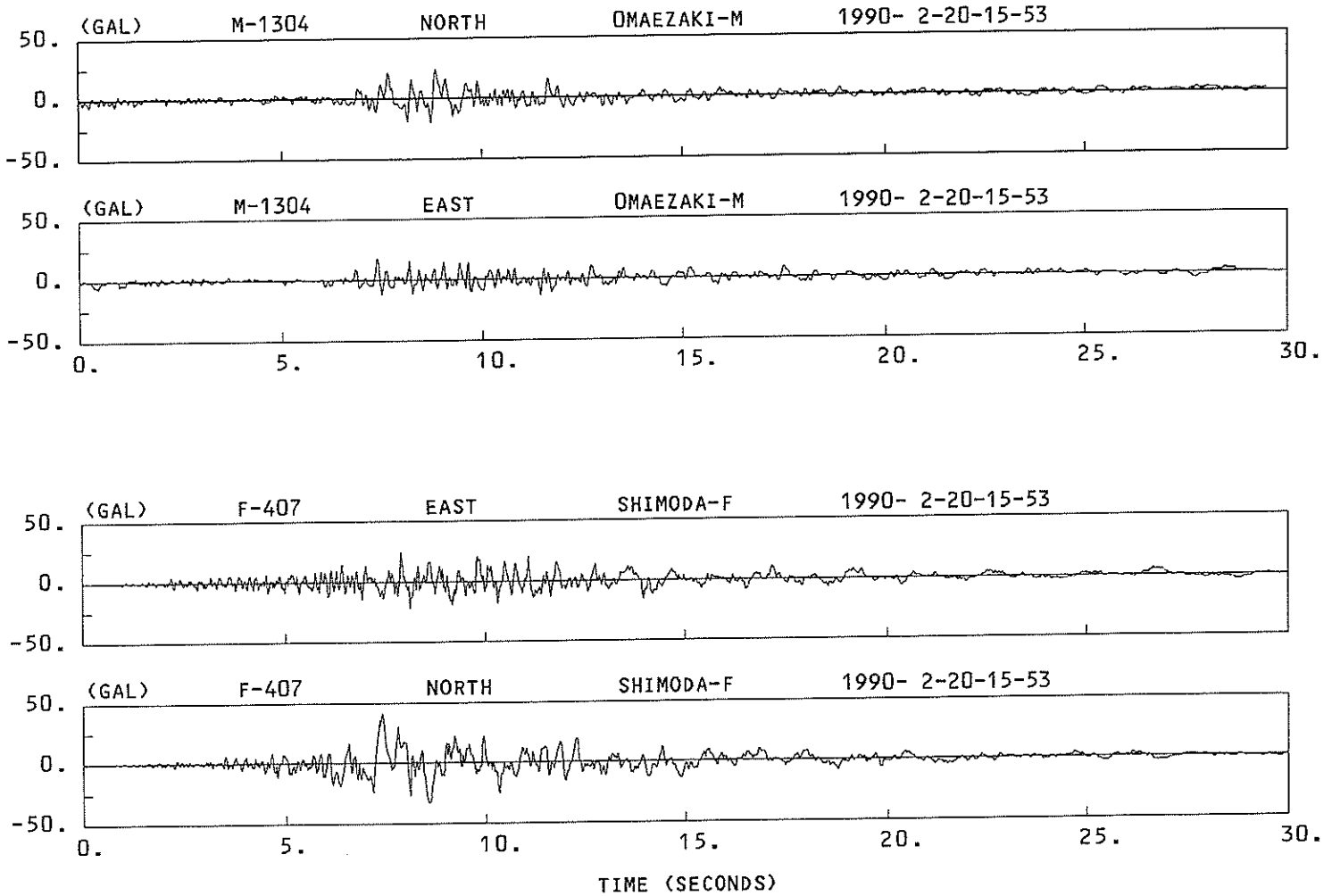
TIME (SECONDS)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(GAL) F-407 EAST SHIMODA-F 1990- 2-20-15-53
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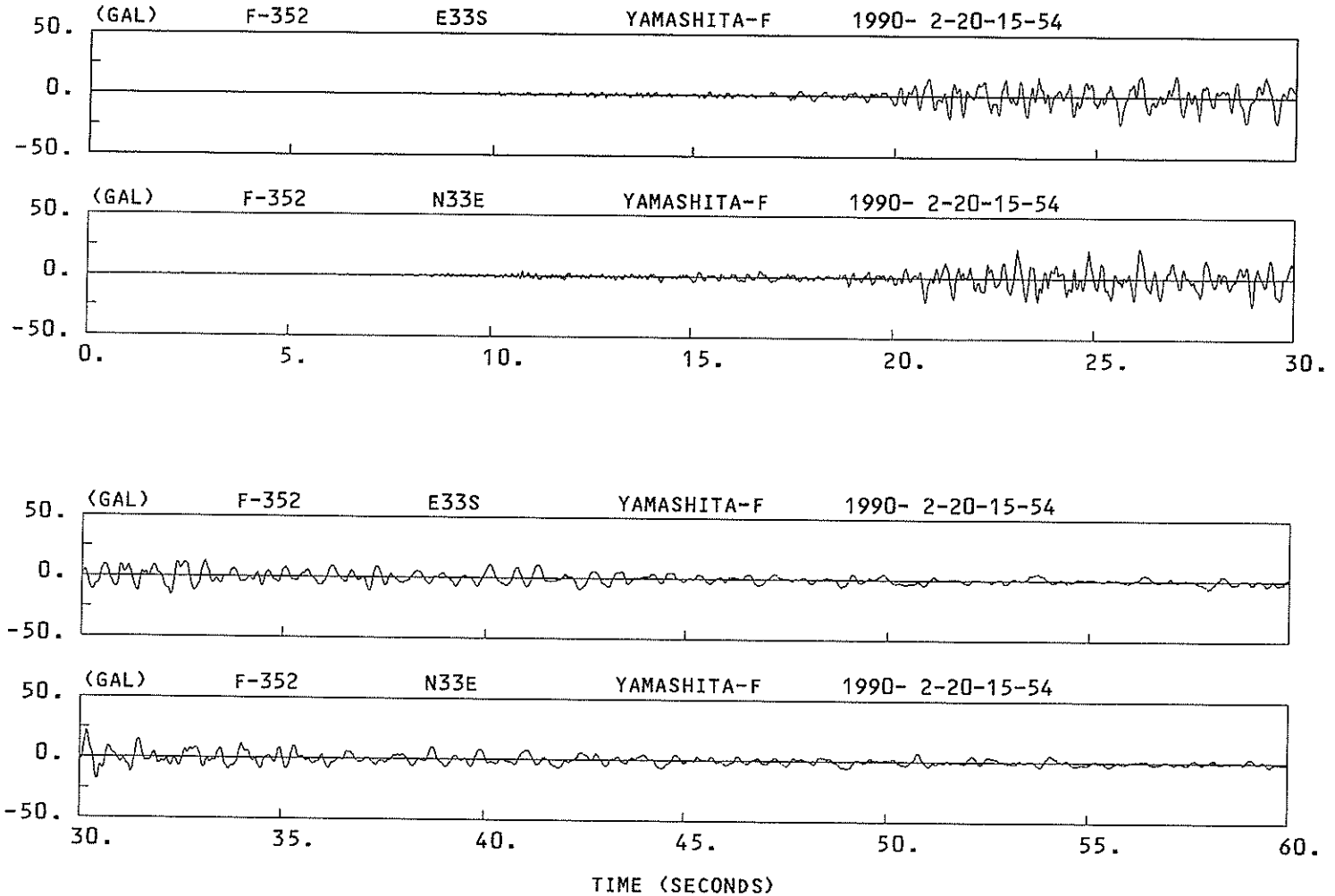
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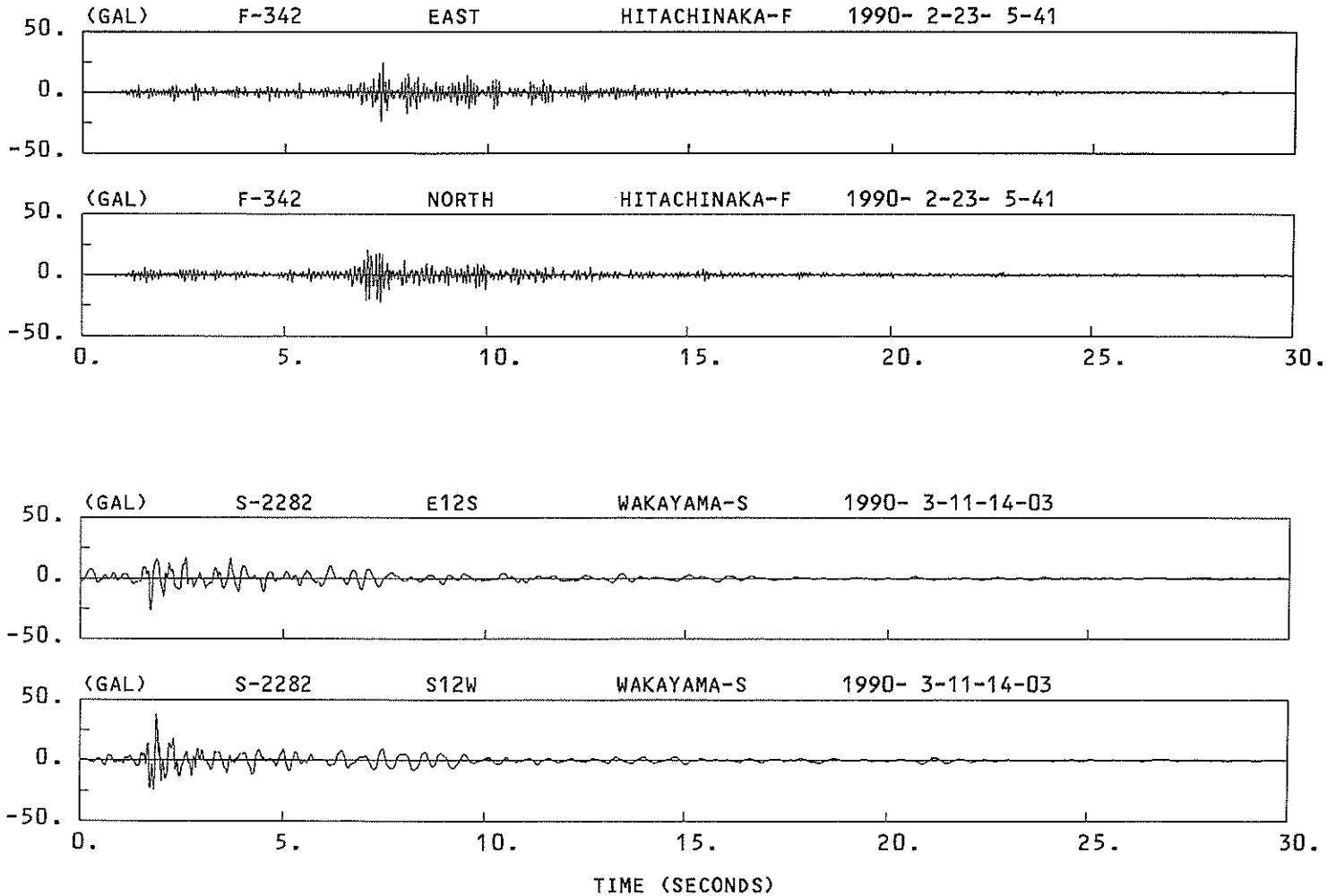
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(GAL) S-2282 E12S WAKAYAMA-S 1990- 3-11-14-03
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(GAL) S-2282 S12W WAKAYAMA-S 1990- 3-11-14-03
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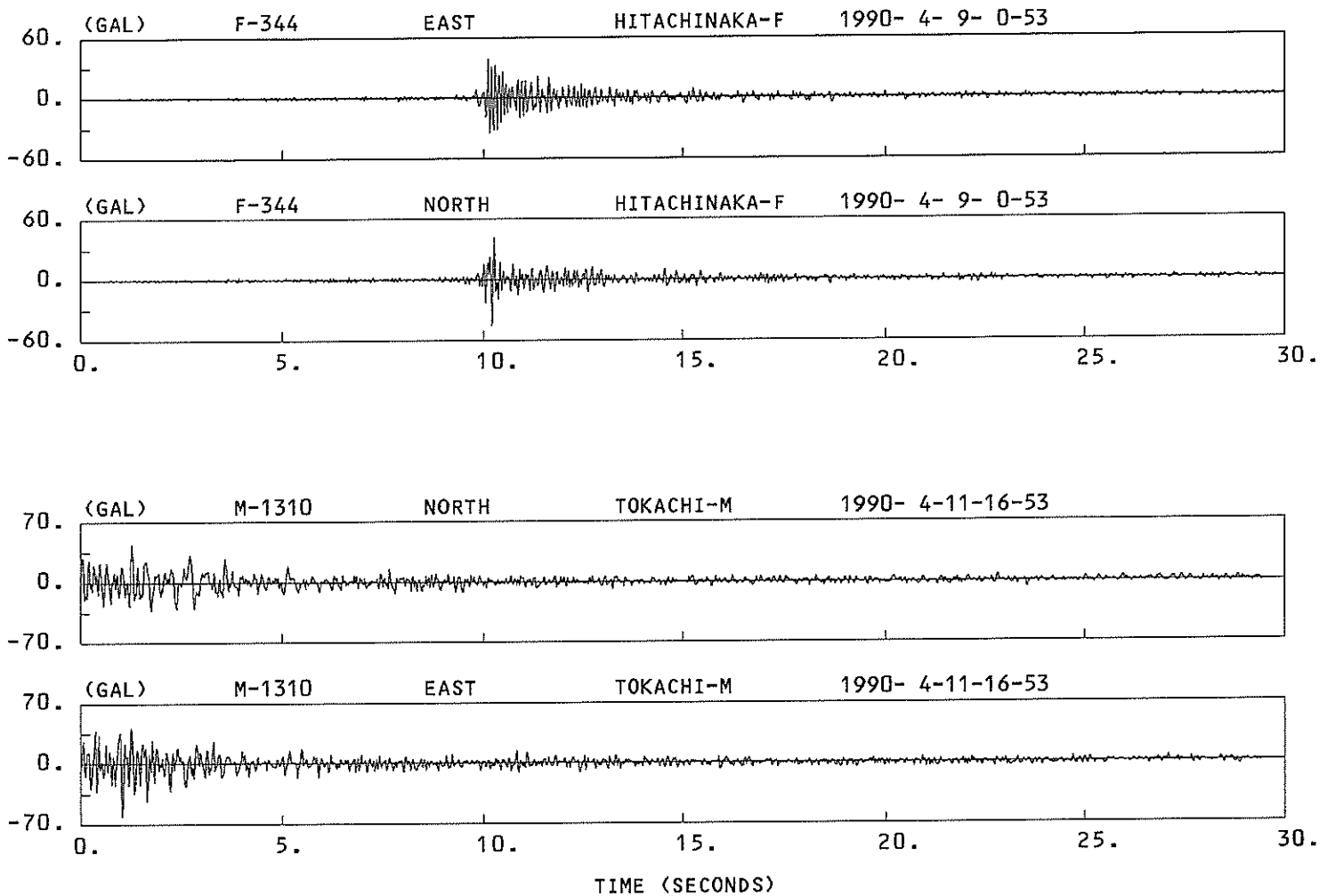
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(GAL) M-1310 NORTH TOKACHI-M 1990- 4-11-16-53
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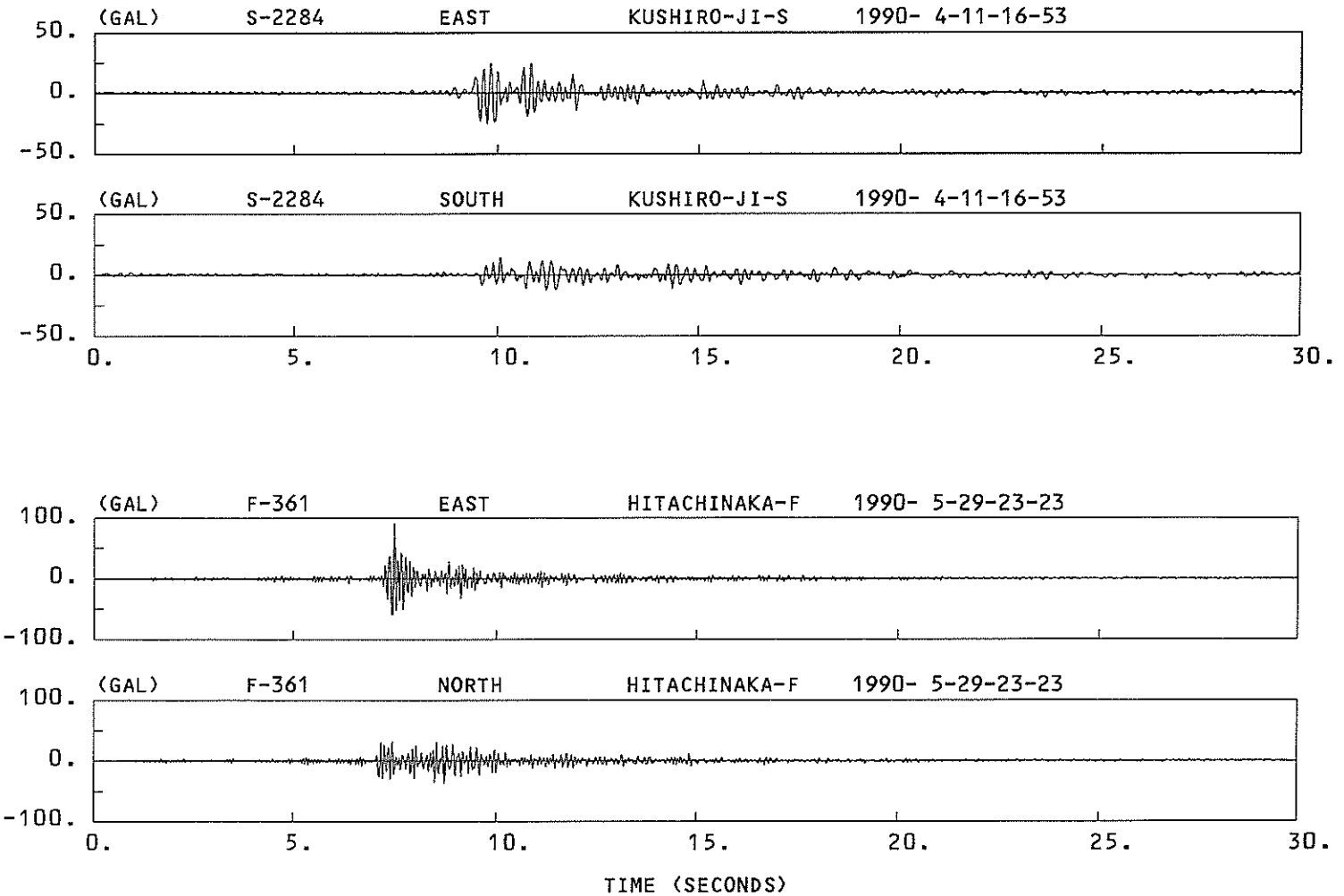
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(GAL) F-361 EAST HITACHINAKA-F 1990- 5-29-23-23
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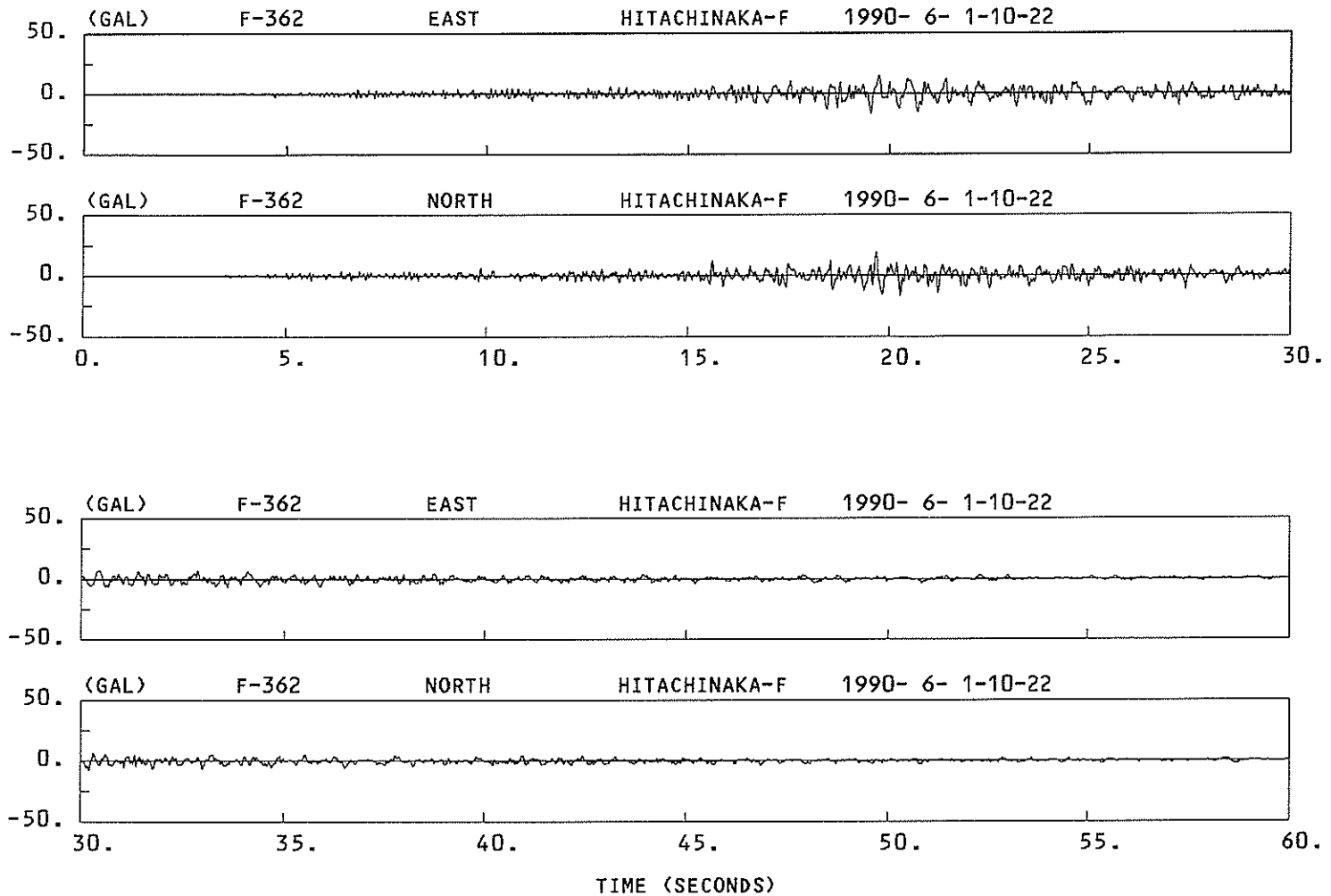
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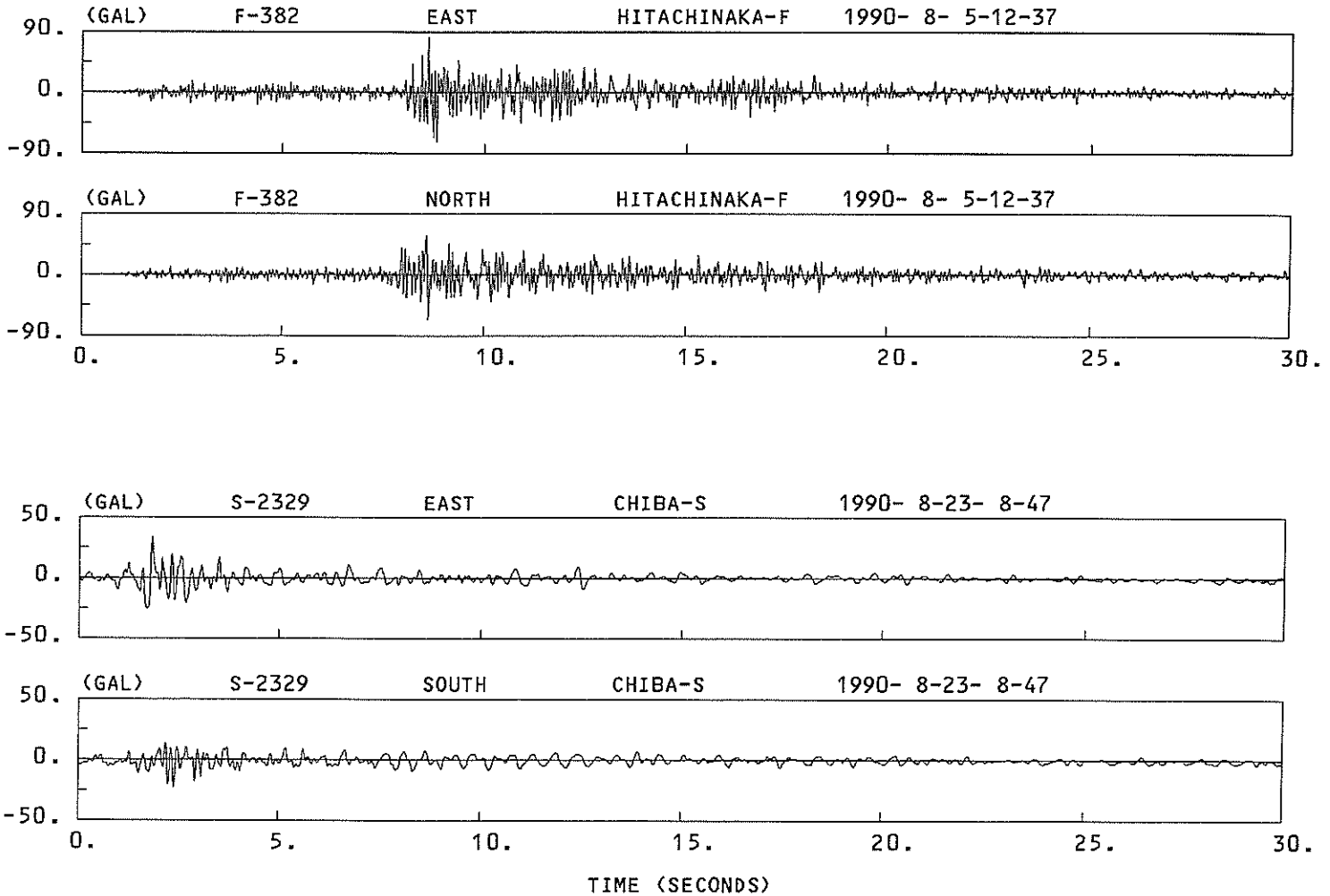
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(GAL) S-2329 EAST CHIBA-S 1990- 8-23- 8-47
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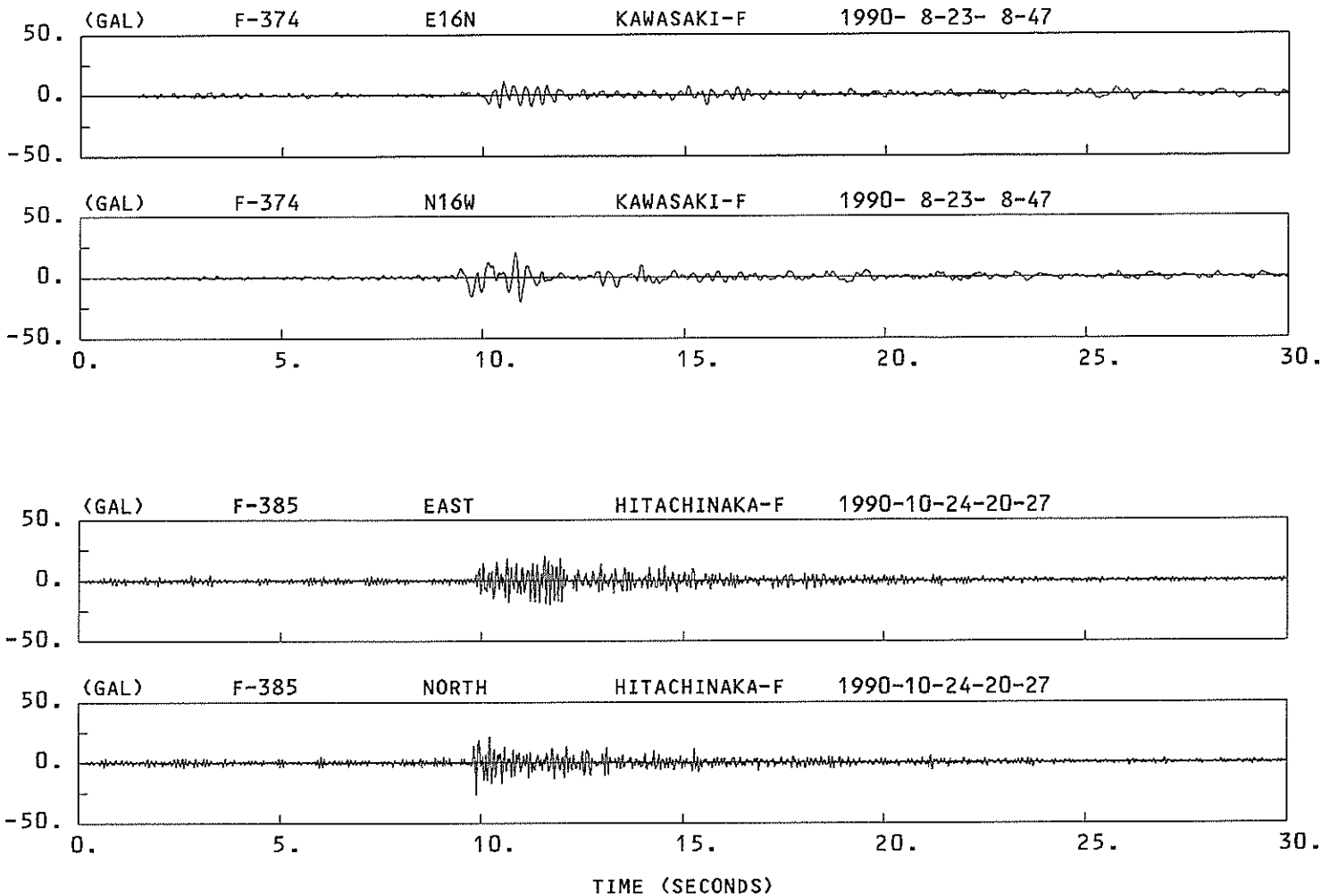
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(GAL) F-385 EAST HITACHINAKA-F 1990-10-24-20-27
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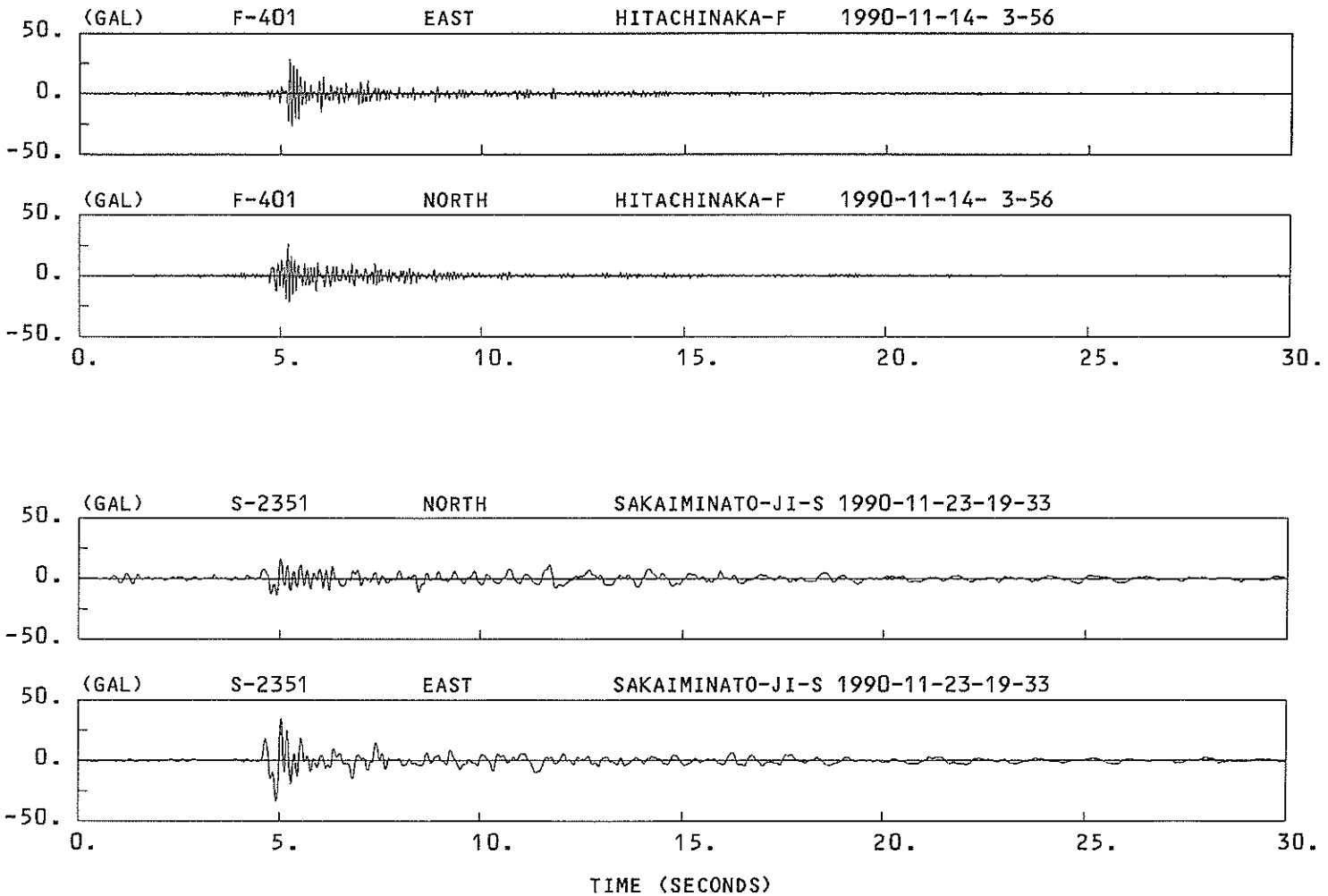
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(GAL) S-2351 NORTH SAKAIMINATO-JI-S 1990-11-23-19-33
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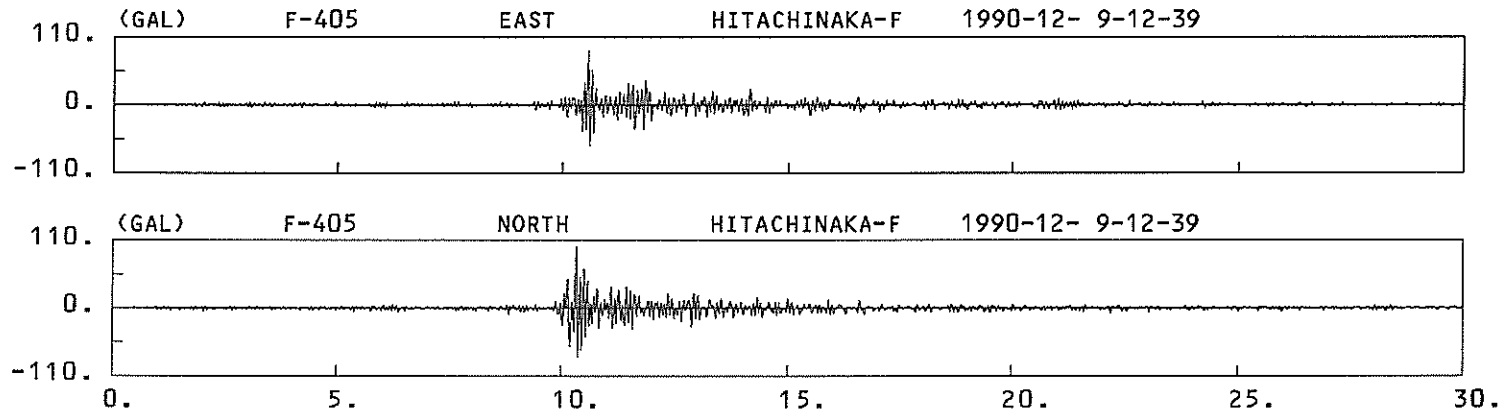
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DATE AND TIME = 1990- 5- 3-16-45 TOTAL NUMBER OF DATA = 3000
SAMPLING INTERVAL = 0.010 (SEC) SCAL = 0.10000
SIGNAL = GR. ACC.
CONECTION POINT IN DATA NUMBER = 3000,

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40	-2	4	2	0	6	-3	-16	-6	0	-4
50	-1	0	-5	4	13	4	-2	-10	-13	6
60	-5	-39	-12	26	4	-18	-5	-1	-4	-6
70	-5	34	57	32	22	10	-16	-23	-33	-58
80	-53	-19	15	43	22	-19	-19	0	-14	-43
90	-42	-24	-12	-7	3	23	34	20	40	98
100	97	47	47	74	14	-78	-109	-107	-64	15
110	69	68	27	-1	6	0	-44	-64	-9	40
120	19	-5	25	54	40	4	-42	-61	-39	-15
130	15	91	141	117	52	2	-29	-78	-123	-128
140	-101	-63	-18	22	20	-20	-43	-31	15	85
150	125	80	-25	-101	-92	-44	-9	6	-17	-48
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200	72	53	-19	-89	-91	-29	30	64	78	47
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270	36	45	17	-42	-78	-61	-7	49	74	57
280	14	-11	-3	20	52	74	41	-37	-89	-79
290	-31	35	97	116	85	22	-47	-90	-92	-80
300	-82	-65	-6	45	48	28	8	-19	-77	-145
310	-147	-69	37	133	162	110	14	-72	-101	-49
320	24	69	85	78	65	29	-13	-37	-39	2
330	68	108	109	84	27	-51	-99	-83	-29	-1
340	-10	-27	-43	-61	-58	-20	32	49	20	-15
350	-36	-35	-2	30	17	-13	-37	-51	-40	-14
360	4	17	43	70	72	64	43	-6	-34	-6
370	44	101	124	99	50	-24	-103	-146	-164	-138
380	-66	-17	-24	-24	20	58	49	20	0	15
390	33	0	-58	-92	-99	-76	-36	14	104	146
400	82	-9	-86	-144	-137	-51	54	125	161	173
410	158	123	82	36	-10	-54	-82	-89	-69	-21
420	9	16	21	14	0	-6	-40	-92	-114	-120
430	-128	-89	11	85	103	98	76	34	-10	-22
440	-9	-14	-24	-10	20	52	77	99	93	49
450	7	-11	-16	-40	-108	-165	-158	-123	-65	10
460	102	188	200	112	-11	-78	-86	-70	-60	-82
470	-99	-63	-9	46	117	150	98	9	-45	-43

TO BE CONTINUED

CONTINUED(F-358 NORTH)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
480	7	82	116	52	-82	-197	-187	-49	138	263
490	234	86	-77	-179	-151	-46	36	53	-6	-71
500	-90	-76	-10	58	55	6	-13	35	75	40
510	-1	-52	-128	-162	-108	5	87	119	123	74
520	-1	-47	-37	-11	-5	-2	8	19	40	61
530	43	-14	-36	7	69	88	59	5	-34	-71
540	-103	-53	34	28	-29	-78	-102	-68	-12	17
550	27	6	-21	-8	33	62	52	18	-32	-75
560	-57	16	79	106	108	86	-7	-145	-197	-135
570	-73	-70	-58	9	92	143	140	109	86	42
580	-21	-63	-65	-10	38	10	-32	-2	69	115
590	116	79	3	-51	-31	7	24	28	-5	-105
600	-197	-168	-40	89	184	224	191	76	-84	-178
610	-167	-125	-119	-128	-89	-1	64	74	48	10
620	-26	-69	-98	-74	-2	84	158	193	200	181
630	160	180	206	223	222	128	-21	-139	-238	-357
640	-493	-593	-593	-494	-337	-183	-84	-44	-19	29
650	95	139	107	-22	-179	-251	-161	86	387	600
660	638	509	341	232	164	72	-53	-189	-271	-256
670	-131	114	373	475	356	104	-92	-88	89	318
680	423	272	-36	-286	-341	-230	-121	-173	-365	-521
690	-476	-284	0	340	462	222	-147	-407	-433	-157
700	224	391	331	191	3	-163	-213	-172	-112	-47
710	-9	9	82	231	389	416	212	-91	-320	-459
720	-475	-342	-116	126	326	441	413	191	-168	-537
730	-776	-716	-395	-33	274	451	393	202	63	10
740	-9	0	30	8	-26	40	197	311	316	212
750	45	-57	-31	72	207	319	330	225	44	-152
760	-317	-376	-314	-217	-109	49	205	243	145	-75
770	-372	-572	-558	-399	-157	145	395	435	230	-47
780	-238	-330	-328	-199	-19	116	203	213	146	129
790	191	226	191	115	30	-39	-82	-99	-41	107
800	277	419	491	434	242	-46	-381	-660	-754	-567
810	-123	355	609	560	278	-75	-315	-434	-482	-451
820	-385	-351	-306	-149	112	378	545	566	455	265
830	78	-61	-168	-284	-396	-434	-331	-91	198	425
840	524	429	124	-211	-375	-320	-130	63	178	156
850	31	-49	-9	116	230	212	36	-201	-383	-422
860	-284	-55	133	227	214	128	26	-11	46	134
870	171	167	158	148	124	84	62	79	90	40
880	-29	-83	-150	-211	-230	-234	-256	-284	-285	-257
890	-199	-98	9	81	113	89	5	-88	-132	-143
900	-122	-61	0	8	-16	-15	27	82	103	70
910	38	49	55	15	-22	-19	23	89	161	211
920	221	167	43	-78	-124	-78	57	250	427	500
930	434	267	88	-29	-85	-91	-55	-71	-109	-108
940	-39	49	82	48	-27	-137	-234	-278	-281	-237
950	-135	-17	74	103	36	-98	-229	-299	-279	-155
960	20	170	262	285	257	202	109	18	-58	-124
970	-155	-131	-77	-23	20	63	109	129	99	3
980	-132	-239	-259	-186	-48	93	208	263	237	156
990	69	11	12	59	104	132	151	135	61	-51
1000	-175	-259	-269	-239	-183	-118	-99	-135	-177	-180

TO BE CONTINUED

CONTINUED(F-358 NORTH)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1010	-137	-57	0	16	0	-29	-23	53	143	187
1020	178	141	109	89	84	96	108	101	59	15
1030	16	44	52	26	-1	9	53	105	152	163
1040	117	39	-29	-73	-71	-43	-66	-140	-201	-217
1050	-174	-82	6	40	-8	-124	-254	-343	-366	-346
1060	-318	-289	-257	-219	-148	-41	57	122	153	155
1070	170	207	227	239	281	346	412	429	356	232
1080	102	-5	-40	17	119	187	172	98	40	30
1090	54	88	67	-63	-255	-395	-402	-283	-112	28
1100	99	78	-19	-112	-160	-155	-111	-63	-31	-19
1110	-15	-21	-56	-107	-116	-45	91	239	338	334
1120	210	42	-64	-91	-65	-13	-24	-140	-256	-229
1130	-63	132	247	212	39	-190	-357	-372	-248	-69
1140	72	126	114	114	156	210	247	243	170	59
1150	-21	-52	-46	-27	-19	-17	29	126	204	211
1160	154	64	-31	-94	-101	-42	40	82	49	-11
1170	-61	-97	-129	-169	-224	-266	-267	-226	-137	-44
1180	-13	-41	-91	-138	-129	-34	91	173	187	146
1190	61	-32	-94	-92	-16	87	143	106	4	-83
1200	-98	-58	25	105	146	153	146	138	156	175
1210	132	-3	-162	-262	-261	-142	46	197	220	109
1220	-73	-221	-249	-168	-59	14	34	-8	-79	-91
1230	-2	103	141	115	56	-6	-35	-35	-35	-35
1240	-45	-48	-9	56	99	116	94	44	-19	-64
1250	-53	7	69	82	56	25	-2	-38	-78	-115
1260	-139	-111	4	168	297	331	251	58	-177	-326
1270	-306	-129	93	252	289	217	110	32	2	1
1280	-9	-78	-207	-310	-307	-182	20	198	279	254
1290	145	3	-84	-100	-96	-118	-196	-305	-378	-370
1300	-259	-44	178	286	249	112	-53	-163	-137	15
1310	201	325	349	259	108	-22	-103	-123	-106	-98
1320	-94	-76	-49	-14	35	84	113	97	39	-2
1330	-15	-7	40	94	111	94	49	2	-14	-10
1340	3	17	-20	-101	-165	-197	-178	-93	10	79
1350	88	24	-66	-118	-108	-61	-36	-72	-144	-192
1360	-182	-98	36	158	202	147	40	-38	-58	-19
1370	57	129	158	144	104	67	57	74	80	36
1380	-45	-130	-161	-105	17	158	254	262	198	127
1390	76	33	0	-30	-76	-108	-85	-14	74	128
1400	113	22	-121	-242	-275	-226	-126	-13	58	74
1410	72	77	89	82	27	-62	-141	-162	-121	-39
1420	50	113	108	46	-28	-79	-75	-10	57	79
1430	68	15	-78	-163	-191	-145	-39	86	168	164
1440	63	-72	-155	-158	-110	-31	36	66	54	29
1450	26	45	64	59	20	-30	-68	-64	-31	-2
1460	9	14	31	69	119	163	163	118	48	-41
1470	-108	-95	-16	69	113	98	54	0	-52	-78
1480	-63	-40	-41	-61	-70	-58	-25	10	21	-24
1490	-110	-197	-244	-233	-179	-119	-66	-17	12	32
1500	57	93	129	142	133	121	103	77	53	29
1510	2	-3	-10	-39	-51	-32	0	30	35	3
1520	-48	-92	-95	-53	14	59	63	48	36	14
1530	-11	-11	12	30	28	19	26	56	78	67

TO BE CONTINUED

CONTINUED(F-358 NORTH)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1540	34	-7	-45	-42	7	80	129	133	101	48
1550	-1	-31	-39	-24	2	29	47	74	111	140
1560	136	95	36	-44	-136	-187	-172	-128	-80	-35
1570	-4	-7	-36	-51	-26	17	40	29	-14	-76
1580	-122	-128	-99	-61	-31	-9	4	19	37	46
1590	46	40	22	-14	-41	-39	-22	2	28	45
1600	54	54	61	81	84	49	2	-39	-78	-94
1610	-82	-52	-24	-18	-31	-34	-20	-9	0	24
1620	37	31	22	19	2	-29	-73	-104	-101	-58
1630	7	65	106	130	125	94	69	49	29	20
1640	10	-29	-98	-162	-202	-213	-193	-155	-105	-48
1650	-4	18	27	46	89	148	213	256	240	151
1660	27	-69	-110	-70	39	148	181	114	-4	-103
1670	-140	-101	-10	72	88	25	-54	-73	-31	31
1680	79	73	0	-93	-157	-143	-58	32	61	15
1690	-54	-93	-88	-47	8	37	27	0	-37	-66
1700	-59	-7	67	125	137	112	78	41	-3	-39
1710	-52	-31	14	59	81	74	51	27	2	-23
1720	-32	-29	-24	-33	-52	-56	-31	3	36	56
1730	34	-15	-73	-132	-173	-145	-55	34	74	62
1740	10	-44	-63	-33	19	56	44	-12	-79	-120
1750	-119	-68	26	120	178	197	173	108	21	-61
1760	-119	-143	-137	-101	-39	31	79	85	43	-27
1770	-82	-87	-40	28	94	148	167	146	105	69
1780	62	69	49	-18	-110	-175	-180	-120	-20	71
1790	120	107	46	-20	-43	-17	9	5	-31	-75
1800	-95	-89	-69	-44	-31	-32	-40	-43	-32	-9
1810	-9	-34	-64	-61	-9	69	138	170	162	116
1820	52	10	14	49	81	85	49	-13	-63	-62
1830	-12	52	91	74	0	-90	-147	-155	-120	-54
1840	1	25	7	-24	-42	-31	-22	-40	-78	-113
1850	-140	-135	-88	-26	24	40	8	-35	-39	5
1860	56	82	79	59	43	49	77	97	100	94
1870	78	49	21	14	34	48	46	36	23	10
1880	3	7	34	66	95	126	140	108	39	-47
1890	-115	-130	-96	-39	12	25	-6	-58	-91	-92
1900	-64	-36	-26	-33	-67	-104	-111	-85	-46	-14
1910	-14	-49	-104	-151	-152	-112	-58	-10	12	3
1920	-4	22	78	133	157	141	115	104	98	89
1930	82	71	30	-25	-54	-39	-9	0	-12	-32
1940	-44	-33	2	40	44	-4	-76	-122	-109	-32
1950	69	140	148	88	3	-53	-59	-22	33	74
1960	72	35	-4	-29	-24	8	56	103	137	142
1970	116	79	37	-11	-52	-78	-94	-111	-138	-158
1980	-158	-151	-143	-120	-90	-58	-33	-19	-19	-24
1990	-31	-28	-14	20	91	168	196	153	61	-27
2000	-76	-75	-37	10	52	93	30	12	11	26
2010	49	67	57	13	-29	-50	-55	-39	-11	1
2020	-9	-24	-27	-22	-9	10	22	22	20	22
2030	30	37	32	0	-58	-99	-98	-59	-10	17
2040	7	-34	-80	-91	-54	14	74	82	42	-10
2050	-41	-23	32	84	102	81	40	18	28	54
2060	70	56	12	-31	-45	-26	12	40	30	-18

TO BE CONTINUED

CONTINUED(F-358 NORTH)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2070	-86	-135	-138	-93	-30	7	0	-33	-81	-114
2080	-98	-27	54	114	109	45	-30	-72	-58	4
2090	84	136	145	115	66	30	23	43	82	123
2100	138	123	94	59	17	-33	-81	-118	-123	-103
2110	-81	-58	-29	-3	12	23	30	27	-1	-41
2120	-64	-61	-35	-4	4	-16	-41	-48	-40	-21
2130	-3	3	-9	-44	-84	-110	-109	-81	-40	-1
2140	31	56	68	74	66	47	27	15	16	30
2150	52	75	84	57	2	-41	-63	-59	-29	20
2160	74	103	84	16	-56	-87	-55	20	89	116
2170	94	45	0	-14	-4	6	0	-19	-35	-48
2180	-52	-44	-34	-36	-48	-58	-66	-65	-45	-17
2190	6	19	7	-21	-46	-44	-19	10	32	36
2200	30	19	3	-9	-6	5	10	1	-13	-27
2210	-33	-27	-19	-21	-29	-39	-39	-21	2	15
2220	10	-3	-12	-8	8	24	33	31	21	27
2230	54	86	111	114	78	13	-48	-76	-62	-31
2240	-10	-11	-22	-24	-2	40	83	95	65	13
2250	-17	-4	33	59	47	-2	-68	-129	-155	-123
2260	-56	7	40	42	17	-19	-48	-56	-49	-32
2270	-11	12	36	40	23	0	-19	-32	-35	-16
2280	22	57	58	24	-16	-46	-57	-44	-10	23
2290	49	66	86	111	118	92	59	26	-3	-24
2300	-24	-6	23	45	40	2	-44	-72	-68	-41
2310	-5	14	7	-24	-60	-86	-91	-68	-33	-9
2320	0	0	0	-2	-2	5	5	0	-6	-12
2330	-5	15	42	52	53	62	79	96	99	75
2340	25	-26	-58	-49	-15	13	14	-12	-58	-95
2350	-103	-81	-48	-25	-11	4	26	59	97	115
2360	97	51	0	-27	-18	16	52	68	47	-2
2370	-48	-61	-51	-31	-9	9	12	2	-14	-39
2380	-59	-72	-76	-64	-41	-32	-41	-58	-72	-78
2390	-78	-69	-45	-20	10	42	59	68	73	72
2400	61	41	27	31	40	39	25	10	4	6
2410	10	22	37	45	37	9	-40	-87	-101	-81
2420	-40	8	48	58	41	14	-4	0	23	52
2430	64	45	2	-51	-92	-95	-62	-13	17	10
2440	-29	-74	-98	-88	-51	-3	31	44	34	15
2450	6	14	30	39	31	19	14	30	56	72
2460	63	39	12	-4	-1	14	15	-10	-42	-61
2470	-43	4	65	107	115	100	85	76	58	22
2480	-21	-58	-74	-59	-13	45	92	95	41	-36
2490	-92	-110	-83	-21	32	49	24	-23	-69	-100
2500	-107	-88	-68	-68	-87	-110	-124	-115	-85	-49
2510	-19	-1	4	7	18	33	40	35	15	4
2520	9	30	59	82	91	79	59	45	42	48
2530	43	22	2	0	10	35	49	46	28	10
2540	5	13	25	29	16	-8	-27	-22	2	32
2550	47	35	-5	-55	-77	-63	-26	10	29	26
2560	2	-30	-53	-53	-34	-2	23	33	25	0
2570	-32	-52	-50	-39	-29	-16	-12	-21	-37	-44
2580	-41	-36	-27	-16	-6	0	7	20	30	23
2590	5	-5	-2	3	10	15	22	25	20	18

TO BE CONTINUED

CONTINUED(F-358 NORTH)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2600	19	25	30	22	6	-10	-27	-33	-23	-2
2610	13	21	20	14	8	4	-3	-9	-9	-12
2620	-23	-29	-22	-1	28	53	59	48	27	6
2630	-4	-1	7	10	9	2	-4	-6	-7	-10
2640	-10	-10	-10	-8	-6	-10	-14	-17	-17	-10
2650	5	33	69	94	91	66	25	-14	-44	-57
2660	-55	-35	-3	24	40	35	2	-39	-63	-68
2670	-49	-16	6	7	-8	-26	-37	-29	-6	15
2680	21	0	-39	-67	-64	-38	-9	0	-13	-37
2690	-50	-33	6	35	32	11	-17	-43	-41	-7
2700	27	40	28	10	7	28	69	94	92	64
2710	28	2	-4	0	14	36	51	58	58	56
2720	49	39	23	10	3	6	22	43	54	49
2730	29	-3	-35	-60	-72	-73	-53	-45	-35	-32
2740	-32	-32	-31	-32	-37	-42	-43	-43	-46	-49
2750	-51	-50	-39	-13	10	27	21	-5	-40	-65
2760	-59	-29	9	42	55	42	12	-16	-29	-27
2770	-22	-23	-26	-20	-1	27	56	67	54	33
2780	14	16	34	49	49	24	-12	-39	-40	-19
2790	17	46	49	27	-7	-23	-11	17	47	56
2800	45	27	-2	-36	-61	-61	-44	-19	0	16
2810	20	15	5	0	7	20	30	30	26	22
2820	30	48	61	54	26	-9	-33	-40	-34	-28
2830	-27	-32	-37	-39	-31	-13	0	-4	-27	-56
2840	-70	-71	-57	-35	-17	-20	-33	-35	-16	10
2850	38	59	59	28	-9	-32	-31	-10	12	35
2860	56	64	65	61	53	45	40	29	9	-15
2870	-39	-46	-31	-4	28	53	61	54	36	11
2880	-12	-39	-63	-74	-69	-47	-16	10	20	2
2890	-20	-38	-39	-19	2	17	24	32	42	52
2900	56	48	28	-1	-30	-39	-19	9	34	37
2910	23	7	-4	-11	-19	-29	-45	-60	-54	-30
2920	-1	18	22	6	-19	-31	-19	3	26	39
2930	36	20	2	-4	4	22	29	21	7	-5
2940	-11	-13	-12	-9	-6	-12	-19	-9	9	20
2950	23	17	0	-19	-24	-10	18	48	62	49
2960	15	-29	-56	-66	-59	-41	-20	-6	5	15
2970	20	11	-10	-37	-51	-45	-29	-10	-3	-13
2980	-36	-59	-72	-66	-45	-23	-6	-1	-5	-15
2990	-24	-21	-15	-6	9	27	40	39	30	17

END

RECORD = F-358 COMPONENT = EAST STATION = HITACHINAKA-F
DATE AND TIME = 1990- 5- 3-16-45 TOTAL NUMBER OF DATA = 3000
SAMPLING INTERVAL = 0.010 (SEC) SCAL = 0.10000
SIGNAL = GR. ACC.
CONECTION POINT IN DATA NUMBER = 3000,

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	0	0	0	1	1	1	1	1	0	0
10	0	1	0	0	0	0	0	0	0	1
20	0	1	1	0	1	1	0	0	1	-2
30	2	8	1	-3	1	0	-1	6	0	-12
40	-8	0	7	6	0	6	-3	-15	8	6
50	-23	-10	0	-15	4	1	-24	0	0	-30
60	13	34	-7	19	65	21	-1	21	-25	-71
70	-25	4	-13	-12	13	34	56	50	6	6
80	9	-6	26	55	21	2	34	32	-29	-78
90	-78	-49	-31	-25	14	36	-5	-58	-61	-26
100	-20	-30	-17	14	31	8	-5	14	12	-9
110	2	2	-44	-50	36	99	55	-19	-53	-60
120	-56	-30	6	14	-36	-55	-2	-8	-50	17
130	114	126	109	95	65	25	4	2	0	-15
140	-36	-11	61	89	59	29	-30	-103	-128	-106
150	-51	13	56	74	89	85	44	-29	-82	-71
160	3	89	107	52	1	-19	-10	-24	-96	-136
170	-131	-95	-13	55	58	42	24	-1	-36	-92
180	-128	-91	-20	48	88	87	69	24	-37	-66
190	-73	-96	-114	-91	6	160	263	257	168	26
200	-107	-160	-131	-62	7	56	70	75	114	174
210	169	52	-96	-196	-248	-251	-178	-56	54	121
220	131	94	52	40	38	-1	-71	-140	-170	-118
230	-10	83	116	102	61	-6	-71	-108	-131	-112
240	-73	-20	66	146	159	122	89	50	-3	-55
250	-93	-94	-39	36	85	116	170	189	125	33
260	-47	-116	-137	-91	-13	67	94	64	22	-34
270	-97	-121	-116	-106	-103	-66	30	121	153	136
280	65	-35	-106	-106	-47	29	82	94	71	5
290	-76	-139	-156	-123	-66	-18	13	14	-25	-43
300	1	52	78	89	90	54	3	-28	-50	-55
310	-34	-4	21	57	93	91	49	-13	-82	-87
320	-29	4	33	86	96	63	48	14	-56	-93
330	-96	-81	-33	22	54	74	64	-2	-76	-104
340	-88	-34	42	96	94	48	0	-30	-26	6
350	42	69	47	-36	-126	-169	-124	-16	84	119
360	89	30	-45	-109	-106	-27	61	92	74	60
370	71	64	27	-22	-81	-106	-77	-20	47	104
380	131	124	62	-44	-101	-119	-156	-131	-15	80
390	116	117	82	32	-15	-66	-59	5	53	64
400	36	-40	-109	-136	-120	-50	8	16	14	3
410	-11	-13	0	25	8	-64	-81	-37	0	53
420	111	97	30	-41	-121	-163	-100	14	89	154
430	188	134	104	104	24	-76	-106	-116	-129	-88
440	13	88	96	68	19	-37	-62	-50	-44	-47
450	-38	-18	12	65	124	154	143	52	-119	-216
460	-136	-17	6	-8	-3	-18	-65	-71	-7	86
470	159	162	83	-23	-104	-125	-51	49	94	112

TO BE CONTINUED

CONTINUED(F-358 EAST)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
480	100	50	8	-18	-47	-67	-65	-36	-20	-30
490	-6	10	-35	-79	-45	24	66	68	74	101
500	97	30	-51	-108	-126	-96	-19	64	106	100
510	55	-16	-96	-159	-171	-109	-39	-7	26	66
520	79	78	74	59	-9	-126	-149	-29	78	126
530	163	114	-17	-94	-108	-89	-36	-14	-10	19
540	36	63	121	100	-5	-65	-84	-131	-123	-21
550	56	61	53	33	-10	-41	-40	-29	6	45
560	25	17	56	36	-5	19	70	71	15	-24
570	-13	-33	-96	-106	-45	38	105	131	109	50
580	-17	-33	-44	-104	-123	-71	-16	44	94	82
590	28	-14	-36	-51	-57	-30	22	40	-10	-63
600	-51	-3	11	-5	-5	-26	-79	-101	-98	-80
610	-24	44	63	55	96	131	84	-3	-65	-89
620	-66	20	132	194	166	98	40	-15	-71	-101
630	-101	-50	38	104	118	82	-4	-55	-10	35
640	51	60	48	48	81	139	221	281	281	244
650	213	199	204	249	338	380	281	105	0	-65
660	-164	-286	-436	-589	-616	-444	-206	-71	-45	-45
670	-118	-326	-537	-679	-743	-668	-497	-316	-136	-14
680	-30	-158	-309	-356	-142	324	788	938	684	219
690	-216	-451	-372	-96	124	221	243	263	385	586
700	683	496	57	-428	-719	-646	-189	476	994	1027
710	540	-215	-873	-1084	-794	-242	361	779	820	553
720	118	-315	-543	-531	-351	-121	39	116	113	80
730	146	268	318	304	212	18	-138	-139	9	208
740	292	181	-59	-269	-293	-121	134	324	293	10
750	-380	-676	-748	-566	-252	14	169	183	79	-35
760	-89	-114	-162	-229	-236	-116	80	240	297	243
770	89	-96	-212	-150	110	427	618	584	312	-60
780	-348	-451	-346	-73	261	479	514	418	197	-60
790	-242	-303	-246	-128	-40	0	18	21	-11	-136
800	-340	-491	-466	-253	94	450	662	621	344	0
810	-263	-374	-333	-182	24	211	294	287	199	46
820	-71	-64	77	293	473	517	398	170	-89	-282
830	-281	-108	94	199	139	-60	-294	-458	-509	-461
840	-349	-219	-148	-160	-218	-302	-366	-316	-151	54
850	269	413	408	285	121	-16	-10	161	376	519
860	529	399	177	-59	-220	-260	-231	-197	-189	-176
870	-123	-61	-21	-4	-33	-114	-178	-180	-126	-31
880	52	29	-80	-149	-122	-42	55	129	98	-44
890	-190	-239	-144	69	279	393	399	313	160	9
900	-42	4	72	110	111	89	43	-23	-71	-99
910	-146	-216	-268	-272	-247	-224	-194	-128	-35	26
920	17	-40	-110	-178	-196	-126	4	168	304	317
930	204	35	-113	-151	-43	133	266	321	302	221
940	114	44	37	67	99	114	78	-33	-175	-273
950	-288	-216	-91	11	56	33	-41	-114	-146	-158
960	-178	-198	-197	-190	-174	-116	-40	-10	-20	-41
970	-53	-31	40	170	321	417	417	320	176	53
980	-6	22	122	234	299	301	242	133	23	-57
990	-96	-92	-86	-116	-133	-107	-61	-36	-54	-80
1000	-71	-30	20	74	90	50	-15	-71	-93	-58

TO BE CONTINUED

CONTINUED(F-358 EAST)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1010	-4	14	6	-33	-83	-98	-73	-38	-6	-7
1020	-60	-117	-83	35	164	255	267	156	-26	-159
1030	-183	-158	-156	-186	-238	-283	-233	-55	169	314
1040	312	192	38	-75	-91	18	164	204	119	-30
1050	-172	-217	-116	59	169	144	15	-133	-227	-239
1060	-191	-123	-65	-45	-48	-43	-55	-96	-115	-110
1070	-102	-65	34	146	201	181	123	52	1	-34
1080	-53	-26	36	121	211	283	305	273	201	110
1090	20	-40	-64	-69	-58	-27	33	114	181	180
1100	104	3	-83	-149	-181	-172	-156	-138	-106	-59
1110	-32	-40	-46	-27	-1	7	3	-23	-71	-86
1120	-30	64	151	211	216	159	60	-42	-98	-91
1130	-60	-10	14	-23	-96	-122	-69	26	105	101
1140	9	-105	-188	-186	-91	28	63	-5	-107	-174
1150	-166	-89	-18	-1	-35	-108	-179	-198	-163	-96
1160	-28	0	0	20	79	144	173	146	52	-78
1170	-154	-118	1	138	229	249	223	180	137	122
1180	146	196	232	214	151	87	36	6	-5	-6
1190	-15	-49	-92	-92	-48	-11	-9	-30	-68	-131
1200	-206	-226	-149	-27	70	112	84	23	-20	-45
1210	-55	-36	-16	-25	-35	-17	21	71	104	74
1220	-14	-120	-221	-276	-233	-116	13	136	228	249
1230	191	80	-40	-117	-118	-52	49	143	183	147
1240	48	-54	-101	-77	-4	49	49	43	33	-13
1250	-64	-72	-65	-58	-35	18	90	146	156	89
1260	-60	-236	-334	-277	-71	161	316	348	229	0
1270	-207	-282	-243	-146	-28	48	44	0	-24	-12
1280	0	-14	-43	-66	-66	-23	58	146	188	136
1290	14	-87	-123	-76	58	214	301	299	223	96
1300	-31	-109	-126	-106	-89	-108	-157	-186	-137	-25
1310	113	226	252	191	87	-27	-117	-170	-171	-106
1320	-10	59	53	-20	-116	-204	-263	-253	-184	-128
1330	-103	-80	-46	36	178	324	411	401	274	83
1340	-88	-168	-132	-50	-6	-33	-116	-211	-241	-186
1350	-95	-43	-52	-78	-74	-36	29	130	224	276
1360	276	229	157	89	34	0	-25	-45	-71	-71
1370	-22	18	16	-19	-66	-99	-87	-28	43	97
1380	108	74	39	34	42	44	36	4	-52	-100
1390	-116	-94	-51	-18	-19	-62	-116	-136	-89	11
1400	106	164	176	139	73	24	-8	-31	-30	-24
1410	-18	-19	-54	-119	-186	-226	-186	-57	104	244
1420	319	289	151	-25	-162	-218	-197	-119	-1	109
1430	164	170	129	28	-93	-172	-190	-153	-71	23
1440	97	113	69	18	-23	-49	-28	29	84	122
1450	133	86	4	-65	-98	-98	-80	-67	-56	-22
1460	29	54	41	23	14	41	113	174	161	72
1470	-46	-157	-231	-226	-133	6	131	199	194	134
1480	51	-15	-51	-63	-71	-74	-66	-45	-10	28
1490	54	63	68	70	62	29	-8	-40	-71	-80
1500	-66	-42	-29	-35	-29	1	29	43	38	13
1510	-29	-69	-99	-123	-126	-116	-106	-91	-52	6
1520	74	137	169	151	100	40	-33	-116	-146	-96
1530	0	96	158	153	102	40	-8	-45	-65	-53

TO BE CONTINUED

CONTINUED(F-358 EAST)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1540	-23	10	44	59	31	-16	-62	-97	-112	-98
1550	-57	2	56	70	37	-5	-32	-45	-38	-16
1560	-11	-21	-25	-15	14	57	98	133	152	139
1570	100	45	-14	-51	-45	-15	3	6	6	9
1580	14	32	46	31	2	-39	-96	-131	-118	-70
1590	-6	59	95	79	40	4	-26	-40	-46	-59
1600	-71	-75	-86	-96	-92	-83	-71	-34	24	65
1610	74	50	17	0	-4	-6	4	22	26	12
1620	-13	-43	-59	-60	-51	-28	20	77	119	138
1630	126	96	75	68	74	88	89	79	57	19
1640	-6	0	35	72	86	77	50	2	-47	-78
1650	-103	-118	-87	-35	-1	-9	-46	-85	-110	-109
1660	-77	-25	17	36	24	0	-16	-23	-35	-44
1670	-60	-96	-122	-112	-79	-31	23	55	78	70
1680	56	44	51	85	114	106	60	-11	-81	-109
1690	-81	-26	18	36	24	-19	-65	-76	-62	-40
1700	-16	-12	-40	-64	-50	-9	28	34	24	18
1710	23	31	30	16	-10	-46	-58	-23	40	103
1720	132	113	65	28	24	47	83	118	120	81
1730	19	-35	-58	-38	-8	-7	-29	-50	-60	-48
1740	-16	16	32	24	-3	-52	-101	-126	-99	-32
1750	44	83	63	4	-43	-59	-47	-13	19	24
1760	-5	-50	-91	-116	-115	-91	-57	-29	-11	11
1770	25	3	-31	-43	-33	-8	38	102	153	163
1780	138	106	88	89	107	127	126	104	81	66
1790	34	-16	-62	-83	-71	-37	7	52	64	33
1800	-6	-35	-50	-36	1	34	50	44	11	-46
1810	-106	-128	-120	-106	-86	-65	-59	-64	-61	-56
1820	-56	-60	-81	-116	-131	-91	0	100	147	106
1830	-4	-119	-156	-86	54	204	279	252	141	8
1840	-81	-103	-55	22	65	53	8	-30	-25	23
1850	74	95	79	30	-27	-65	-68	-58	-57	-65
1860	-74	-77	-49	0	39	54	39	-11	-79	-118
1870	-93	-13	86	155	152	78	-10	-50	-34	4
1880	43	70	64	33	-1	-28	-39	-29	-11	5
1890	5	-15	-37	-48	-53	-43	-16	19	53	51
1900	13	-40	-103	-131	-96	-26	46	114	141	120
1910	72	3	-64	-97	-86	-47	8	49	45	-3
1920	-63	-77	-45	-3	25	17	-19	-50	-48	-10
1930	45	84	78	28	-35	-79	-84	-48	1	39
1940	37	12	6	28	51	50	22	0	-8	-8
1950	12	56	95	118	124	99	58	24	8	16
1960	34	37	39	31	0	-25	-15	14	43	48
1970	9	-56	-121	-150	-132	-91	-57	-46	-65	-99
1980	-104	-71	-24	10	8	-45	-110	-139	-104	-8
1990	101	167	161	99	29	0	24	81	114	89
2000	23	-40	-71	-43	29	94	118	98	44	-22
2010	-61	-59	-32	-10	-6	-20	-46	-63	-53	-28
2020	-20	-49	-101	-134	-118	-66	-11	20	25	6
2030	-9	3	39	81	113	116	94	66	46	35
2040	23	6	-8	-11	-10	-10	-9	-27	-71	-105
2050	-104	-74	-29	9	10	-39	-101	-140	-131	-72
2060	-8	38	65	64	45	26	13	14	36	65

TO BE CONTINUED

CONTINUED(F-358 EAST)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2070	86	89	74	56	37	20	6	4	8	7
2080	-6	-15	-23	-28	-10	20	32	18	0	-10
2090	-5	14	37	44	52	65	68	63	46	25
2100	0	-26	-42	-26	8	46	75	81	55	6
2110	-59	-119	-133	-100	-45	11	46	47	24	-5
2120	-26	-36	-39	-40	-26	-3	23	42	37	13
2130	-20	-63	-92	-88	-69	-45	-28	-18	-14	4
2140	33	46	31	-4	-49	-81	-89	-71	-50	-38
2150	-35	-41	-36	1	74	148	187	167	98	26
2160	-16	-26	-12	9	24	17	1	-2	4	8
2170	5	-3	0	11	33	58	74	71	49	14
2180	-11	-15	6	39	60	48	4	-56	-99	-96
2190	-61	-38	-44	-69	-98	-120	-110	-65	-2	54
2200	73	37	-36	-104	-131	-98	-26	42	68	45
2210	2	-29	-30	-10	10	27	32	13	-18	-43
2220	-45	-25	1	21	34	41	44	53	50	20
2230	-23	-55	-61	-26	34	79	84	64	34	11
2240	21	64	110	139	137	100	45	0	-25	-24
2250	-3	20	26	18	9	0	0	9	29	47
2260	42	16	-20	-60	-86	-85	-65	-30	6	27
2270	22	-9	-49	-80	-95	-93	-80	-65	-58	-48
2280	-20	17	45	45	20	-16	-60	-92	-86	-40
2290	11	57	82	68	23	-19	-38	-29	3	39
2300	64	74	70	52	44	49	51	48	40	24
2310	1	-28	-60	-84	-91	-72	-44	-22	-28	-55
2320	-80	-83	-50	9	67	91	81	44	-3	-42
2330	-53	-36	-11	4	9	7	-1	-2	16	48
2340	68	67	63	61	59	50	29	5	-15	-25
2350	-29	-30	-30	-40	-63	-91	-101	-94	-78	-58
2360	-38	-25	-13	9	39	55	45	14	-17	-34
2370	-20	8	42	70	84	84	88	91	84	66
2380	38	5	-21	-26	-10	11	23	19	5	-2
2390	9	29	33	8	-47	-103	-120	-92	-40	13
2400	41	25	-17	-63	-91	-73	-14	53	92	80
2410	22	-34	-61	-57	-35	0	29	33	10	-9
2420	-15	-9	11	38	46	24	-15	-47	-53	-34
2430	8	60	100	115	103	67	14	-35	-63	-57
2440	-40	-35	-44	-53	-62	-61	-50	-37	-31	-32
2450	-25	-9	2	1	-2	-1	3	9	24	44
2460	60	62	53	38	17	0	-6	-4	-1	13
2470	36	53	50	18	-33	-76	-78	-29	48	116
2480	142	119	70	24	-4	-17	-15	-8	-12	-31
2490	-57	-72	-69	-43	-9	13	12	-9	-41	-65
2500	-72	-67	-54	-33	-9	19	44	53	45	28
2510	8	-16	-35	-39	-27	-8	14	31	32	17
2520	1	0	9	21	19	2	-17	-34	-52	-76
2530	-96	-103	-81	-31	30	86	118	111	67	10
2540	-22	-24	0	33	54	53	34	19	17	19
2550	19	9	-10	-21	-8	9	13	0	-22	-40
2560	-37	-11	16	33	34	23	-3	-28	-36	-25
2570	-8	-3	-16	-41	-58	-50	-25	1	19	27
2580	24	19	6	-10	-21	-28	-31	-31	-28	-19
2590	-4	9	17	20	16	9	9	9	13	26

TO BE CONTINUED

CONTINUED(F-358 EAST)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2600	40	38	25	16	11	3	-4	-3	-2	-3
2610	-2	0	-5	-14	-24	-38	-46	-39	-12	17
2620	34	43	34	0	-45	-78	-86	-69	-33	7
2630	41	63	71	72	76	85	91	90	74	38
2640	-12	-48	-48	-18	17	52	78	88	83	74
2650	68	57	34	0	-35	-65	-78	-80	-77	-69
2660	-58	-52	-44	-30	-17	-13	-25	-48	-65	-60
2670	-36	2	34	34	4	-34	-60	-69	-63	-54
2680	-55	-60	-63	-58	-32	14	57	66	34	-14
2690	-59	-75	-55	-11	33	52	43	24	12	14
2700	36	63	68	59	45	33	30	36	42	45
2710	48	48	43	29	13	-1	-10	-11	-13	-18
2720	-27	-29	-17	10	39	42	23	0	-15	-25
2730	-18	0	22	29	18	-12	-45	-54	-29	8
2740	34	38	14	-20	-45	-51	-38	-17	-3	4
2750	0	-15	-25	-25	-23	-21	-22	-30	-35	-28
2760	-13	1	8	-2	-28	-57	-71	-57	-21	21
2770	54	67	53	28	13	6	7	15	29	36
2780	31	11	-12	-27	-16	20	66	98	103	83
2790	40	-6	-38	-40	-18	17	43	48	31	5
2800	-18	-35	-50	-58	-60	-62	-63	-55	-36	-15
2810	0	5	12	19	25	29	26	10	-8	-23
2820	-30	-25	-6	13	28	35	34	25	16	6
2830	1	3	8	15	23	24	24	27	17	-8
2840	-38	-57	-58	-45	-33	-30	-38	-38	-25	-3
2850	18	32	33	17	0	-11	-2	19	40	49
2860	35	0	-45	-63	-40	2	33	38	22	-1
2870	-20	-17	9	44	64	56	22	-20	-46	-35
2880	9	62	86	72	31	-10	-33	-28	-7	3
2890	1	-12	-29	-36	-24	2	14	9	-13	-39
2900	-56	-58	-46	-33	-31	-31	-20	-5	1	-1
2910	-13	-27	-34	-28	-11	3	8	9	13	14
2920	12	10	12	13	5	-16	-36	-46	-46	-33
2930	-9	5	7	5	4	5	17	34	46	40
2940	20	8	11	37	69	93	92	65	34	14
2950	13	24	43	50	37	13	-1	-2	8	20
2960	22	-1	-39	-65	-76	-77	-71	-58	-46	-36
2970	-24	-11	-4	-6	-17	-30	-36	-28	-15	0
2980	4	-4	-22	-36	-35	-23	-1	19	35	45
2990	44	40	31	10	-13	-28	-25	-11	10	31

END

RECORD = F-358 COMPONENT = UP STATION = HITACHINAKA-F
DATE AND TIME = 1990- 5- 3-16-45 TOTAL NUMBER OF DATA = 3000
SAMPLING INTERVAL = 0.010 (SEC) SCAL = 0.10000
SIGNAL = GR. ACC.
CONECTION POINT IN DATA NUMBER = 3000.

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	0	0	0	0	0	0	0	0	1	0
10	0	0	1	0	0	0	0	0	5	14
20	26	19	-2	-1	22	30	42	53	0	-11
30	90	120	55	62	91	37	-40	-22	29	-58
40	-155	-57	-22	-158	-154	-95	-163	-113	-35	-87
50	-14	86	74	150	108	-69	40	13	-411	-298
60	267	173	-178	46	317	144	-67	-140	-125	-26
70	-15	2	147	96	-83	52	199	-36	-196	31
80	206	66	-104	-46	144	143	-69	-40	185	53
90	-227	-94	172	48	-248	-218	101	223	38	15
100	197	70	-214	-85	88	-181	-343	-31	172	9
110	-57	140	180	-147	-366	-59	270	37	-216	76
120	290	87	-49	-37	-1	78	68	-66	-88	51
130	60	-31	9	29	-28	-69	-71	8	98	81
140	5	-34	-22	7	23	2	-39	10	112	83
150	5	10	8	-82	-130	-32	22	-82	-142	-24
160	76	48	5	-11	-19	-17	-32	-29	29	40
170	-36	-13	130	122	-56	-87	40	38	-104	-74
180	81	77	5	-32	-94	-46	98	98	-32	-70
190	20	22	-115	-127	71	177	24	-87	19	58
200	-95	-154	-13	83	17	-34	30	85	94	118
210	73	-46	-108	-72	-66	-76	41	169	115	-38
220	-115	-107	-99	-60	-3	1	4	70	120	100
230	27	-55	-76	-58	-16	58	82	51	47	17
240	-29	7	69	-22	-167	-79	60	9	-21	81
250	100	-48	-109	-12	46	11	-33	4	98	91
260	9	-5	-7	-31	10	64	25	-26	-23	-4
270	-16	-18	22	71	76	9	-73	-95	-76	-87
280	-95	-52	22	62	38	37	52	-9	-131	-139
290	-7	45	-7	2	1	-43	-4	8	-46	1
300	84	8	-139	-75	66	37	11	83	112	39
310	-91	-161	-73	85	74	-37	14	96	91	86
320	54	65	120	-6	-198	-71	176	154	5	-56
330	-43	5	-43	-187	-112	140	146	-39	-43	49
340	-2	-71	0	52	-33	-90	-11	24	-84	-62
350	140	149	-74	-142	55	113	-90	-207	-91	68
360	45	-69	-9	96	37	-30	20	79	45	-32
370	-44	-28	-4	75	146	14	-233	-115	229	130
380	-172	-56	213	136	-166	-243	18	209	76	-80
390	-14	79	61	-12	-29	63	34	-145	-190	24
400	193	111	52	50	-83	-178	-80	-23	-71	-5
410	57	-74	-116	22	15	-27	133	162	-1	-75
420	-118	-144	-48	9	-69	29	236	63	-213	-48
430	224	93	-168	-142	12	1	-80	16	142	77
440	-21	22	90	41	-29	47	95	-97	-188	91
450	324	96	-211	-137	77	83	-24	-56	-7	51
460	47	-43	-126	-7	164	65	-150	-157	4	52
470	-78	-40	149	8	-284	-142	204	228	108	89

TO BE CONTINUED

CONTINUED(F-358 UP)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
480	1	-149	-96	83	39	-146	-132	40	111	83
490	101	100	-20	-157	-174	-26	165	164	-39	-147
500	-51	-26	-188	-155	129	206	24	-42	123	130
510	-103	-69	145	57	-205	-159	189	275	-4	-122
520	-21	-100	-195	-63	-26	-20	225	303	7	-155
530	-1	114	-15	-245	-216	156	237	-138	-166	120
540	103	-103	-141	15	140	78	-29	2	79	-7
550	-100	48	110	-76	-58	80	-113	-279	22	268
560	22	-169	54	169	-125	-272	49	235	-64	-169
570	165	295	86	-18	5	-100	-135	42	56	-115
580	22	324	88	-373	-233	167	80	-167	-86	63
590	27	-7	71	44	-103	-87	-15	-139	-220	17
600	202	-85	-342	-27	308	77	-286	-149	196	161
610	-71	-103	12	55	31	114	251	142	-123	-88
620	198	263	115	66	98	5	-44	155	202	-86
630	-180	49	61	-200	-146	195	255	23	-107	-30
640	-45	-292	-366	-35	257	138	-99	-95	-39	-125
650	-71	106	12	-202	-103	124	52	-211	-250	-36
660	135	130	32	-66	-69	64	183	136	60	39
670	15	-54	-135	-66	128	122	-59	-23	185	202
680	63	5	-11	-111	-263	-239	71	253	99	-26
690	34	69	-60	-153	-19	110	4	-165	-118	84
700	99	-29	47	199	17	-381	-381	150	501	208
710	-197	-161	-8	-180	-331	-16	376	217	-288	-381
720	11	199	-27	-145	27	130	41	-13	105	263
730	185	-49	-57	75	-14	-164	-29	204	174	15
740	6	71	58	-12	-37	30	173	262	161	-31
750	-175	-230	-142	-36	-64	-51	85	96	-79	-154
760	-63	-17	-81	-162	-178	-133	-77	-37	12	81
770	88	-69	-233	-213	-105	-19	71	130	141	160
780	127	-20	-98	10	86	30	-7	12	22	2
790	68	229	252	30	-181	-186	-73	42	100	61
800	-3	-63	-111	-72	-12	-30	-58	6	53	-11
810	-55	1	48	42	4	-53	-19	71	90	95
820	143	111	-27	-116	-97	-14	100	150	58	-9
830	37	38	-21	-20	48	81	41	2	18	104
840	162	75	-10	-9	-92	-207	-96	88	61	-47
850	-61	-95	-164	-115	-38	-68	-80	20	71	-18
860	-37	88	150	91	4	-64	-58	27	105	117
870	122	106	0	-86	-71	-101	-201	-223	-126	-71
880	-85	-45	-8	-85	-223	-219	-48	0	-131	-117
890	52	60	-74	-36	185	248	81	2	86	81
900	-47	-58	81	161	135	89	66	76	95	76
910	39	47	45	17	32	65	91	130	130	46
920	-36	-2	58	14	-62	-82	-72	-80	-97	-17
930	118	89	-58	-103	-33	11	-1	-5	19	69
940	100	59	-14	-38	-8	9	-32	-99	-99	-20
950	71	101	19	-97	-125	-145	-230	-263	-169	-39
960	-17	-89	-161	-142	-11	64	12	-39	-3	56
970	12	-56	20	118	66	-3	29	85	69	42
980	61	88	95	74	81	152	165	64	0	76
990	143	86	5	9	61	76	44	4	-10	-36
1000	-137	-189	-71	36	-75	-240	-207	-103	-137	-184

TO BE CONTINUED

CONTINUED(F-358 UP)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1010	-81	41	20	-66	-42	45	25	-29	61	162
1020	88	0	27	32	-33	6	169	207	87	31
1030	77	76	9	2	74	94	-13	-84	0	29
1040	-89	-119	-11	39	10	11	12	14	74	64
1050	-76	-112	16	91	86	57	-16	-63	-66	-93
1060	-79	22	83	20	-51	-63	-66	-78	-73	-78
1070	-109	-115	-83	-56	-59	-101	-108	-28	77	100
1080	45	57	91	81	144	236	182	25	-60	-18
1090	51	61	9	-55	-85	-117	-150	-108	-7	38
1100	2	-56	-107	-96	16	103	72	32	64	120
1110	94	-4	-11	71	59	-31	-60	7	96	101
1120	-4	-95	-116	-127	-122	-37	90	117	8	-91
1130	-52	52	75	38	79	106	21	-34	12	66
1140	60	-13	-93	-81	-32	-51	-84	-60	-24	-1
1150	-1	-33	-33	16	-7	-109	-91	22	55	12
1160	-3	18	51	56	-7	-56	16	85	2	-67
1170	34	148	91	-24	-7	76	52	-36	-40	15
1180	15	-24	-7	58	39	-48	-51	41	88	61
1190	15	-31	-68	-52	-16	-7	2	7	-41	-135
1200	-186	-122	-36	-31	-45	-45	-52	-59	-76	-98
1210	-66	9	17	-21	-22	-3	24	100	186	218
1220	173	61	-1	91	217	213	152	139	120	15
1230	-53	70	217	130	-48	-66	2	-7	-84	-103
1240	-26	4	-101	-182	-123	-77	-147	-203	-156	-116
1250	-144	-157	-104	-56	-75	-88	-22	22	7	37
1260	88	28	-81	-44	106	135	43	22	78	74
1270	36	74	160	167	114	68	0	-61	-32	24
1280	36	61	78	5	-59	-10	69	79	18	-81
1290	-172	-214	-201	-116	12	64	29	0	-39	-83
1300	-71	5	77	86	85	120	101	-19	-71	32
1310	129	61	-59	-85	-41	-18	-15	24	120	211
1320	160	-11	-98	-54	-35	-85	-110	-76	-27	15
1330	48	57	19	-11	20	48	-3	-66	-30	18
1340	-19	-36	58	122	55	-15	-12	-36	-85	-71
1350	-26	-22	-50	-53	-21	9	-7	-58	-61	-27
1360	-39	-76	-70	-36	-7	26	72	79	36	18
1370	29	31	42	38	2	6	45	48	56	96
1380	71	-24	-56	-23	-48	-105	-81	7	57	18
1390	-26	0	9	-14	-2	-16	-77	-60	12	14
1400	-16	32	71	5	-46	-27	-7	-10	-7	24
1410	22	-19	18	108	79	-38	-52	32	46	-14
1420	-15	37	34	-49	-84	2	80	88	103	117
1430	85	34	19	-20	-88	-45	61	60	-7	17
1440	81	48	-33	-41	-23	-51	-76	-70	-41	-38
1450	-67	-70	-49	-23	6	5	-29	-83	-100	-47
1460	7	21	7	-18	-19	5	19	-37	-127	-128
1470	-74	-47	-28	27	105	146	129	88	32	-19
1480	-13	44	80	61	32	46	71	38	-15	-14
1490	0	-52	-113	-104	-73	-57	-31	-11	-10	-7
1500	4	7	-6	0	27	38	29	36	40	18
1510	28	69	81	61	56	77	66	12	0	-9
1520	-35	-10	18	-7	10	118	140	14	-71	-43
1530	-26	-66	-83	-17	42	4	-46	4	76	39

TO BE CONTINUED

CONTINUED(F-358 UP)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1540	-53	-59	0	0	-35	-19	4	-11	-37	-79
1550	-120	-88	-31	-49	-90	-66	-22	-36	-85	-86
1560	-32	3	-4	1	26	11	-15	22	91	88
1570	39	20	32	45	48	31	-10	-24	15	27
1580	-12	-12	45	86	87	84	86	77	70	54
1590	36	41	10	-55	-81	-63	-17	20	2	-26
1600	-5	-1	-37	-37	-21	-52	-89	-96	-96	-84
1610	-70	-43	27	74	29	-33	-21	45	78	57
1620	7	-18	-1	6	-7	-8	8	20	9	10
1630	36	46	15	1	24	2	-67	-59	22	32
1640	-42	-43	39	32	-51	-62	2	44	35	29
1650	37	29	18	28	41	22	4	24	56	45
1660	1	-24	-6	0	-42	-50	-3	-13	-71	-67
1670	-22	-27	-46	-3	54	58	-7	-63	-8	80
1680	64	12	40	60	-2	-56	-12	61	44	-26
1690	-40	-17	-40	-76	-58	-18	-14	-26	-40	-51
1700	-42	-18	2	14	22	15	-21	-65	-77	-45
1710	12	48	26	7	22	32	16	-7	0	26
1720	22	9	31	68	61	10	-11	0	12	26
1730	24	8	5	17	20	4	6	22	-1	-37
1740	-61	-85	-82	-42	0	30	50	53	36	12
1750	9	20	35	53	77	83	66	52	47	31
1760	-7	-24	-4	-3	-26	-4	37	16	-29	-7
1770	42	21	-52	-93	-78	-57	-81	-115	-103	-77
1780	-87	-87	-37	3	-20	-63	-57	-27	-13	-7
1790	2	19	27	21	-4	-13	36	88	57	13
1800	34	44	7	-17	24	75	71	51	63	86
1810	95	90	55	2	-3	39	59	16	-42	-61
1820	-47	-60	-91	-72	-27	-12	-9	5	-1	-36
1830	-58	-39	0	32	33	-12	-66	-68	-20	18
1840	5	-23	-1	31	2	-24	12	48	41	34
1850	39	18	-10	-3	14	17	20	22	2	-12
1860	-15	-22	-14	9	10	-5	2	15	-16	-71
1870	-58	-12	-39	-71	-24	22	5	-16	20	68
1880	52	17	28	40	13	-4	-7	-2	16	24
1890	0	-16	3	24	22	7	12	15	-29	-45
1900	-9	-8	-27	19	66	22	-46	-69	-46	2
1910	43	66	58	25	12	26	18	-7	-28	-26
1920	-10	-24	-51	-38	6	3	-42	-39	7	12
1930	-44	-60	12	29	-66	-98	-18	42	32	22
1940	51	55	32	42	71	46	4	0	2	-13
1950	-14	12	47	26	-23	-16	12	-20	-46	-13
1960	-12	-53	-67	-47	-26	-13	-1	2	-12	-22
1970	-14	-17	-34	-13	24	20	8	10	12	35
1980	43	12	2	45	81	59	10	-11	1	19
1990	21	21	18	9	-12	-46	-54	-24	-4	-11
2000	-7	7	8	17	26	4	-39	-54	-39	-41
2010	-57	-24	36	48	17	-1	-21	-51	-36	22
2020	40	-6	-32	-1	12	0	21	65	49	-11
2030	-41	-17	15	27	30	12	-7	-12	-2	13
2040	10	-16	-14	7	1	1	32	36	-4	-39
2050	-42	-23	0	4	12	34	18	-29	-31	0
2060	14	7	-17	-48	-49	-33	-32	-14	29	44

TO BE CONTINUED

CONTINUED(F-358 UP)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2070	17	-4	1	18	30	24	5	0	15	29
2080	63	91	68	27	24	15	-35	-71	-43	0
2090	32	37	4	-30	-47	-75	-80	-33	15	25
2100	2	-26	-24	-9	-7	2	17	16	2	-9
2110	-9	0	22	47	46	19	12	37	32	-1
2120	-10	-4	-24	-46	-36	-12	-7	-18	-9	12
2130	6	-10	-7	-10	-19	-7	15	21	8	-9
2140	-21	-30	-31	-34	-35	-11	12	-1	-26	-7
2150	13	-3	-26	-20	-9	-18	-20	-1	1	3
2160	27	36	12	0	-4	-15	-16	2	9	2
2170	11	24	17	0	16	47	48	31	20	2
2180	-29	-34	8	46	43	32	31	-1	-46	-34
2190	-2	0	5	19	0	-22	-1	20	23	27
2200	20	-8	-28	-16	0	12	31	29	8	-3
2210	-7	4	24	37	31	2	-18	-16	-4	-1
2220	-7	-2	5	-7	-30	-33	-7	16	2	-32
2230	-44	-35	-39	-60	-57	-20	0	-21	-46	-36
2240	-15	-7	8	32	35	17	4	6	16	12
2250	-7	-20	-8	12	22	12	3	6	10	21
2260	47	61	39	12	2	-3	-10	-21	-17	12
2270	40	15	-27	-14	27	17	-21	-26	-1	-20
2280	-57	-34	24	29	-24	-47	-8	34	34	20
2290	31	37	7	-17	5	32	24	9	7	2
2300	12	27	15	2	0	-32	-83	-102	-76	-47
2310	-36	-33	-18	-5	-7	-11	2	12	0	-13
2320	1	18	9	-7	4	21	4	-14	0	12
2330	-4	-19	2	27	31	25	30	38	23	7
2340	17	28	7	-16	8	43	39	16	6	8
2350	4	0	11	30	26	-8	-40	-38	-17	-1
2360	7	3	2	8	8	4	7	6	0	4
2370	-3	-25	-18	-7	-16	-22	-20	-27	-31	-27
2380	-16	-6	-6	-23	-46	-44	-24	-10	-8	-3
2390	-4	-4	18	31	10	-5	12	26	7	-5
2400	13	49	45	10	24	59	42	24	55	61
2410	4	-20	28	45	-12	-40	-7	7	-26	-38
2420	-7	2	-35	-49	-27	-30	-53	-52	-27	-16
2430	-21	-9	10	0	-27	-36	-23	-10	9	37
2440	29	0	-16	-9	12	36	32	12	4	0
2450	-9	-10	0	7	12	5	0	6	2	-7
2460	5	36	42	7	-17	7	29	9	-3	14
2470	16	-7	-10	4	2	-20	-39	-30	-13	-7
2480	-7	-4	0	8	7	-14	-19	0	8	0
2490	0	11	12	11	21	30	19	-7	-27	-22
2500	1	31	48	27	2	10	18	4	6	42
2510	52	17	-9	-7	-9	-19	1	37	25	-18
2520	-22	11	21	-4	-26	-12	-7	-37	-53	-30
2530	-16	-37	-51	-42	-24	-10	-10	-20	-26	-13
2540	-3	-14	-21	0	27	21	0	2	21	20
2550	15	16	8	2	2	5	5	0	-12	-31
2560	-36	-26	-29	-39	-24	8	9	-28	-42	-16
2570	6	-3	-21	-6	19	12	8	24	25	-4
2580	1	46	66	66	80	90	71	41	36	39
2590	28	35	59	48	9	-3	-1	-17	-32	-21

TO BE CONTINUED

CONTINUED(F-358 UP)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2600	-13	-32	-43	-17	-2	-31	-40	-19	-27	-47
2610	-26	7	-5	-51	-64	-39	-28	-37	-28	-4
2620	-10	-35	-42	-20	7	24	29	36	37	19
2630	8	22	26	0	-13	5	21	20	21	36
2640	56	57	25	-13	-24	-16	-9	-9	-9	-9
2650	-20	-42	-42	-17	-5	-25	-40	-26	0	18
2660	12	2	4	8	10	7	-2	-3	-3	-17
2670	-18	12	37	15	-17	-28	-26	-16	2	20
2680	22	24	14	-13	-28	-12	10	12	-1	-3
2690	4	-3	-8	26	61	42	18	26	19	-7
2700	-3	22	22	9	4	7	9	10	16	11
2710	-13	-29	-24	-16	-18	-26	-19	-7	-16	-38
2720	-36	-24	-18	-11	-3	-3	-2	10	28	24
2730	10	5	16	24	16	2	2	2	2	5
2740	0	-31	-48	-36	-22	-24	-26	-19	2	14
2750	8	8	7	-9	-14	-1	-1	-11	-7	9
2760	12	18	37	44	16	-16	-15	0	0	11
2770	42	49	20	0	14	27	18	9	12	8
2780	-7	-9	-3	-5	0	27	36	0	-30	-10
2790	14	10	-12	-19	0	0	-28	-27	5	16
2800	-18	-51	-46	-31	-30	-28	-13	8	31	32
2810	4	-15	-19	-25	-24	-10	3	5	-1	-4
2820	2	0	-21	-22	9	24	10	-1	2	15
2830	11	-8	-9	7	1	-21	-14	10	2	-26
2840	-29	-11	-6	-14	-7	3	-4	-23	-32	-19
2850	0	2	15	41	38	6	2	25	32	34
2860	37	20	9	26	56	61	39	19	27	37
2870	12	-13	-9	7	9	2	10	20	5	-11
2880	-4	2	-7	-17	-17	-27	-37	-27	-21	-31
2890	-35	-21	-20	-42	-45	-17	-11	-47	-71	-44
2900	-15	-16	-9	15	22	1	-14	-1	17	27
2910	32	40	47	38	20	11	18	19	10	12
2920	16	5	7	21	12	-10	-20	-16	-19	-23
2930	-12	2	-1	-14	-13	-11	-11	-4	0	-2
2940	8	16	1	-12	-2	7	-11	-27	-3	19
2950	2	-12	8	16	-12	-34	-15	2	-12	-21
2960	-5	2	-3	-4	2	4	8	7	-3	-12
2970	-7	7	16	18	16	14	10	5	7	12
2980	9	0	-10	-3	16	26	20	20	30	31
2990	16	10	12	9	17	32	18	-7	-3	20

END

RECORD = F-384 COMPONENT = NORTH STATION = HITACHINAKA-F
DATE AND TIME = 1990-10- 6-23-33 TOTAL NUMBER OF DATA = 3000
SAMPLING INTERVAL = 0.010 (SEC) SCAL = 0.10000
SIGNAL = GR. ACC.
CONECTION POINT IN DATA NUMBER = 3000.

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	0	0	0	0	-1	-1	0	0	-1	1
10	3	-1	-3	4	1	-8	0	10	-1	-7
20	6	5	-10	-2	11	2	-7	-5	-1	3
30	5	-3	-6	6	7	3	1	-10	-12	3
40	4	3	21	9	-26	-12	13	-16	-26	11
50	15	0	20	33	6	-12	-12	-24	-36	-20
60	1	15	27	32	11	-40	-78	-39	25	30
70	-2	6	51	50	-12	-56	-41	-11	12	55
80	83	65	-8	-94	-102	-40	-27	-46	3	97
90	125	57	-51	-124	-110	-44	-7	18	106	174
100	115	-14	-100	-97	-56	-21	15	55	80	53
110	-11	-40	-31	-37	-49	-26	38	90	100	64
120	1	-55	-79	-51	23	90	83	1	-107	-136
130	-18	112	137	66	-34	-100	-108	-52	48	131
140	140	17	-180	-248	-121	51	159	169	83	-29
150	-110	-107	0	134	137	20	-96	-185	-162	-6
160	120	110	2	-120	-236	-242	-39	211	330	285
170	107	-102	-237	-240	-104	83	187	157	67	-7
180	-55	-55	-9	33	57	75	82	30	-42	-63
190	-57	-60	-52	-32	-18	-1	11	-2	-25	-15
200	25	59	70	65	41	-18	-77	-111	-128	-102
210	-38	38	102	104	10	-127	-183	-124	11	160
220	262	252	103	-79	-183	-170	-24	139	182	107
230	1	-87	-144	-123	-32	38	50	19	-18	-24
240	-21	-31	-11	32	84	119	88	8	-36	-21
250	-13	-35	-18	41	30	-68	-157	-172	-102	22
260	146	185	105	-31	-130	-121	-28	72	118	86
270	4	-39	-32	-10	19	14	-58	-150	-161	-67
280	55	135	137	70	-47	-137	-116	-14	78	140
290	177	149	62	4	-18	-47	-97	-135	-90	20
300	82	68	22	-42	-105	-119	-59	53	150	172
310	112	-22	-161	-242	-215	-77	79	167	164	102
320	11	-78	-132	-151	-128	-47	65	140	142	109
330	86	53	-11	-78	-69	5	72	99	105	63
340	-39	-128	-146	-91	10	85	91	80	38	-38
350	-67	-48	-29	-8	6	0	-29	-51	-32	-14
360	-18	-16	-23	-51	-62	-8	75	140	157	103
370	17	-87	-155	-90	31	80	75	48	-9	-77
380	-70	6	63	83	64	2	-51	-77	-60	0
390	40	36	8	-37	-43	2	2	-57	-95	-86
400	-61	-29	0	30	49	22	-21	-16	53	100
410	80	48	2	-14	27	34	-25	-30	28	3
420	-38	16	25	-67	-83	25	132	157	125	51
430	-41	-117	-154	-102	2	30	-1	-11	-41	-104
440	-139	-97	31	150	165	93	6	-50	-65	-64
450	-12	90	122	53	-28	-51	-27	-10	-33	-72
460	-48	33	120	146	76	-22	-113	-174	-117	28
470	129	125	61	-52	-179	-205	-99	75	212	186

TO BE CONTINUED

CONTINUED(F-384 NORTH)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
480	13	-102	-78	-38	27	113	56	-88	-150	-97
490	27	180	265	181	-10	-166	-221	-149	4	95
500	90	53	-18	-62	0	69	33	-18	-38	-91
510	-106	-9	57	46	30	-8	-45	-56	-28	36
520	87	92	45	-41	-132	-150	-76	27	110	133
530	75	18	-5	-73	-123	-42	83	134	120	100
540	64	-2	-52	-72	-91	-128	-153	-126	-11	127
550	166	129	70	-37	-134	-138	-106	-40	78	98
560	-19	-68	6	65	69	49	-10	-80	-73	-20
570	6	65	100	-3	-85	-40	14	60	138	167
580	75	-46	-110	-120	-70	-27	-54	-94	-82	-47
590	38	157	183	131	77	29	-22	-65	-58	3
600	70	75	26	-2	-4	-43	-90	-67	34	116
610	107	38	-35	-99	-139	-127	-50	60	73	-43
620	-107	-45	20	44	25	-9	-35	-79	-132	-136
630	-57	95	230	288	317	314	253	157	30	-136
640	-335	-489	-475	-249	75	325	404	289	52	-152
650	-310	-456	-471	-364	-273	-187	-105	-42	28	53
660	-64	-293	-474	-419	-77	430	920	1187	1115	780
670	337	-124	-591	-911	-873	-418	266	860	1123	1025
680	702	87	-806	-1421	-1366	-731	154	873	1142	921
690	411	-99	-437	-558	-490	-277	-28	20	-182	-370
700	-354	-140	181	428	522	518	261	-293	-762	-881
710	-729	-394	58	560	985	1140	864	242	-331	-633
720	-747	-697	-390	63	426	576	453	88	-305	-505
730	-450	-240	-8	148	179	58	-192	-343	-173	158
740	389	434	262	-50	-294	-339	-189	75	313	374
750	177	-154	-368	-289	27	300	349	262	184	68
760	-127	-221	-91	137	307	340	242	112	4	-109
770	-228	-315	-363	-327	-205	-85	-3	1	-110	-266
780	-314	-172	60	279	389	323	150	-46	-209	-157
790	139	357	301	75	-168	-331	-337	-211	-10	194
800	316	339	305	234	149	59	-3	16	74	88
810	55	19	-4	-64	-182	-255	-205	-117	-102	-166
820	-259	-344	-395	-308	-42	281	466	446	329	163
830	-73	-284	-328	-261	-171	-14	206	384	404	228
840	-37	-258	-412	-482	-400	-126	239	533	661	580
850	296	-69	-378	-537	-495	-262	56	283	295	145
860	-50	-199	-204	-55	82	92	-3	-143	-248	-236
870	-77	191	454	587	539	320	5	-253	-347	-315
880	-207	-35	128	216	196	80	-31	-52	-39	-63
890	-104	-148	-215	-297	-337	-283	-139	30	154	198
900	161	81	19	-40	-139	-251	-301	-221	-29	159
910	235	206	127	11	-84	-65	55	159	169	56
920	-115	-214	-153	60	349	582	607	384	40	-223
930	-299	-202	-45	55	78	45	11	40	95	107
940	49	-72	-205	-251	-153	65	292	372	262	86
950	-71	-204	-265	-257	-262	-290	-293	-242	-135	31
960	219	345	341	241	95	-87	-241	-291	-221	-72
970	90	203	214	134	21	-60	-82	-40	30	68
980	29	-76	-188	-236	-174	-7	174	262	238	152
990	67	24	0	-53	-119	-169	-188	-144	-5	171
1000	282	274	175	15	-142	-217	-188	-97	-15	-8

TO BE CONTINUED

CONTINUED(F-384 NORTH)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1010	-82	-160	-151	-62	21	36	-38	-151	-232	-225
1020	-99	70	179	194	118	4	-47	-2	96	170
1030	135	5	-119	-127	15	227	399	481	437	260
1040	40	-109	-161	-148	-115	-95	-79	-59	-26	10
1050	-10	-107	-217	-277	-267	-197	-89	26	116	127
1060	56	-57	-171	-250	-288	-307	-304	-257	-166	-57
1070	40	120	194	245	246	184	94	34	28	64
1080	132	194	225	258	307	349	365	338	252	111
1090	-45	-132	-97	6	86	90	6	-134	-238	-248
1100	-184	-87	-26	-26	-90	-193	-262	-238	-155	-84
1110	-58	-73	-112	-149	-152	-99	-5	85	147	168
1120	137	87	70	94	135	164	161	131	108	91
1130	52	6	-25	-89	-187	-234	-205	-102	59	177
1140	176	88	-46	-179	-227	-157	-29	73	108	51
1150	-47	-88	-47	38	130	186	167	72	-27	-77
1160	-62	3	105	189	202	134	28	-72	-139	-141
1170	-71	11	56	26	-68	-150	-158	-83	48	144
1180	134	48	-58	-161	-229	-224	-149	-68	-22	2
1190	4	-19	-33	-14	13	53	108	154	165	117
1200	48	10	11	25	14	-15	-31	-48	-92	-154
1210	-176	-130	-85	-20	18	77	149	190	188	154
1220	78	-40	-145	-173	-130	-47	42	109	120	65
1230	-14	-65	-87	-90	-82	-75	-35	41	108	148
1240	169	150	86	4	-71	-104	-80	-25	21	49
1250	44	9	-10	4	18	11	1	-18	-43	-31
1260	11	33	7	-53	-107	-92	-18	73	166	236
1270	218	113	-11	-116	-185	-189	-111	8	103	131
1280	73	-40	-120	-128	-80	15	109	151	140	80
1290	5	-26	-18	-13	-11	-23	-86	-147	-156	-154
1300	-135	-91	-62	-45	-22	-5	-13	-45	-67	-42
1310	25	109	179	221	203	100	-46	-163	-209	-159
1320	-32	78	122	114	69	6	-33	-17	42	120
1330	184	182	113	31	-58	-154	-186	-131	-18	112
1340	203	198	102	-31	-164	-252	-262	-220	-163	-99
1350	-47	-8	33	60	46	7	-35	-76	-73	-5
1360	70	116	135	103	23	-45	-53	6	91	132
1370	89	-12	-118	-172	-134	9	174	252	231	142
1380	23	-75	-121	-89	-3	60	66	46	38	55
1390	80	83	53	15	-16	-48	-56	-39	-29	-30
1400	-28	-5	28	53	52	16	-45	-99	-105	-65
1410	-6	53	95	78	2	-77	-120	-104	-60	-37
1420	-46	-60	-63	-64	-54	-14	46	95	97	47
1430	-21	-68	-69	-24	48	90	57	-25	-100	-145
1440	-142	-87	3	84	119	122	117	114	109	98
1450	53	-18	-70	-86	-84	-64	-35	-28	-45	-47
1460	-22	-11	-16	-18	-25	-25	4	61	105	126
1470	127	98	49	1	-23	-35	-55	-79	-69	-24
1480	21	60	77	68	33	-2	-22	-38	-58	-80
1490	-100	-104	-94	-81	-44	9	36	24	-3	-42
1500	-79	-82	-48	0	31	31	-3	-58	-91	-68
1510	1	72	117	111	57	5	3	51	114	162
1520	159	97	-5	-96	-130	-108	-53	21	89	100
1530	41	-52	-131	-157	-114	-25	66	115	105	48

TO BE CONTINUED

CONTINUED(F-384 NORTH)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1540	-9	-26	12	75	127	141	81	-19	-95	-118
1550	-79	6	90	119	75	7	-31	-29	9	56
1560	84	98	100	82	31	-43	-120	-171	-170	-105
1570	-1	93	120	56	-52	-124	-133	-82	7	88
1580	111	72	9	-36	-58	-62	-52	-45	-53	-66
1590	-66	-57	-57	-60	-43	-16	0	16	36	38
1600	30	35	49	67	85	68	20	-3	0	-1
1610	-2	-3	-14	-28	-37	-25	-1	19	34	32
1620	23	17	4	-15	-46	-98	-159	-191	-166	-85
1630	23	114	120	48	-37	-84	-72	1	98	154
1640	139	71	4	-21	-19	-3	6	-14	-57	-89
1650	-91	-59	10	83	119	114	86	57	40	15
1660	-27	-55	-39	13	88	140	140	99	22	-53
1670	-82	-51	23	102	118	56	-45	-135	-170	-149
1680	-95	-40	-21	-50	-103	-139	-115	-18	106	191
1690	199	140	52	-24	-60	-56	-37	-29	-23	-18
1700	-6	11	26	38	36	5	-37	-57	-47	-23
1710	-8	-3	1	32	82	124	134	99	28	-42
1720	-84	-101	-90	-60	-30	-12	-12	-8	11	28
1730	25	3	-29	-50	-40	-12	9	33	56	43
1740	-1	-45	-74	-79	-65	-41	-10	22	47	49
1750	31	16	21	43	68	83	78	35	-32	-83
1760	-80	-20	43	66	54	30	-18	-74	-100	-89
1770	-53	-13	-1	-15	-27	-32	-25	-23	-33	-45
1780	-47	-33	1	58	110	132	114	70	30	12
1790	15	31	35	21	10	1	-5	10	40	47
1800	27	-14	-60	-69	-35	7	31	28	0	-39
1810	-58	-48	-40	-43	-46	-47	-54	-57	-43	-5
1820	43	68	50	2	-40	-57	-21	53	119	147
1830	139	110	70	38	37	52	40	-5	-67	-118
1840	-137	-130	-124	-123	-120	-112	-86	-27	40	75
1850	72	40	-10	-53	-58	-14	39	64	52	18
1860	-2	3	20	31	28	1	-50	-94	-97	-42
1870	47	127	169	167	127	75	40	28	26	11
1880	-35	-89	-106	-71	-4	65	103	84	18	-48
1890	-66	-21	49	93	77	9	-62	-90	-48	34
1900	104	114	50	-53	-137	-172	-170	-151	-109	-50
1910	4	47	70	64	36	-8	-57	-91	-91	-63
1920	-27	-10	-19	-36	-26	0	13	11	5	-12
1930	-39	-37	0	57	104	135	154	165	153	105
1940	41	-8	-40	-67	-75	-47	6	54	75	56
1950	25	-28	-71	-81	-56	-19	-1	0	-6	-15
1960	-30	-32	-10	25	51	56	32	-12	-48	-59
1970	-48	-20	22	62	78	64	23	-19	-42	-40
1980	-18	4	14	7	-8	-27	-36	-25	0	40
1990	67	61	38	1	-41	-68	-59	-27	-4	-19
2000	-53	-75	-77	-61	-26	6	13	-8	-42	-58
2010	-39	6	55	72	50	14	-17	-33	-18	27
2020	75	90	60	10	-31	-52	-51	-18	36	73
2030	79	68	48	23	1	-7	-12	-25	-32	-31
2040	-28	-22	-10	0	7	6	-1	6	38	70
2050	75	48	-5	-62	-99	-105	-72	-18	28	53
2060	57	30	-6	-26	-23	-16	-16	-23	-39	-50

TO BE CONTINUED

CONTINUED(F-384 NORTH)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2070	-45	-28	-6	16	28	24	20	11	-9	-29
2080	-37	-42	-46	-38	-26	-4	23	45	67	87
2090	89	66	33	2	-5	11	32	31	16	4
2100	5	16	43	70	71	33	-29	-76	-70	-17
2110	45	88	101	73	8	-57	-85	-57	8	64
2120	78	39	-32	-111	-160	-149	-82	-4	40	46
2130	19	-18	-46	-60	-65	-65	-62	-60	-55	-40
2140	-16	1	16	21	19	21	31	53	75	86
2150	70	46	36	37	44	42	26	-3	-31	-51
2160	-55	-45	-30	-18	0	24	43	52	50	38
2170	23	12	16	31	37	17	-12	-42	-65	-72
2180	-60	-34	-10	2	17	26	15	-5	-21	-22
2190	-19	-18	-22	-22	-21	-11	8	20	6	-23
2200	-45	-43	-32	-18	3	27	38	38	36	38
2210	43	30	-4	-36	-50	-57	-66	-64	-43	-15
2220	8	23	32	36	34	21	3	-8	-12	-16
2230	-9	9	30	41	48	51	41	21	10	10
2240	11	13	20	25	28	28	11	-22	-55	-70
2250	-65	-57	-45	-29	-13	1	8	-6	-32	-50
2260	-42	-16	16	35	21	-8	-31	-29	1	49
2270	87	87	55	9	-22	-28	-10	16	41	44
2280	28	9	-7	-14	-13	-13	-13	-11	-10	-2
2290	6	0	-11	-11	0	14	15	5	-1	1
2300	1	-12	-21	-12	3	20	25	16	-1	-18
2310	-31	-35	-26	-3	14	16	6	-10	-16	-17
2320	-20	-17	0	20	23	14	15	33	50	54
2330	38	15	1	-8	-22	-30	-35	-41	-40	-21
2340	9	34	44	40	25	8	-6	-19	-20	-6
2350	9	27	42	44	35	16	-21	-72	-103	-95
2360	-58	-16	1	6	1	-10	-8	18	55	73
2370	57	31	11	0	-3	10	40	68	67	30
2380	-16	-57	-80	-85	-77	-60	-38	-27	-31	-39
2390	-41	-38	-22	-3	16	28	33	21	-5	-31
2400	-37	-31	-22	-5	14	37	61	79	79	66
2410	50	36	18	3	-4	-5	1	10	13	0
2420	-27	-65	-90	-87	-50	-2	32	47	33	-1
2430	-25	-32	-39	-39	-34	-34	-31	-12	15	36
2440	35	20	1	-3	1	11	23	15	-5	-26
2450	-40	-31	-5	14	27	34	35	32	37	51
2460	69	73	53	21	-4	-12	-3	9	15	-1
2470	-39	-65	-60	-29	14	53	70	66	43	17
2480	1	3	11	8	0	0	2	7	21	30
2490	22	2	-12	-16	-4	10	15	1	-25	-58
2500	-82	-89	-79	-58	-43	-48	-62	-62	-51	-38
2510	-31	-25	-18	-22	-40	-44	-25	-3	7	1
2520	-15	-27	-16	11	46	78	91	80	53	24
2530	5	5	25	56	79	85	71	46	26	9
2540	-1	-2	3	0	-8	-13	-10	-2	5	13
2550	10	4	1	3	11	26	32	28	18	6
2560	3	16	29	25	-2	-46	-80	-90	-82	-65
2570	-47	-37	-39	-41	-39	-38	-38	-40	-43	-34
2580	-10	15	40	57	49	17	-15	-42	-55	-42
2590	-22	0	25	44	50	40	15	-7	-13	-1

TO BE CONTINUED

CONTINUED(F-384 NORTH)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2600	18	32	34	19	-5	-10	9	40	59	49
2610	13	-23	-40	-35	-25	-12	-1	-5	-12	-14
2620	-3	15	38	64	78	68	43	14	-10	-32
2630	-43	-40	-32	-23	-11	-1	-1	-2	6	22
2640	30	25	11	-3	-17	-19	-12	-9	-12	-6
2650	3	8	7	-3	-20	-40	-53	-48	-18	23
2660	58	65	43	23	16	21	32	38	26	0
2670	-21	-25	-16	-10	-16	-31	-42	-39	-23	-8
2680	-5	-14	-34	-60	-82	-90	-74	-31	15	42
2690	48	36	13	-2	0	9	18	24	22	16
2700	11	9	13	23	34	40	35	23	3	-18
2710	-31	-28	-10	6	13	15	23	35	41	38
2720	35	31	19	8	4	6	14	27	38	46
2730	50	49	36	6	-21	-35	-38	-40	-37	-31
2740	-26	-24	-32	-37	-33	-26	-29	-43	-52	-50
2750	-48	-40	-27	-16	-12	-20	-35	-33	-10	14
2760	30	35	31	15	-1	-3	0	0	0	-6
2770	-14	-14	-10	-5	-1	-3	-6	-11	-15	-14
2780	-5	6	8	7	14	34	63	83	79	51
2790	16	-9	-19	-10	6	21	35	43	43	37
2800	23	4	-17	-38	-49	-40	-19	-4	-3	-12
2810	-22	-30	-35	-36	-32	-25	-18	-8	16	48
2820	68	69	48	15	-14	-30	-25	-3	27	49
2830	46	21	-6	-23	-31	-31	-20	-7	-8	-18
2840	-33	-51	-65	-67	-58	-33	-4	12	19	14
2850	-2	-12	-12	-2	15	34	49	51	42	31
2860	27	23	17	15	8	-1	-8	-1	18	37
2870	40	27	11	-3	-16	-19	-18	-16	-17	-22
2880	-27	-27	-22	-20	-20	-20	-26	-29	-18	0
2890	15	25	33	45	46	35	21	1	-20	-34
2900	-30	-7	19	28	7	-26	-49	-48	-25	1
2910	19	21	17	16	25	41	60	67	58	36
2920	12	-5	-19	-27	-41	-58	-65	-49	-15	10
2930	17	7	-8	-23	-32	-23	-5	10	24	32
2940	33	27	23	21	15	1	-12	-12	3	16
2950	24	25	20	6	-5	-11	-11	-14	-27	-40
2960	-37	-22	-11	-11	-20	-33	-42	-31	-8	9
2970	11	-2	-27	-45	-42	-27	-14	-11	-8	-3
2980	10	31	43	38	14	-15	-35	-37	-21	6
2990	19	1	-28	-51	-58	-47	-23	-3	6	13

END

RECORD = F-384 COMPONENT = EAST STATION = HITACHINAKA-F
DATE AND TIME = 1990-10- 6-23-33 TOTAL NUMBER OF DATA = 3000
SAMPLING INTERVAL = 0.010 (SEC) SCAL = 0.10000
SIGNAL = GR. ACC.
CONECTION POINT IN DATA NUMBER = 3000.

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	0	0	0	0	0	0	0	0	1	-2
10	-4	2	1	-2	5	2	-7	0	9	-3
20	-7	5	0	-9	8	10	-14	-11	10	5
30	-7	-2	6	6	0	-3	10	0	-34	-19
40	25	20	-8	12	25	-17	-5	28	-23	-55
50	-7	14	10	24	19	-12	-23	-8	-3	-36
60	-40	32	74	38	7	4	-14	-40	-36	1
70	15	-24	-5	47	20	-20	-25	-49	-54	5
80	82	81	20	19	81	74	-38	-111	-68	12
90	49	35	41	17	-78	-125	-62	25	49	31
100	18	-2	3	27	-10	-82	-79	-20	-9	-24
110	15	95	138	67	-68	-164	-193	-122	23	162
120	207	139	16	-137	-259	-240	-62	115	165	152
130	95	9	-61	-104	-44	98	172	133	48	-58
140	-138	-112	-2	96	111	49	-52	-140	-171	-105
150	62	230	264	165	-6	-180	-250	-149	52	230
160	332	253	-29	-288	-341	-224	-14	212	322	226
170	-10	-268	-410	-337	-106	135	325	367	197	-22
180	-188	-287	-218	-22	156	230	146	-6	-108	-172
190	-158	-40	36	-3	-82	-124	-88	30	166	249
200	217	52	-157	-286	-237	-20	246	408	355	95
210	-214	-379	-342	-133	162	348	297	102	-126	-311
220	-318	-162	50	249	339	248	20	-195	-281	-220
230	-64	97	197	199	81	-102	-236	-249	-139	-8
240	68	130	124	37	-17	-14	35	102	79	-12
250	-93	-160	-157	-46	97	192	193	112	15	-73
260	-134	-87	52	138	115	74	45	-28	-109	-119
270	-71	-7	30	49	30	-28	-50	0	57	90
280	107	70	-52	-155	-137	-57	10	71	118	50
290	-105	-187	-164	-87	17	102	124	46	-58	-84
300	-40	21	82	132	107	5	-58	-75	-102	-98
310	-17	88	97	12	-43	-63	-85	-74	-11	60
320	104	86	34	2	-12	-10	22	65	54	-4
330	-39	-40	-20	29	60	20	-65	-129	-102	-14
340	50	102	137	94	-7	-82	-112	-75	10	81
350	84	21	-30	-62	-69	-20	26	40	21	-27
360	-46	-12	46	90	67	6	-60	-94	-49	2
370	26	67	71	25	-27	-97	-149	-92	44	138
380	177	167	62	-116	-268	-227	-14	132	185	215
390	122	-84	-229	-217	-104	37	186	253	179	8
400	-157	-226	-194	-115	-29	72	173	190	114	2
410	-145	-237	-184	-60	85	265	318	150	-58	-184
420	-254	-254	-160	-53	10	91	151	102	50	22
430	-36	-7	55	33	25	52	40	30	30	-6
440	-60	-76	-63	-64	-47	19	56	-4	-44	40
450	101	37	-41	-9	90	140	117	31	-84	-147
460	-142	-110	-45	39	108	127	50	-81	-140	-99
470	-51	-3	96	181	130	9	-42	-50	-49	0

TO BE CONTINUED

CONTINUED(F-384 EAST)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
480	32	-32	-88	-9	92	107	70	-10	-97	-134
490	-137	-88	47	147	172	170	80	-39	-97	-98
500	-48	22	70	45	-18	-36	-54	-97	-67	11
510	37	-1	-44	-25	-9	-27	6	54	32	-31
520	-68	-59	-7	53	60	19	0	-12	-38	-10
530	56	72	30	-32	-86	-91	-37	25	52	66
540	30	-54	-61	47	127	62	-49	-79	-64	-55
550	-18	82	170	113	-54	-142	-98	-98	-109	20
560	137	91	21	13	15	35	69	27	-112	-198
570	-98	61	146	195	197	84	-77	-187	-190	-90
580	40	165	235	150	-25	-153	-199	-193	-92	105
590	220	174	50	-89	-145	-127	-101	0	105	81
600	9	-47	-85	-55	-9	-22	-29	-37	-56	-28
610	25	64	57	-19	-67	-9	47	55	56	57
620	54	34	10	10	26	4	-45	-57	-29	37
630	107	117	90	51	-38	-132	-101	39	161	189
640	129	51	-22	-112	-154	-50	137	275	297	185
650	18	-97	-167	-167	-52	130	327	483	483	292
660	0	-270	-390	-332	-127	127	259	205	107	64
670	4	-108	-219	-360	-647	-923	-905	-607	-244	22
680	57	-126	-318	-412	-339	-84	173	253	40	-411
690	-699	-553	-54	693	1461	1775	1323	361	-577	-1164
700	-1210	-730	-32	630	974	804	350	-197	-676	-725
710	-304	347	943	1097	654	-38	-538	-697	-576	-204
720	364	825	850	490	-57	-615	-896	-818	-560	-225
730	155	430	449	249	-2	-136	-130	-77	52	323
740	505	397	169	5	-144	-222	-111	67	172	152
750	-20	-229	-324	-321	-224	-18	137	85	-110	-302
760	-448	-469	-262	70	347	480	464	278	-63	-392
770	-549	-520	-403	-226	0	202	343	422	406	261
780	27	-173	-218	-102	65	205	302	338	346	375
790	334	151	-25	-121	-194	-192	-104	-71	-165	-304
800	-389	-338	-107	200	413	447	318	36	-298	-465
810	-375	-131	133	322	390	327	147	-80	-259	-313
820	-278	-230	-111	122	361	485	485	364	152	-73
830	-238	-255	-119	79	267	384	333	89	-199	-359
840	-382	-339	-226	-67	52	95	60	-45	-154	-217
850	-247	-265	-287	-304	-284	-224	-153	-49	104	174
860	126	134	248	373	475	544	507	350	163	20
870	-75	-132	-162	-184	-177	-147	-122	-103	-110	-142
880	-149	-139	-149	-129	-19	144	220	115	-101	-326
890	-471	-474	-335	-64	273	516	534	329	10	-247
900	-293	-117	179	459	601	529	274	-20	-231	-307
910	-243	-101	-7	-31	-118	-201	-229	-174	-66	38
920	78	20	-69	-111	-106	-79	-62	-79	-123	-174
930	-209	-172	-65	52	125	148	162	182	203	190
940	116	55	51	73	108	122	60	-41	-118	-138
950	-74	62	207	303	298	201	109	54	-2	-55
960	-131	-282	-457	-533	-459	-263	-25	162	227	163
970	10	-158	-238	-189	-69	64	162	189	178	167
980	135	62	10	50	155	232	234	180	90	-24
990	-112	-105	24	237	418	480	412	221	-34	-267
1000	-392	-375	-270	-170	-125	-127	-142	-164	-193	-172

TO BE CONTINUED

CONTINUED(F-384 EAST)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1010	-82	11	75	107	105	92	94	99	107	133
1020	144	104	27	-75	-168	-211	-207	-141	-35	35
1030	52	44	21	-11	-40	-57	-79	-135	-189	-195
1040	-122	21	162	217	171	86	28	22	56	109
1050	135	80	-47	-149	-154	-74	30	90	62	-47
1060	-181	-265	-266	-189	-83	-11	-1	-28	-48	-35
1070	25	122	197	222	197	125	49	9	-4	-19
1080	-35	-57	-94	-114	-69	54	202	290	298	238
1090	127	10	-49	-33	0	15	35	35	-9	-44
1100	-17	38	73	74	24	-65	-161	-235	-273	-275
1110	-251	-187	-87	10	64	77	95	129	140	146
1120	167	166	127	87	65	37	26	26	-14	-95
1130	-149	-133	-58	27	89	103	68	0	-60	-70
1140	-35	-20	-67	-138	-173	-156	-122	-109	-115	-125
1150	-134	-110	-45	30	73	42	-22	-65	-64	-12
1160	45	59	27	-38	-117	-150	-109	-25	75	164
1170	181	134	62	-5	-22	31	96	109	66	15
1180	-8	3	47	102	122	100	60	39	64	125
1190	195	242	229	159	77	33	35	46	15	-60
1200	-154	-237	-255	-175	-57	26	33	-55	-159	-191
1210	-157	-106	-69	-40	-24	-28	-35	-27	4	31
1220	30	8	-9	21	122	236	283	232	97	-62
1230	-192	-258	-231	-116	46	177	192	87	-61	-177
1240	-202	-127	-10	82	124	92	4	-69	-72	0
1250	110	188	194	126	5	-122	-199	-193	-112	-10
1260	89	172	195	157	89	16	-47	-122	-192	-199
1270	-149	-87	-36	-17	-34	-64	-69	-40	-19	-12
1280	10	29	46	94	149	188	197	141	40	-52
1290	-112	-97	-3	88	112	66	-16	-101	-125	-46
1300	84	181	189	92	-56	-175	-213	-148	-11	101
1310	146	127	66	7	-4	20	35	2	-92	-197
1320	-251	-239	-165	-64	10	35	27	2	-30	-44
1330	-15	58	121	115	69	30	-9	-38	-14	43
1340	85	71	-8	-99	-147	-124	-34	72	110	51
1350	-62	-169	-214	-157	-24	102	167	159	86	-8
1360	-63	-38	35	96	106	77	32	0	-8	21
1370	85	135	152	150	132	82	27	-17	-52	-85
1380	-104	-95	-61	-41	-73	-131	-164	-147	-84	1
1390	62	62	19	-18	-25	-2	39	82	101	83
1400	50	35	32	40	52	32	-12	-59	-90	-101
1410	-90	-60	-22	2	-1	-14	-15	-15	-30	-32
1420	-1	21	20	26	19	-17	-59	-75	-61	-18
1430	22	41	60	71	64	67	69	30	-40	-117
1440	-146	-91	5	84	113	95	52	0	-50	-59
1450	-34	-3	14	17	2	-25	-34	-7	35	62
1460	62	49	31	30	46	50	15	-47	-104	-122
1470	-87	-11	93	188	200	115	-7	-108	-149	-100
1480	9	85	87	47	-4	-56	-87	-63	2	47
1490	57	44	7	-30	-50	-50	-33	-27	-29	-34
1500	-41	-55	-63	-62	-69	-69	-35	37	110	135
1510	101	20	-70	-114	-104	-56	12	57	32	-61
1520	-152	-158	-91	4	90	142	140	105	84	88
1530	101	109	89	29	-37	-67	-53	-17	9	0

TO BE CONTINUED

CONTINUED(F-384 EAST)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1540	-28	-62	-80	-58	0	61	77	53	29	15
1550	9	10	8	-20	-72	-90	-51	-3	16	9
1560	-40	-127	-188	-170	-60	90	187	184	121	35
1570	-35	-65	-45	0	45	72	70	35	2	-2
1580	30	84	116	116	72	-5	-98	-166	-174	-115
1590	-28	43	82	67	15	-8	7	8	-4	-22
1600	-59	-82	-49	0	23	0	-81	-182	-235	-210
1610	-116	14	113	127	63	-33	-104	-104	-37	45
1620	107	137	135	125	137	182	218	214	178	112
1630	10	-60	-81	-77	-52	-24	-33	-68	-83	-77
1640	-57	-13	30	50	50	19	-30	-65	-59	-5
1650	77	130	128	84	15	-37	-47	-39	-31	-17
1660	-1	2	-20	-57	-71	-53	-12	8	-30	-90
1670	-125	-139	-131	-85	-19	29	48	29	-25	-87
1680	-109	-75	-14	37	62	57	38	15	-7	-22
1690	-20	-8	7	27	47	76	110	116	75	11
1700	-49	-99	-134	-114	-32	64	137	180	175	105
1710	10	-55	-78	-63	-22	25	45	12	-53	-97
1720	-74	7	82	109	81	14	-49	-70	-42	22
1730	90	130	122	76	35	37	55	42	-9	-90
1740	-174	-216	-187	-106	-24	15	13	-2	-19	-32
1750	-18	15	36	18	-32	-62	-39	21	89	135
1760	116	44	-35	-95	-122	-106	-64	-34	-28	-37
1770	-48	-49	-25	10	52	82	84	61	50	61
1780	67	59	37	17	22	69	126	154	141	97
1790	28	-29	-29	9	45	81	95	54	-22	-94
1800	-135	-138	-111	-87	-75	-72	-60	-27	15	39
1810	28	-11	-55	-75	-71	-50	-28	-11	10	6
1820	-24	-49	-57	-56	-68	-95	-102	-67	-11	40
1830	59	37	9	7	25	62	109	141	139	103
1840	34	-31	-45	-5	52	94	79	7	-55	-90
1850	-109	-98	-49	4	41	59	45	7	-17	-19
1860	-24	-40	-50	-37	0	51	94	100	63	-14
1870	-107	-156	-129	-49	37	98	117	90	47	13
1880	4	29	64	84	78	48	-1	-64	-110	-107
1890	-59	5	60	75	37	-34	-116	-172	-170	-106
1900	-17	50	80	77	49	6	-25	-25	-10	6
1910	13	7	-7	-17	-19	-3	29	65	95	100
1920	82	55	19	-19	-58	-110	-155	-153	-107	-32
1930	49	113	137	105	26	-55	-97	-76	-19	42
1940	89	110	106	77	33	1	-15	-27	-37	-44
1950	-46	-45	-39	-32	-23	0	44	92	110	102
1960	75	20	-28	-43	-29	6	39	39	1	-49
1970	-89	-105	-89	-42	-4	7	-1	-24	-32	-19
1980	-4	2	4	4	-3	-5	0	-10	-44	-62
1990	-35	10	57	92	106	86	29	-45	-99	-106
2000	-72	-21	27	60	57	32	4	-18	-14	19
2010	57	64	40	4	-43	-79	-74	-31	22	66
2020	89	89	56	0	-46	-66	-65	-56	-44	-37
2030	-37	-34	-24	-18	-14	-7	15	40	45	27
2040	0	-29	-60	-77	-71	-38	14	75	123	126
2050	84	27	-29	-84	-119	-130	-120	-95	-65	-35
2060	-10	-4	-15	-29	-31	-8	34	79	109	114

TO BE CONTINUED

CONTINUED(F-384 EAST)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2070	99	72	44	33	60	108	141	135	91	19
2080	-38	-60	-38	7	32	17	-20	-51	-48	-13
2090	28	58	60	32	-17	-62	-57	-7	45	52
2100	1	-73	-129	-136	-90	-22	35	58	27	-45
2110	-110	-111	-40	62	141	165	132	56	-12	-35
2120	-12	17	22	3	-24	-39	-34	-10	20	34
2130	15	-20	-44	-50	-42	-24	-9	-3	1	-5
2140	-17	-26	-50	-80	-89	-76	-52	-20	5	14
2150	1	-26	-45	-37	-10	19	33	24	19	34
2160	52	49	30	10	-4	-4	20	60	98	115
2170	104	74	44	17	1	-2	0	0	2	1
2180	-9	-24	-39	-47	-47	-39	-29	-27	-25	-7
2190	20	38	45	41	27	7	-19	-46	-63	-74
2200	-79	-72	-52	-28	-17	-19	-28	-41	-49	-50
2210	-42	-14	17	37	35	14	-22	-59	-77	-64
2220	-29	15	50	56	49	47	54	65	78	85
2230	75	49	15	-9	-28	-37	-34	-24	-4	27
2240	55	62	60	50	22	-14	-24	4	42	73
2250	88	71	19	-32	-39	0	54	95	102	67
2260	-3	-74	-109	-104	-73	-24	12	14	-12	-39
2270	-56	-57	-37	-4	16	12	-10	-32	-35	-33
2280	-23	-8	-7	-27	-47	-48	-26	10	45	56
2290	32	-13	-49	-50	-17	22	52	62	44	12
2300	-2	2	6	5	-3	-23	-44	-55	-53	-42
2310	-27	0	20	19	2	-12	-15	-13	-10	-9
2320	0	14	29	45	50	42	37	42	44	41
2330	29	7	-33	-77	-102	-98	-65	-24	10	28
2340	17	-4	-14	-10	11	42	66	77	74	52
2350	20	-5	-17	-17	-11	2	10	1	-16	-29
2360	-35	-34	-37	-44	-50	-57	-59	-50	-38	-29
2370	-24	-10	13	40	59	68	61	35	7	-3
2380	-2	10	37	64	72	55	19	-20	-49	-54
2390	-25	12	42	48	27	-9	-52	-72	-52	-2
2400	45	70	68	38	0	-25	-33	-26	-10	0
2410	-4	-8	-3	8	10	-2	-19	-30	-34	-32
2420	-28	-31	-41	-40	-24	0	19	30	25	12
2430	0	-4	-6	-7	-4	-1	5	25	64	89
2440	82	48	-2	-41	-54	-48	-28	0	10	-3
2450	-18	-8	27	69	92	90	49	-17	-69	-79
2460	-60	-34	-29	-50	-81	-96	-85	-47	4	44
2470	60	53	29	0	-16	-9	10	23	25	25
2480	32	36	37	41	47	48	29	2	-12	-18
2490	-19	-24	-24	-13	7	29	54	65	55	27
2500	-4	-27	-39	-38	-22	-2	7	-9	-44	-69
2510	-78	-83	-79	-57	-30	-12	4	10	3	-12
2520	-25	-29	-23	0	37	65	73	62	32	-3
2530	-19	-15	1	21	30	21	0	-20	-30	-25
2540	-2	24	32	12	-19	-45	-50	-25	17	57
2550	75	65	44	21	6	8	19	23	12	-4
2560	-22	-28	-22	-8	7	15	10	-2	-12	-11
2570	-9	-13	-19	-17	-14	-16	-22	-19	-8	-4
2580	1	12	22	27	24	11	0	-7	-18	-24
2590	-34	-50	-58	-50	-34	-15	4	14	15	10

TO BE CONTINUED

CONTINUED(F-384 EAST)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2600	-2	-17	-22	-9	9	25	24	4	-20	-30
2610	-21	7	37	52	45	21	-7	-24	-15	13
2620	46	62	57	36	14	8	18	24	20	10
2630	-5	-11	1	13	21	21	14	-2	-14	-7
2640	8	20	26	17	0	-8	0	10	15	13
2650	1	-18	-28	-27	-19	-10	-5	1	10	10
2660	4	-5	-13	-27	-40	-38	-33	-30	-22	-9
2670	-3	0	5	10	2	-15	-43	-67	-72	-52
2680	-14	24	44	37	8	-27	-58	-70	-54	-18
2690	2	-1	-24	-52	-65	-47	-10	25	52	60
2700	46	27	17	21	29	44	50	43	32	30
2710	44	65	75	62	26	-14	-48	-59	-37	4
2720	34	32	5	-13	-12	9	34	50	47	26
2730	-4	-29	-41	-34	-4	20	32	31	27	9
2740	-24	-50	-67	-69	-59	-35	-4	21	34	34
2750	25	7	-14	-32	-48	-57	-52	-42	-29	-15
2760	-5	-4	-17	-33	-38	-32	-18	0	13	10
2770	-4	-15	-12	10	39	57	54	36	22	20
2780	28	38	37	19	-4	-13	-7	2	9	10
2790	2	-7	-5	10	28	36	29	9	-12	-15
2800	2	21	30	36	30	3	-27	-49	-57	-50
2810	-33	-9	15	26	12	-9	-25	-30	-19	-5
2820	-3	-6	-2	2	-2	0	16	25	22	10
2830	2	2	7	13	20	10	-5	-19	-14	3
2840	22	36	34	14	-9	-19	-12	4	22	34
2850	29	6	-18	-32	-34	-30	-19	-7	0	0
2860	-7	-14	-24	-26	-17	0	9	4	-9	-20
2870	-28	-28	-14	7	20	22	19	11	5	2
2880	1	-1	-7	-11	-3	13	30	42	44	27
2890	6	-5	-3	9	25	37	34	18	0	-4
2900	5	15	15	2	-18	-40	-55	-49	-28	-13
2910	-13	-27	-47	-62	-67	-58	-41	-29	-25	-24
2920	-15	-2	11	21	29	30	25	15	0	-15
2930	-24	-24	-19	-14	-7	0	0	-3	-3	5
2940	19	37	50	49	37	32	38	51	67	75
2950	67	44	14	2	10	30	40	25	-6	-35
2960	-47	-37	-9	14	15	-12	-52	-74	-68	-45
2970	-19	0	3	-6	-15	-14	1	17	27	29
2980	20	1	-17	-32	-40	-42	-30	-8	10	15
2990	14	6	2	-9	-14	-15	-15	-12	0	17

END

RECORD = F-384 COMPONENT = UP STATION = HITACHINAKA-F
DATE AND TIME = 1990-10- 6-23-33 TOTAL NUMBER OF DATA = 3000
SAMPLING INTERVAL = 0.010 (SEC) SCAL = 0.10000
SIGNAL = GR. ACC.
CONECTION POINT IN DATA NUMBER = 3000,

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	0	1	3	6	6	-8	-2	32	2	-48
10	19	60	-31	-15	92	-2	-128	24	133	-57
20	-126	47	70	-34	-31	11	-28	-92	-61	75
30	166	94	21	73	48	-20	57	10	-170	-40
40	156	5	-32	163	-31	-297	-67	60	-242	-272
50	149	368	164	0	22	-140	-355	-182	88	89
60	152	341	148	-445	-713	-323	150	211	261	503
70	233	-500	-652	1	464	132	-218	104	478	187
80	-314	-257	120	103	-173	-121	153	213	161	104
90	-120	-158	134	71	-432	-416	184	415	169	65
100	148	64	-152	-293	-270	78	449	319	-59	-244
110	-225	-165	-84	26	104	152	86	-140	-236	-21
120	158	47	-73	60	225	90	-177	-163	28	-52
130	-221	3	252	118	47	59	-97	-92	56	3
140	-79	11	88	39	-17	-20	35	97	11	-72
150	27	36	-103	-49	104	18	-86	30	3	-217
160	-135	160	185	-12	-144	-126	-25	20	93	299
170	248	-107	-224	-153	-193	-61	246	275	1	-178
180	-101	-47	-154	-116	136	230	65	-49	14	66
190	-19	-123	-100	1	75	96	95	57	11	-88
200	-171	-44	43	-84	-103	37	115	82	-25	-52
210	80	77	-124	-127	110	144	-43	-81	35	73
220	6	-52	-35	27	-3	-104	-79	78	188	60
230	-129	-99	14	24	9	68	136	64	-119	-165
240	-46	0	40	164	102	-65	-39	6	-94	-124
250	16	124	48	-59	28	147	14	-116	-1	53
260	-61	-34	105	40	-82	-3	57	-31	-67	13
270	3	-107	-22	177	139	-93	-139	42	38	-119
280	6	192	57	-76	11	-24	-201	-87	188	137
290	-118	-129	90	88	-201	-232	55	87	-108	1
300	255	148	-142	-175	7	42	-92	-101	57	135
310	50	-4	17	-37	-154	-106	46	62	13	97
320	198	70	-135	-82	42	-8	-10	105	184	109
330	-85	-142	-31	24	-25	-25	68	95	53	-16
340	-127	-118	-7	5	36	148	129	-1	-55	-49
350	-115	-90	54	28	-93	-52	74	47	-67	-60
360	-60	-79	102	281	146	-199	-274	72	97	-213
370	-4	369	73	-418	-210	281	194	-174	-115	127
380	-12	-203	57	326	151	-31	-13	-67	-90	-32
390	-67	-27	170	160	-89	-123	80	92	-25	-36
400	-95	-102	19	-18	3	247	122	-179	-54	96
410	-44	-75	24	-126	-180	163	225	-100	-52	207
420	-7	-289	-80	133	-28	-145	76	296	7	-471
430	-274	284	196	-199	36	420	94	-463	-357	99
440	165	-52	-87	144	361	286	-41	-302	-249	1
450	118	21	9	190	223	-43	-223	-51	101	-45
460	-131	65	154	-35	-142	17	121	-40	-84	105
470	138	-11	-30	65	0	-133	-157	-179	-21	213

TO BE CONTINUED

CONTINUED(F-384 UP)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
480	5	-237	9	243	101	-101	-41	112	25	-175
490	-151	134	183	-63	30	201	-93	-299	23	241
500	-35	-210	-58	17	33	140	147	53	-15	-101
510	-101	-48	-35	-17	-1	75	162	23	-218	-106
520	239	189	-110	-146	-45	-12	-29	-92	11	267
530	149	-225	-63	385	105	-462	-220	289	52	-344
540	-38	340	155	-81	-51	-55	-97	-70	-70	-67
550	29	222	306	34	-201	-67	0	-175	-171	120
560	256	58	-77	-49	-85	-104	-2	63	85	149
570	112	28	11	-134	-309	-141	93	10	-16	191
580	264	101	-134	-249	-81	53	-111	-77	309	397
590	16	-252	-105	86	-80	-342	-157	151	21	-93
600	195	256	-107	-258	-96	-7	-44	-21	21	16
610	80	137	-40	-242	-60	148	-47	-187	6	107
620	-9	-30	217	407	166	-173	-155	92	180	34
630	-35	155	331	132	-176	-86	168	95	-182	-325
640	-233	-11	119	106	67	65	91	28	-246	-395
650	-95	144	-4	-17	217	212	-102	-229	-29	15
660	-201	-241	-52	8	0	171	265	93	-39	-95
670	-273	-337	-84	141	208	259	255	205	119	-44
680	-202	-124	72	-22	-227	-84	281	380	133	-108
690	-201	-320	-376	-79	318	288	-70	-87	259	202
700	-291	-416	41	420	125	-390	-314	153	253	-4
710	-88	65	128	-21	-177	-123	15	-33	-131	13
720	217	151	20	62	76	-17	-161	-347	-346	-83
730	72	134	365	493	252	-3	-76	-223	-355	-200
740	109	314	334	201	4	-157	-116	94	168	8
750	-191	-222	-119	-50	14	200	333	230	78	-17
760	-119	-189	-248	-271	-175	-29	26	18	26	35
770	41	-15	-167	-262	-192	-35	115	215	215	97
780	-119	-287	-209	-25	58	109	132	33	-70	-75
790	-21	141	326	233	3	-38	-50	-168	-142	137
800	280	41	-143	-33	10	-91	-107	-47	-9	4
810	13	-1	-41	-60	-20	84	99	16	31	33
820	-88	-80	17	-81	-131	100	247	152	144	214
830	52	-217	-283	-111	102	156	70	64	168	150
840	-12	-18	95	-19	-215	-156	36	102	16	-49
850	46	142	37	-147	-146	-31	-50	-119	-99	-87
860	-41	120	164	47	33	65	-47	-183	-189	-38
870	192	249	56	-91	-36	6	-62	-91	-60	-44
880	9	76	18	-78	-55	-31	-123	-224	-185	3
890	135	80	-47	-114	-126	-152	-181	-137	-12	92
900	147	179	187	147	102	84	64	96	129	47
910	-80	-82	29	89	73	33	48	191	272	120
920	-92	-163	-113	-51	16	104	115	-15	-128	-94
930	-19	7	2	28	73	-2	-118	-39	79	-7
940	-91	44	120	-11	-87	12	129	105	-14	-97
950	-103	-101	-96	-13	62	-1	-116	-127	-62	-31
960	-68	-84	-43	-33	-52	-47	-45	-48	-17	-10
970	-83	-119	-72	-22	-8	-7	53	158	158	39
980	-17	53	99	42	16	129	228	150	11	-26
990	12	41	72	139	181	124	-15	-110	-91	-27
1000	49	119	78	-63	-149	-124	-91	-143	-198	-162

TO BE CONTINUED

CONTINUED(F-384 UP)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1010	-132	-185	-185	-41	116	136	33	-47	-58	-87
1020	-108	-27	72	99	101	70	36	92	163	136
1030	115	150	102	-7	-11	63	88	72	56	27
1040	-36	-90	-81	-55	-57	-67	-57	-37	-23	-18
1050	14	70	67	-37	-133	-116	-49	15	83	93
1060	50	48	69	36	-41	-69	14	56	-55	-147
1070	-70	-10	-66	-43	57	34	-75	-87	-52	-96
1080	-110	-14	19	-95	-154	-8	114	64	25	117
1090	220	188	94	76	91	65	35	24	-26	-121
1100	-143	-47	32	12	-28	-63	-135	-166	-55	63
1110	2	-122	-110	-27	-25	3	159	242	151	63
1120	40	17	-39	-119	-136	-25	85	51	14	69
1130	52	-32	-44	19	82	68	2	-21	28	77
1140	39	-16	-14	-17	-87	-140	-103	-29	11	19
1150	-9	-52	-3	65	20	-6	65	34	-109	-166
1160	-99	-3	32	26	60	124	88	1	24	90
1170	92	76	47	-28	-86	-76	-55	-72	-79	-40
1180	-37	-70	-61	-18	26	57	76	85	63	31
1190	10	-5	-1	-2	4	60	85	24	1	64
1200	51	-78	-173	-152	-61	33	42	-57	-118	-79
1210	-64	-86	-47	28	9	-87	-131	-73	2	33
1220	85	148	100	-6	6	132	169	89	35	63
1230	117	110	64	109	254	272	74	-82	-68	-3
1240	13	-20	-22	12	-52	-177	-190	-87	-62	-140
1250	-168	-157	-138	-62	-23	-69	-77	-25	-26	-76
1260	-50	42	79	29	-21	-16	24	36	0	15
1270	95	83	42	96	102	0	-15	58	53	26
1280	56	76	34	-2	40	82	38	-2	11	-30
1290	-155	-182	-76	1	-8	-30	-23	-37	-83	-75
1300	13	65	8	-47	-36	-42	-67	-22	42	38
1310	15	36	56	60	48	33	65	92	73	74
1320	110	127	80	12	-12	-33	-82	-109	-106	-95
1330	-23	52	-15	-113	-33	68	-3	-89	-12	102
1340	104	47	56	97	13	-134	-100	70	81	-41
1350	-70	-31	-47	-76	-52	-19	-14	-4	-4	-27
1360	-37	-51	-62	-10	13	-49	-59	3	16	-3
1370	12	48	42	25	10	0	48	116	112	46
1380	-2	-5	-2	1	36	52	0	-70	-86	-35
1390	9	-3	-2	35	21	-57	-99	-52	11	33
1400	40	38	1	-27	6	72	80	-7	-120	-148
1410	-93	-51	6	104	108	-14	-67	4	45	34
1420	28	26	14	-20	-44	-2	50	54	35	17
1430	10	31	40	7	19	79	70	0	-17	8
1440	-1	-19	9	35	3	-25	-3	-15	-57	-15
1450	64	30	-81	-81	-6	-31	-73	11	77	-5
1460	-93	-64	-33	-38	-18	-20	-70	-104	-78	-34
1470	-47	-85	-39	56	67	13	21	84	116	107
1480	78	43	11	14	31	21	7	-9	-43	-43
1490	14	48	-6	-75	-87	-53	-10	-11	-19	0
1500	-6	-22	26	67	1	-47	20	77	27	-15
1510	32	80	69	38	6	-24	-45	-15	41	48
1520	27	36	28	-2	-1	29	33	1	-1	31
1530	52	7	-67	-71	-22	-10	-16	6	30	-2

TO BE CONTINUED

CONTINUED(F-384 UP)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1540	-67	-80	-58	-35	-7	28	57	30	-27	-12
1550	32	26	-8	-27	-16	-15	-60	-92	-49	14
1560	14	-20	-57	-71	-20	48	38	-31	-52	-19
1570	-12	-14	14	31	2	-38	-31	11	31	34
1580	61	65	21	1	17	25	23	41	54	-7
1590	-69	-23	36	0	-34	16	43	20	31	19
1600	-30	4	70	45	11	40	38	-23	-63	-27
1610	40	72	37	-27	-47	-40	-62	-76	-39	-12
1620	-37	-52	-37	-43	-40	-3	0	-29	-39	-34
1630	-1	60	78	60	69	50	-28	-48	19	72
1640	72	44	20	7	-15	-37	-14	26	16	-29
1650	-37	-2	-9	-43	-13	54	56	-7	-34	4
1660	53	63	18	-28	-28	4	45	51	-7	-64
1670	-54	-14	-2	-13	-22	-25	-23	-43	-85	-76
1680	4	66	63	26	9	33	46	1	-28	11
1690	28	-15	-33	-12	-12	-32	-11	43	25	-67
1700	-111	-75	-37	-29	-8	17	7	-31	-48	-35
1710	-26	-21	1	41	57	40	53	88	56	-15
1720	-20	24	30	8	19	41	25	12	55	80
1730	22	-2	58	54	-49	-75	6	40	-28	-64
1740	-5	25	-12	-26	7	25	-11	-64	-61	-11
1750	16	1	-13	-13	2	35	55	59	60	37
1760	-2	-3	30	59	50	31	19	-5	-41	-50
1770	-40	-51	-54	-33	-19	-22	-35	-43	-33	-30
1780	-40	-41	-46	-59	-41	6	12	-18	-17	-2
1790	-18	-23	-5	0	11	23	-6	-28	3	16
1800	-8	-11	3	19	50	72	56	46	63	55
1810	28	35	62	70	72	58	21	7	2	-22
1820	-41	-40	-20	-11	-37	-60	-55	-52	-45	-16
1830	-9	-18	-14	-20	-39	-23	7	0	-10	7
1840	14	-2	-21	-6	45	63	8	-31	11	77
1850	60	4	-3	23	28	3	-10	6	17	-2
1860	-26	-27	-13	-5	-4	1	6	-8	-64	-113
1870	-86	-14	11	-1	5	13	6	4	14	30
1880	60	64	10	-38	-26	10	24	12	2	-7
1890	-24	-20	10	43	38	-6	-29	-14	-8	-6
1900	20	59	64	16	-35	-47	-30	6	45	35
1910	-5	-25	-18	-13	-5	12	25	28	15	-18
1920	-33	-1	9	-36	-68	-30	25	24	-8	-8
1930	9	-4	-47	-52	-1	34	4	-28	-5	25
1940	26	31	39	24	-2	-5	5	-7	-11	19
1950	30	14	19	21	-1	-5	8	-24	-62	-21
1960	21	-11	-30	17	35	-22	-60	-40	-18	-32
1970	-60	-57	-8	28	26	6	1	2	-1	10
1980	17	2	-15	-25	-18	6	36	47	40	45
1990	56	46	5	-15	24	56	38	22	50	50
2000	-8	-60	-68	-57	-35	1	32	25	7	4
2010	-13	-40	-35	-1	8	-20	-52	-35	5	-12
2020	-39	1	30	-29	-78	-26	28	1	-20	16
2030	19	-37	-40	14	10	-28	-8	41	55	20
2040	17	45	26	1	32	50	18	3	21	14
2050	-15	-27	-10	17	9	-34	-40	-6	25	32
2060	3	-30	-30	-3	-1	-25	-20	18	23	-15

TO BE CONTINUED

CONTINUED(F-384 UP)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2070	-31	-12	-26	-63	-55	-15	-3	-1	23	33
2080	3	-6	31	45	19	6	18	24	16	11
2090	18	30	59	81	50	1	5	28	11	-47
2100	-62	-10	9	-20	-18	16	13	-38	-59	-30
2110	-8	-17	-30	-15	4	-15	-55	-58	-20	8
2120	4	17	61	57	4	-13	6	8	-6	-7
2130	7	4	-17	-1	43	37	-6	-11	1	-16
2140	-23	-2	2	-20	-37	-10	26	26	12	23
2150	20	-17	-37	-25	-31	-43	-41	-30	-15	-18
2160	-25	-3	37	37	16	25	23	-14	-31	-21
2170	-18	-18	-7	-8	-16	-4	14	21	26	36
2180	35	26	28	25	17	22	23	20	31	50
2190	41	17	1	-12	-16	-6	-9	-17	1	15
2200	0	-16	-19	-27	-28	-20	-22	-27	-15	-14
2210	-24	0	25	15	-1	18	62	76	30	-6
2220	17	41	2	-22	31	56	-7	-43	-14	-14
2230	-52	-41	0	-13	-55	-37	4	-15	-52	-33
2240	-1	-27	-50	-1	24	-27	-59	-26	3	7
2250	28	43	14	-22	-22	6	15	0	1	16
2260	4	-2	30	62	50	19	4	14	18	1
2270	14	56	46	-17	-48	-13	14	14	11	11
2280	10	-6	-21	-17	-1	16	9	-24	-30	-4
2290	-9	-40	-32	15	28	4	5	14	-6	-20
2300	-15	-6	-9	-19	-6	19	14	-10	-16	-19
2310	-36	-36	-2	20	9	1	18	25	-11	-57
2320	-42	1	4	-28	-41	-17	4	1	9	40
2330	51	31	8	11	20	9	-8	-7	8	10
2340	0	9	40	38	6	-1	0	-18	-21	-4
2350	1	6	13	13	10	9	0	-17	-31	-25
2360	5	30	14	-11	-13	-7	-20	-18	20	33
2370	-2	-30	-19	-3	8	29	36	15	0	11
2380	16	-7	-21	-7	4	-3	-14	-16	-24	-27
2390	-25	-19	-7	6	18	16	0	-8	1	7
2400	-6	-11	-5	6	18	12	-1	-1	8	9
2410	0	-5	5	22	12	-3	5	20	9	-1
2420	17	38	17	-7	-1	6	-8	-10	0	-4
2430	-19	-17	-6	-16	-34	-33	-27	-30	-32	-29
2440	-25	-14	0	-2	-11	2	24	17	3	4
2450	-8	-31	-23	1	6	0	4	16	21	16
2460	24	35	13	-35	-51	-12	21	21	28	52
2470	48	4	-27	-18	18	50	48	20	16	23
2480	1	-32	-22	6	-2	-40	-38	-10	-2	-5
2490	8	16	0	-15	-8	0	0	0	3	8
2500	9	-2	-7	11	21	11	9	4	1	12
2510	11	0	7	20	10	-13	-17	6	22	6
2520	-19	-20	-9	-5	1	11	23	27	1	-41
2530	-54	-34	-33	-47	-38	-16	-5	-11	-14	-15
2540	-22	-13	10	9	-18	-26	-5	6	4	6
2550	8	-2	-30	-39	0	41	32	10	23	37
2560	26	16	25	35	20	-10	-29	-11	22	29
2570	14	0	-10	-10	-6	-7	-5	5	7	0
2580	-6	-1	9	6	-11	-12	7	16	9	21
2590	40	35	24	16	1	4	25	31	28	33

TO BE CONTINUED

CONTINUED(F-384 UP)

NO.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2600	21	-10	-20	-8	-11	-26	-34	-31	-20	-1
2610	7	-20	-47	-31	-18	-31	-26	-11	-24	-42
2620	-30	-12	-10	-17	-8	2	-9	-17	4	10
2630	3	17	31	17	-1	1	8	-2	-7	15
2640	28	18	24	42	33	11	22	43	20	-12
2650	-7	27	35	6	-5	8	-4	-36	-33	-17
2660	-20	-10	4	-15	-35	-13	-5	-27	-35	-17
2670	-2	-17	-38	-20	3	1	-15	-16	9	29
2680	19	1	-4	4	11	8	-7	-12	0	1
2690	-18	-12	22	28	0	-7	20	25	5	-3
2700	-1	9	29	35	26	23	22	12	-7	-13
2710	1	7	-4	-10	0	9	3	-9	-10	6
2720	22	11	-12	-15	-4	-8	-16	1	20	11
2730	4	14	21	16	11	3	-20	-33	-14	5
2740	-2	-22	-27	-21	-29	-37	-20	-7	-8	-8
2750	-17	-28	-27	-20	-21	-1	25	21	0	-2
2760	11	18	12	8	2	1	11	30	27	11
2770	10	14	19	13	3	0	-2	-7	-6	6
2780	16	16	8	1	8	22	14	-5	0	19
2790	20	-6	-19	4	13	-8	-14	-1	-11	-18
2800	-3	-5	-23	-11	9	0	-21	-15	0	-12
2810	-35	-15	18	9	-13	3	18	-7	-28	-13
2820	0	-3	-1	6	1	-3	-2	-1	-15	-27
2830	-15	-2	-9	-17	0	24	19	-4	-3	9
2840	4	-8	-5	2	3	8	16	11	1	3
2850	11	0	-15	-2	13	5	-8	-6	0	0
2860	3	8	12	20	20	9	5	7	16	31
2870	34	21	20	24	15	1	3	13	11	-2
2880	-4	12	16	1	-7	0	4	-8	-28	-23
2890	-4	-13	-44	-57	-38	-23	-20	-6	1	-20
2900	-22	1	1	-16	-10	10	8	-1	0	6
2910	10	0	-15	-17	-11	-5	9	18	14	12
2920	14	8	-2	7	24	8	-20	-27	-12	1
2930	6	8	7	-1	-5	-6	0	8	4	-13
2940	-15	6	14	-1	-11	-4	-8	-17	-10	11
2950	22	-1	-17	0	8	-1	-5	6	13	-6
2960	-22	1	34	32	19	12	-6	-14	13	35
2970	16	-11	-10	-7	-31	-31	13	35	8	-5
2980	18	32	21	23	27	13	-2	-3	-2	1
2990	16	17	0	-7	1	8	10	8	2	-7

END

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