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OF
THE PUBLIC WORKS RESEARCH INSTITUTE
土 木 研 究 所 資 料
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ANNUAL REPORT
ON
STRONG-MOTION RECORDS
NO.3 (1968)

強震記録年次報告NO.3(1968)

STRONG-MOTION EARTHQUAKE RECORDS FROM PUBLIC WORKS IN JAPAN(1968)

土木構造物における強震記録(1968)

APRIL 1969
昭 和 4 4 年 4 月

THE PUBLIC WORKS RESEARCH INSTITUTE
MINISTRY OF CONSTRUCTION
建 設 省 土 木 研 究 所

PUBLICATIONS ON STRONG-MOTION RECORDS

The Public Works Research Institute has published the following reports on strong-motion earthquake records reproduced in full size. In the reports there are three kinds of series, ANNUAL REPORT, SPECIAL REPORT, and SUMMARIZED REPORT.

(I) ANNUAL REPORT: These reports are series of general ones published annually and contain almost all strong-motion records obtained during the period indicated in the title of each report.

No.1 STRONG-MOTION EARTHQUAKE RECORDS FROM PUBLIC WORKS IN JAPAN (1961-1966), Technical Memorandum of PWRI No.217, December, 1966.
No.2 STRONG-MOTION EARTHQUAKE RECORDS FROM PUBLIC WORKS IN JAPAN (1967), Technical Memorandum of PWRI No.341, February, 1968.
No.3 STRONG-MOTION EARTHQUAKE RECORDS FROM PUBLIC WORKS IN JAPAN (1968), Technical Memorandum of PWRI No.430, April, 1969.

(II) SPECIAL REPORT: These reports are series of special ones on specified earthquakes or quake swarms published immediately after each quake. Usually these records are also contained in ANNUAL REPORT, but sometimes they are not contained.

No.1 STRONG-MOTION EARTHQUAKE RECORDS FROM PUBLIC WORKS IN JAPAN (THE MATSUSHIRO QUAKE SWARM, DECEMBER 9 1965-FEBRUARY 28 1966, THE OCHIAI BRIDGE), Technical Memorandum of PWRI No.163, April, 1966.
No.2 STRONG-MOTION EARTHQUAKE RECORDS FROM PUBLIC WORKS IN JAPAN (THE MATSUSHIRO QUAKE SWARM, MARCH 1-JUNE 22 1966, THE OCHIAI BRIDGE), Technical Memorandum of PWRI No. 194, July, 1966.
No.3 STRONG-MOTION EARTHQUAKE RECORDS FROM PUBLIC WORKS IN JAPAN (THE MATSUSHIRO QUAKE SWARM, JUNE 25 - DECEMBER 1 1966, THE OCHIAI BRIDGE), Technical Memorandum of PWRI NO. 254, March, 1967.
No.4 STRONG-MOTION EARTHQUAKE RECORDS FROM PUBLIC WORKS IN JAPAN (THE MATSUSHIRO QUAKE SWARM, MAY 27 - OCTOBER 23 1966, THE SUSOBANA DAM) Technical Memorandum of PWRI No. 263, March, 1967.

(III) SUMMARIZED REPORT: These reports are series of summarized reports on especially major strong-motion records published occasionally (mostly every four years). These records are extracted from both ANNUAL REPORTS and SPECIAL REPORTS.

No.1 STRONG-MOTION EARTHQUAKE RECORDS FROM PUBLIC WORKS IN JAPAN (1961-1968), expected to be published in 1969.

REFERENCES

The following references are available for utilization and evaluation of the records

1) Earthquake Resistant Structure Section: "Digitalized Data of Strong-Motion Earthquake Records (No.1)", (in Japanese) Technical Memorandum of the Public Works Research Institute, No. 317, March, 1968.

2) Earthquake Resistant Structure Section: "Digitalized Data of Strong-Motion Earthquake Records (No.2)", (in Japanese) Technical Menorandum of the Public Works Research Institute, No. 318, 1968.

3) Structure Section: "Examination on the Characteristics of a SMAC-B2 Accelerograph and an Underground Seismograph", (in Japanese) Technical Memorandum of P.W.R.I., No. 399, March, 1968.

4) Eiichi Kuribayshi, Toshio Iwasaki. "Observed Earthquake Responses of Bridges", 4th WCEE, Chile, January, 1969.

Erratum

Page	Line	Error	Correction
Preface	10	ninty	ninety
Preface	12	hundreds	hundred
3. R	Group III, No.309	Otome, Mifume	Otome, Mifune
3. R	Group III, No.312	Kumarogawa - Cho,	Kumanogawa - Cho,
4. R	Group IX, No.901	Aragawa,	Anagawa,
6. R	表 1	13. 北海道開発庁	13. 北海道開発局
6. R	表 1 No.112	和歌山国道	和歌山工事
8. L	Table 2, No. 19	19. Toyakawa Bridge	19. Toyakawa Embankment
8. L	Table 2, No. 20	20. Tonegawa Bridge	20. Tonegawa Embankment
8. L	Table 2, No. 21	21. Otagawa Bridge	21. Otagawa Embankment
8. R	Table 3, (last column)	Number of Stations	Number of Instruments
11. L	Table 6,	Magnitication : X16(mechanical)	Magnification:x16(mechanical)
11. R	Fig. 5,	Horizontal Pendulam (A-Direction)	Horizontal Pendulum (A-Direction)
11. R	Fig. 5,	Driving Part (Spring Moter)	Driving Part (Spring Motor)
12. L	Recording system	Recording Pen : diamong point	Recording Pen : diamond point
12. R	SIDE-SECTION	Polling Spool	Rolling Spool
14. R	Table 8, No.1006	Isurukawa "	Tsurukawa"
14. R	Table 8, Note	Earch	Each
17. R	301 Yuhei Bridge	Off Iwata -Pref. E143°08'N39°25'	Off Iwate - Pref E143°08' N39°25'
18. L	304 Date Bridge	1968. 19.8 04 : 22	1968. 10. 8 04 : 22
19. L	309 Otome Bridge	SW of Miyazaki-Pref. E130°__ N32°01'	SW of Miyazaki-Pref. E130°43' N32°01'
19. R	310 Hirai Bridge	| | | 40 | III:Tokyo |	| | | 340 | III:Tokyo |
21. L	901 The Public Works Research Institute	| E off Oshima E139°25' N43°38' | | 70 |	| E off Oshima E139°48' N34°50' | | 100 |
21. R	902 Nishiarai Bridge	| -Pref. | 4.2 | 50 | III:Tokyo |	| -Pref. | 5.1 | 50 | III:Tokyo |
22. L	905 Ochiai Bridge	Near Matsushiro E138°05' N362°26'	Near Matsushiro E138°05' N36°26'
22. L	905 Ochiai Bridge	E off N Honshu E138°10' N36°31'	E off N Honshu E143°35' N40°44'
22. L	905 Ochiai Bridge	1968 12. 4 ~ 22 : 24	1969. 12. 4 • 22: 24
22. R	907 Taira Bridge	| -Pref. | 80 | | | | -Pref. | 5.4 | 80 | III:Fukushima |	| -Pref. | | 80 | | | -Pref. | 5.4 | 50 | III:Fukushima |
22. R	907 Taira Bridge	E off N Honshu E143°35'_____	E off N Honshu E143°35' N40°44'
22. R	907 Taira Bridge	Off Miyagi-Pref. E141°50'_____	Off Miyagi-Pref E141°50' N37°55'
23. R	1109 Haneda Undersea Tunnel	| 1109- Tc - 1 | 5 | 3 | 88 |	| 1109- Tc - 1 | 5 | 3 | 8 |
23. R	1109 Haneda Undersea Tunnel	| 1109- Tc - 4 | 10 | 55 | 18 |	| 1109- Tc - 4 | 10 | 5 | 18 |
23. R	1301 Civil Engineering Research Institute	E off Aomori - Pref. E142°51' N41°51'	E off Aomori - Pref. E142°51' N41°25'

STRONG-MOTION EARTHQUAKE RECORDS FROM PUBLIC WORKS IN JAPAN(1968)

APRIL 1969

THE PUBLIC WORKS RESEARCH INSTITUTE
MINISTRY OF CONSTRUCTION

Abstract

This memorandum reports strong-motion earthquake records of ground motions and responses of engineering structures such as highway bridges, tunnels, dams, and embankments administrated by Ministry of Construction, Public Corporations, Hokkaido Development Bureau and Regional Governments.

The photographs of major record traces of strong earthquakes occurred in and around Japan in 1968 are reproduced in full size. Also the maximum amplitudes of all seismograph records are presented.

Preface

Strong-motion earthquake record is most helpful to establish reasonable design methods of structures subjected to earthquake motions.

In 1960 the Public Works Research Institute proposed a recommendation to the Ministry of Construction on project of survey of ground motions and structural responses during strong-motion earthquakes. In response to the recommendation the Ministry gave the approval. Since then the project has obliged it to install instruments, to consult the way of installing and instrumentation, and to analyze and publish the records obtained.

Total number of SMAC accelerographs operated is one hundred and thirty and total number of the accelerometers is three hundred and ninty. Meanwhile, total number of electro-magnetic accelerometers is two hundreds and five.

Several reports reproducing record traces in full size have already published as shown inside front cover of this report. And some analyses have been done and these typical reports are shown in References.

The present report reproduces strong-motion seismograph records obtained from public works in Japan--such as highway bridges, tunnels, dams, and embankments--and on grounds near the structures during the year of 1968, and summarizes their maximum acceleration values.

The structures which served strong-motion seismographs are administrated by Ministry of Construction, Public Corporations, Hokkaido Development Bureau and Regional Governments.

April 1969

compiled by

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Acknowledgments

The present network of strong-motion instrumentation on public works in Japan is due to efforts of the staff of the Public Works Research Institute that have installed the instruments and serviced instrumentation since 1960. The purchase of the instruments has been a cooperative effort of the Regional Construction Bureaus of the Ministry of Construction, Regional Governments throughout Japan, Public Corporations (such as Japan Highway, Tokyo Expressway, Hanshin Expressway, and Water Resources Development), and Hokkaido Development Bureau under the general direction of the Public Works Research Institute.

We should mention the skill and care which has been put into the design and fabrication of the instruments by the members of SMEOC (Strong-Motion Earthquake Observation Committee established in 1951 in Japan) and the manufacturing companies.

The members dealing with field work made notable contributions to the success of the surveys.

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§1 Network of Strong-Motion Seismograph Stations

The sites of the strong-motion seismograph stations observing ground motions and earthquake responses of engineering structures such as highway bridges, tunnels, dams, and embankments are shown in Figs. 1 to 4, and Tables 1 and 2.

Fig. 1 and Table 1 indicate SMAC-type accelerograph stations throughout Japan. In the Fig. 1, black round spots represent the existing stations as of March 1969, and white rounds represent the stations expected in future. Mostly each station has a pair of instruments as shown in Table 1. One is some part of the structure (mainly at the crest of the structure), the other is on the adjacent ground surface. The location of ground instrument is required to be decided so that the ground condition is similar to that beneath the structure and the ground motion should not be affected by the motion of the structure, keeping away a certain distance from the structure.

A pair of instruments installed at the structure and the ground usually have occasional starting devices individually. A few of the stations have one instrument or three instruments. And each instrument has three components of accelerometers (1 vertical and 2 horizontal), and two types of starting devices (electric and mechanical).

Fig. 2 and Table 2 show electro-magnetic type seismograph stations as of March 1969. Each station has three or more components of accelerometers, a starting device, and a recorder. Accelerometers are usually set up at the structure and on the ground nearby, and trigger their traces electrically or optically on a recording paper, film, or tape. In this case the recorder begins to operate by the function of the electric staring device during rather strong earthquakes.

Figs. 3 and 4 show the detailed sites of the stations with SMAC in Tokyo and in Osaka, respectively. In the figures only the stations operated as of March 1969 are shown.

Table 3 and 4 show the number of strong-motion seismographs and that of stations operated as of March, 1969.

The numbers in Table 3 are summarized in relation to the administrative sponsorship and those in Table 4 are summarized in relation to the variety of structures.

At the present time 67 stations for 130 SMAC-type instruments and 26 stations for electro-magnetic type seismographs are operated in the field of Public Works and serviced by the Public Works Research Institute.

In Table 3 the stations are classified into 14 groups. Table 5 defines the classification of stations both in Japanese and English.

Table 1. Strong-Motion Seismograph Stations for SMAC-Type Accelerographs, Including Stations Expected in Future.

as of March, 1969

Station Number	Station (Name of Structure)	Number of Instruments	Seismo-graph Type	Location	Year & Month Installed
	Group I.				
101	Shinkatsushika Bridge	2, Ground 1, pier 1	SMAC-B2	Matsudo City, Chiba Pref.	1966-3
102	Yoneyama "	3, Ground 1, pier 2		Kashiwazaki City, Niigata Pref.	1966-2 1966-5
103	Nakagawa "	2,			*
104	Shintonegawa "	2, Ground 1, pier 1	SMAC-B2	Kurihashi Cho, Saitama Pref.	1967-2
105	Takasaki "	2,			*
106	Soka "	2, Ground 1, pier 1	SMAC-B2	Soka City, Saitama Pref.	1968-3
107	Oiso "	2,			*
108	Himekawa "	2,			*
109	Kisogawa "	2,			*
110	Hijiyama "	2,			*
111	Mimitsu "	2,			*
112	Kinokawa "	2, Ground 1, pier 1	SMAC-B2	Wakayama City, Wakayama Pref.	1967-3
113	Wagagawa "	1, Ground	"		1969-3
114	Amagasaki "	2, Ground 1, pier 1	SMAC-B2 SMAC-C2	Amagasaki City, Hyogo Pref.	1963-3
115	Sakuragawa "	2,			*
	Group II.				
201	Oya Bridge	2, Ground 1, pier 1	SMAC-B2	Aizuwakamatsu City, Fukushima Pref.	1965-3
202	Uonuma "	2, Ground 1, pier 1	SMAC-B2	Oziya City, Niigata Pref.	1965-12
203	Yokokurasawa "	2, Ground 1, pier 1	SMAC-B2	Yokokura, Sakae-Mura, Nagano Pref.	1965-10
204	Shinyawata "	2, Ground 1, pier 1	SMAC-B2	Chita Cho, Aichi Pref.	1965-11
205	Ishiseto "	2, Ground 1, pier 1	SMAC-B2	Nojiri Cho, Miyazaki Pref.	1965-3
206	Bosyu "	2,			*

Note: Stations with star-mark * are expected in future.

Station Number	Station (Name of Structure)	Number of Instruments	Seismo-graph Type	Location	Year & Month Installed
	Group II. (cont.)				
207	Takatsu Bridge	2, Ground 1, pier 1	SMAC-B2	Masuda City Shimane Pref.	1967-3
208	Tsurusaki "	2,			*
	Group III.				
301	Yuhei Bridge	2, Ground 1, pier 1	SMAC-B2	Jumonji Cho, Akita Pref.	1966-12
302	Kaihoku "	2, Ground 1, pier 1	"	Ishinomaki City, Miyagi Pref.	1966-3
303	Kahoku "	2, Ground 1, pier 1	"	Sagae-City, Yamagata-Prefecture	1965-3
304	Date "	2, Ground 1, pier 1	"	Date-Cho, Fukushima-Prefecture	1965-10
305	Minato "	2, Ground 1, pier 1	"	Tsuiyama, Toyooka-City, Hyogo-Pref.	1965-3
306	Myoken "	2, Ground 1, pier 1	"	Nishisono-Cho, Izumo-City, Shimane-Pref.	1966-3 1967-3
307	Godaisan "	2, Ground 1, pier 1	"	Godaisan, Kochi-City, Kochi-Prefecture	1966-3
308	Itajima "	2, Ground 1, pier 1	"	Uwajima-City, Ehime-Prefecture	1966-3
309	Otome "	2, Ground 1, pier 1	"	Otome, Mifume-Cho, Kumamoto-Prefecture	1965-3
310	Hirai "	3, Ground 1, pier 2	"	Hirai, Edogawa-Ku, Tokyo	1965-8
311	Toyohama "	2, Ground 1, pier 1	"	Ise-City, Mie-Prefecture	1966-9
312	Akagi "	2, Ground 1, pier 1	"	Akagi, Higashi-kumarogawa-Cho, Wakayama-Pref.	1966-9
313	Ishizuchi "	2, Ground 1, pier 1	"	Ishizuchi, Komatsu-Cho, Ehime-Prefecture	1967-3
314	Kiyokawa "	2, Ground 1, pier 1	"	Kiyokawa, Tachikawa-Cho, Yamagata-Pref.	1968-10 1969-3
315	Shinpo "	2,			*
316					
317	Sezume "	2, Ground 1, pier 1	SMAC-B2	Yamakawa-Cho, Tokushima-Pref.	1967-3
318	Shinden "	2,			*
319	Shitoku "	2, Ground 1, pier 1	SMAC-B2	Shitoku, Nakagawa-Mura, Nagano-Pref.	1966-12

Note: Stations with star-mark * are expected in future.

Station Number	Station (Name of Structure)	Number of Instruments	Seismo-graph Type	Location	Year & Month Installed
	Group IV.				
401	Biwako Bridge	1, Box-girder 1	SMAC-B2	Katada-Cho, Shiga-Pref.	1964-9
402					
	Group V.				
501	Tokyo Bay (Futtu Cape)	1, Ground 1	SMAC-B2	Futtu-Cho, Chiba-Pref.	1965-10
502	Kanmon Bridge	2, " 2	"	Shimonoseki-City, Yamaguchi-Pre. & Moji-ku, Kitakyushu-City, Fukuoka-Pref.	1965-10
503	Tokyo Bay (Kannonzaki)	1, " 1	"	Yokosuka-City, Kanagawa-Pref.	1967-3
	Group VI.				
601	Muromaki Dam	1, Dam	SMAC-B2	Yatsuo-Cho, Nei-Gun, Toyama-Prefecture	1961-8
602	Yokoyama "	2,	"	Higashiyokoyama, Fujihashi-Mura, Gifu-Prefecture	1964-6
603	Sarutani "	1, Ground	SMAC-A	Sarutani, Oto-Mura, Yoshino-Gun, Nara-Pref.	1958-3
604	Amagase "	1, Dam	SMAC-B2	Ujikaneido, Uji-City, Kyoto-Pref.	1964-8
605	Susobana "	1, Ground	"	Konabe, Nagano-City, Nagano-Prefecture	1966-5
606	Turuta "	2, Ground 1, Dam 1	SMAC-D	Koshi, Turuda-Cho, Satuma-Gun, Kagoshima-Pref.	1968-12
607	Kanayama "	1,			*
608	Shijushida "	1,			*
609					
610	Koshibu "	2, Ground 1, Dam 1	SMAC-D	Nakagawa-Mura, Kamiina-Gun, Nagano-Pref.	1968-12
611	Saigawa "	1,			*
612	Kimigano "	1,			*
613	Shimouke "	2,			*
614	Yahagi "	2,			*

Note: Stations with star-mark * are expected in future.

Station Number	Station (Name of Structure)	Number of Instruments	Seismo-graph Type	Location	Year & Month Installed
	Group VII.				
701	Yodogawa Embankment	2, Groud 1, St. 1	SMAC-B2	Shin-Machi, Hirakata-City, Osaka-Pref.	1966-3
702	Tokyo Embankment	1,			*
703					
704	Okayama	1,			*
705					
	Group VIII.				
801	Ariake-Sea Enbankment (Chikugo River Mouth)	1, Ground	SMAC-B2	Daijugarami, Higashiyoka-Cho, Saga-Gun, Saga-Pref.	1965-8
802	Aomori	1,			*
803	Toyama	1,			*
804	Kanazawa	1,			*
805	Okayama	1,			*
806					
	Group IX.				
901	Public Works Research Institute, Chiba-Branch	1, Ground	SMAC-B2	Aragawa, Chiba-City Chiba-Pref.	1962-3 (1967-3)
902	Nishiarai Bridge	3, Ground 1, Pier 2	"	Nishiarai-Cho, Adachi-Ku, Tokyo	1962-3
903	Showa "	2, Ground 1, pier 1	"	Gakkocho dori, Niigata-City, Niigata-Pref.	1965-1
904	Shintenryugawa Bridge	2, Ground 1, pier 1	"	Kodateno, Toyoda-Mur Iwata-Gun, Shizuoka-Pref.	1964-12
905	Ochiai "	3, Ground 2, pier 1	"	Nagano-City, Nagano-Pref.	1965-12
906	P.W.R.I. Kashima Experiment Laboratory	1, Ground	"	Kashima-Gun, Ibaragi-Pref.	1967-3
907	Taira Bridge	2, Ground 1, Abut. 1	"	Taira, Iwaki-City, Fukushima-Pref.	1968-1
908	Honjo Bridge	2,			*
909	Miyako	2,			*

Note: Stations with star-mark * are expected in future.

Station Number	Station (Name of Structure)	Number of Instruments	Seismo-graph Type	Location	Year & Month Installed
	Group IX. (cont.)				
910	Hachinohe	2,			*
911	Takamatsu	2,			*
912	Miyazaki	2,			*
	Group X.				
1001	Ajigawa Bridge	2, Ground 1, pier 2	SMAC-B2	Benten-Cho, Minato-Ku, Osaka-Pref.	1963-3
1002	Tomei-Highway Fujikawa-Bridge	2, Ground 1, pier 1	SMAC-B2	Fuji-City, Shizuoka-Pref.	1967-3
1003	Tomei-Highway Hamanako Bridge	2, Ground1, pier 1	SMAC-D	Inasa-Gun, Shizuoka-Pref.	1968-12 1969-3
1004	Chuo-Highway Sakaigawa Bridge	2, Ground 1, pier 1	SMAC-B2	Uenohara-Cho, Kitatsuru-Gun, Yamanashi-Prefecture	1967-3
1005	Chuo-Highway Ubakubo Bridge	2, Ground 1, pier 1	"	Ubakubo, Hino-City, Tokyo	1967-3
1006	Chuo-Highway Tsurukawa Bridge	2, Ground 1, pier 1	"	Tsurukawa, Uenohara-Cho, Kitatsuru-Gun, Yamanashi-Pref.	1967-3
1007	Tomei-Highway Toyokawa Bridge	2, Ground 1, pier 1	"	Ichinomiya-Cho, Hoi-Gun, Aichi-Pref.	1968-3
1008	Kisogawa Bridge	2,			*
1009	Tomei-Highway Sakawagawa Bridge	2, Ground 1, pier 1	SMAC-D	Yamakita-Cho, Ashigarakami-Gun, Kanagawa-Pref.	1969-3
	Group XI.				
1101	Route 1 Iwamoto-Cho, Chiyoda-Ku,	2,			*
1102	Route 1 Shibakaigandori, Minato-Ku,	2,			*
1103	Route 1 Morigasaki-Cho, Ota-Ku,	2,			*
1104	Route 3 Aoyamatakagi-Cho, Minato-Ku,	2,			*
1105	Route 5 Ikebukuro, Toshima-Ku	2,			*
1106	Route 6 Tutumidori, Sumida-Ku,	2,			*
1107	Route 7 Oshima-Cho, Koto-Ku	2,			*
1108	(Route 2) Ichinohashi Bridge	2, Ground 1, pier 1	SMAC-B2	Azabu, Minato-Ku, Tokyo.	1967-7

Note: Stations with star-mark * are expected in future.

Station Number	Station (Name of Structure)	Number of Instruments	Seismo-graph Type	Location	Year & Month Installed
	Group XI. (cont.)				
1109	(Route 1) Haneda Under-sea Tunnel	3, Ground 1, Tunnel 2	SMAC-B2	Omoriminami-Cho, Ota-Ku, Tokyo	1968-2
1110					
	Group XII.				
1201	Route 1 Nishiyokobori Bridge	2, Ground 1, piper 1	SMAC-B2	Minamisumiya-Machi, Minami-Ku, Osaka	1965-3
1202	Route 4 Ikue-Cho, Asahi-ku	2,			*
1203	Route 4 Tamadehondori, Nishnari-Ku	2,			*
1204					
	Group XIII.				
1301	Civil Engine-ering Research Institute				(1963-12) moved
1302	Chiyoda Bridge	3, Ground 1, pier 2	SMAC-B2	Ikeda, Makubetu-Cho, Nakagawa-Gun, Tokachi	1966-11
1303	Shinishikari Bridge	2, Ground 1, pier 1	SMAC-B2	Tsuishikari, Ebetsu-City, Ishikari	1967-8 1968-11
1304	Otanoshige Bridge	2, Ground 1, pier 1	SMAC-B2	Otanoshige, Kushiro-City Kushiro.	1967-10
1305	Horoman Bridge	2, Ground 1, pier 1	SMAC-B2	Horoman, Samani-Cho, Samani-Gun, Hidaka	1967-12
1306	Asahikawa Bridge	2, Ground 1, pier 1	SMAC-B2	1, Kamui-Cho, Asahikawa-City Kamikawa	1968-11 1969-3
1307	Shichiho Bridge	2, Ground 1, pier 1	SMAC-B2	Yunosato, Shiriuchi-Cho, Kamiiso-Gun, Oshima	1968-11
1308					
	Group XIV.				
1401	Tonegawa Estuary Dam	2, Ground 1, Dam 1	SMAC-D	Omigawa-Cho, Katori-Gun, Chiba-Pref.	1969-3
1402					
1403					
1404					
1405					

Note: Stations with star-mark * are expected in future.

Fig. 1 Sites of Strong-Motion Seismograph Stations for SMAC-Type Accelerographs
– Observation Network of Ground Motions and Earthquake Responses of Highway Bridges, Tunnels, Dams, and Embankments –

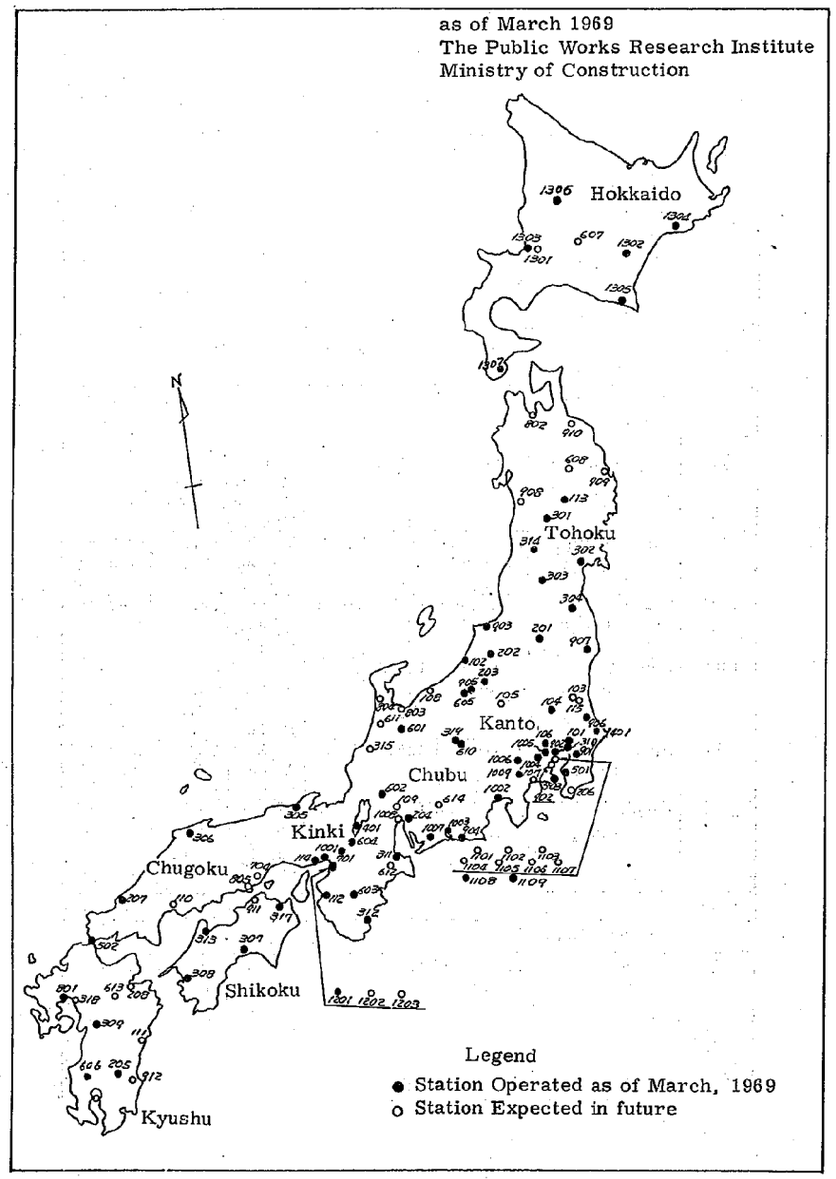


表1 SMAC型強震計配置計画一覧表

建設省土木研究所（1969.2.28現在）

No.	観測所名	型式	台数	設置箇所	県名	維持管理	設置年月
	1. 関道一課						
101	新長橋	SMAC-B2	2	地盤・橋脚	千葉	首都国道	41-3
102	木山大橋	〃	1	地盤橋脚・橋脚	新潟	長岡工事	41-3
103	那珂川橋		2		茨城		
104	新利根川橋	SMAC-B2	2	地盤・橋脚	埼玉	宇都宮国道	42-2
105	高崎高架橋		2		群馬		
106	早加 〃	SMAC-B2	2	地盤・橋脚	埼玉	宇都宮国道	43-3
107	大袋 〃		2		神奈川		
108	姫川橋		2		新潟		
109	木曽川橋		2		岐阜		
110	鼓山橋		2		広島		
111	関ヶ津橋		2		宮崎		
112	紀ノ川大橋	SMAC-B2	2	地盤・橋脚	和歌山	和歌山国道	42-3
113	和賀川第一橋	〃	1	橋脚	岩手	岩手工事事務所	44-3
114	尼崎高架橋	SMAC-B2 SMAC-C	2	地盤・橋脚	兵庫	第2阪神	33-3
115	桜川橋		2		茨城		
116							
	2. 関道二課						
201	小谷橋	SMAC-B2	2	地盤・橋脚	福島	若松土木	40-3
202	魚沼橋	〃	2	〃	新潟	小千谷土木	40-12
203	横倉沢橋	〃	2	〃	長野	飯山建設	40-10
204	新八幡橋	〃	2	〃	愛知	西知多道路	40-11
205	石脚戸橋	〃	2	〃	宮崎	小林土木	40-3
206	房州大橋		2		千葉		
207	高津大橋	SMAC-B2	2	地盤・橋脚	島根	益田土木	42-3
208	鶴崎橋		2		大分		
209			2				
	3. 地方道課						
301	雄平橋	SMAC-B2	2	地盤・橋脚	秋田	平鳥土木	41-12
302	閖北橋	〃	2	〃	宮城	石巻土木	41-3
303	西北橋	〃	2	〃	山形	酒田工事事務所	40-3
304	伊達橋	〃	2	〃	福島	保原土木	40-10
305	鹿大橋	〃	2	〃	兵庫	姫路土木	40-3
306	鈴見橋	〃	2	〃	島根	出雲土木	41-3
307	五台山橋	〃	2	〃	高知	高知土木	41-3
308	板鳥橋	〃	2	〃	愛媛	宇和島土木	41-3
309	乙女橋	〃	2	〃	熊本	矢部土木	40-3
310	平井大橋	〃	3	地盤・橋脚2	東京	第5建設	40-6
311	豊浜大橋	〃	2	地盤・橋脚	三重	伊勢土木	41-9
312	浜木橋	〃	2	〃・橋台	和歌山	新宮土木	41-9
313	石鎚橋	〃	2	〃	愛媛	丹原土木	42-3
314	清川橋	〃	2	〃	山形	酒田建設	43-10 43-3
315	新俣橋		2		福井		
316							
317	瀬戸大橋	SMAC-B2	2	地盤・橋脚	徳島	川島土木	42-3
318	新田橋		2		福岡		
319	四万十大橋	SMAC-B2	2	地盤・橋脚	長野	伊那建設	41-12
320							
	4. 有料道路課						
401	阪奈高大橋	SMAC-B2	1	橋脚	奈良	管理所	39-9
402							
403							
	5. 道路企画課						
501	東京湾(京浜)	SMAC-B2	1	地盤	千葉	首都道路	40-10
502	関門架橋	〃 〃	2	地盤(下部)	福岡	北九州国道	40-10
503	東京湾(横浜)	〃 〃	1	地盤	神奈川	首都道路	42-3
504							
	6. 開発課						
601	室牧ダム	SMAC-B2	1	堤体	富山	管理所(県)	36-8
602	横山ダム	〃 〃	2	地盤・堤体	岐阜	〃 (建)	39-6
603	菅谷ダム	SMAC-A	1	地盤	奈良	〃 (〃)	33-3
604	天ヶ瀬ダム	SMAC-B2	1	堤体	京都	〃 (〃)	39-8
605	椿花ダム		1	地盤	長野	〃 (県)	41-5
606	鶴田ダム	SMAC-D	2	地盤・堤体	鹿児島	九州地建	43-12
607	金山ダム		1		北海道		
608	四十四田ダム		1		岩手		
609							
610	小渋ダム	SMAC-D	2	地盤・堤体	長野	小渋ダム工事	43-12
611	岸川ダム		1		石川		
612	百々野ダム		1		三重		
613	下筌ダム		2		熊本		
614	矢作ダム		2		愛知		
615							
	7. 治水課						
701	安川瑞坊	SMAC-B2	2	地盤・本体	大阪	淀川工事	41-3
702	東京高潮堤		1		東京		
703							
704	岡山		1		岡山		
705							
706							
	8. 海岸課						
801	有明海	SMAC-B2	1	地盤	佐賀	筑後川工事	40-6
802	青森		1		青森		
803	富山		1		富山		
804	金沢松任		1		石川		
805	岡山		1		岡山		
806							
	9. 土木研究所						
901	土研千葉支所	SMAC-B2	1	地盤	千葉	土研(千葉)	42-3
902	西新井橋	〃	3	地盤・橋脚2	東京	〃	37-3
903	相模大橋	〃	2	地盤・橋脚	新潟	〃	40-1
904	新天竜川橋	〃	2	〃	静岡	〃	39-12
905	高台橋	〃	3	地盤2・橋脚	長野	〃	40-12
906	土研・鹿島試験所	〃	1	地盤	茨城	鹿島試験所	42-3
907	平大橋	〃	2	地盤・橋台	福島	土研(千葉)	43-1
908	本荘大橋		2		秋田		
909	宮古市		2		岩手		
910	八戸市		2		青森		
911	高松市		2		香川		
912	宮崎市		2		宮崎		
913							
	10. 日本道路公団						
1001	安治川大橋	SMAC-B2	3	地盤・橋脚2	大阪	大阪支社	38-3
1002	東名富士川橋	〃	2	地盤・橋脚	静岡	静岡局	42-3
1003	東名浜名湖橋	SMAC-D	2	〃	〃	〃	43-12 43-3
1004	相川橋	SMAC-B2	2	〃	山梨	八王子局	42-3
1005	能久保橋	〃	2	〃	東京	〃	42-3
1006	鶴川橋	〃	2	〃	山梨	〃	42-3
1007	東名豊川橋	〃	2	〃	愛知	名古屋局	43-3
1008	木曽川橋		2		〃		
1009	東名酒匂川橋	SMAC-D	2	地盤・橋脚	神奈川		44-3
1010							
	11. 首都高速道路公団						
1101	千代田区岩本町		2		1号線		
1102	港区芝浦埠頭		2		〃		
1103	大田区西ヶ崎町		2		〃		
1104	港区青山高樹町		2		3号線		
1105	豊島区池袋		2		5号線		
1106	墨田区横通り		2		6号線		
1107	江東区大島町		2		7号線		
1108	一ノ橋高架橋	SMAC-B2	2	地盤・橋脚	2号線	工務部	42-7
1109	羽田海底トンネル	〃	3	地盤・トンネル2	1号線	〃	43-2
1110							
1111							
	12. 阪神高速道路公団						
1201	西淀川高架橋	SMAC-B2	2	地盤・橋脚	1号線	設計課	40-5
1202	旭区生江町		2		3号線		
1203	西成区玉出本町		2		4号線		
1204							
1205							
	13. 北海道開発庁						
1301	土木試験所		0		石狩	開発局	技術(石狩) 43-3
1302	千代田橋	SMAC-B2	3	地盤・基礎橋脚	十勝	〃	41-11
1303	新石狩大橋	〃	2	地盤・橋脚	石狩	〃	42-11
1304	大楽毛橋	〃	2	〃	釧路	〃	42-10
1305	牧洞橋	〃	2	〃	日高	〃	42-12
1306	旭川大橋	〃	2	〃	石狩	〃	42-11
1307	七飯橋	〃	2	〃	渡島	〃	43-12
1308							
1309							
	14. 水資源開発公団						
1401	利根川河口堰	SMAC-D	2	堰柱 2	千葉	河口堰建設事務所	44-3
1402							
1403							

設置年月欄が空白の箇所は未設置である。

Fig. 2 Sites of Strong-Motion Seismograph Stations for Electro-Magnetic Type Seismographs
– Observation Network of Ground Motions and Earthquake Responses of Highway Bridges, Dams, and Embankments –

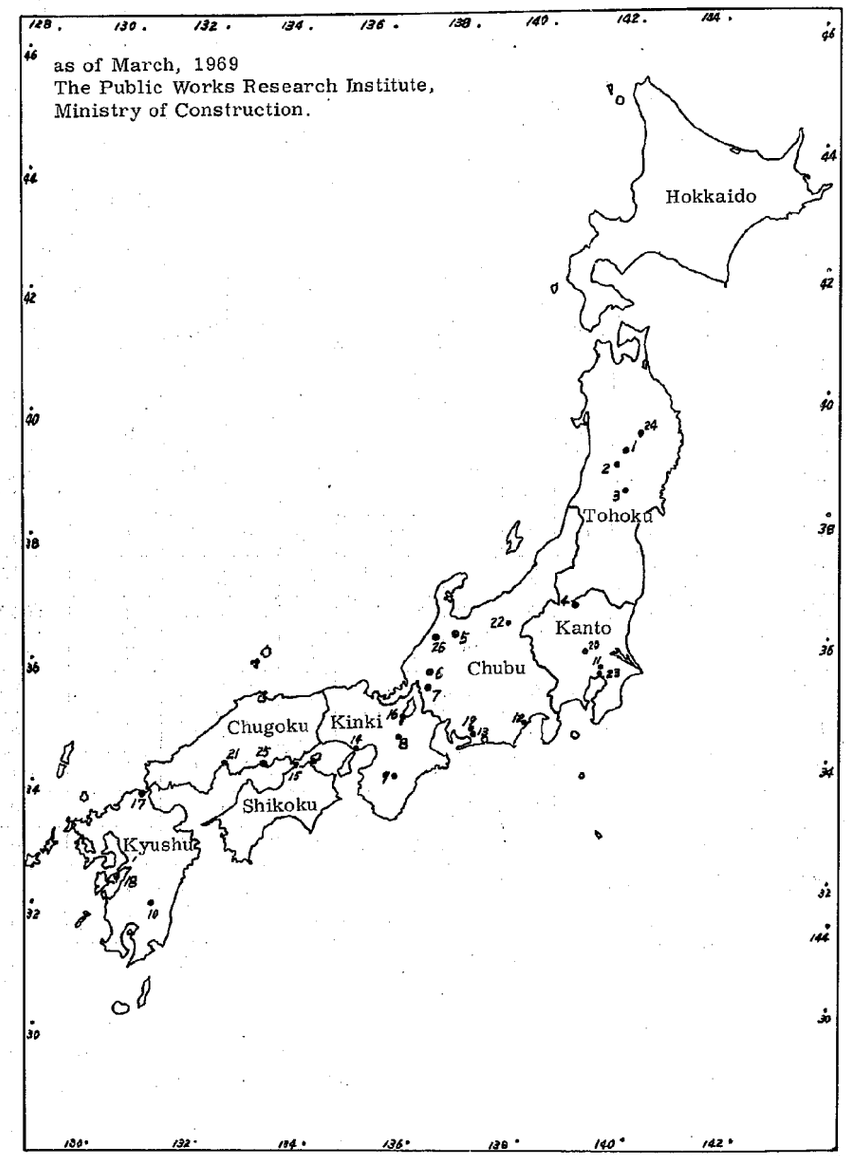


Table 2. Strong-Motion Seismograph Stations with Electro-Magnetic Type Seismographs

as of Marsh, 1969

Station Number	Station (Name of Structure)	Number of Components	Location	Year Installed	Administering Group
1	Yuda Dam	6 Accelerometers	Waga-Cho, Waga-Gun, Iwate-Prefecture.		VI
2	Minase "	4 "	Minase-Mura, Okachi-Gun, Akita-Pref.		VI
3	Narugo "	8 "	Narugo-Cho, Tamazukuri-Gun, Miyagi-Prefecture.		VI
4	Kawamata "	10 "	Kuriyama-Mura, Shioya-Gun, Tochigi-Prefecture.	1964	VI
5	Muromaki "	12 "	Yatsuo-Cho, Nei-Gun, Toyama-Prefecture.	1961	VI
6	Sasaogawa "	10 "	Nishitani-Mura, Ono-Gun, Fukui-Prefecture.		VI
7	Yokoyama "	12 "	Fujihashi-Mura, Ibi-Gun, Gifu-Prefecture.	1962	VI
8	Amagase "	12 "	Makishima-Cho, Uji-City, Kyoto-Prefecture.	1964	VI
9	Sarutani "	5 "	Oto-Mura, Yoshino-Gun, Nara-Pref.	1957	VI
10	Ayakita "	6 "	Suki-Mura, Nishimorokata-Gun, Miyasaki-Prefecture.	1961	VI
11	Shinkatsushika Bridge	3 " 3 Earth-Pressure meters	Matsudo-City, Chiba-Prefecture.	1967	I
12	Suruga Bridge	6 Accelerometers	Minamiabe, Shizuoka-City, Shizuoka-Prefecture.	1959	I
13	Yoshida "	6 "	Toyohashi-City, Aichi-Prefecture.	1959	I
14	Honshu-Shikoku Bridge (Tarumi)	3 "	Tarumi-Ku, Kobe-City, Hyogo-Pref.	1962	V
15	Honshu-Shikoku Bridge (Syamizima)	3 "	Sakaide-City, Kagawa-Prefecture.	1962	V
16	Biwako Bridge	6 "	Katada-Cho, Shiga-Prefecture.	1963	IV
17	Wakato "	18 "	Wakamatsu-Ku, Kitakyushu-City, Fukuoka-Prefecture.	1961	X
18	Ariake-Sea Embankment (Oyano Island)	3 "	Oyano-Cho, Amakusa-Gun, Kumamoto-Pref.	1963	VIII

(continued)

(continued)

19	Toyokawa Bridge	8 Accelerometers	Toyohashi-City, Aichi-Prefecture.	1966	VII
20	Tonegawa Bridge	6 "	Kurihashi-Cho, Saitama-Prefecture.	1968	IX
21	Otagawa Bridge	8 "	Hiroshima-City, Hiroshima-Prefecture.	1965	VII
22	Nagano (Under ground)	9 "	Nagano-City, Nagano-Prefecture.	1966	IX
23	Hirai Bridge	5 " 3 Earth-Pressure meters	Hirai, Edogawa-Ku, Tokyo.	1967	III
24	Shijushida Dam	9 Accelerometers	Shimokuriyagawa, Morioka-City, Iwate-Prefecture.	1967	VI
25	Onomichi Bridge	11 "	Mukaihigashi-Cho, Mitsugi-Gun, Hiroshima-Prefecture.	1968	X
26	Saigawa Dam	10 "	Futamatashin-Machi, Kanazawa-City, Ishikawa-Prefecture.	1968	VI

Table 4 Number of Strong-Motion Seismograph Stations and that of Instruments in Relation to the Variety of Structures

Operated as of March, 1969

Variety of Structure		Number of Stations		Number of Instruments		
		SMAC	Electro-Magnetic-type Seismograph	Number of SMAC		Number of Components of Electro-Magnetic-type Seismograph
				Ground	Structure	
Bridge		52	7	52	56	61
Tunnel		1	-	1	2	-
Dam	Concrete	7	10	5	5	91
	Fill-type	-	2			13
Embankment	River	2	3	1	3	22
	Coast	-	-	-	-	-
Future Structure Site		3	3	3	-	9
Others		2	1	2	-	9
Total		67	26	64	66	205

Table 3 Number of Strong-Motion Seismograph Stations and that of Instruments in Relation to the Groups Defined by Sponsorship

Operated as of March, 1969

Period / Group	Strong-Motion Accelerograph, SMAC									Electro-Magnetic Type Seismograph	
	Number of Stations	Number of Instruments								Number of Stations	Number of Stations
		Before 1963	1963	1964	1965	1966	1967	1968	Total		
I	7	2	0	0	3	6	2	1	14	3	15A 3E
II	6	0	0	4	6	2	0	0	12	0	0
III	16	0	0	6	12	13	0	2	33	1	5A 3E
IV	1	0	0	1	0	0	0	0	1	1	6A
V	3	0	0	0	3	1	0	0	4	2	6A
VI	7	2	0	3	0	1	0	4	10	12	104A
VII	1	0	0	0	2	0	0	0	2	2	16A
VIII	1	0	0	0	1	0	0	0	1	1	3A
IX	7	4	0	4	2	2	2	0	14	2	15A
X	8	3	0	0	0	8	2	4	17	2	29A
XI	2	0	0	0	0	0	5	0	5	0	0
XII	1	0	0	2	0	0	0	0	2	0	0
XIII	6	0	1	0	0	3	4	5	13	0	0
XIV	1	0	0	0	0	0	0	2	2	0	0
Total	67	11	1	20	29	36	15	18	130	26	199A 6E

Note 1) Each SMAC has 3 accelerometers (1 vertical and 2 horizontal).
2) A and E in the extremely right column mean Accelerometers and Earth-pressure meters, respectively.

Fig. 3 Detailed Sites of Strong-Motion Stations for SMAC in Tokyo

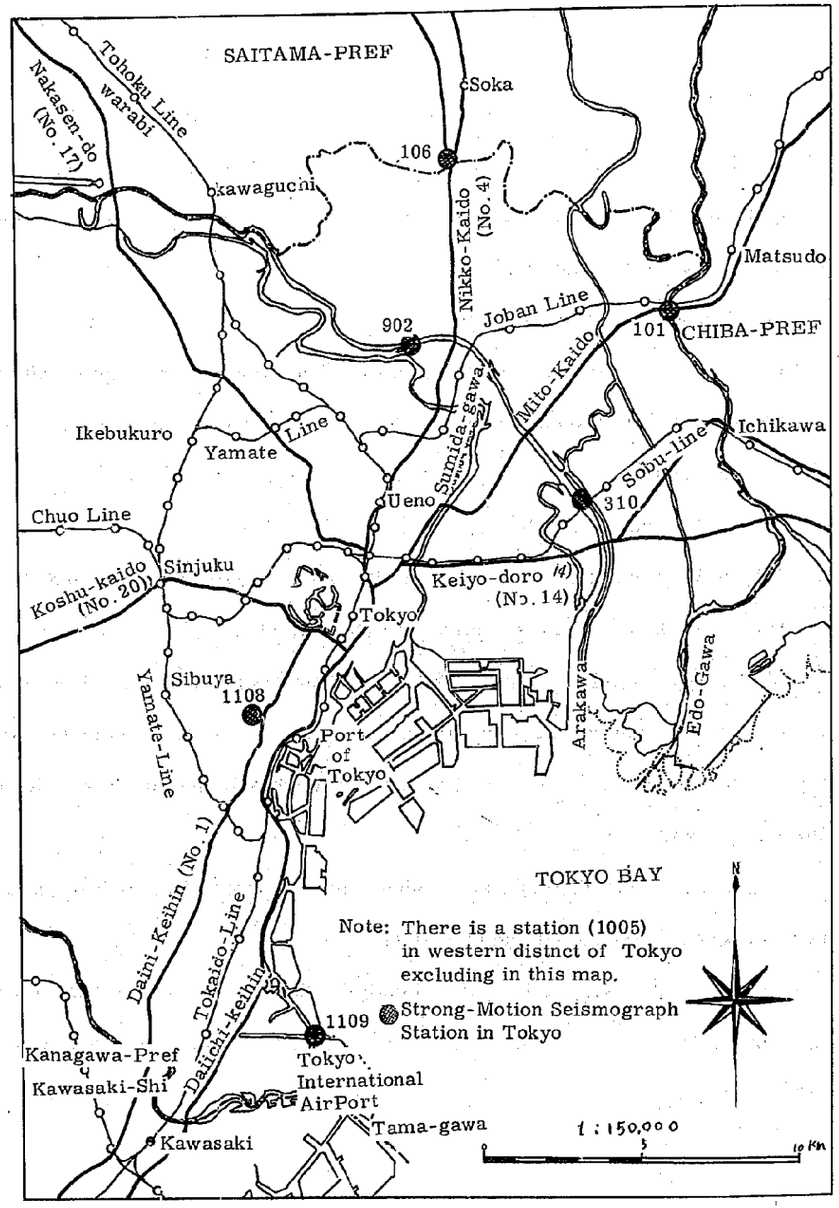


Fig. 4 Detailed Sites of Strong-Motion Stations for SMAC in Osaka

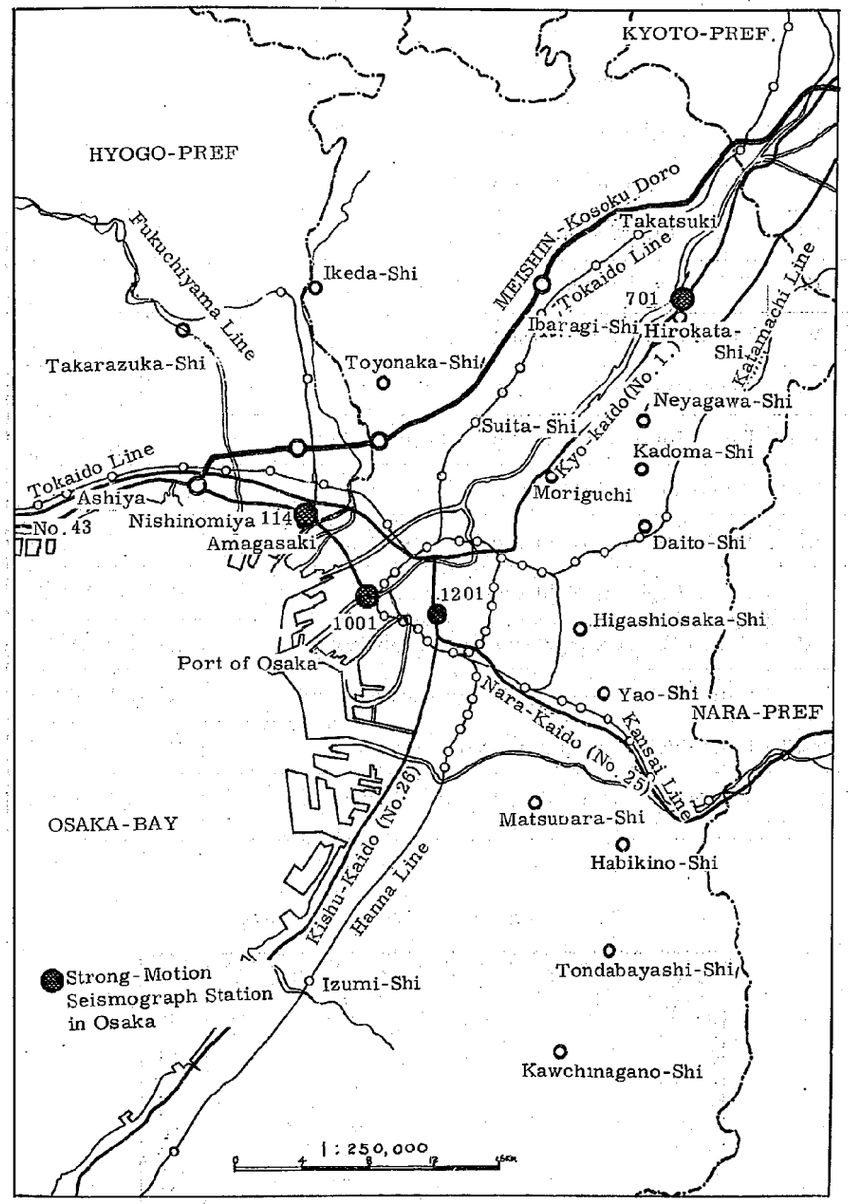


Table 5. Definition of the Groups

Group	Administrative Sponsor	分　類
I	First National Highway Section, Road Bureau	道路局 国道第一課
II	Second National Highway Section, Road Bureau	〃 国道第二課
III	Local Road Section, Road Bureau	〃 地方道課
IV	Toll Road Section, Road Bureau	〃 有料道路課
V	Planning Section, Road Bureau	〃 企画課
VI	Development Section, River Bureau	河川局 開発課
VII	River Improvement Section, River Bureau	〃 治水課
VIII	Seacoast Section, River Bureau	〃 海岸課
IX	Public Works Research Institute	土木研究所
X	Japan Highway Public Corporation	日本道路公団
XI	Tokyo Expressway Public Corporation	首都高速道路公団
XII	Hanshin Expressway Public Corporation	阪神高速道路公団
XIII	Hokkaido Development Bureau	北海道開発局
XIV	Water Resources Development Corporation	水資源開発公団

別表　所有者別・会計別にみた強震計台数

所有者＼会計	一般会計	道路特会	海岸特会	治水特会	都県	公団	北海道開発局	合計
地方建設局	−	18	1	10	−	−	−	29
土木研究所	8	6	−	−	−	−	−	14
都県	−	−	−	−	48	−	−	48
4公団	−	−	−	−	−	26	−	26
北海道開発局	−	−	−	−	−	−	13	13
合計	8	24	1	10	48	26	13	130

§2. Characteristics of Strong-Motion Seismographs

In the most stations SMAC type accelerographs are installed to record strong-motion earthquake as shown in Tables 3 and 4. In general it is advisable that the seismographs which are installed at such structures as bridges, tunnels, dams, and embankments for engineering purpose, have such characters as follows :

(1) reliable starting devices,

(2) to be able to record strong-motion acceleration up to about 500 gals,

(3) to be able to operate with batteries (without commercial alternating currents),

(4) to be easy to handle,

(5) to be sure to catch earthquake traces with little trouble, and

(6) to be strong against water, air, shock, etc.

SMAC-type accelerograph is one of the best strong-motion seismographs made in Japan, having the above mentioned characters. Accordingly this type of accelerograph is generally used to record strong-motion accelerations in Japan.

Figs. 5 to 8 and Tables 6 and 7 show the characteristics of two types of accelerographs, SMAC-B2 and SMAC-D.

As for electro-magnetic type seismographs shown in Table 2 there are a lot of different kinds. Their indivisual characteristics are given up in the present report.

Table 6 Strong-Motion Accelerograph, SMAC-B2

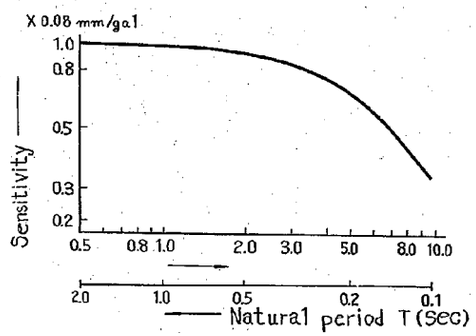
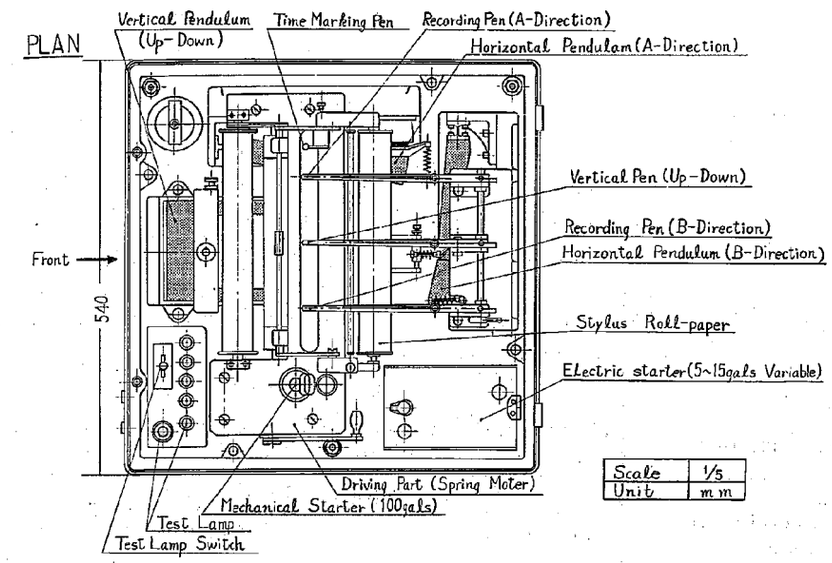
Parts	Specifications and Characteristics
Pendulum	3-Component accelerometer
	Natural period : 0.14 sec
	Sensitivity : 12.5 gals per mm on the paper
	Damping : critical damping (h=1)
	Recording rang : 6 ~ 500 gals
	Magnitication : x 16 (mechanical)
Recording system	Recording paper : scratching stylus roll-paper
	Recording speed : 10 mm per sec
	Recording pen : sapphire point
Driving part	Spring motor
	Operating for about 3 min.
Electric self-starter	Vertical component accelerometer
	Natural period : 0.3 sec
	Sensitivity at starting : from 5 to 15 gals
Mechanical Self Starter	Sensitivity at starting : about 100 gals horizontal
Time marking	Interval : 1 sec
Checking device	Pilot lamp and buzzer
Electric power supply	Dry cell 3V x 4 (JIS No FM 5)
Console	Aluminum alloy
Dimension	540 (width) x 540 (length) x 370 (height) mm
Net weight	Approximately 100 kg
Frequency Characteristics	

Fig. 5 Illustration of Strong-Motion Accelerograph, SMAC-B2



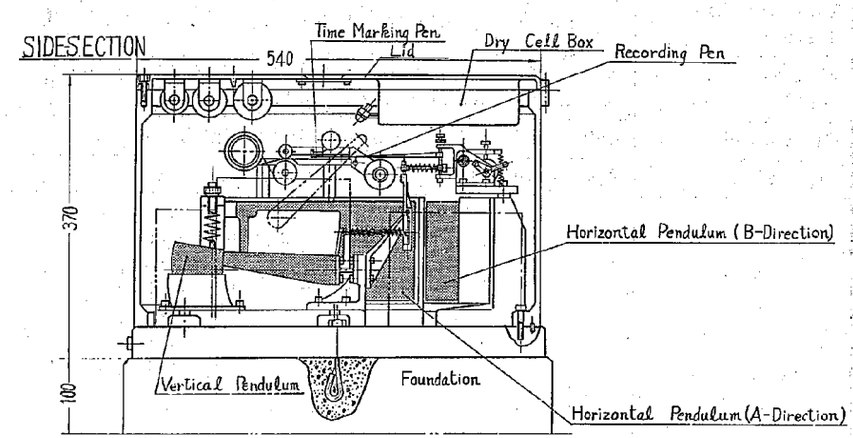


Table 7 Strong-Motion Accelerograph, SMAC-D

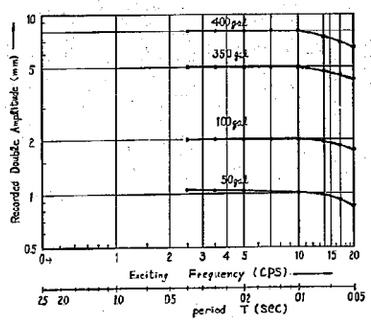
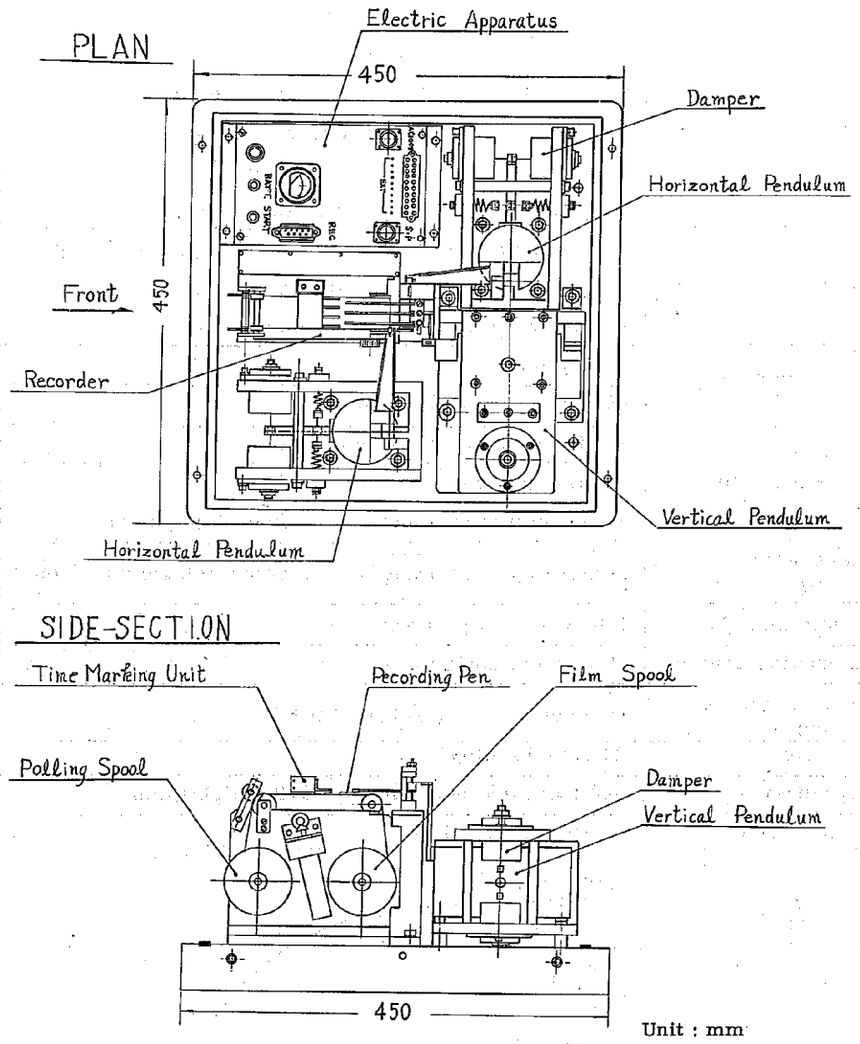
Parts	Specifications and Characteristics
Pendulum	3-Component accelerometer Natural period : 0.05 sec (20 cps) Sensitivity : 5mm/500gals on scratch-record-film. 40mm/500gals (by multiplying optically the film by 8) Damping : air damper h = 0.5 ~ 0.7 Recording range : 5 ~ 500 gals Frequency range : 0 ~ 20 cps
Recording system	Recording paper : scratching stylus scratch-record-film Recording speed : 5 mm per sec. Recording pen : diamong point
Driving part	Micro-motor (DC.12 Volts) able to start 100 times, operates for about 1 min. 30 sec. after each starting
Electric-self-stater	Vertical component accelerometer Natural period : 0.3 sec. Sensitivity at starting : 5 gals
Time marking System	5 pulse / sec, Electric timer
Electric power supply	Nickel-Cadmium Battery (DC 12V., 3.5A, with Automatic charger or AC.100V together)
Dimension	450 (width) x 450 (length) x 350 (height) mm
Net weight	Approximately 70 kg
Frequency Characteristics	

Fig. 6. Illustration of Strong-Motion Accelerograph, SMAC-D



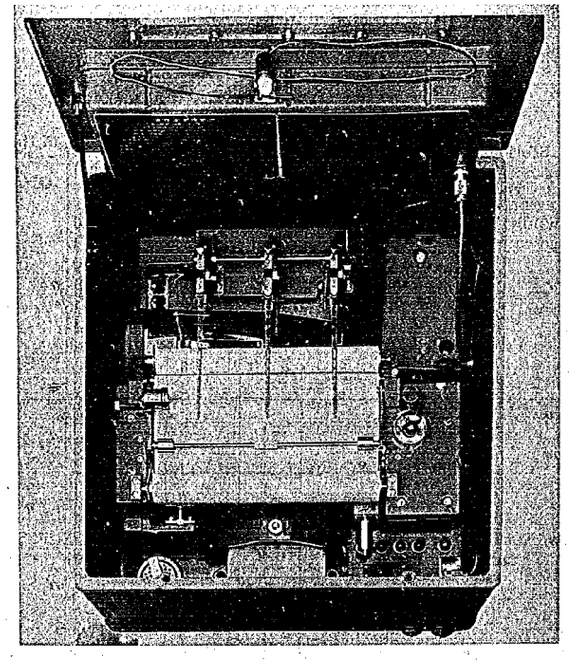


Fig. 7 Picture of Strong-Motion Accelerograph, SMAC-B2

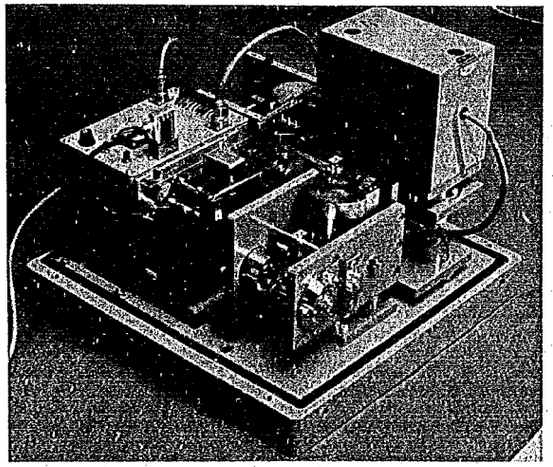


Fig. 8 Picture of Strong-Motion Accelerograph, SMAC-D

§ 3 Strong-Motion Seismograph Results

Tables 8 and 9 summarize the number of the records obtained from stations with SMAC and that of the records obtained from stations with electro-magnetic type seismographs, respectively, during the period from January to December in 1968. In the tables numbers of records printed in the present report are also given.

Table 10 summarizes the data of obtained records and the data of earthquakes, which occurred in and around Japan in 1968. The records in Table 8 involve those from uncertain earthquakes and those caused by vehicles or other disturbances.

Column headings are described as follows:

1: Earthquake Time and Date: Y, M, D, H, M.

The column shows the time and date of the occurrence of the earthquake corresponding to the record number in the same row, according to the data published by Japan Mateological Agency. Y, M, D, H, and M refer to year, month, day, hour, and minute in Japan Standard Time, respectively. In case where it is difficult to identify the time and date of the occurrence, the period during which the records are obtained, are given.

2: Location of Epicenter: Long.; Lati.

The column indicates approximate location of the epicenter of the corresponding earthquake in Column 1. Here the location are generally given by means of prefectural name and the direction from the prefecture. Long. and Lati. refer to the longitude and the latitude of the epicenter, respectively. Those data are according to the reports of J.M.A.

3: Magnitude: M (Richter Scale)

The column shows the value of Magnitude of the corresponding earthquake in Richter Scale, decided by J.M.A.

4: Depth: H (Km)

The column shows the depth of the origin of the corresponding earthquake in Km, given by J.M.A.

5: Maximum J.M.A. Seismic Intensity and Place

The column shows the maximum seismic intensity of the corresponding earthquake in J.M.A. scale, and some places (near the epicenter) having the maximum intensity.

6: Ground

7: Structure ( )

These two columns show the data of the strong-motion records obtained on the ground and at the structure, respectively. Those records which have pages in the left columns of their record numbers are considered to be important and accordingly their photographs are reproduced in full size on the indicated pages in the present report. The photographs of the other records are not shown.

Max. Amplitude shows the absolute values of maximum amplitudes from zero level drawn approximately. The values without figures under decimal points are rough ones, and those with figures down to two places of decimals are rigorous ones given by digitizations. In parenthesis next to word of Structure are shown the location of the structure where the instrument is installed. For example, crest of pier is described in the parenthesis in case of bridge.

Table 8 Number of Records Obtained from Stations with Strong-Motion Accelerographs, SMAC

(Jan. to Dec., 1968)

Station Number	Station	Number of Instruments		Total Number of Records			Number of Records Printed in this Report		
		Ground	Structure	Ground	Structure	Total	Ground	Structure	Total
101	Shinkatsushika Bridge	1	1	5	5	10	2	2	4
104	Shintonegawa "	1	1	8	6	14	1	1	2
106	Soka "	1	1	15	15	30	3	3	6
112	Kinokawa "	1	1	14	4	18	3	3	6
201	Oya "	1	1	0	1	1	-	1	1
202	Uonuma "	1	1	0	3	3	-	1	1
203	Yokokurasawa "	1	1	21	17	38	0	0	0
205	Ishiseto "	1	1	6	11	17	3	3	6
207	Takatsu "	1	1	2	7	9	2	2	4
301	Yuhei "	1	1	4	6	10	1	0	1
302	Kaihoku "	1	1	13	11	24	3	3	6
303	Kahoku "	1	1	5	0	5	1	-	1
304	Date "	1	1	11	16	27	0	3	3
305	Minato "	1	1	1	0	1	1	-	1
306	Myoken "	1	1	2	11	13	2	2	4
307	Godaisan "	1	1	0	8	8	-	1	1
308	Itajima "	1	1	9	5	14	8	4	12
309	Otome "	1	1	7	7	14	0	1	1
310	Hirai "	1	2	6	19	25	3	6	9
311	Toyohama "	1	1	3	4	7	1	1	2
313	Ishizuchi "	1	1	3	3	6	1	2	3
317	Sezume "	1	1	2	1	3	0	1	1
319	Shitoku "	1	1	3	3	6	1	1	2
501	Tokyo Bay (Futtu Cape)	1	0	17	-	17	1	-	1
502	Kanmon Bridge	2	0	4	-	4	2	-	2
503	Tokyo Bay (Kannonzaki)	1	0	8	-	8	3	-	3
604	Amagase Dam	0	1	-	6	6	-	4	4
605	Susobana "	1	0	2	-	2	0	-	0
701	Yodogawa Embankment	1	1	5	7	12	1	1	2
801	Ariake-Sea "	1	0	2	-	2	1	-	1
901	P.W.R.I. Chiba Branch	1	0	9	-	9	3	-	3
902	Nishiarai Bridge	1	2	6	26	32	2	3	5
903	Showa "	1	1	1	5	6	1	1	2
904	Shintenryugawa Bridge	1	1	2	0	2	1	-	1
905	Ochiai "	2	1	22	14	36	8	6	14
906	Kashima Experiment Lab.	1	0	2	-	2	1	-	1
907	Taira Bridge	1	1	22	5	27	3	3	6
1004	Sakaigawa "	1	1	1	1	2	1	1	2
1005	Ubakubo "	1	1	1	1	2	1	1	2
1006	Isurukawa "	1	1	2	0	2	1	-	1
1108	Ichinohashi Bridge	1	1	7	3	10	5	3	8
1109	Haneda Undersea Tunnel	1	2	4	7	11	2	4	6
1201	Nishiyokobori Bridge	1	1	3	7	10	1	0	1
1301	Civ.Eng.Research Institute	1	0	2	-	2	1	-	1
1302	Chiyoda Bridge	1	1	5	6	11	2	4	6
1303	Shinishikari "	1	1	4	0	4	2	-	2
1304	Otanoshige "	1	1	3	2	5	1	1	2
1305	Horoman "	1	1	10	4	14	2	2	4
	Total	49	43	284	257	541	82	75	157

Note) Earch instrument has 3 components: 1 vertical and 2 horizontal.

Table 9 Number of Records Obtained from Stations with Electro-Magnetic Type Seismographs

(Jan. to Dec., 1968)

Station No.	Station	Number of Components: Ground	Number of Components: Structure	Total Number of Records	Number of Records Printed in this Report	Kind of Meter (Component)
11	Shinkatsushika Bridge	-	6	25	2	Earth-pressure meter (3) Accelerometer (3)
12	Suruga Bridge	3	3	85	0	Accelerometer (3)
18	Ariake-Sea Embankments (Oyano-Island)	3	-	105	1	Accelerometer (3)
23	Hirai Bridge	-	8	29	0	Earth-pressure meter (3) Accelerometer (5)
24	Shijushida Dam	2	7	1	1	Accelerometer (9)
Total		8	24	245	4	

§ 4 Strong-Motion Seismograph Records

The photographic reproductions of strong-motion seismograms are shown in full size on and after page 29.

The following notes will help to clarify various details.

1 : The identifying number of every photographic reproduction appears in the bottom and corresponds to the number in Table 10.

2 : The page of every photograph also corresponds to the page in Table 10.

3 : Every seismometer-pendulum is given above the corresponding record trace in connection with the principal axis of the structure or the direction to the north.

Table 10 Strong-Motion Seismograph Results

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M	Location of Epicenter Long · Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Ground: Page	Ground: Record Number	Ground: Max. Amplitude (gals) Hori.A	Ground: Max. Amplitude (gals) Vertical	Ground: Max. Amplitude (gals) Hori.B	Structure (Crest of Pier): Page	Structure (Crest of Pier): Record Number	Structure (Crest of Pier): Max. Amplitude (gals) Hori.A	Structure (Crest of Pier): Max. Amplitude (gals) Vertical	Structure (Crest of Pier): Max. Amplitude (gals) Hori.B
101 Shinkatsushika Bridge														
1967. 11. 13 ~ 1968. 3. 6											101-P-7	Caused by Vehicle		
1968. 3. 6. 09 : 12	SW of Ibaraki-Pref. E139°55' N36°03'	5.2	50	III: Tokyo, Chiba		101-Gr-6	20	8	23					
1968. 3. 7. 11 : 54	Middle of Chiba-Pref. E140°08' N35°32'	5.1	50			" -7	23	3	25		" -8	40	3	33
1968. 3. 8 ~ 1968. 5. 21						" -8	not measurable							
1968. 7. 1. 19 : 45	Middle of Saitama-Pref. E139°26' N35°50'	6.1	50	IV: Tokyo, Yokohama	29	" -9	38.53	10	37	30	" -9	55	10	50
1968. 7. 3 ~ 1968. 10. 8											" -10	15	10	10
1968. 10. 8. 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV: Chiba	31	" -10	28	5	35	31	" -11	45	10	38
104 Shintonegawa Bridge														
1967. 11. 19. 21 : 07	Off Ibaraki-Pref. E141°13' N36°26'	6.0	50	IV: Onahama		104-Gr-4	13	5	10		104-P-4	8	not measurable	8
1968. 2. 28. 05 : 00	Off Fukushima-Pref. E141°37' N37°34'	5.4	50			" -5	5	not measurable	3					
1968. 3. 6. 09 : 12	SW of Ibaraki-Pref. E139°55' N36°03'	5.2	50	III: Tokyo, Mito		" -6	18	8	15		" -5	13	"	10
1968. 3. 7. 11 : 54	Middle of Chiba-Pref. E140°08' N35°32'	5.1	50	III: Tokyo, Yokohama		" -7	5	not measurable	5		" -6	8	"	10
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI: Tomakomai		" -8	13	"	15		" -7	10	"	20
1968. 7. 1. 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV: Tokyo, Mito	32	" -9	65	25	75	33	" -8	53	13	90
1968. 10. 8. 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV: Chiba		" -10	5	not measurable	8		" -9	10	not measurable	13
1968. 10. 8. 20 : 49	Kanagawa-Tokyo Border E139°27' N35°34'		100	I: Utsunomiya		" -11	5	"	8					
106 Soka Bridge														
1968. 2. 28. 21 : 08	Off Tokaido E137°56' N32°55'		340	III: Tokyo		106-Gr-1	5	not measurable	5		106-P-1	35	5	60
1968. 3. 7. 11 : 54	Middle of Chiba-Pref. E140°08' N35°32'	5.1	50	III: Tokyo, Chiba	34	" -2	25	5	13	34				
1968. 3. 13 ~ 1968. 5. 16						" -3	not measurable				" -2	8	3	13
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI: Tomakomai		" -4	15	3	10		" -3	18	not measurable	10
1968. 5. 16						" -5	not measurable				" -4	not measurable		
~ 1968. 5. 17						" -6	5	"	8		" -5	5	not measurable	5
1968. 5. 23 ~ 1968. 5. 29						" -7	5	3	5		" -6	5	"	13
1968. 6. 12. 02 : 33	Off Ibaraki-Pref. E141°02' N36°37'	4.0	50			" -8	5	not measurable	5		" -7	5	"	5

(Continued on next page.)

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M	Location of Epicenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A. Seismic Intensity and Place	Ground					Structure (Crest of Pier)				
	Long . Lat				Page	Record Number	Max. Amplitude (gals)			Page	Record Number	Max. Amplitude (gals)		
							Hori.A	Vertical	Hori.B			Hori.A	Vertical	Hori.B
106 Soka Bridge (Cont.)														
1968. 7. 1. 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV: Tokyo, Mito	35	106-Gr-9	50	15	50	36	106-P-8	65	8	75
1968. 7. 1. 21 : 06	"	4.0	50								" -9	not measurable		5
1968. 7. 4. 18 : 17	Middle of Saitama-Pref. E139°26' N35°00'	4.1	60			" -10	5	not measurable	5		" -10	5	not measurable	10
1968. 7. 5. 05 : 38	SW of Yamanashi-Pref. E138°28' N35°19'	4.6	10			" -11	5	"	5		" -11	5	"	5
1968. 8. 8. 13 : 55	Off Ibaraki-Pref. E141°35' N36°21'	5.6	10	III: Mito, Shirakawa		" -12	5	"	5		" -12	5	"	5
1968. 8. 8						" -13	3	5	3		" -13	not measurable		5
~ 1968. 10. 8						" -14	10	3	5		" -14	15	not measurable	10
1968. 10. 8. 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV: Chiba	37	" -15	48	10	35	38	" -15	63	5	45
112 Kinokawa Bridge														
1968. 3. 30. 04 : 04	Near Wakayama E135°10' N34°10'	5.0	0	IV: Wakayama	39	112-Gr-8	70	85	80	39	112-P-2	55	30	115
1968. 3. 30. 04 : 09	Near Wakayama E135°11' N34°10'	3.9	0	I: Wakayama	40	" -9	28	30	20	40	" -3	13	10	15
1968. 3. 30. 05 : 05	Middle of Gifu-Pref. E136°57' N35°49'	3.5	10			" -10	23	15	40		" -4	15	13	20
1968. 3. 30. 05 : 41	Near Takayama E137°22' N36°02'	3.9	0		41	" -11	30	25	50	41	" -5	15	8	30
1968. 4. 1. 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka		" -12	8	not measurable	5					
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI: Tomakomai		" -13	5	3	5					
1968. 6. 8. 08 : 15	Near Wakayama E135°07' N34°11'	4.0	0			" -14	8	10	13					
1968. 6. 12. 02 : 49	Near Wakayama		3	II: Wakayama		" -15	5	5	10					
1968. 6. 22. 20 : 08	Osaka-Wakayama Border E135°31' N34°24'		380			" -16	15	15	30					
1968. 7. 11. 03 : 18	Near Wakayama		0	II: Wakayama		" -17	8	8	8					
1968. 7. 11 ~ 1968. 8. 16						" -18	not measurable							
1968. 8. 16. 19 : 39	E off N Honshu E143°51' N38°34'	5.9	0			" -19	5	5	8					
1968. 8. 27. 21 : 58	Near Kyoto E135°45' N35°00'	4.9	10	III: Kyoto		" -20	5	not measurable	3					
1968. 9. 11. 14 : 49	Middle of Kyoto Pref. E135°20' N35°15'	4.0	0	II: Maizuru		" -21	not measurable							

112-Gr-8, 9 are continuous.

112-P-2, 3 are continuous.

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A. Seismic Intensity and Place	Ground					Structure (Crest of Pier)				
	Long . Lat				Page	Record Number	Max. Amplitude (gals)			Page	Record Number	Max. Amplitude (gals)		
							Hori.A	Vertical	Hori.B			Hori.A	Vertical	Hori.B
201 Oya Bridge														
1968. 2. 28. 05 : 00	Off Fukushima-Pref. E141°37' N37°34'	5.4	50	III: Onahama						45	201-P-3	25	8	10
202 Uonuma Bridge														
1967. 1. 17 ~ 1967. 4. 7											202-P-7	Caused by Vehicle		
1967. 4. 7 ~ 1967. 10. 18										45	" -8	55	5	60
1967. 10. 18 ~ 1967. 12. 14											" -9	Caused by Vehicle		
203 Yokokurasawa Bridge														
1966. 4. 6						203-Gr-6	Caused by Vehicle							
~ 1966. 4. 28						" -7	"							
1966. 4. 28						" -8	"							
~ 1966. 5. 28						" -9	"							
1966. 5. 28						" -10	"				203-P-12	Caused by Vehicle		
						" -11	"							
						" -12	"							
1966. 6. 27						" -13	"							
1966. 6. 27						" -14	"							
~ 1966. 7. 7						" -15	"				203-P-13	Caused by Vehicle		
1966. 7. 7 ~ 1966. 7. 19						" -16	"							
1966. 7. 19 ~ 1966. 8. 5						" -17	"							
1966. 8. 5 ~ 1966. 8. 19						" -18	"							
1966. 8. 19 ~ 1966. 9. 22						" -19	"							
1966. 9. 22						" -20	"				203-P-14	Caused by Vehicle		
											" -15	"		
1967. 2. 7											" -16	"		
											" -17	"		
1966. 9. 22 ~ 1966. 11. 28						203-Gr-21	Caused by Vehicle							
1966. 12. 19 ~ 1966. 12. 23						" -22	"							
1966. 2. 7						" -23	"							
~ 1966. 3. 7						" -24	"							
1966. 3. 7											203-P-18	Caused by Vehicle		
											" -19	"		
											" -20	"		
											" -21	"		
											" -22	"		
											" -23	"		

(Continued on next page.)

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A. Seismic Intensity and Place	Ground					Structure (Crest of Pier)				
					Page	Record Number	Max. Amplitude (gals)			Page	Record Number	Max. Amplitude (gals)		
	Long · Lat						Hori.A	Vertical	Hori.B			Hori.A	Vertical	Hori.B
203 Yokokurasawa Bridge (Cont.)														
											203-P-24	Caused by Vehicle		
											" -25	"		
											" -26	"		
											" -27	"		
1967. 1. 29											" -28	"		
1967. 9. 26 ~ 1967. 10. 23						203-Gr-25	Caused by Vehicle							
1968. 1. 24 ~ 1968. 1. 27						" -26	"							
											Data 203-P-12 in Report of 1967 coincides with Data 203-P-18 in this Report.			
205 Ishiseto Bridge														
1967. 2. 16 ~ 1967. 12. 4											205-P-8 ~ 14	Caused by Vehicle		
1968. 2. 21. 08 : 51	SW of Miyazaki-Pref. E130°43' N32°00'	5.7	0	V: Hitoyoshi		205-Gr-1	10	5	18					
1968. 2. 21. 10 : 45	"	6.1	0	V: "	46	" -2	17.53	10	20.00	46	" -15	50	3	25
1968. 2. 22. 19 : 19	SW of Miyazaki-Pref. E130°46' N32°00'	5.6	0	IV: "		" -3	15	5	15					
1968. 3. 25. 00 : 58	SW of Miyazaki-Pref. E130°43' N32°01'	5.7	0	III: Miyazaki	47	" -4	22.5	13	22.5	47	" -16	50	5	35
1968. 3. 25. 01 : 21	SW of Miyazaki-Pref. E130°44' N31°59'	5.4	10	IV: Hitoyoshi		" -5	18	10	20					
1968. 3. 25 ~ 1968. 4. 1											" -17	Caused by Vehicle		
1968. 4. 1. 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka	48	" -6	26.25	15	28.38	49	" -18	70	10	35
207 Takatsu Bridge														
1968. 4.1. 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka	50	207-Gr-1	20	5	25	51	207-P-1	118	20	75
1968. 8. 6. 01 : 17	W coast of Ehime-Pref. E132°23' N33°18'	6.6	40	V: Uwajima	52	" -2	25	8	33	53	" -2	95	20	83
1968. 8. 6. 03 : 32	W coast of Ehime-Pref. E132°23' N33°22'	4.1	30								" -3	5	not measurable	5
1968. 8. 6											" -4	Caused by Vehicle		
											" -5	"		
											" -6	"		
1969. 1. 31											" -7	"		
301 Yuhei Bridge														
1967. 1. 18 ~ 1968. 3. 29											301-P-2	Caused by Vehicle		
1968. 3. 29											" -3	"		
											" -4	"		
1968. 5. 16											" -5	"		

(continued)

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A. Seismic Intensity and Place	Ground					Structure (Crest of Pier)				
					Page	Record Number	Max. Amplitude (gals)			Page	Record Number	Max. Amplitude (gals)		
	Long Lat						Hori.A	Vertical	Hori.B			Hori.A	Vertical	Hori.B
301 Yuhei Bridge (Cont.)														
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI: Tomakomai	57	301-Gr-1	25	10	23					
1968. 5. 16. 19 : 39	E off Aomori-Pref. E142°51' N41°25'	7.5	40	V: Urakawa		" -2	10	5	10		301-P-6	13	5	15
1968. 5. 17. 08 : 05	E off N Honshu E143°29' N39°46'	6.7	30			" -3	3	not measurable	3		" -7	5	not measurable	5
1968. 6. 12. 22 : 42	Off Iwata-Pref. E143°08' N39°25'	7.2		IV: Aomori		" -4	13	5	10					
302 Kaihoku Bridge														
														Isolated pier (No girder)
1968. 1. 29 ~ 1968. 3. 22											302-P-9	47.5	not measurable	18.8
1968. 3. 22 ~ 1968. 4. 25						302-Gr-4	not measurable							
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI: Tomakomai	58	" -5	8	5	13	58	" -10	30	10	25
1968. 5. 16. 19 : 39	E off Aomori-Pref. E142°51' N41°25'	7.5	40	V: Urakawa		" -6	8	3	13		" -11	30	8	20
1968. 5. 17. 08 : 05	E off N Honshu E143°29' N39°40'	6.7	30			" -7	not measurable	not measurable	3		" -12	8	not measurable	5
1968. 5. 23. 04 : 29	E off Iwate-Pref. E142°34' N40°15'	6.3	30	III: Hachinohe		" -8	3	3	5		" -13	15	3	13
1968. 6. 12. 22 : 42	Off Iwate-Pref. E143°08' N39°25'	7.2		IV: Aomori	60	" -9	13	10	15	59	" -14	35	10	25
1968. 6. 13. 06 : 57	Off Iwate-Pref. E143°05' N39°19'	6.1	40	III: Hachinohe		" -10	3	not measurable	3		" -15	15	3	5
1968. 7. 5. 20 : 28	Off Miyagi-Pref. E142°13' N38°26'	6.4	50	IV: Ofunato	60	" -11	20	13	28	62	" -16	85	20	43
1968. 9. 3. 16 : 01	Off Miyagi-Pref. E141°50' N37°55'		80	III: Fukushima		" -12	5	5	8					
1968. 9. 4 ~ 1968. 10. 5						" -13	not measurable				Completed Bridge (1968. 10.5)			
1968. 11. 14. 03 : 41	Off Iwate-Pref. E142°47' N40°09'	6.0	30	III: Hachinohe		" -14	"				302-P-17	5	not measurable	5
1968. 11. 24. 12 : 16	E off Aomori-Pref. E142°48' N41°23'	4.0	40			" -15	"				" -18	18	"	5
1969. 1. 19. 16 : 02	E off N Hokkaido E144°00' N44°36'		240	IV: Kushiro		" -16	"				" -19	18	"	5

302-P-9: Only max. value of acceleration can be measurable.
302-P-10 ~ 13: Irregular paper speed.

303 Kahoku Bridge														
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI: Tomakomai	61	303-Gr-8	18	10	20					

(Continued on next page.)

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter Long . Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A. Seismic Intensity and Place	Ground					Structure (Crest of Pier)				
					Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
303 Kahoku Bridge (Cont.)														
1968. 6. 14						303-Gr-9	10	5	10					
						" -10	not measurable							
						" -11	10	5	8					
1969. 2. 4						" -12	not measurable							
304 Date Bridge														
1967. 3. 23 ~ 1967. 9. 29						304-Gr-9	not measurable							
1967. 9. 29											304-P-11	not measurable		3
~ 1967. 11. 3											" -12	3	not measurable	8
1967. 11. 3											" -13	20	10	33
										62	" -14	50	10	43
										63	" -15	55	30	60
1968. 3. 21											" -16	10	not measurable	5
1968. 3. 21											" -17	13	10	5
						304-Gr-10	not measurable							
						" -11	5	not measurable	5					
1968. 6. 15						" -12	not measurable							
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N140°44'	7.9	0	VI: Tomakomai						64 65	304-P-18	35	5	30
1968. 5. 16. 19 : 39	E off Aomori-Pref. E142°51' N41°25'	7.5	40								" -19	23	5	20
1968. 5. 16 ~ 1968. 6. 12											" -20	5	not measurable	5
1968. 6. 12. 22 : 42	Off Iwate-Pref. E143°08' N39°25'	7.2	0	IV: Aomori							" -21	20	10	30
1968. 7. 1. 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV: Tokyo		304-Gr-13	10	3	5		" -22	13	5	13
1968. 7. 5. 20 : 28	Off Miyagi-Pref. E142°13' N38°26'	6.4	50	IV: Ofunato		" -14	23	5	18		" -23	20	5	30
1968. 7. 11						" -15	not measurable							
~ 1968. 7. 29						" -16	"							
1968. 9. 3. 16 : 01	Off Miyagi-Pref. E141°50' N37°55'		80	III: Sendai		" -17	30	10	23		304-P-24	30	5	33
1968. 19. 8. 04 : 22	Near Bominis E140°56' N26°09'		480	III: Fukushima		" -18	6	3	6		" -25	10	5	13
1968. 10. 9 ~ 1969. 1. 26											" -26	8	4	8
1969. 1. 26 ~ 1969. 3.3						" -19	8	3	10					

304-P-21: Irregular paper speed.

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter Long . Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A. Seismic Intensity and Place	Ground					Structure (Crest of Pier)				
					Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
305 Minato Bridge														
1968. 4. 1. 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka	63	305-Gr-4	15	8	25					
306 Myoken Bridge														
1968. 4. 1 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka	66	306-Gr-1	35	20	48	67	306-P-1	45	8	48
1968. 4. 5											" -2	15	10	25
~ 1968. 8. 6											" -3	15	13	20
1968. 8. 6. 01 : 17	W Coast of Ehime-Pref. E132°23' N33°18'	6.6	40	V: Uwajima	68	" -2	18	5	18	69	" -4	25	20	25
1968. 8. 19											" -5	Caused by Vehicle		
											" -6	"		
											" -7	"		
											" -8	"		
											" -9	"		
1969. 2. 3											" -10	"		
											" -11	"		
307 Godaisan Bridge														
1968. 4. 1. 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka						70	307-P-3	90	25	45
1968. 8. 6. 01 : 17	W Coast of Ehime-Pref. E132°23' N33°18'	6.6	40	V: Uwajima							" -4	not measurable		
1968. 8. 6											" -5	"		
											" -6	"		
											" -7	"		
1968. 12. 11											" -8	"		
1968. 12. 11. 20 : 45	E Part of Kochi-Pref. E134°06' N33°30'	5.6	50	III: Tokushima							" -9	"		
308 Itajima Bridge											" -10	20	8	10
1968. 4. 1. 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka	71	308-Gr-2	166.25	43	169.88	72	308-P-2	375	55	213
1968. 4. 1. 16 : 13	Hyuganada E132°23' N32°18'	6.3		IV: Nobeoka	73	" -3	36	10	34	73	" -3	65	13	35
1968. 8. 6. 01 : 17	W Coast of Ehime-Pref. E132°23' N33°18'	6.6	40	V: Uwajima	74	" -4	360.88	140	437.50	75	" -4	233	100	200
1968. 8. 6. 03 : 32	W Coast of Ehime-Pref. E132°21' N33°22'	4.1	30		76	" -5	55	10	55	76	" -5	65	8	30
1968. 8. 6. 05 : 51	W Coast of Ehime-Pref. E132°24' N33°22'	4.8	40	II: Uwajima	77	" -6	60	8	50		" -6	65	20	100

(Continued on next page.)

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A. Seismic Intensity and Place	Ground					Structure (Crest of Pier)				
	Long Lat				Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
308 Itajima Bridge (Cont.)														
1968. 8. 6. 11 : 34	W Coast of Ehime-Pref. E132°24' N33°20'	4.9	40	III: Uwajima	77	308-Gr-7	85	25	130					
1968. 8. 6. 13 : 21	W Coast of Ehime-Pref. E132°27' N33°21'	5.3	40	III: Uwajima	78	" -8	170	60	228					
1968. 8. 6. 14 : 25	W Coast of Ehime-Pref. E132°21' N33°23'	4.2	20		78	" -9	43	20	80					
1968. 8. 8. 02 : 44	W Coast of Ehime-Pref. E132°22' N33°12'	4.4	50			" -10	80	20	88					

308-Gr-10, 308-P-6 : Only max. values of acceleration can be measurable.

309 Otome Bridge														
1967. 3. 1. 20 : 03	Near Uwajima E132°22' N33°18'	5.0	40			309-Gr-8	15	10	15					
1967. 3. 11 ~ 1968. 1. 31						" -9	10	10	8					
1967. 2. 20											309-P-10	Caused by Vehicle		
											" -11	"		
											" -12	"		
											" -13	"		
											" -14	"		
1968. 2. 22											" -15	"		
1968. 3. 21. 08 : 61	SW of Miyazaki-Pref. E130° N32°01'	5.7	0	V: Hitoyosi		309-Gr-10	15	5	10					
1968. 2. 21. 10 : 45	"	5.1	0	"		" -11	20	10	13					
1968. 2. 22. 19 : 19	SW of Miyazaki-Pref. E130°46' N32°00'	5.6	0	IV: Hitoyosi		" -12	10	5	8					
1968. 3. 25. 00 : 58	SW of Miyazaki-Pref. E130°43' N32°01'	5.7	0	III: Miyazaki		" -13	18	5	10					
1968. 4. 1. 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka		" -14	33	15	35					
1968. 8. 6. 01 : 17	W Coast of Ehime-Pref. E132°23' N33°18'	6.6	40	V: Uwajima						79	309-P-16	23	8	20

309-Gr-14 : Only max. Value of acceleration can be measurable.

1	2	3	4	5	6					7					8				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Ground					Structure (Crest of Pier 5)					Structure (Crest of Pier 6)				
	Long . Lat				Page	Record Number	Max. Amplitude (gals) Hori. A	Vertical	Hori. B	Page	Record Number	Max. Amplitude (gals) Hori. A	Vertical	Hori. B	Page	Record Number	Max. Amplitude (gals) Hori. A	Vertical	Hori. B
310 Hirai Bridge																			
1968. 1. 9																$310\text{-}P_6\text{-}5$	Caused by Vehicle		
											310-P -6	Caused by Vehicle				" -6	"		
											" -7	"				" -7	"		
											" -8	"				" -8	"		
1968. 2. 28											" -9	"				" -9	"		
1968. 2. 28. 21 : 08	Off Tokaido E137°56' N32°55'		40	III: Tokyo		310-Gr-11	5	not measurable	5										
1968. 3. 6. 09 : 12	SW of Ibaraki-Pref. E139°55' N36°03'	5.2	50	III: Tokyo	79	" -12	30	8	25	80	$310\text{-}P_5\text{-}10$	20	8	18	80	$310\text{-}P_6\text{-}10$	58	8	13
1968. 3. 7. 12 : 00	Off Ibaraki-Pref. E141°25' N36°37'	4.2	50	III: Tokyo		" -13	25	5	25							" -11	35	3	15
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI: Tomakomai		" -14	13	not measurable	13		" -11	20	not measurable	13					
1968. 7. 1. 19 : 45	Middle of Saitama-Pref. E139°25' N35°59'	6.1	50	IV: Tokyo	81	" -15	58.13	25	48.75	82	" -12	108	30	63	83	" -12	128	30	60
1968. 10. 8. 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV: Chiba	84	" -16	30	5	35	84	" -13	48	15	35	88	" -13	65	15	28
1968. 10. 8 ~ 1968. 12. 13											" -14	not measurable				" -14	not measurable		

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter	Magnitude M (Richer Scale)	Depth H (Km)	Maximum. J.M.A. Seismic Intensity and Place	Ground					Structure (Crest of Pier)				
	Long . Lat				Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
311 Toyohama Bridge														
1967. 8. 31											311-P-2	Caused by Vehicle		
											" -3	"		
											" -4	20	20	45
1968. 4. 1						311-Gr-2	not measurable							
1968. 5. 9. 23 : 22	Off Shima Pen E138°56' N34°01'	5.6	0	III: Osaka	85	" -3	30	8	23	85	311-P-5	60	10	85
1968. 8. 6. 01 : 17	W Coast of Ehime-Pref. E132°23' N33°18'	6.6	40	V: Uwajima		" -4	not measurable							

311- P-4: Only max. value of acceleration can be measurable.

313 Ishizuchi Bridge														
1968. 4. 1. 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka		313-Gr-1	55	10	35	86	313-P-2	65	23	63
1968. 4. 1. 15 : 13	Hyuganada E132°23' N32°18'	6.3	0	IV: Nobeoka							" -3	8	not measurable	10
1968. 8. 6. 01 : 17	W Coast of Ehime-Pref. E132°23' N33°18'	6.6	40	V: Uwajima	87	" -2	63	20	63	88	" -4	78	23	95
1968. 8. 6 ~ 1969. 1						" -3	5	not measurable	5					

313-Gr-1 : Only max. value of acceleration can be measurable.

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter Long . Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A. Seismic Intensity and Place	Ground					Structure (Crest of Pier)				
					Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
317 Sezume Bridge														
1968. 4. 1. 09 : 42	Hyuganada E132°23' N32°17'	7.5	30	V: Nobeoka						89	317-P-2	30	15	30
1968. 8. 6. 01 : 17	W Coast of Ehime-Pref. E132°23' N33°18'	6.6	40	V: Uwajima		317-Gr-1	13	5	10					
1968. 12. 11. 20 : 45	E Part of Kochi-Pref. E134°06' N33°30'	5.6	50	III: Tokushima		" -2	35	8	40					
319 Shitoku Bridge														
1968. 1. 26. 16 : 55	Near Matsushiro E138°09' N36°31'	5.3	0-	IV: Nagano		319-Gr-1	18	5	25		319-P-1	20	5	30
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N40°44'	7.9		VI: Tomakomai		" -2	not measurable				" -2	20	not measurable	5
1968. 7. 1. 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV: Tokyo	90	" -3	25	18	30	90	" -3	98	13	40
501 Tokyo Bay (Futt Cape)														
1968. 1. 29 ~ 1968. 3. 5						501-Gr-24	5	not measurable	10					
1968. 3. 6. 09 : 12	SW of Ibaraki-Pref. E139°55' N36°03'	5.2	50	III: Tokyo		" -25	5	"	5					
1968. 3. 7. 11 : 54	Middle of Chiba-Pref. E140°08' N35°32'	5.1	50	III: Tokyo		" -26	15	"	10					
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N40°44'	7.9		VI: Tomakomai		" -27	8	3	8					
1968. 5. 16. 19 : 39	E off Aomori-Pref. E142°51' N41°25'	7.5	40	V: Urakawa		" -28	3	not measurable	3					
1968. 7. 1. 19 : 45	Middle of Saitama-Pref. E139°26 N35°59'	6.1	50	IV: Tokyo	93	" -29	25.13	10	17					
1968. 7. 4. 09 : 34	E off Oshima E139°48' N34°50'		100	III: Yokohama		" -30	18	5	15					
1968. 7. 4 ~ 1968. 8. 3						" -31	not measurable							
1968. 8. 3 ~ 1968. 8. 17						" -32	"							
1968. 9. 3. 16 : 01	Off Miyagi-Pref. E141°50' N37°55'		80	III: Fukushima		" -33	3	not measurable	5					
1968. 9. 22. 22 : 41	E Coast of Bosso Pen. E140°20' N35°18'		70	II: Yokohama		" -34	5	"	5					
1968. 10. 8. 04 : 22	Near BONIN is E140°56' N26°09'		480	III: Tokyo		" $-35_{(1)}$	not measurable							
"	"		"	"		" $-35_{(2)}$	5	3	5					
1968. 10. 8. 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV: Chiba		" -36	25	10	18					
1968. 10. 8. 20 : 49	Kanagawa-Tokyo Border E139°27' N35°34'		100	I Yokohama		" -37	not measurable							
1968. 10. 28. 23 : 41	Near Hachijojima E140°52' N33°35'	5.3	40	III: Hachijojima		" -38	"							
1968. 11. 19 ~ 1968. 12. 9						" -39	5	not measurable	5					

$501\text{-}Gr\text{-}35_{(1)}$, $35_{(2)}$: Continuous

1	2	3	4.	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter Long . Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A. Seismic Intensity and Place	Ground					Structure (Crest of Pier)				
					Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
502 Kanmon Bridge						Ground of Shimonoseki Side.					Ground of Moji Side.			
1968. 4. 1. 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka		502-Gr-1	not measurable				502-Gr-1	5	not measurable	5
1968. 8. 6. 01 : 17	W Coast of Ehime-Pref. E132°23' N33°18'	6.6	40	V: Uwajima	94	" -2	5	5	5	95	" -2	13	5	13
503 Tokyo Bay (Kannonzaki)														
1967. 11. 19. 21 : 07	Off Ibaraki-Pref. E141°13' N36°26'	6.0	50	IV: Onahama		503-Gr-4	15	3	5					
1968. 3. 6. 09 : 12	SW of Ibaraki-Pref. E139°55' N36°03'	5.2	50	III: Tokyo		" -5	5	3	5					
1968. 3. 7. 11 : 54	Middle of Chiba-Pref. E140°08' N35°32'	5.1	50	III: Tokyo		" -6	15	3	8					
1968. 5. 16. 09 : 49	E of N Honshu E143°35' N40°44'	7.9		VI: Tomakomai		" -7	5	not measurable	5					
1968. 7. 1. 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV: Tokyo	96	" -8	25	5	15					
1968. 7. 4. 09 : 34	E off Oshima E139°48' M34°50'		100	III: Yokohama	97	" -9	45	5	43					
1968. 10. 8. 04 : 22	Near Bonin Is E140°56' N26°09'		480	III: Tokyo		" -10	8	3	5					
1968. 10. 8. 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV: Chiba	97	" -11	40	8	35					
604 Amagase Dam											Crest of Dam			
1967. 6. 21. 13 : 23	Off Ibaraki-Pref. E141°45' N36°22'	4.1	60							101	604-D-1	45	10	8
1968. 1. 20. 11 : 31	S Part of Kyoto E135°39' N34°55'	4.4	10	III: Kyoto						101	" -2	170	73	40
1968. 2. 14. 11 : 31	N of Kyoto-Pref. E135°21' N35°13'	4.8	10	III: Maizuru							" -3	13	not measurable	
1968. 2. 24. 20 : 47	Wakayama-Pref. E135°21' N33°56'	4.3	10								" -4	10	8	8
1968. 8. 27. 21 : 58	Near Kyoto E135°45' N35°00'	4.9	10	III: Kyoto						102	" -5	50	20	8
1968. 3. 27. 22 : 52	Near Kyoto E135°46' N35°01'	4.4	10							102	" -6	75	33	15
605 Susobana Dam											Crest of Dam			
1968. 1. 16. 16 : 55	Near Mathushiro	4.9	5	IV: Nagano		605-Gr-49	43.8	12.5	20					
"	"	"	"	"		" -50	not measurable							

605-Gr-49, 50 are continuous.

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter Long . Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A. Seismic Intensity and Place	Page	Ground Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Structure (Crest of Pier) Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
701 Yodogawa Embankment														
1966. 10. 27 ~ 1968. 11. 4											Crest of Embankment			
1967. 4. 27. 14 : 41	N Part of Osaka-Pref. E135°31' N34°51'	3.6									701-E-1	not measurable		
1967. 6. 21. 21 : 09	Kyoto-Pref. E135°35' N35°02'	4.6	10	III: Kyoto		701-Gr-1	20	8	10		" -2	10	5	10
1967. 8. 18. 04 : 31	Near Kyoto													
1967. 8. 31. 05 : 32	S off Shima Pen. E136°34' N34°02'	4.6	30								701-E-3	not measurable		
1968. 1. 20. 11 : 31	S Part of Kyoto E135°39' N34°55'	4.4	10	III: Kyoto		701-Gr-2	20	5	15		" -4	"		
1968. 5. 9. 23 : 22	Off Shima Pen. E136°56' N34°01'	5.6		III: Osaka		" -3	18	5	10					
1968. 8. 18. 16 : 12	Middle of Kyoto-Pref. E135°23' N35°13'	5.6	0	IV: Maizuru		" -4	30	5	20		701-E-5	13	8	10
1968. 8. 27. 21 : 58	Near Kyoto E135°45' N35°00'	4.9	10	III: Kyoto	105	" -5	40	10	33	105	" -6	15	10	20
											" -7	53	15	43
801 Ariake-Sea Embankment (Chikugo River Mouth)														
1968. 4. 1. 09 : 42	Hyuganada E132°32' N32°17'	7.5	30	V: Nobeoka	109 110	801-Gr-2	50	13	38					
1968. 8. 6. 01 : 17	W Coast of Ehime-Pref. E132°23' N33°18'	5.6	40	V: Uwajima		" -3	20	5	15					
901 The Public Works Research Institute, Chiba Branch														
1968. 2. 28. 21 : 08	Off Tokaido E137°56' N32°55'		340	III: Tokyo		901-Gr-29	5	8	5					
1968. 3. 6. 09 : 12	SW of Ibaraki-Pref. E139°55' N36°03'	5.2	50	III: Tokyo		" -30	20	20	20					
1968. 3. 7. 11 : 54	Middle of Chiba-Pref. E140°06' N35°32'	5.1	50	III: Tokyo	113	" -31	50	25	50					
1968. 5. 16. 09 : 49	E off N Honshu E143°35' N40°44'	7.9		VI: Tomakomai		" -32	15	20	10					
1968. 7. 1. 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV: Tokyo	114	" -33	65	38	45					
1968. 7. 4. 09 : 34	E off Oshima E139°25' N43°38'		70	III: Yokohama		" -34	not measurable							
1968. 10. 8. 04 : 20	Near Bonin Is E140°56' N26°09'		480	III: Tokyo		" -35	"							
"	"			"		" -36	"							
1968. 10. 8. 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV: Chiba	113	" -37	50	30	48					

901-Gr-35, 36 are continuous.

1	2	3	4	5	6					7					8			
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter Long . Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Page	Ground Record Number	Max. Amplitude (gals) Hori. A	Vertical	Hori. B	Page	Structure (Crest of Pier 7) Record Number	Max. Amplitude(gals) Hori. A	Vertical	Hori. B	Page	Structure (Crest of Pier 8) Record Number	Max. Amplitude(gals) Hori. A	Vertical	Hori B
902 Nishiarai Bridge																			
1966. 5.2 ~ 1967. 8. 31											902-P7-26 ~ 39	Caused by Vehicle							
1967.11.17~1968. 1. 10																902-P9 -16, 17	Caused by Vehicle		
1968. 2. 28 21 : 08	Off Tokaido E137°56' N32°55'		340	III : Tokyo		902-Gr-21	5	not meas-urable	5							902-P9 -18	15	measur-able	
1969. 3. 6 09 : 12	SW of Ibaragi-Pref. E139°55' N36°03'	5.2	50	III : Tokyo		902-Gr-22	23	10	25		902-P7 -40	33	5	35		902-P9 -19	26	8	25
1968. 3. 7 11 : 54	Middle of Chiba-Pref. E140°08' N35°32'	4.2	50	III : Tokyo		902-Gr-23	23	5	25		902-P7 -41	25	20	3		902-P9 -20	20	8	23
1968. 5.16 09 : 49	E off N Honshu E143°35' N40°44'	7.9		VI : Tomakomai		902-Gr-24	18	not-meas-urable	13		902-P7 -42	13	not meas-urable	5					
1968. 7. 1 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV : Tokyo	115	902-Gr-25	80	15	48	116	902-P7 -43	95	10	33					
1968.10. 8 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV : Chiba	117	902-Gr-26	40	8	50	117	902-P7 -44	40	5	38	118	902-P9 -21	33	10	50
1968.10. 8 ~ 1969. 3. 14											902-P7 -45	not measurable							

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epcenter Long . Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Page	Ground Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Structure (Crest of Pier) Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
903 Showa Bridge														
1968. 1.27											903-P-10	not measurable		
											903-P-11(1)	"		
1968. 3.22											903-P-11(2)	"		
1968. 4. 4 19 : 54	Near Matsushiro E138°11' N36°34'	5.1		IV : Nagano							903-P-12	5	3	10
1968. 5.16 09 : 49	E off N Honshu E 143°35' N40°44'	7.9		VI : Tomakomai	119	903-Gr-5	10	not meas-urable	8	120	903-P-13	13	not meas-urable	10

903-P-11 (1), 11(2) are continuous.

904 Shintenryugawa Bridge

1965. 4.20 ~ 1967. 12.5						904-Gr-2	not measurable							
1968. 3.22 ~ 1968. 7.1					118	904-Gr-3	5	not meas-urable	5					

905 Ochiai Bridge

1	2	3	4	5	6					7					8				
Earthquake Time and Date Y.M.D.H.M	Location of Epicenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Ground (Bridge Site)					Structure (Crest pier)					Ground (Nagano City)				
					Page	Record Number	Max. Amplitude(gals) Hori. A	Vertical	Hori. B	Page	Record Number	Max. Amplitude(gals) Hori. A	Vertical	Hori. B	Page	Record Number	Max. Amplitude(gals) Hori. A	Vertical	Hori. B
1967. 5.24 ~ 1967 : 6.8																905-C -107	not measurable		
1968. 1. 1 10 : 00	Near Matsushiro E138°05' N36°27'	3.5	10													905-C -108	15	5	15
1968. 1.26 16 : 55	Near Matsushiro E138°09' N36°31'	5.3		IV : Nagano											121	905-C -109	40	5	50
1968. 4. 4 19 : 54	Near Matsushiro E138°11' N36°34'	5.1	0	IV : Nagano	121	905-B -252	90	45	53	122	905-A -400	113	25	33	122	905-C -110	53	15	93
1968. 4.21 05 : 19	Near Matsushiro E138°05' N362°26'	4.2	0	III : Nagano		905-B 4253	33	3	35		905-A -401	30	5	15					
1968. 5.16 09 : 49	E off N Honshu E138°10' N36°31'	7.9	0	VI : Tomakomai							905-A -402	13	not meas-urable	10		905-C -111	8	not meas-urable	5
1968. 5.24 00 : 34	Near Matsushiro E138°10' N36°31'	4.1	10	III : Nagano		905-B -254	30	5	20		905-A -403	30	5	20		905-C -112	35	5	30
1968. 6.12 22 : 42	Off Iwate-Pref. E143°09' N39°25	7.2	0	III : Nagano							905-A -404	20	8	30					
1968. 6.21 02 : 49	Near Matsushiro E138°07' N36°31'	4.0	10	II : Nagano		905-B -255	18	10	40		905-A -405	25	5	10					
1968. 7. 1 10 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV : Tokyo		905-B -256	5	3	5		905-A -406	13	3	5					
1968. 7.30					123	905-B -257	100	15	35	123	905-A -407	65	15	30					
~ 1968. 9.16										124	905-A -408	45	5	10					
1968. 9.21 07 : 25	N Part of Nagano-Pref. E138°15' N36°40'	5.3	10	IV : Nagano		905-B -258	15	5	10		905-A -409	25	8	15		905-C -113	33	8	30
1968. 9.21 08 : 35	N Part of Nagano-Pref. E138°08' N36°50'	4.9	0	III : Nagano		905-B -259	13	not meas-urable	5							905-C -114	5	not meas-urable	3
1968. 9.21 09 : 05	N Part of Nagano-Pref. E138°15' N36°47'	4.6	10	III : Nagano												905-C -115	13	"	20
1968. 9.21 ~ 1968.11:11					124	905-B -260	73	15	40	125	905-A -410	25	3	25	125	905-C -116	20	10	25
1968.11.11 ~ 1968.11.25					126	905-B -261	55	5	45	126	905-A -411	33	5	30					
1968.12. 4 ~ 22 : 24	Icar Matsushiro E138°18' N36°35'	4.2	10	III : Nagano		905-B -262	26	8	40		905-A -412	30	5	23					
1969. 1.16 10 : 59	Near Matsushiro			III : Nagano	127	905-B -263	190	30	55	127	905-A -413	85	20	40					

905-C109: Irregular paper speed.

906 The Public Works Research Institute, Kashima Experiment Laboratory

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epcenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Ground					Structure				
					Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
1968. 3. 8 ~ 1968. 4. 27						906-Gr-7	not measurable							
1968. 6.12 22 : 42	Off Iwate-Pref. E143°08' N39°25'	7.2	0	IV : Aomori	128	906-Gr-8	48	8	70					

907 Taira Bridge

											Crest of Abutment			
1968. 2.19 07 : 25	E of Fukushima-Pref. E141°00' N37°12	80				907-Gr-1	not measurable							
1968. 2.26 05 : 00	Off Fukushima-Pref. E141°37' N37°34'	5.4	80	III : Fukushima	129	907-Gr-2	40	20	50	129	907-A-1	35	10	23
1968. 2.28 21 : 08	Off Tokaido E137°56' N32°55'		340	III : Tokyo		907-Gr-3	15	5	15		907-A-2	5	not meas-urable	5
1968. 3. 7 11 : 54	Middle of Chiba-Pref. E140°08' N35°32'	5.1	50	III : Tokyo		907-Gr-4	not measurable							
1968. 4.26 22 : 21	Off Fukushima-Pref. E141°43' N37°19'	5.3	40	III : Fuskushima		907-Gr-5	8	5	5					
1968. 5.16 09: 49	E off N Honshu E143°35'	7.9		VI : Tomakomai	130 131	907-Gr-6	25	8	23	132 133	907-A-3	15	5	8
1968. 5.16 19 :39	E off Aomori-Pref. E142°51' N41°25'	7.5	40	V : Urakawa		907-Gr-7	20	5	20					
1968. 5.16 ~ 1968.5.17						907-Gr-8	5	not measurable						
1968. 5.24 23 : 06	E off N Honshu E143°27' N40°47'	6.2	40	III : Hachinohe		907-Gr-9	5	not measurable						
1968. 5.29 19 : 04	SE of Ibaraki-Pref E140°26' N36°04'		80	II : Tokyo		907-Gr-10	not measurable							
1968. 6.13 23 : 56	Off Iwate-Pref. E143°10' N39°26'	5.2	30	II : Miyako		907-Gr-11	15	5	13		907-A-4	8	not meas-urable	5
1968. 6.23 14 : 20	Off Iwate-Pref. E142°51' N39°19'	4.8				907-Gr-12	not measurable							
1968. 6.23 23 : 27	E off N Honshu E144°10' N40°23'	4.6	60			907-Gr-13	not measurable							
1968. 7. 1 19 : 45	Middle of Saitama-Pref. E139°26 N35°59'	6.1	50	IV : Tokyo	134	907-Gr-14	20	10	18	135	907-A-5	8	5	8
1968. 7. 5 20 : 28	Off Miyagi-Pref. E142°13' N38°26'	6.4	50	IV : Ofunato		907-Gr-15	15	8	18					
1968. 8.13 13 : 55	Off Ibaragi-Pref. E141°35' N36°21	5.6	10	III : Mito		907-Gr-16	5	not meas-urable	8					
1968. 9. 3 16 : 01	Off Miyagi-Pref. E141°50'		80	III : Fukushima		907-Gr-17	13	5	10					
1968. 9.21 22 : 06	Off Urakawa E142°48' N41°59'		80	V : Urakawa		907-Gr-18	5	not meas-urable	5					

(Continued on next page)

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epcenter Long . Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Page	Ground Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Structure (Crest of Pier) Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
907 Taira Bridge (Cont)														
1963. 10. 8 04 : 22	Near Bonin Is. E140°56' N26°09'		480	III : Tokyo		907-Gr-19	13	5	8					
1963. 10. 9 07 : 31	Off Fukushima-pref. E141°35' N37°08'	4.4	50	II : Fukushima		907-Gr-20	not measurable							
1963. 11.15 13 : 36	Off Fukushima-Pref. E141°31' N37°30'		80			907-Gr-21	not measurable							
1963. 11.18 15 : 02	Off Fukushima-Pref. E141°48' N37°15'	4.8	50			907-Gr-22	not measurable							
1004 Sakaigawa Bridge														
1963. 7. 1 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV : Tokyo	139	1004-Gr-1	25	10	55	140	1004-P-1	85	15	125
1005 Ubakubo Bridge														
1963. 7. 1 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV : Tokyo	141	1005-Gr-1	45	15	35	142	1005-P-1	178	15	48
1006 Tsurukawa Bridge														
1963. 7. 1 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV : Tokyo	139	1006-Gr-1	18	8	20					
1963.12. 7 01 : 43	W Part of Kanagawa-Pref. E137°00' N35°24'		20	III : Kawaguchico		1006-Gr-2	not measurable							
1108 Ichinohashi Bridge														
1963. 2.26 05 : 00	Off Fukushima-Pref. E141°37' N37°34'	5.4	50	III : Fukushima		1108-Gr-1	5	not measurable	10					
1963. 2.28 21 : 08	Off Tokaido E137°56' N32°55'		340	III : Tokyo		1108-Gr-2	not measurable							
1963. 3. 6 09 : 12	SW of Ibaraki-Pref. E139°55' N36°03'	5.2	50	III : Tokyo	145	1108-Gr-3	20	5	20	145	1108-P-1	50	10	40
1963. 3. 7 11 : 54	Middle of Chiba-Pref. E140°08' N35°32'	5.1	50	III : Tokyo	146	1108-Gr-4	13	5	8					
1963. 7. 1 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV : Tokyo	147	1108-Gr-5	48	18	38	148 149	1108-P-2	173	25	140
1963.10. 8 04 : 22	Near Bonin Islands E140°56' N26°09'		480	III : Tokyo	146	1108-Gr-6	15	not measurable	13					
1963.10. 8 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV : Chiba	150	1108-Gr-7	55	13	55	150	1108-P-3	125	28	120

1	2	3	4	5	6					7					8				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter Long . Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Page	Ground Record Number	Max. Amplitude(gals) Hori. A	Vertical	Hori. B	Page	Structure (Center part of road) Record Number	Max. Amplitude(gals) Hori. A	Vertical	Hori. B	Page	Structure (Crest of Caisson) Record Number	Max. Amplitude(gals) Hori. A	Vertical	Hori. B
1109 Haneda Undersea Tunnel																			
1963. 3. 6 09 : 12	SW of Ibaragi-Pref.	5.2	50	III : Tokyo		1109-Gr-1	15	5	10		1109-Tr-1	5	not measurable			1109-Tc-1	5	3	88
1963. 3.7 11 : 54	Middle of Chiba-Pref. E140°08' N35°35'	5.1	50	III : Yokohama		1109-Gr-2	18	5	18							1109-Tc-2	5	not measurable	8
1963. 7. 1 19 : 45	Middle of Saitama-Pref. E139°26' N35°56'	6.1	50	IV : Tokyo	151	1109-Gr-3	65	10	48	152	1109-Tr-2	35	15	35	152	1109-Tc-3	35	10	28
1963.10. 8 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV : Chiba	153	1109-Gr-4	28	5	43	153	1109-Tr-3	13	5	30	154	1109-Tc-4	10	5 5	18

1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epcenter Long . Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Page	Ground Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B	Page	Structure (Crest of Pier) Record Number	Max. Amplitude (gals) Hori.A	Vertical	Hori.B
1201 Nishiyokobori Bridge														
1968. 5.10						1201-Gr-2	5	5	10					
											1201-P-3	20	5	13
											1201-P-4	Caused by Vehicle		
											1201-P-5	"		
											1201-P-6	"		
											1201-P-7	"		
1968. 8.18											1201-P-8	"		
1968. 8.18 16 : 12	Middle of Kyoto-Pref. E135°23' N35°13'	5.6	0	IV : Maizuru		1201-Gr-3	10	10	13		1201-P-9	15	5	25
1968. 8.27 21 : 58	Near Kyoto E138°45' N35°00'	4.9	10	III : Kyoto	154	1201-Gr-4	25	15	30					
Hokkaido Development Bureau. 1301 Civil Engineering Research Institute.														
1968. 5.16 09 : 49	E off N Honshu E143°35' N40°44	7.9	0	VI : Tomakomai	158 159	1301-Gr-1	33	30	38					
1968. 5.16 19 : 39	E off Aomori-Pref. E142°51' N41°51'	7.5	40	V : Urakawa		1301-Gr-2	20	10	15					

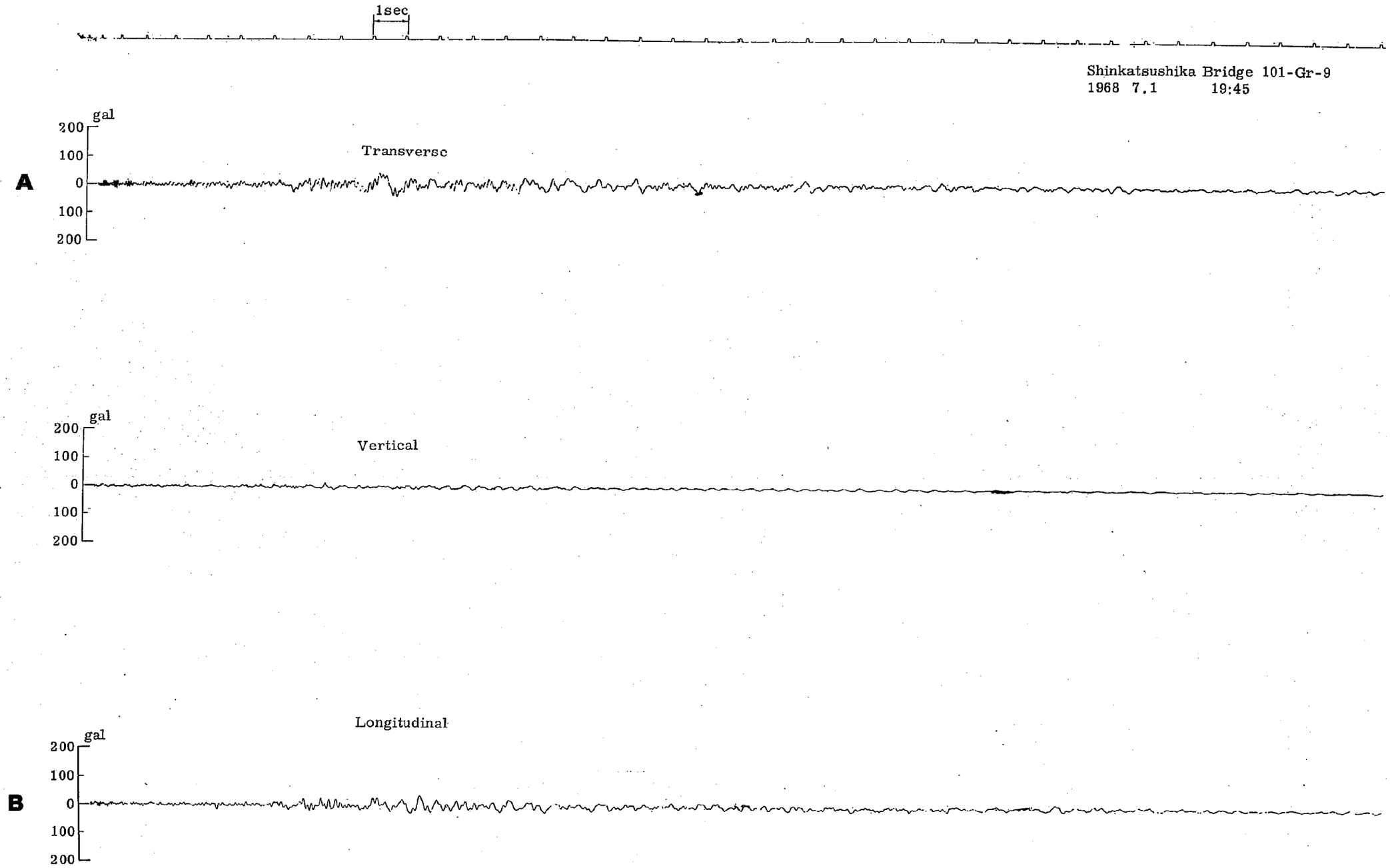
1	2	3	4	5	6					7					8				
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Page	Ground				Page	Structure (Crest of Pier)				Page	(Crest of Abutment)			
	Long Lat					Record Number	Max. Amplitude(gals)				Record Number	Max. Amplitude(gals)				Record Number	Max. Amplitude(gals)		
							Hori. A	Vertical	Hori B			Hori. A	Vertical	Hori B			Hori. A	Vertical	Hori. B
1302 Chiyoda Bridge																			
1968. 5.16 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI : Tomakomai	160 161	1302-Gr-5	83.50	25.0	90.75	162 163	1302-P-5	112.5	25.0	131.3	164 165	1302-A-5	75.0	31.3	91.3
1968. 5.16 10 : 05	E off N Honshu E144°31' N40°52'		80			1302-Gr-6	not measurable												
1968. 5.16 19 : 39	E off Aomori-Pref. E142°51' N41°25'	7.5	40	V : Urakawa	166 167	1302-Gr-7	31.50	18.8	44.5	168 169	1302-P-6	50.0	17.5	77.5	170 171	1302-A-6	36.3	18.8	43.8
1968. 5.16 ~ 1968.12.26						1302-Gr-8	not measurable												
1969. 1.19 16 : 02	E off N Hokkaido E144°00' N44°36'		240	IV : Kushiro		1302-Gr-9	10	not measurable	15		1302-P-7	13	3	18		1302-A-7	8	not measurable	10

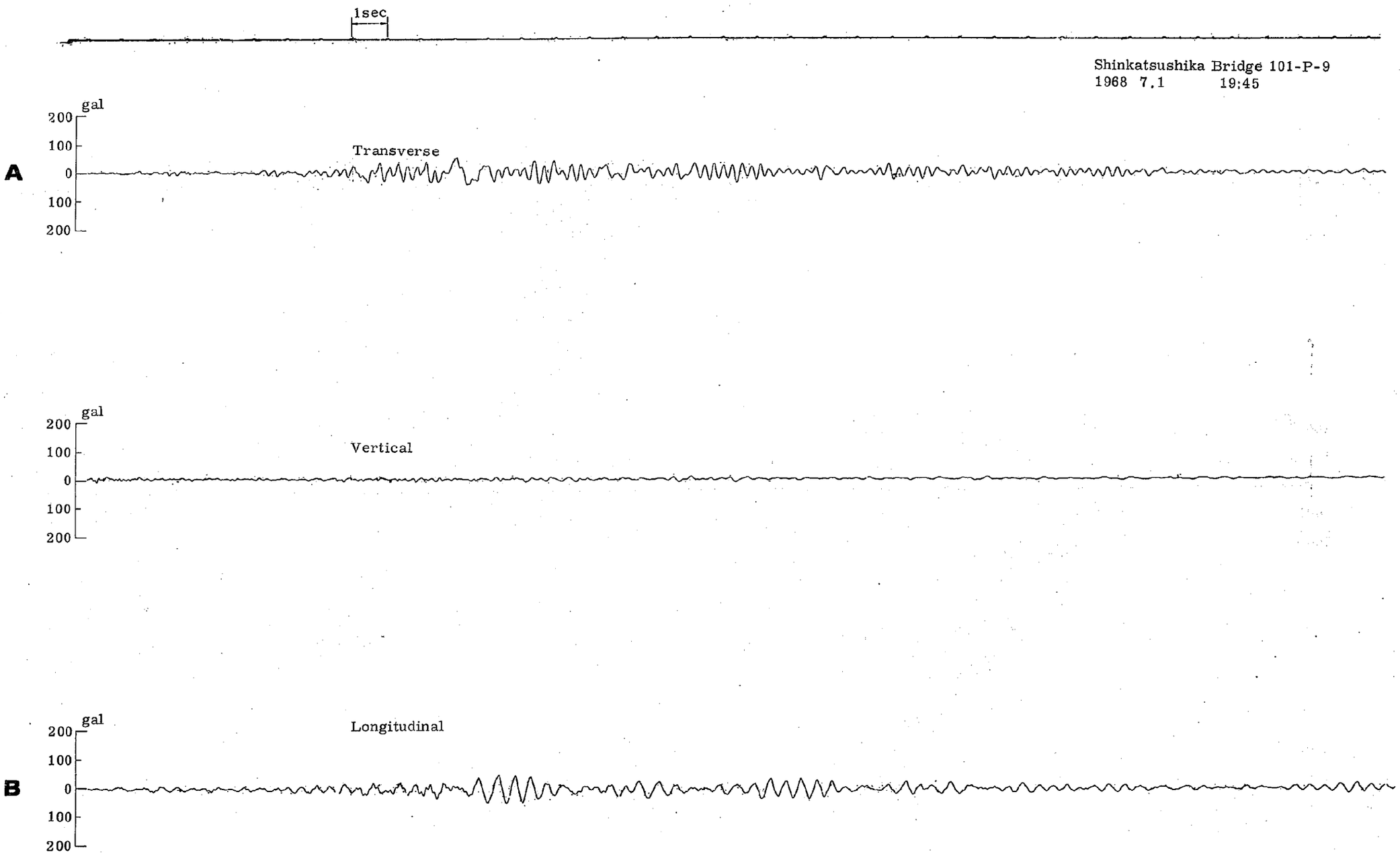
1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epcenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Page	Ground				Page	Structure (Crest of Pier)			
	Long Lat					Record Number	Max. Amplitude (gals)				Record Number	Max. Amplitude (gals)		
							Hori.A	Vertical	Hori.B			Hori.A	Vertical	Hori.B
1303 Ishikari Bridge														
1968. 5.16 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI : Tomakomai	172 173	1303-Gr-1	174.88	40	181.25					
1968. 5.16 19 : 39	E off Aomori-Pref E142°51' N41°25'	7.5	40	V : Urakawa	174 175	1303-Gr-2	170.88	20	96.88					
1968. 5.16 ~ 1968. 9.22						1303-Gr-3	13	not measurable	30					
1968. 10. 8 05 : 49	Off Urakawa E142°43' N41°49'	6.2	60	IV : Urakawa		1303-Gr-4	23	10	not measurable					
1304 Otanoshige Bridge														
1968. 5.16 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI : Tomakomai	176 177	1304-Gr-1	33.00	12.5	47.00	178 179	1304-P-1	45.00	12.5	43.8
1968. 5.16 19 : 39	E off Aomori-Pref. E142°51' N41°25'	7.5	40	V : Urakawa		1304-Gr-2	15	5	20		1304-P-2	not measurable		
1969. 1.19 16 : 02	E off N Hokkaido E144°00' N44°36'		240	IV : Kushiro		1304-Gr-3	15	3	13					

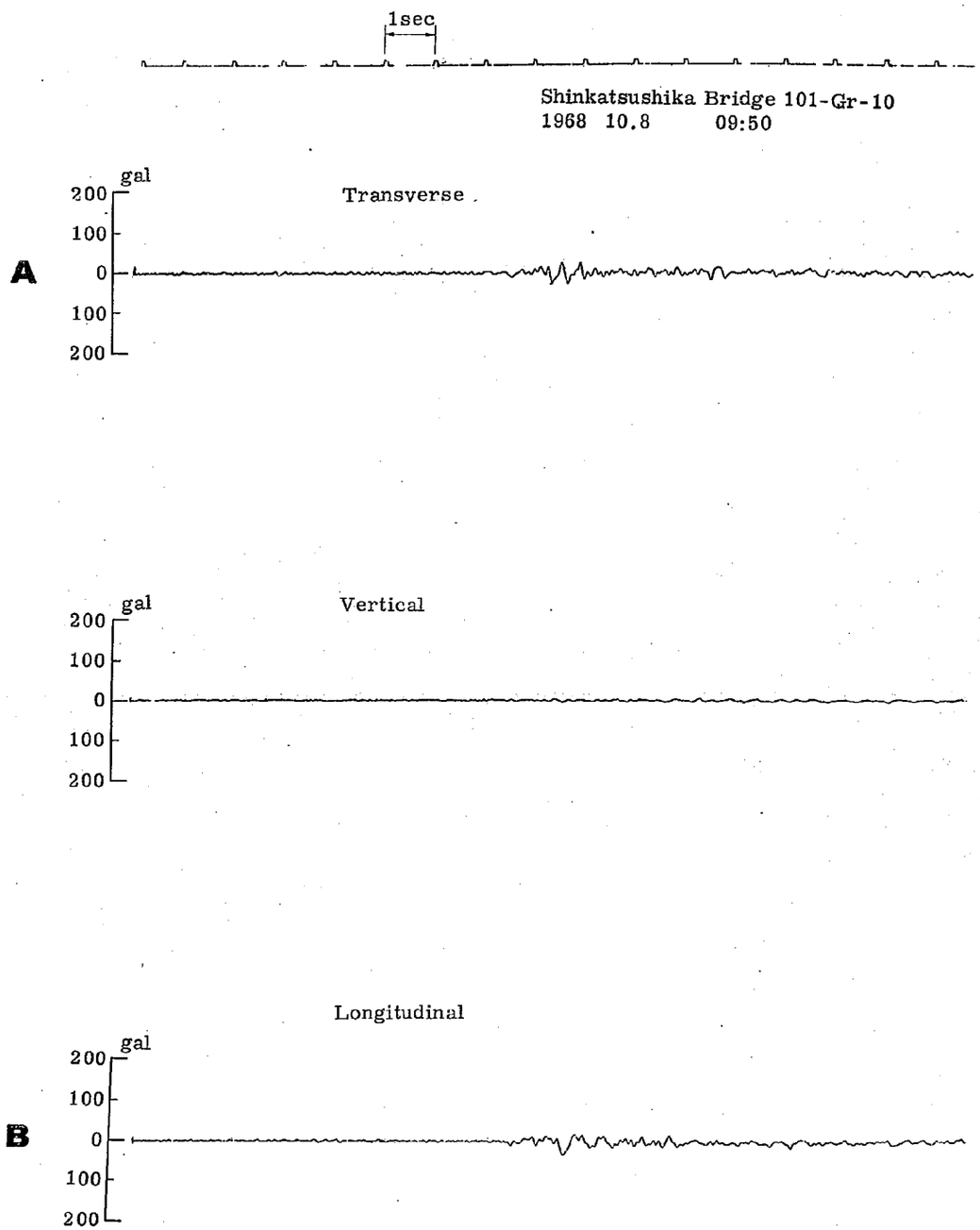
1	2	3	4	5	6					7				
Earthquake Time and Date Y.M.D.H.M.	Location of Epcenter	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Page	Ground				Page	Structure (Crest of Pier)			
	Long Lat					Record Number	Max. Amplutude (gals)				Record Number	Max. Amplitude (gals)		
							Hori.A	Vertical	Hori.B			Hori.A	Vertical	Hori.B
1305 Horoman Bridge														
1968. 5.16 09 : 49	E off N Honshu E143°35' N40°44'	7.9	0	VI : Tomakomai	180	1305-Gr-1	52.25	23.8	77.50	181	1305-P-1	90.0	36.3	72.5
1968. 5.16 10 : 05	E off N Honshu E144°31 N40°52'		80			1305-Gr-2	not measurable							
1968. 5.16 19 : 39	E off Aomori-Pref. E142°51' N41°25'	7.5	40	V : Urakawa	182	1305-Gr-3	46.25	18.8	57.00	183	1305-P-2	87.5	25.0	68.8
1968. 5.16						1305-Gr-4	not measurable							
~ 1968. 5.17						1305-Gr-5	5	not measurable						
1968. 5.17 ~ 1968. 5.22						1305-Gr-6	not measurable				1305-P-3	8	not measurable	8
1968. 5.22 ~ 1968. 5.25						1305-Gr-7	5	not measurable	5					
1968. 12.5 21 : 59	Off Urakawa E142°50' N42°06'	5.0	50	III : Urakawa		1305-Gr-8	5	not measurable	10					
1968. 12.25 12 : 56	Off Urakawa E142°54' N41°40'	5.6	30	III : Urakawa		1305-Gr-9	5	not measurable	20					
1969. 1.19 16 : 02	E off N Hokkaido E144°00' N44°36'		240	IV : Kushiro		1305-Gr-10	5	nor measurable	5		1305-P-4	not measurable		

1	2	3	4	5	6	7	8			9			10
Earthquake Time and Date Y.M.D.H.M.	Location of Epicenter Long · Lat	Magnitude M (Richter Scale)	Depth H (Km)	Maximum J.M.A Seismic Intensity and Place	Page	Record Nuber	Max. Amplitude (gals)			Max. Earth-pressure (kg/cm2)			Remarks
11. Shinkatsushika Bridge						Name of Meter / Date No.	A-1	A-2	A-3	E-1	E-3	E-4	A: Accelerometer E: Earth-pressure meter These 6 meters are all in Open Caisson in the longitudinal direction of the bridge (Horizontal).
1968. 7. 1 19 : 45	Middle of Saitama-Pref. E139°26' N35°59'	6.1	50	IV : Tokyo, Yokohama	187	11 - 3	32.1	25.0	21.8	0.295	0.218	0.108	
1968.10.8 09 : 50	Middle of Chiba-Pref. E140°09' N35°31'		70	IV : Chiba	188	11 - 4	23.6	17.9	12.7	-	0.112	-	
18. Ariake-sea Embankment, Oyano Island						Direction / Date No.	N-S	Vertical	E-W				
1968. 2.21. 10 : 45	SW of Miyazaki-Pref. E130°43' N32°01'	6.1	0	V : Hitoyoshi	189	18 - 5	15.43	4.95	14.76				There accelerometers are on ground at the same place.
24. Shijushida Dam						Direction / Date No.	Dam Axis	Vertical	Perpendicular to Dam Axis				Installed Locations in details .
1968. 5.16 09 : 49	Off N Honshu E143°35' N40°44'	7.9	0	VI : Tomakomai	190	24 - 1	30.2	-	-				Location A : In the roch below 1st Block on the right bank of the river. (EL147.5m)
							30.3	-	70.7				Location B : 6th Black, Concrete portion (EL172m), 2m lower than the crown.
							33.2	19.2	64.9				Location C : 18th Block, Concrete portion (EL170.75m), 3.25 m lower than the crown.
							39.8	-	93.1				Location D : Earth portion (EL172.3m) 1.7m lower than the crown.
						(Note) Elevation of the crown of the Dam is 174.0m above sea level.							

§ 4 STRONG-MOTION SEISMOGRAPH RECORDS


1sec
Shinkatsushika Bridge 101-Gr-9
1968 7.1 19:45
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal


1sec
Shinkatsushika Bridge 101-P-9
1968 7.1 19:45
gal
200
100
0
100
200
A
Transverse
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Longitudinal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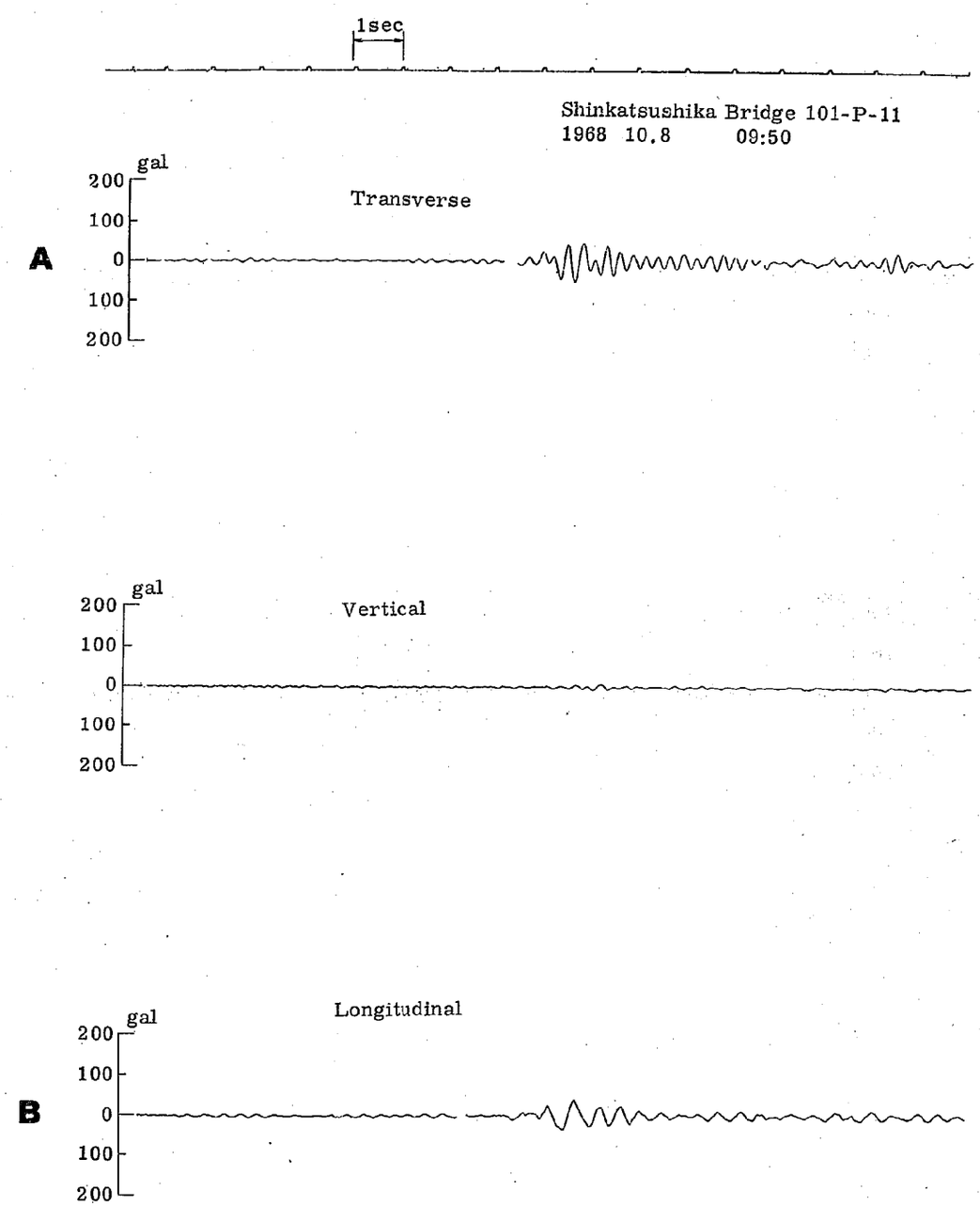
Shinkatsushika Bridge 101-Gr-10
1968 10.8 09:50
A
gal
200
100
0
100
200
Transverse
Vertical
Longitudinal
B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Shinkatsushika Bridge 101-P-11
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gal
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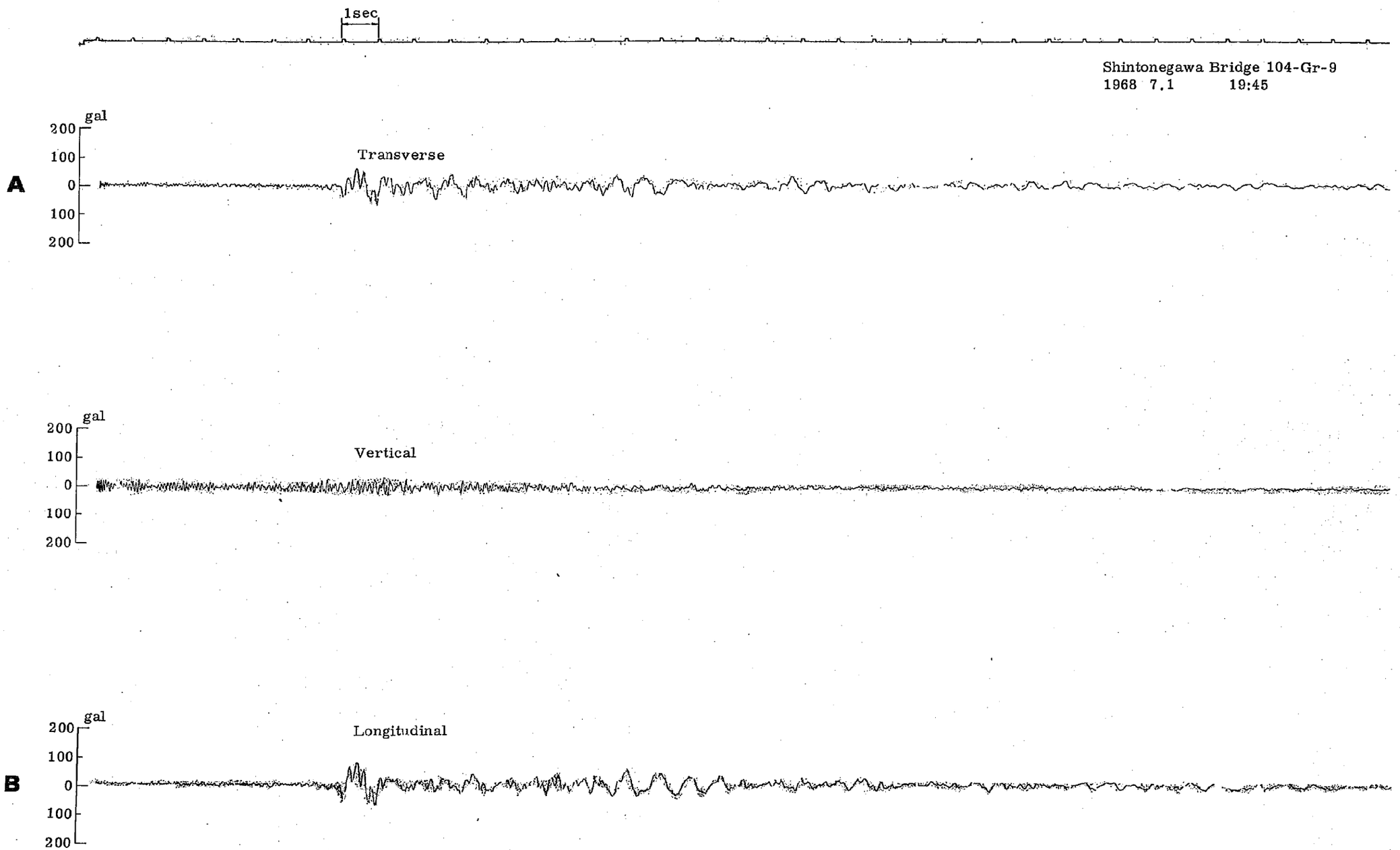
100
0
100
200
Transverse
Vertical
Longitudinal
B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Shintonegawa Bridge 104-Gr-9
1968 7.1 19:45
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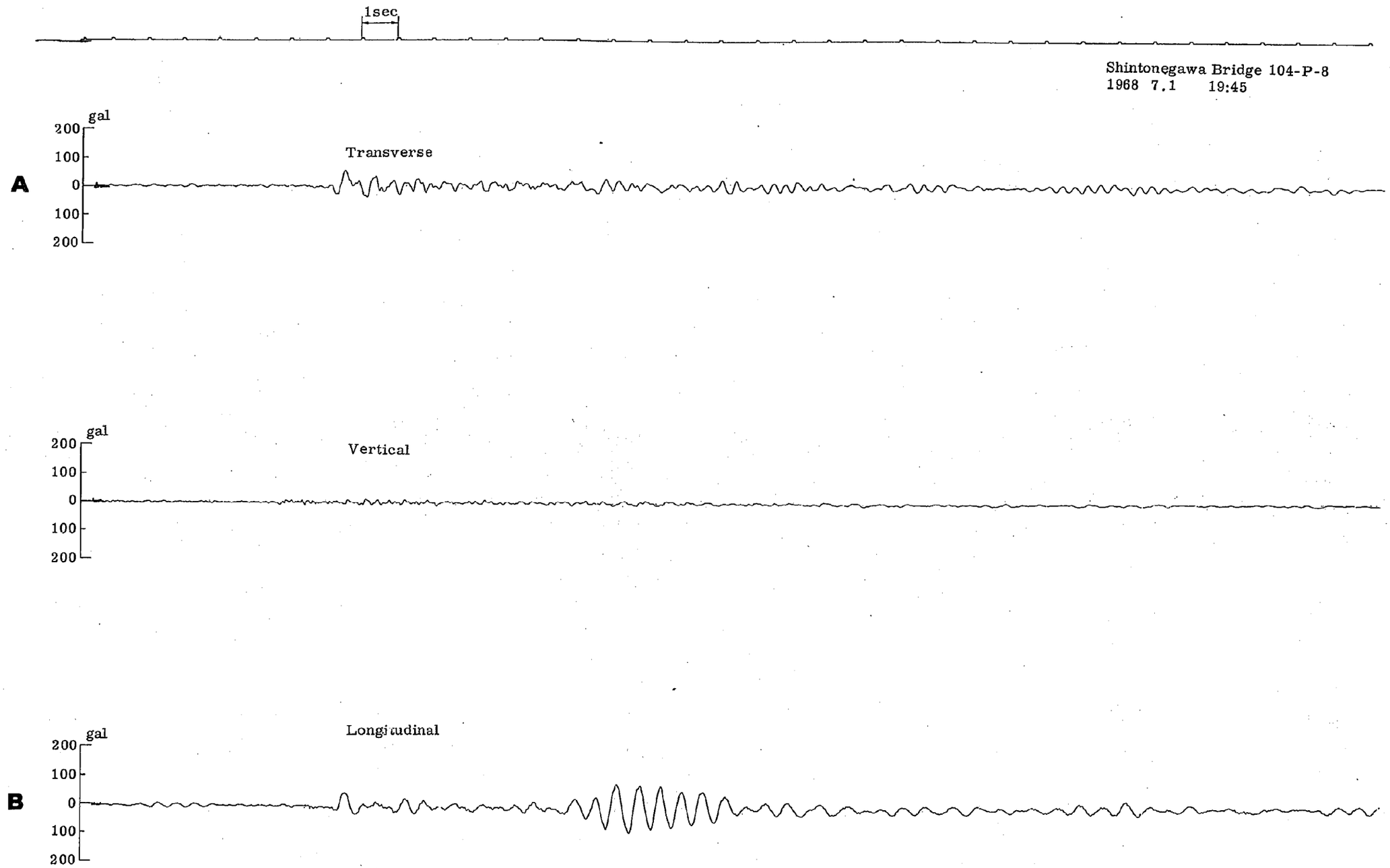
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal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Shintonegawa Bridge 104-P-8
1968 7.1 19:45
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gal
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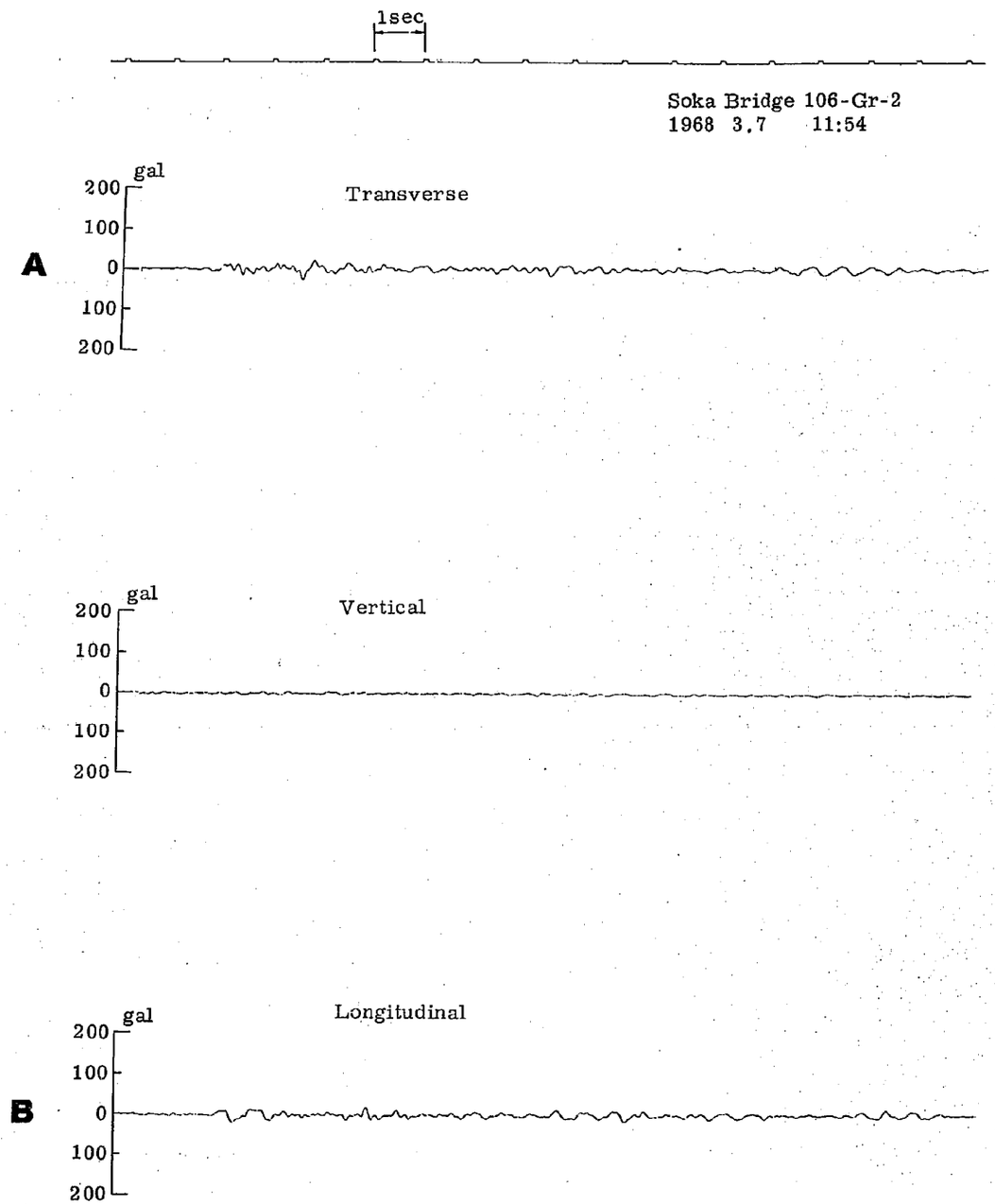
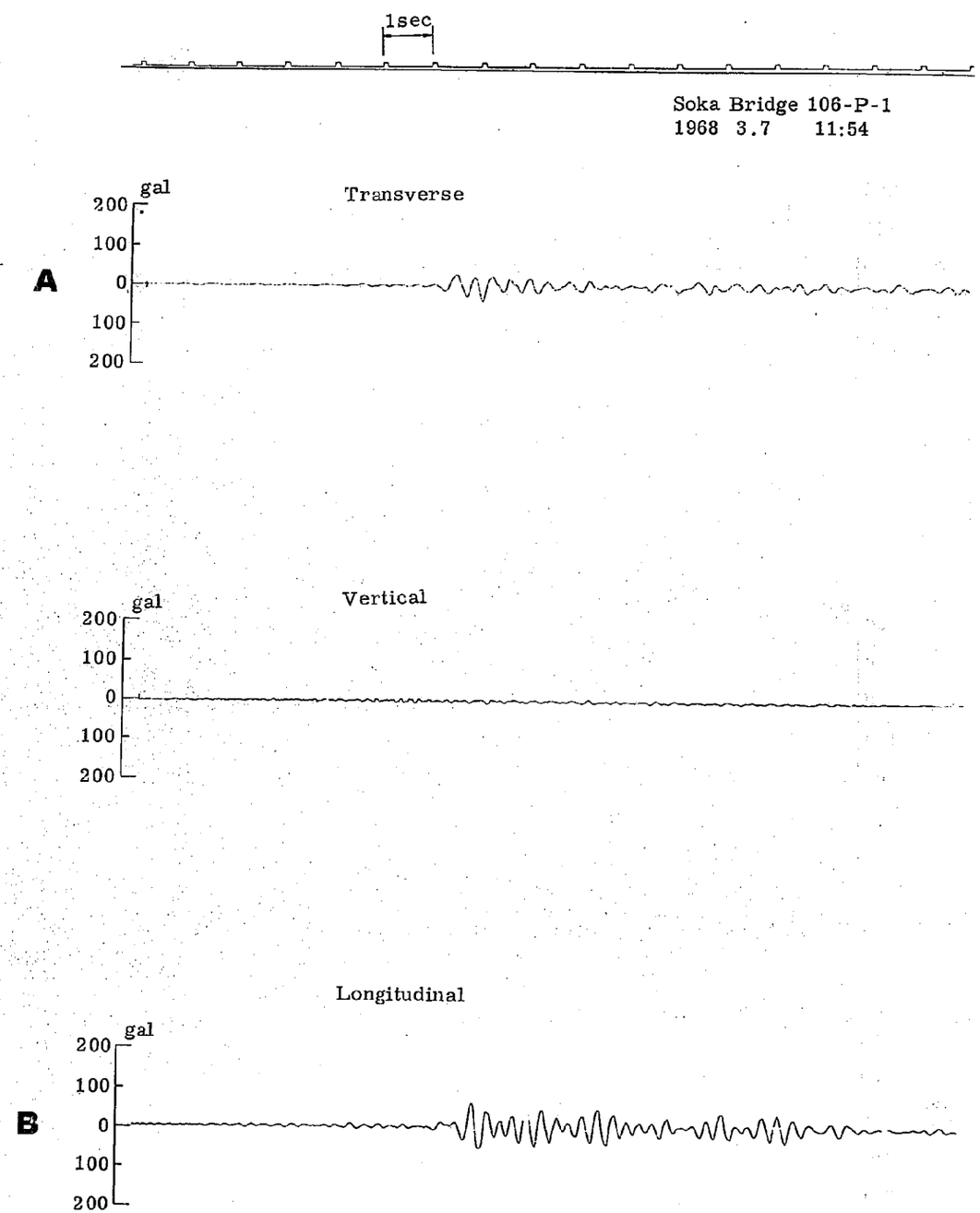
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal


1sec
Soka Bridge 106-Gr-2
1968 3.7 11:54
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal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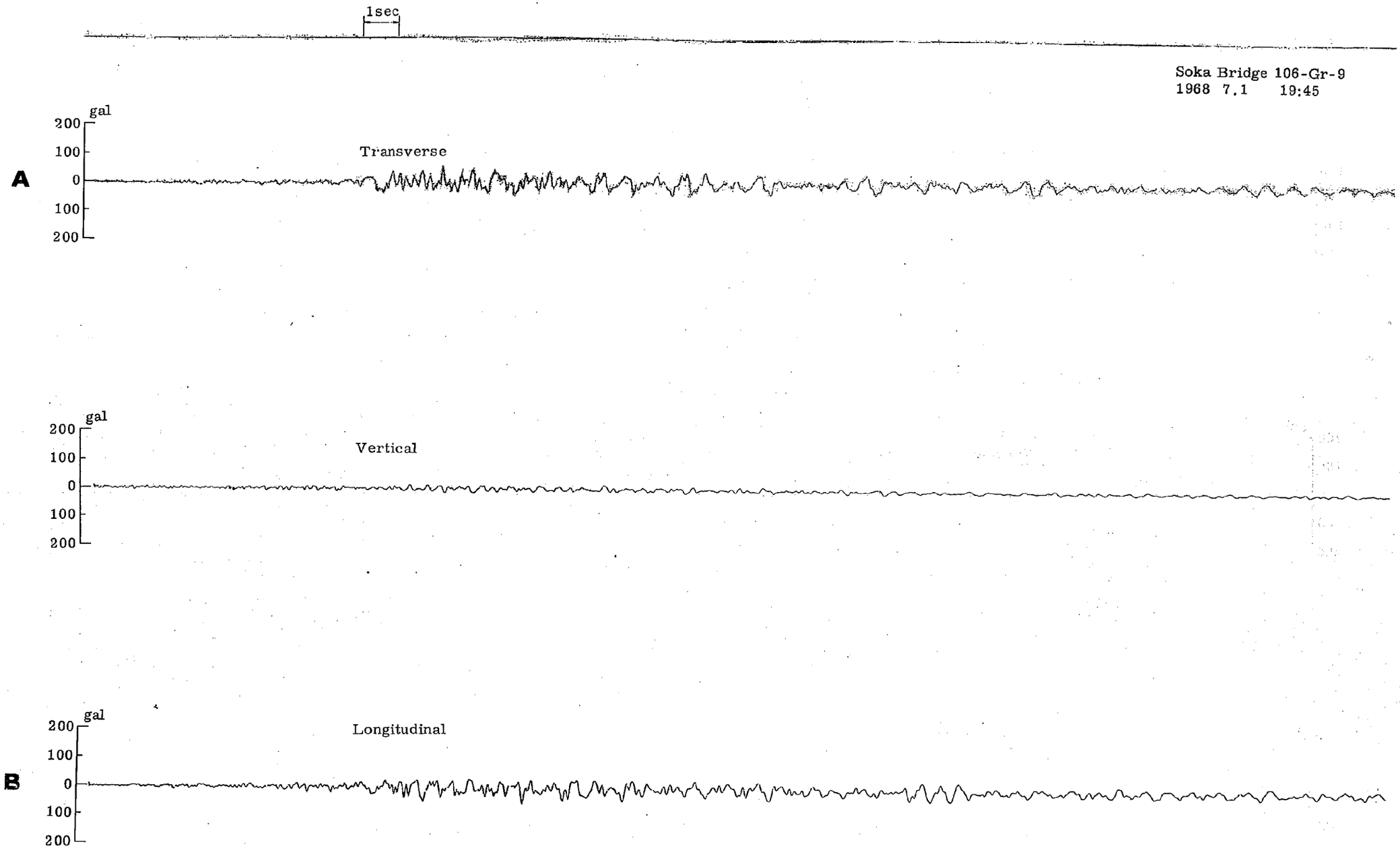
Soka Bridge 106-P-1
1968 3.7 11:54
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal


1sec
Soka Bridge 106-Gr-9
1968 7.1 19:45
gal
200
100
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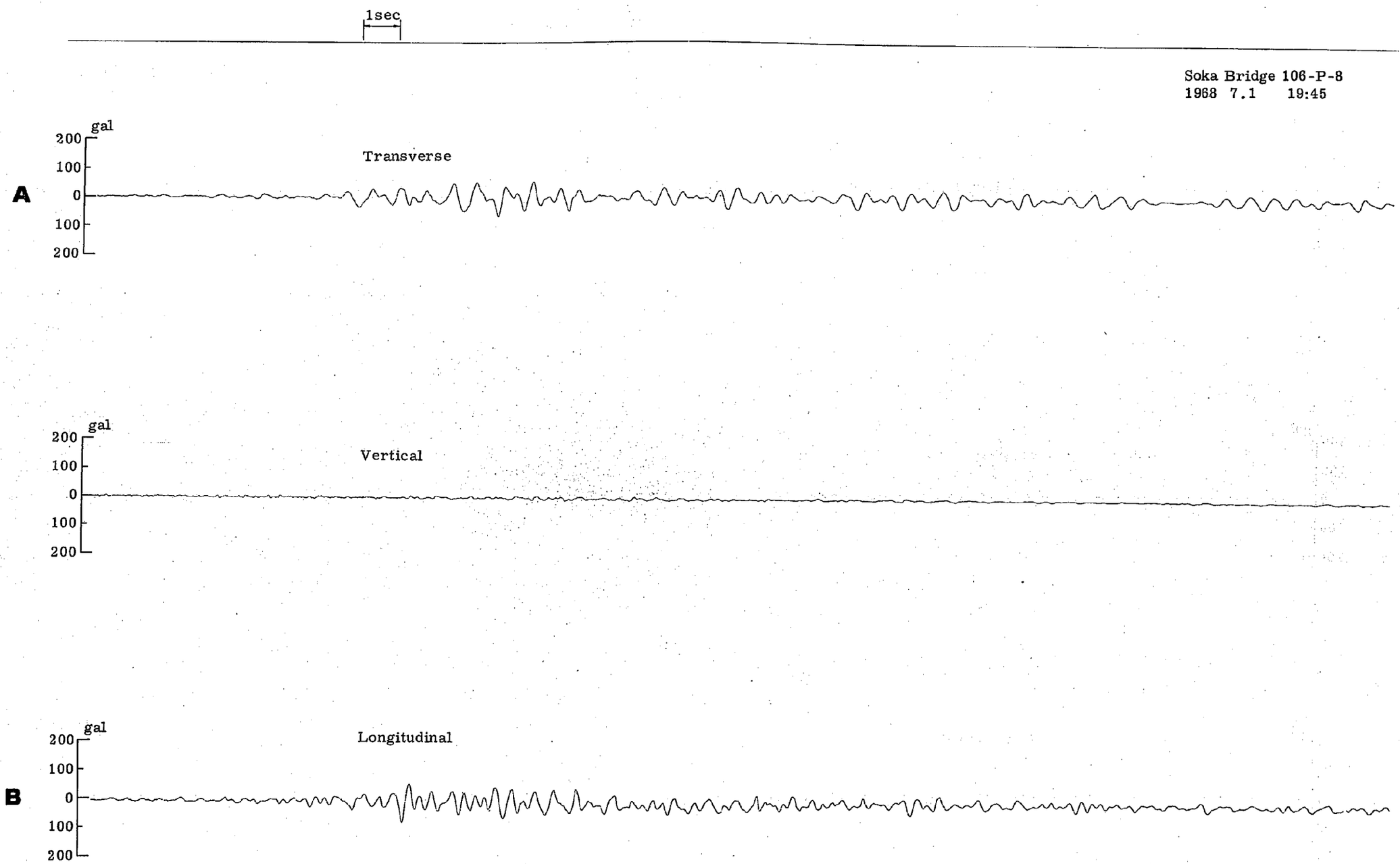
100
200
Transverse
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
Longitudinal
B


1sec
Soka Bridge 106-P-8
1968 7.1 19:45
A
gal
200
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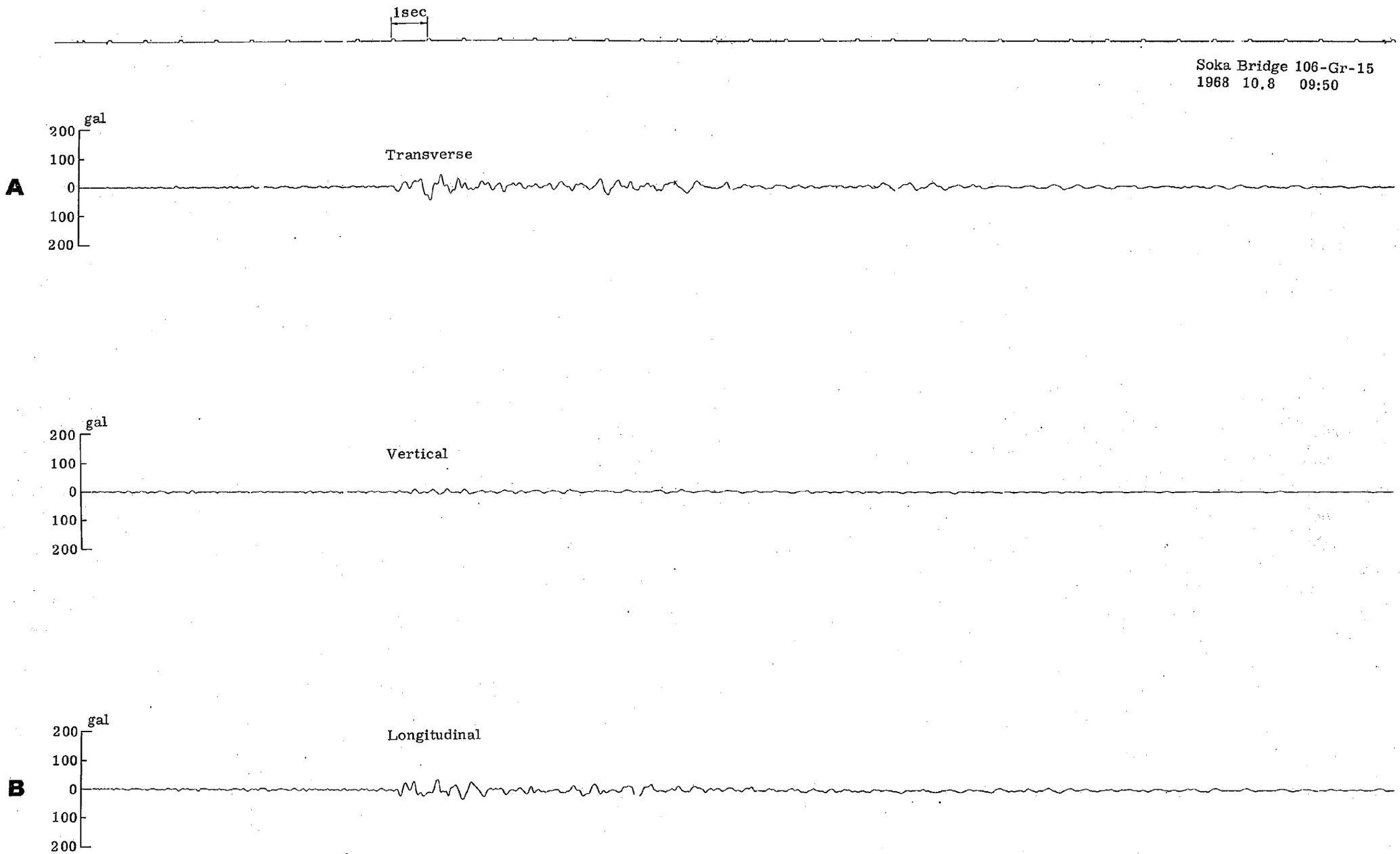
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal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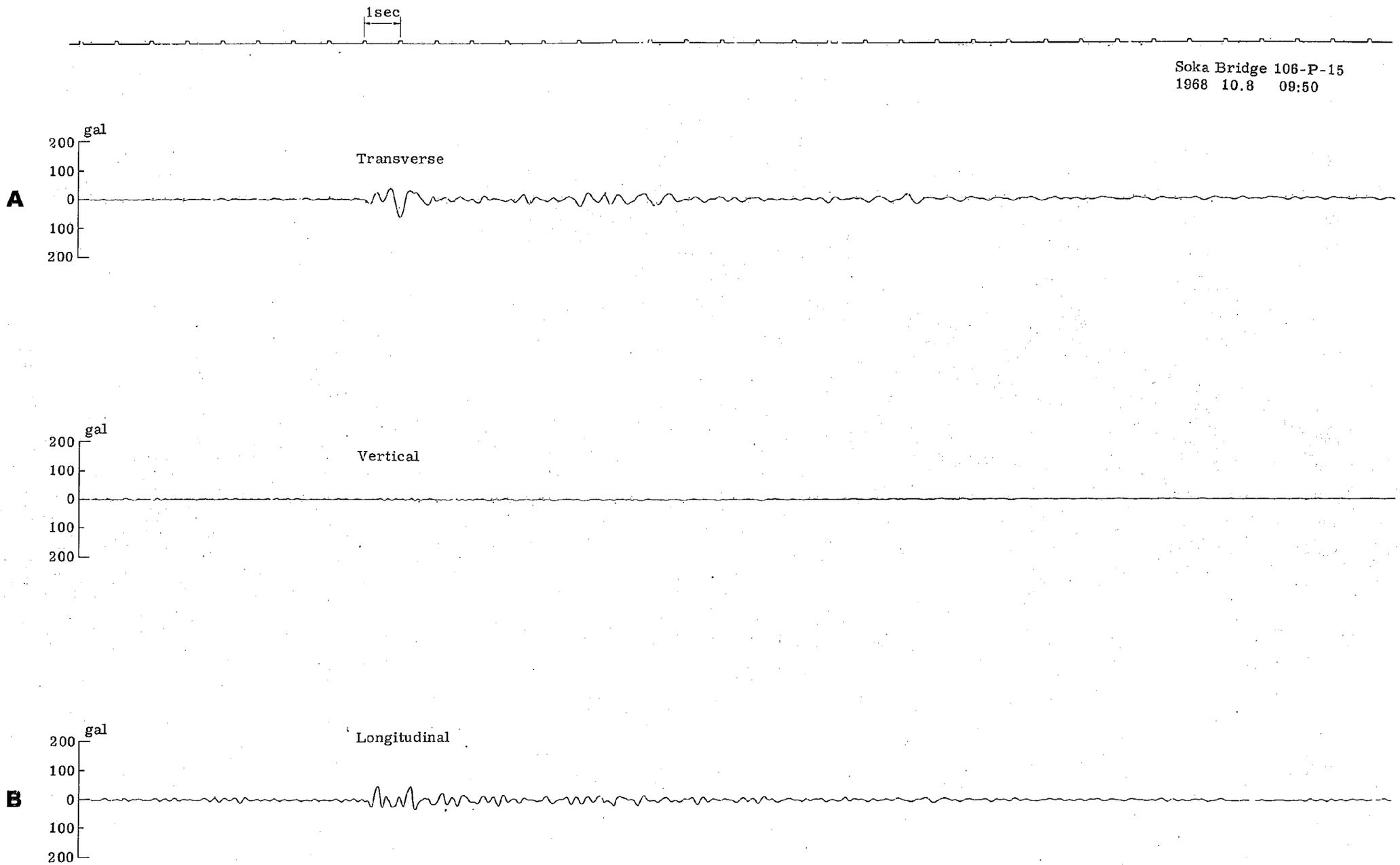
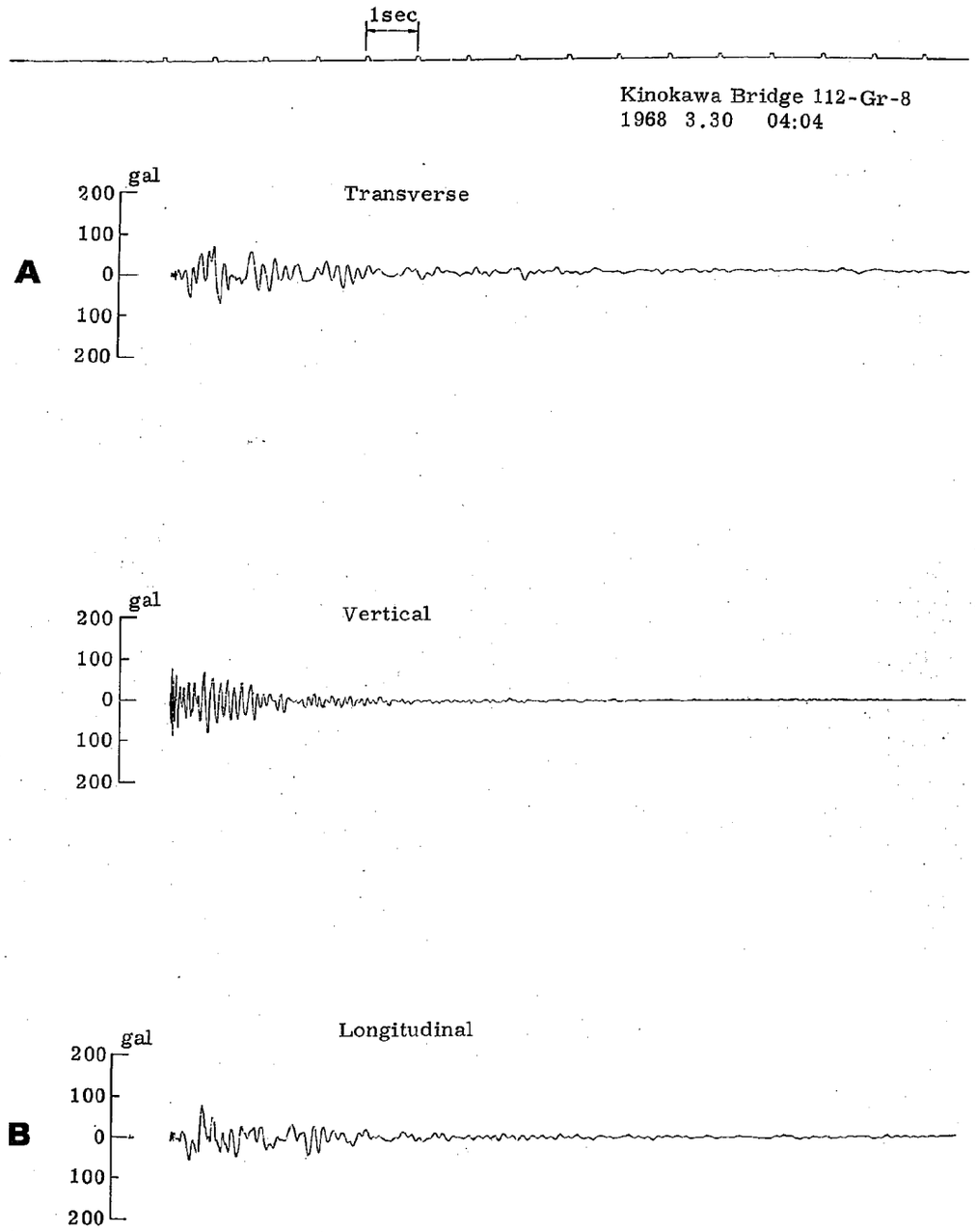
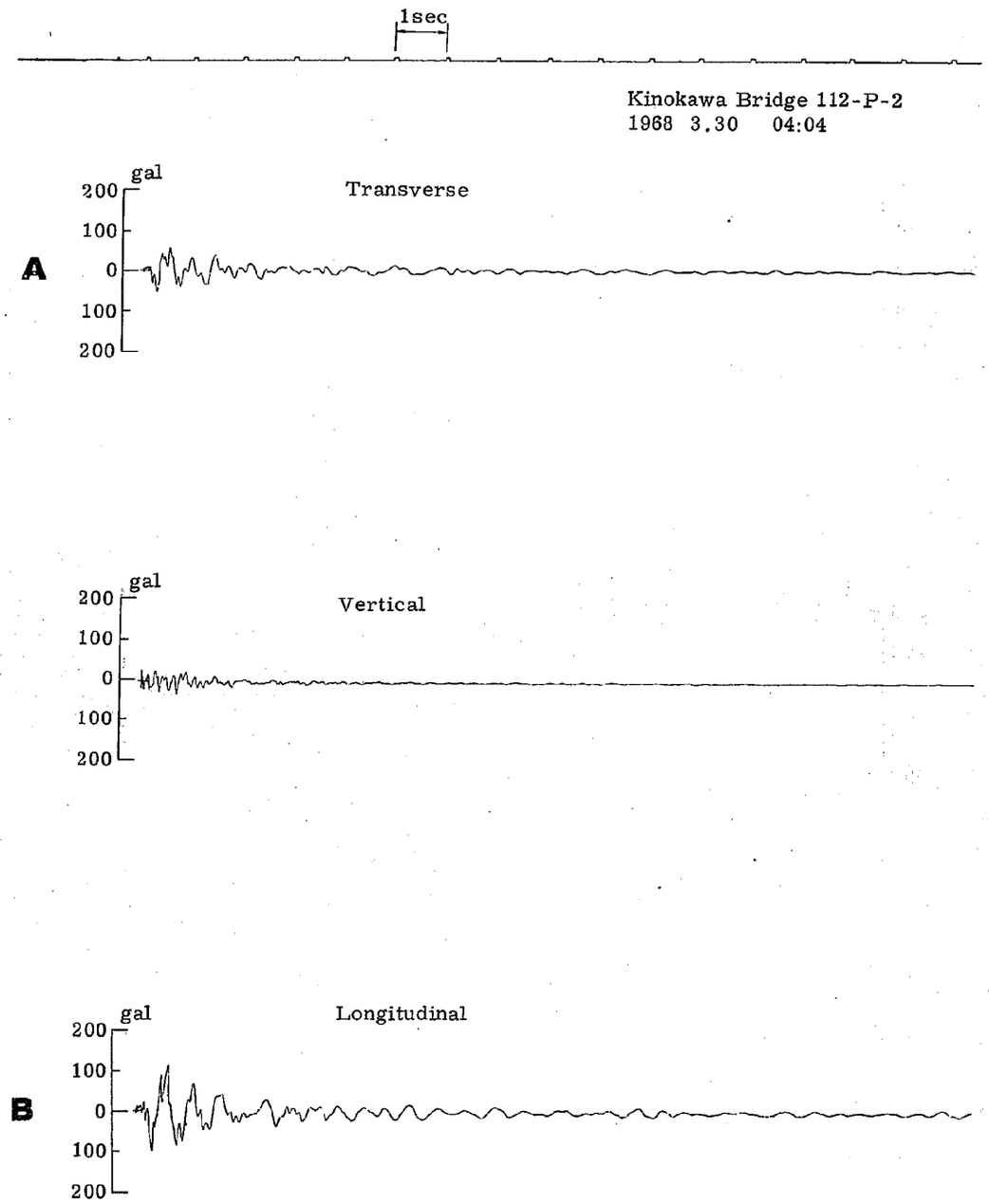
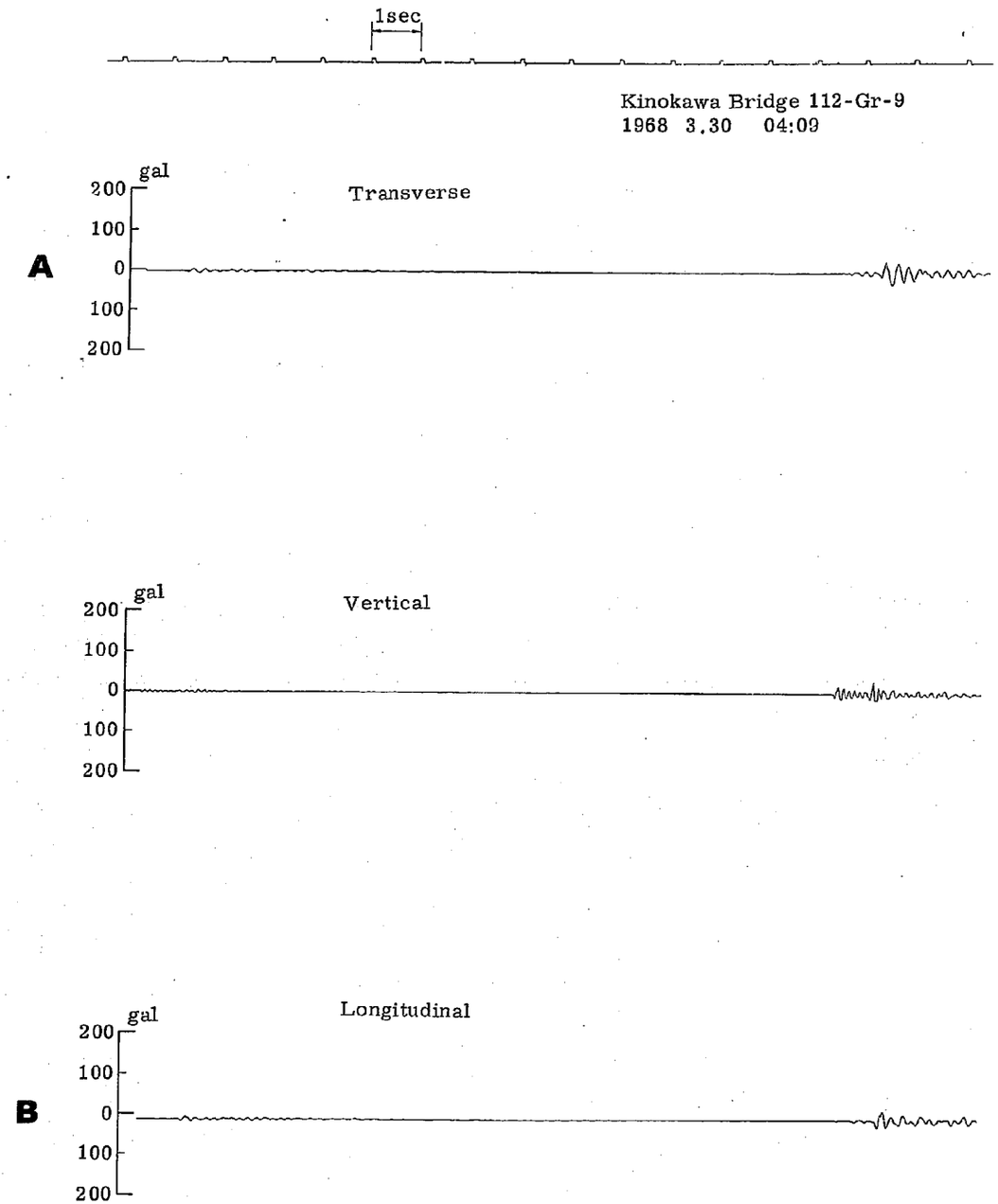
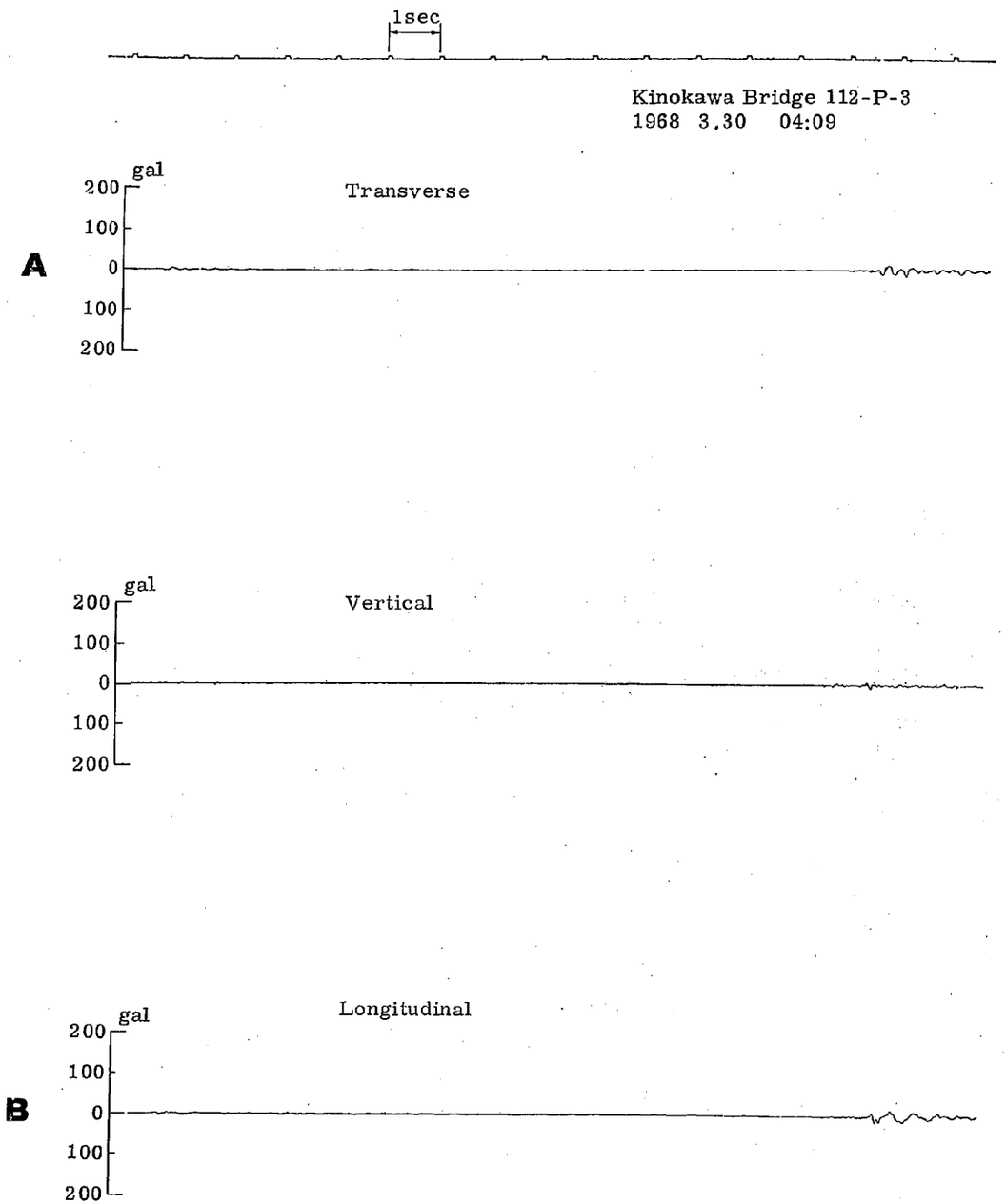
Soka Bridge 106-Gr-15
1968 10.8 09:50
gal
200
100
0
100
200
Transverse
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
Longitudinal
B

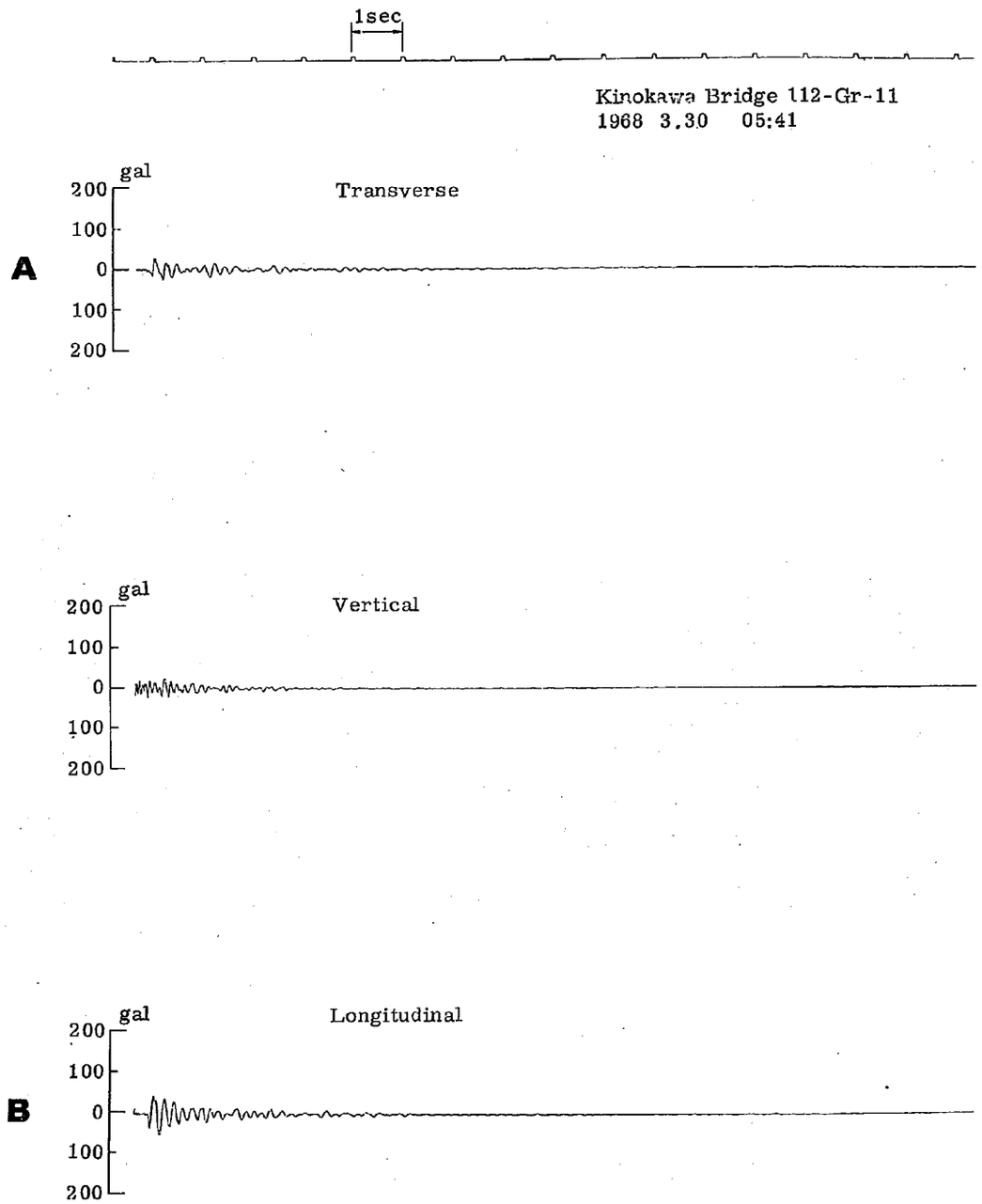

1sec
Soka Bridge 106-P-15
1968 10.8 09:50
gal
200
100
0
100
200
A
Transverse
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Longitudinal

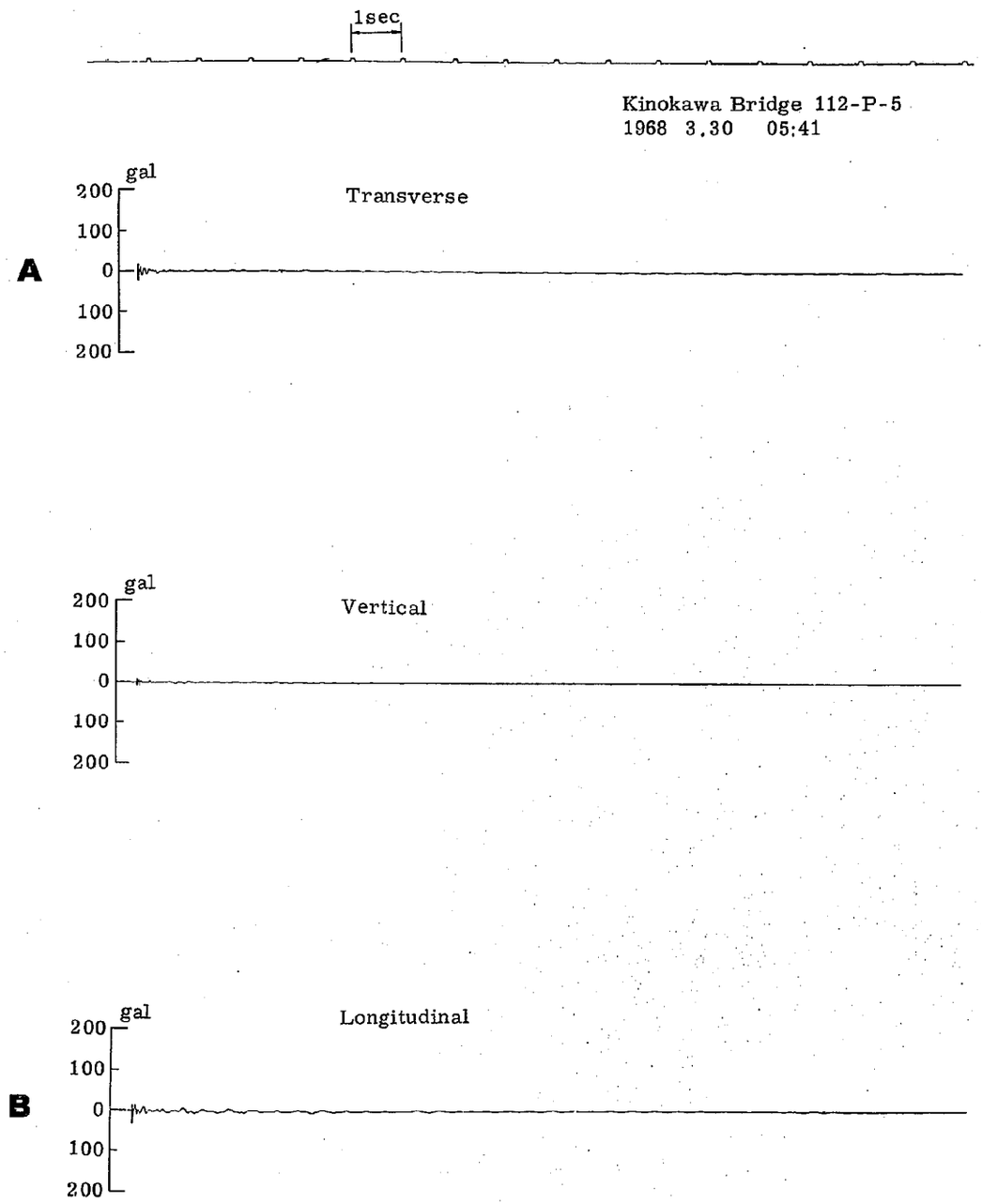

1sec
Kinokawa Bridge 112-Gr-8
1968 3.30 04:04
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

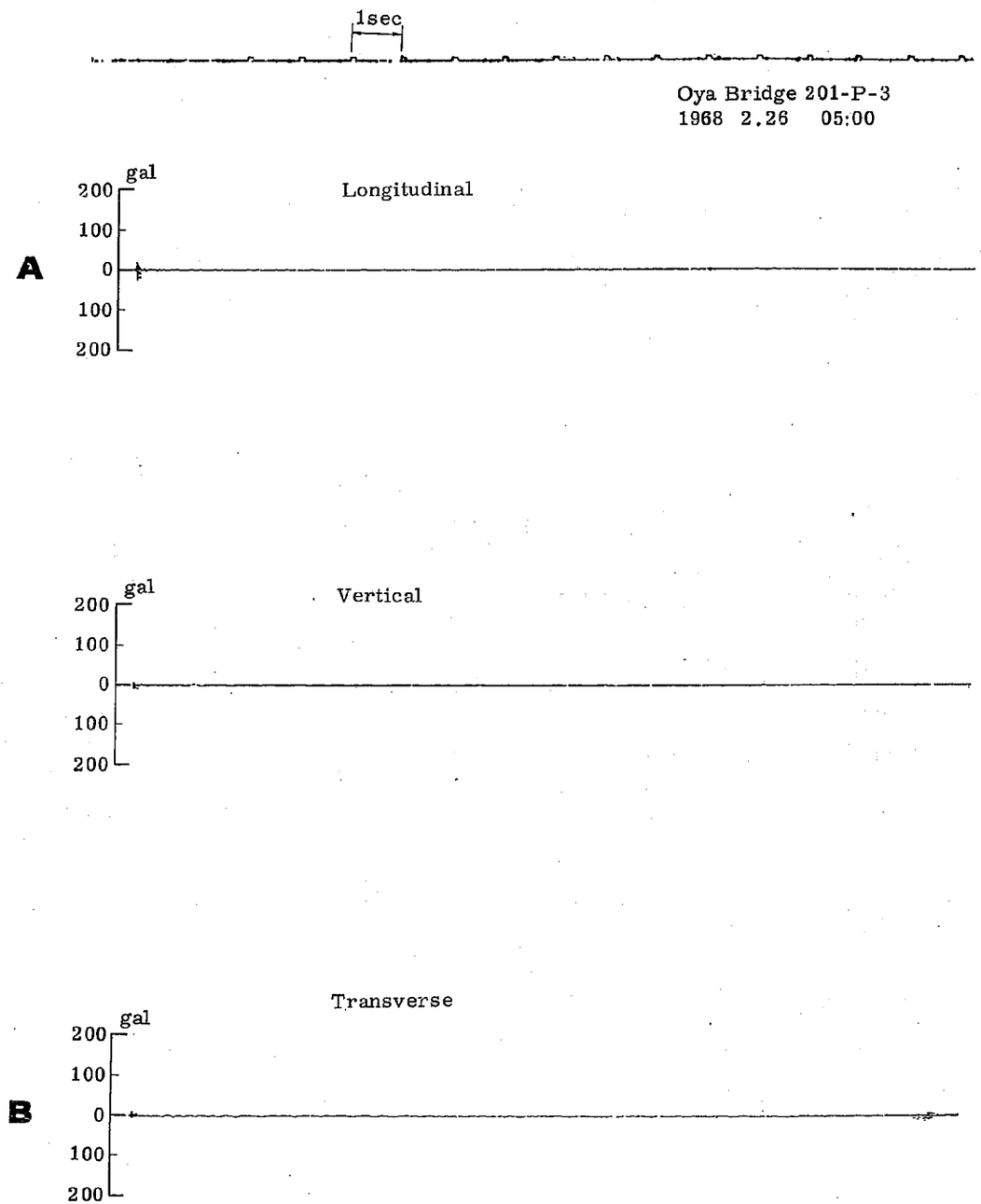

1sec
Kinokawa Bridge 112-P-2
1968 3.30 04:04
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

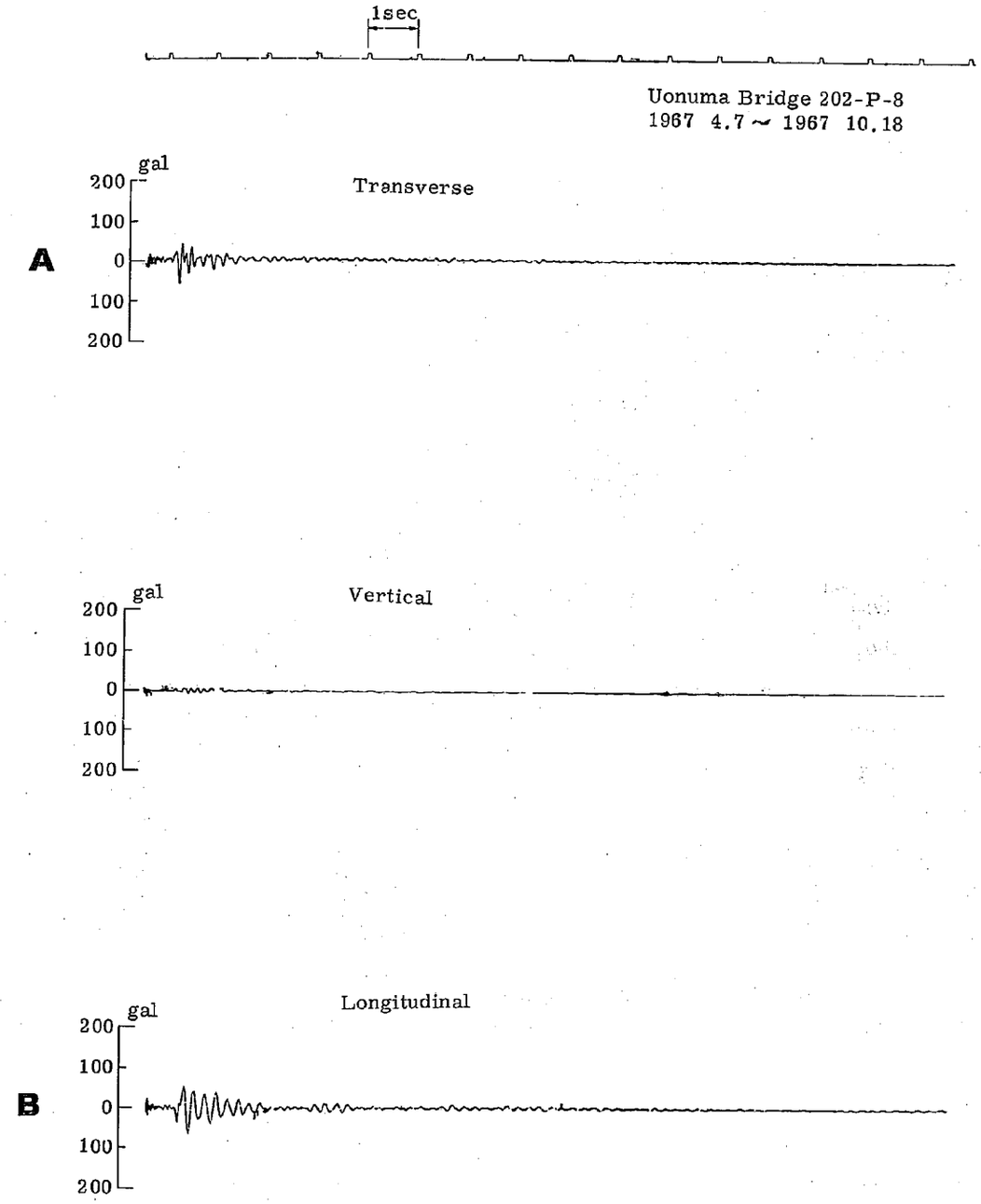

1sec
Kinokawa Bridge 112-Gr-9
1968 3.30 04:09
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal

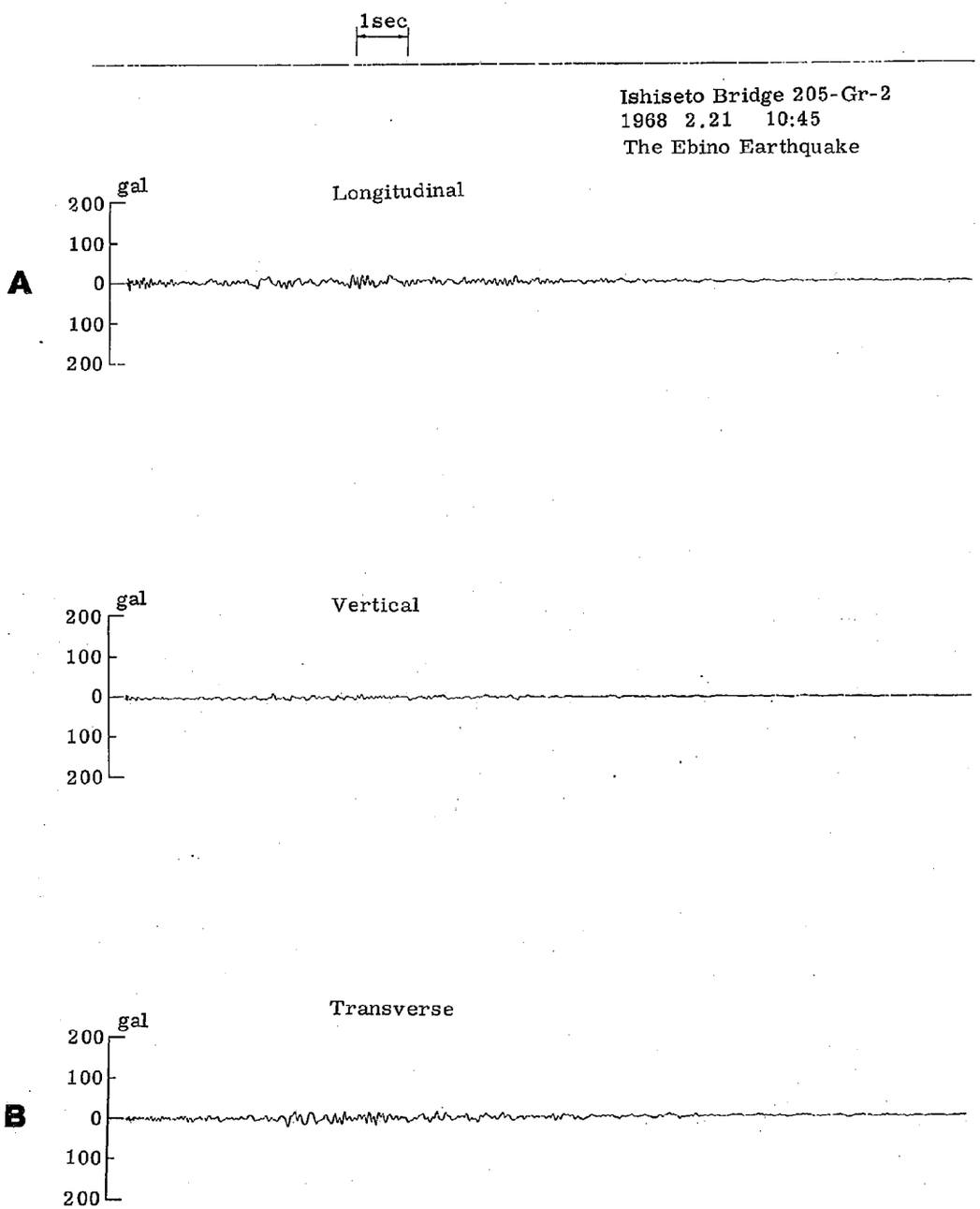

1sec
Kinokawa Bridge 112-P-3
1968 3.30 04:09
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal

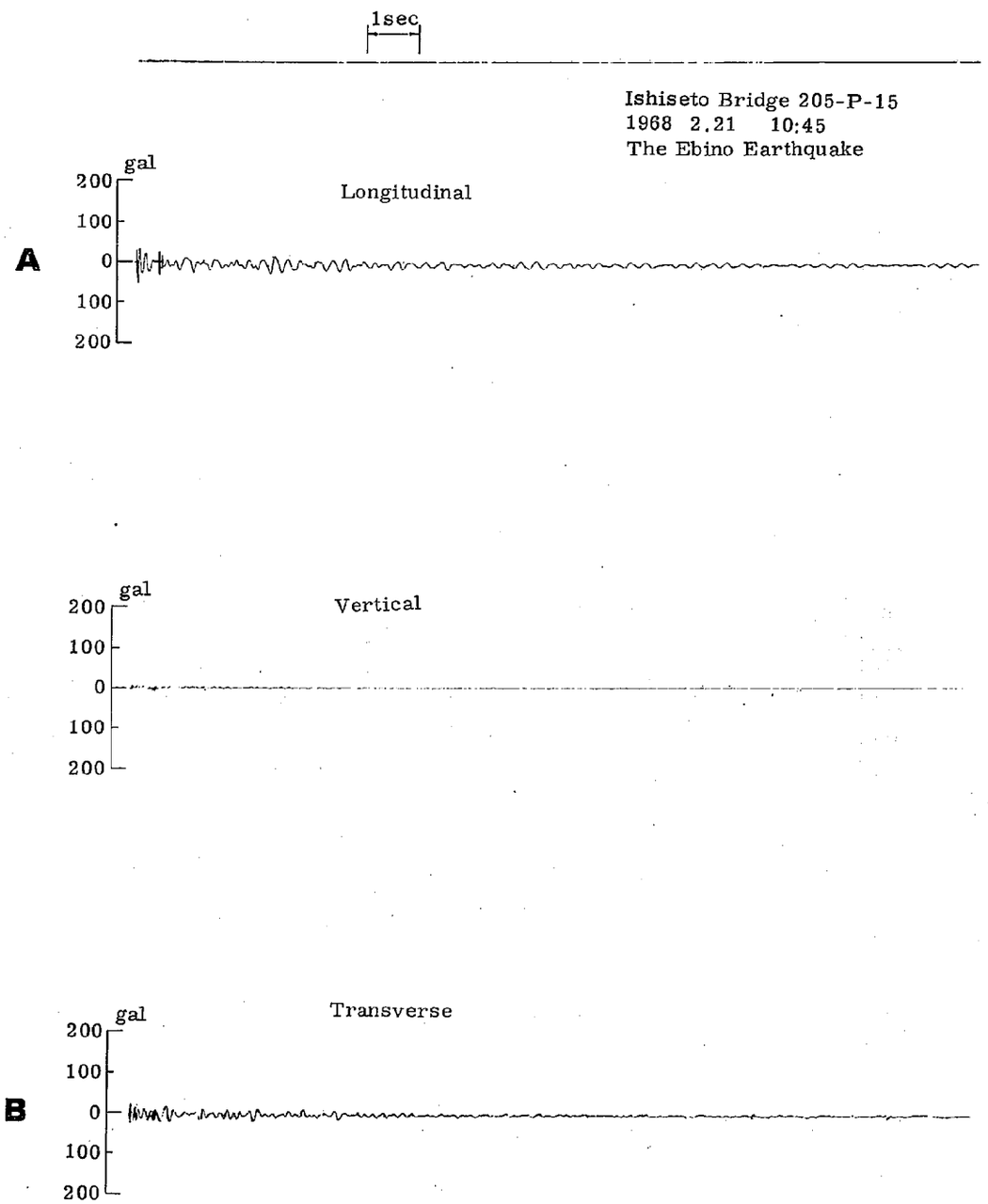

1sec
Kinokawa Bridge 112-Gr-11
1968 3.30 05:41
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal

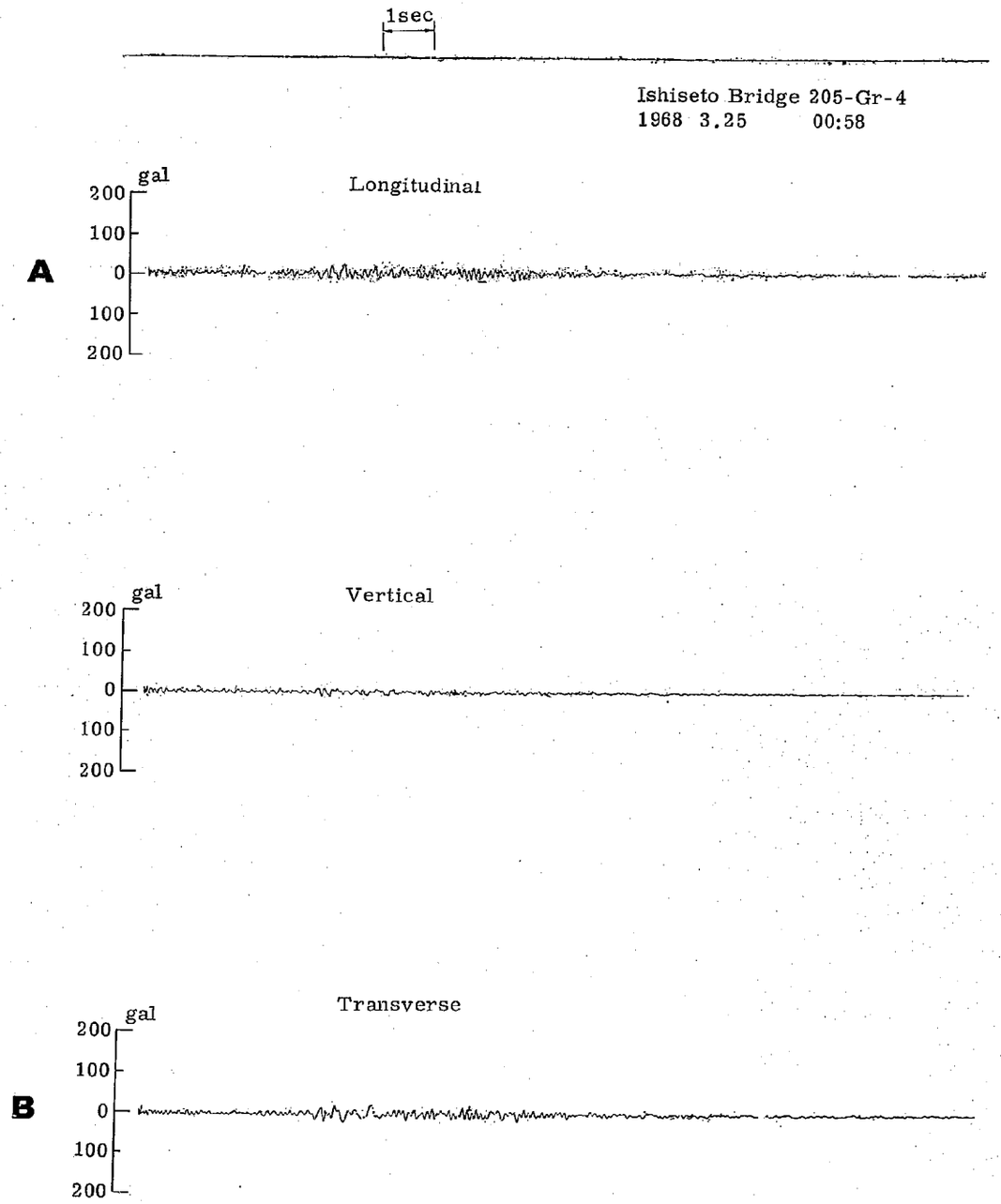

1sec
Kinokawa Bridge 112-P-5
1968 3.30 05:41
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal

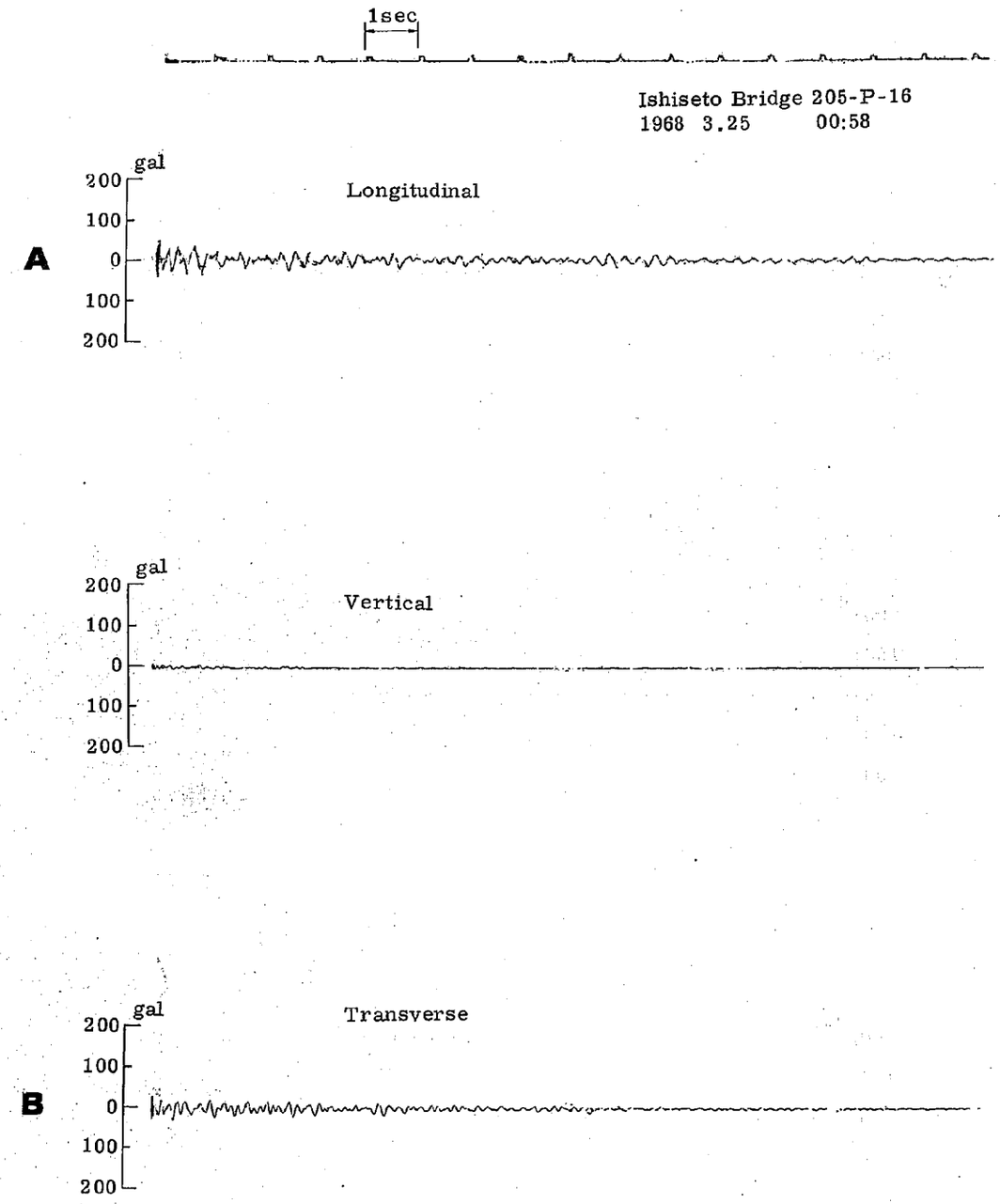

1sec
Oya Bridge 201-P-3
1968 2.26 05:00
A
gal
200
100
0
100
200
Longitudinal
Vertical
Transverse
B


1sec
Uonuma Bridge 202-P-8
1967 4.7 ~ 1967 10.18
A
gal
200
100
0
100
200
Transverse
Vertical
Longitudinal
B


1sec
Ishiseto Bridge 205-Gr-2
1968 2.21 10:45
The Ebino Earthquake
A
gal
Longitudinal
200
100
0
100
200
gal
Vertical
200
100
0
100
200
B
gal
Transverse
200
100
0
100
200


1sec
Ishiseto Bridge 205-P-15
1968 2.21 10:45
The Ebino Earthquake
A
gal
Longitudinal
200
100
0
100
200
gal
Vertical
200
100
0
100
200
B
gal
Transverse
200
100
0
100
200


1sec
Ishiseto Bridge 205-Gr-4
1968 3.25 00:58
A
gal
200
100
0
100
200
Longitudinal
Vertical
B
Transverse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Ishiseto Bridge 205-P-16
1968 3.25 00:58
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gal
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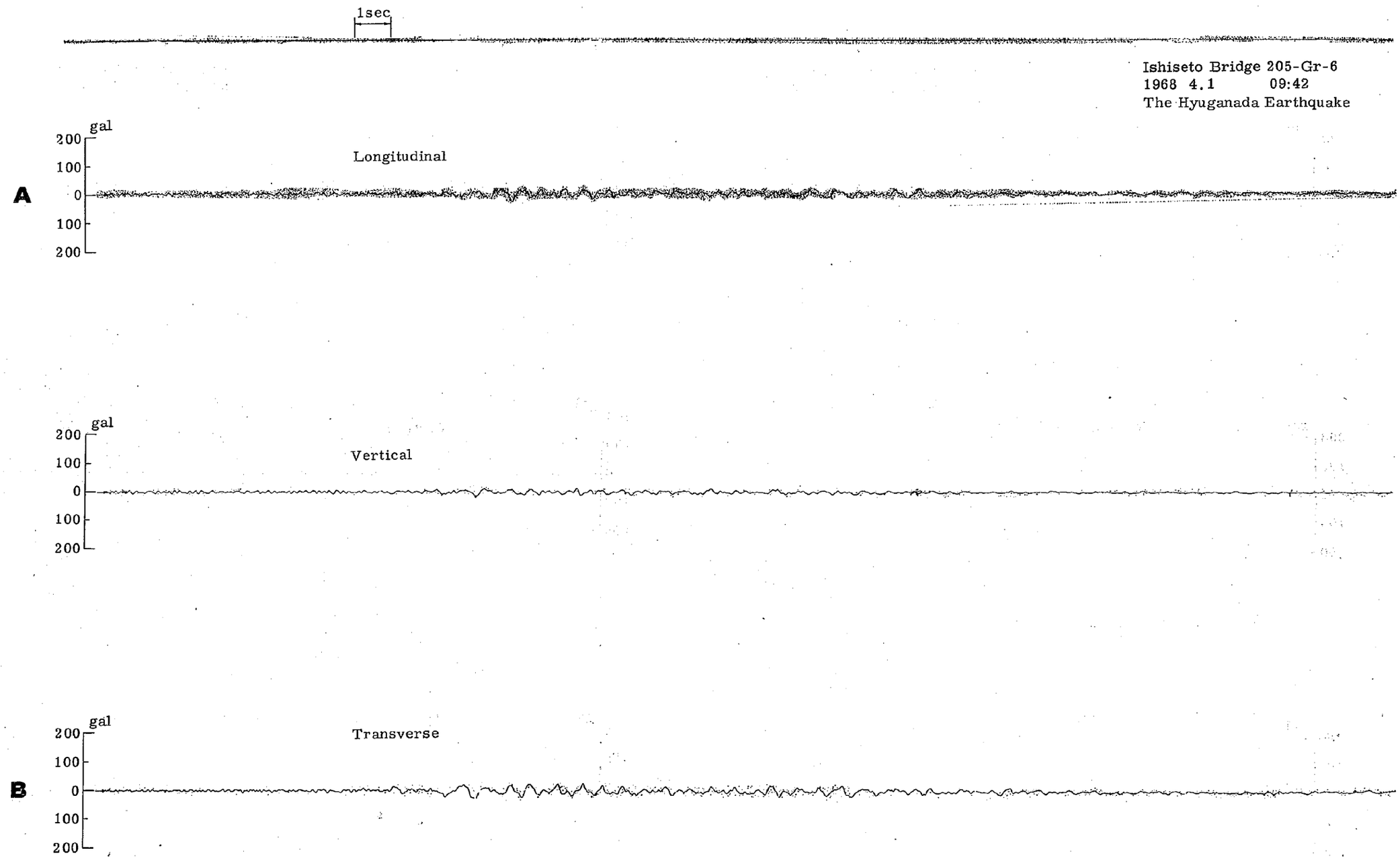
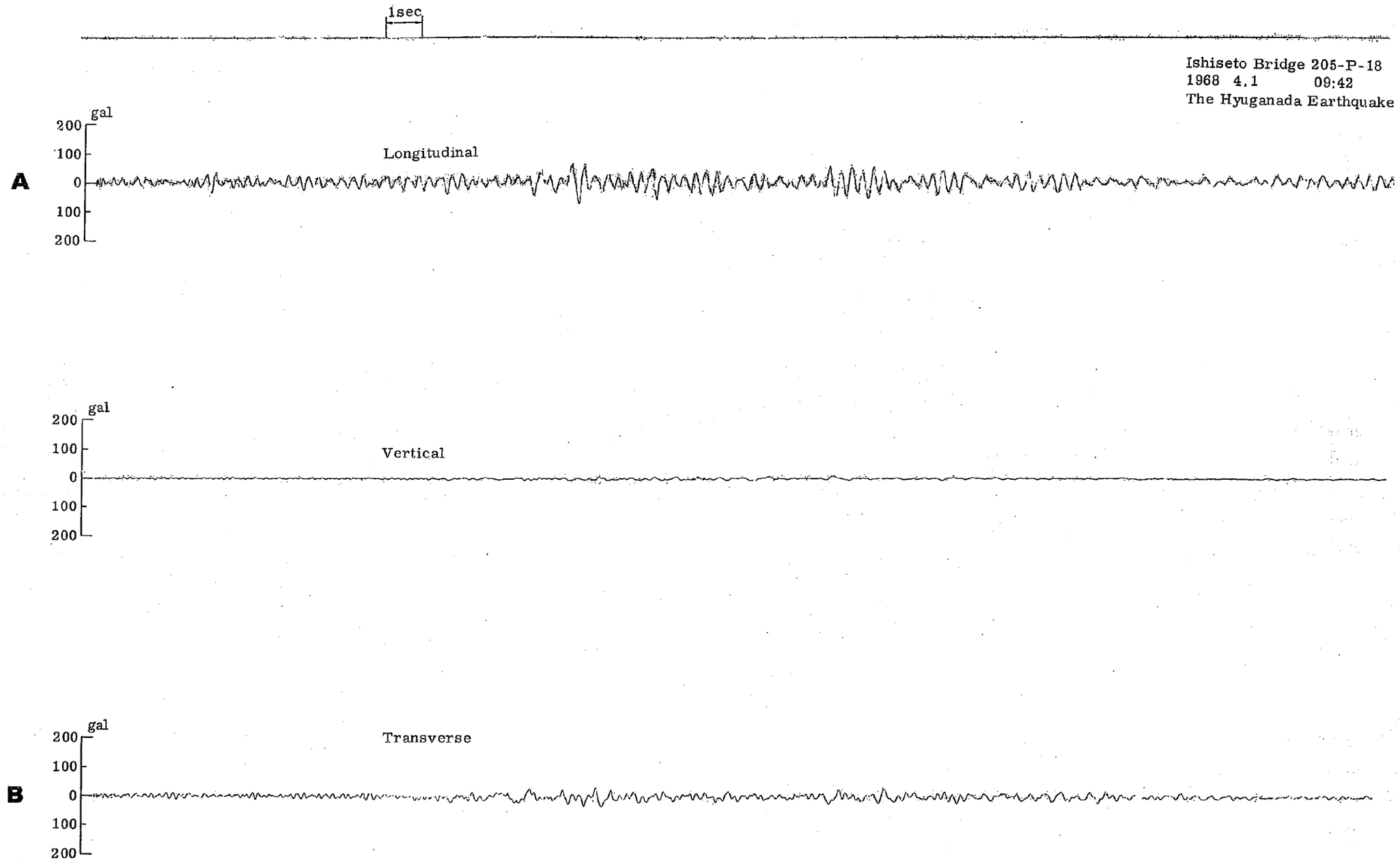
100
200
Longitudinal
Vertical
B
Transverse


1sec
Ishiseto Bridge 205-Gr-6
1968 4.1 09:42
The Hyuganada Earthquake
gal
200
100
0
100
200
Longitudinal
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
Transverse
B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Ishiseto Bridge 205-P-18
1968 4.1 09:42
The Hyuganada Earthquake
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gal
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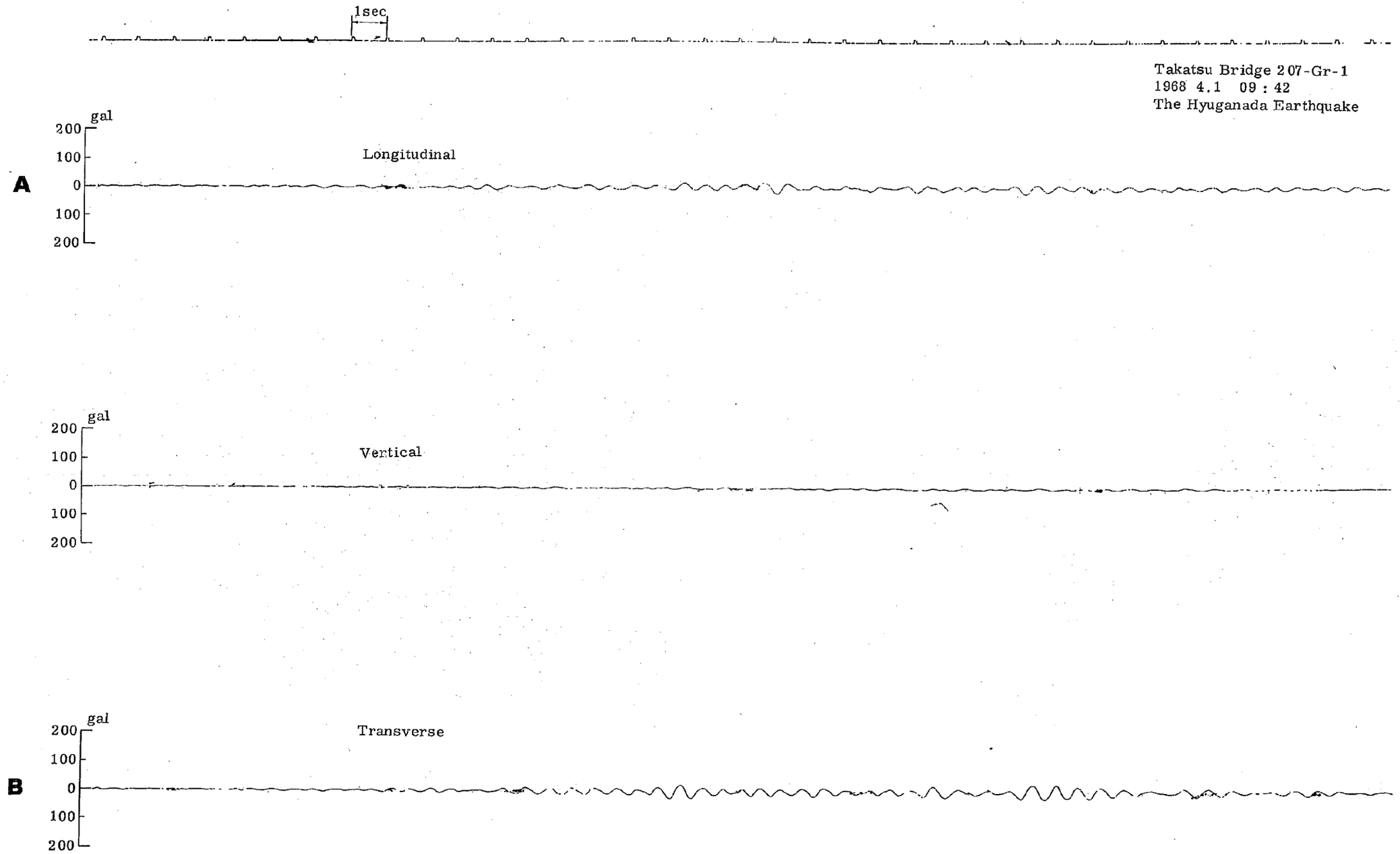
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse


1sec
Takatsu Bridge 207-Gr-1
1968 4.1 09 : 42
The Hyuganada Earthquake
A
gal
200
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200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
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100
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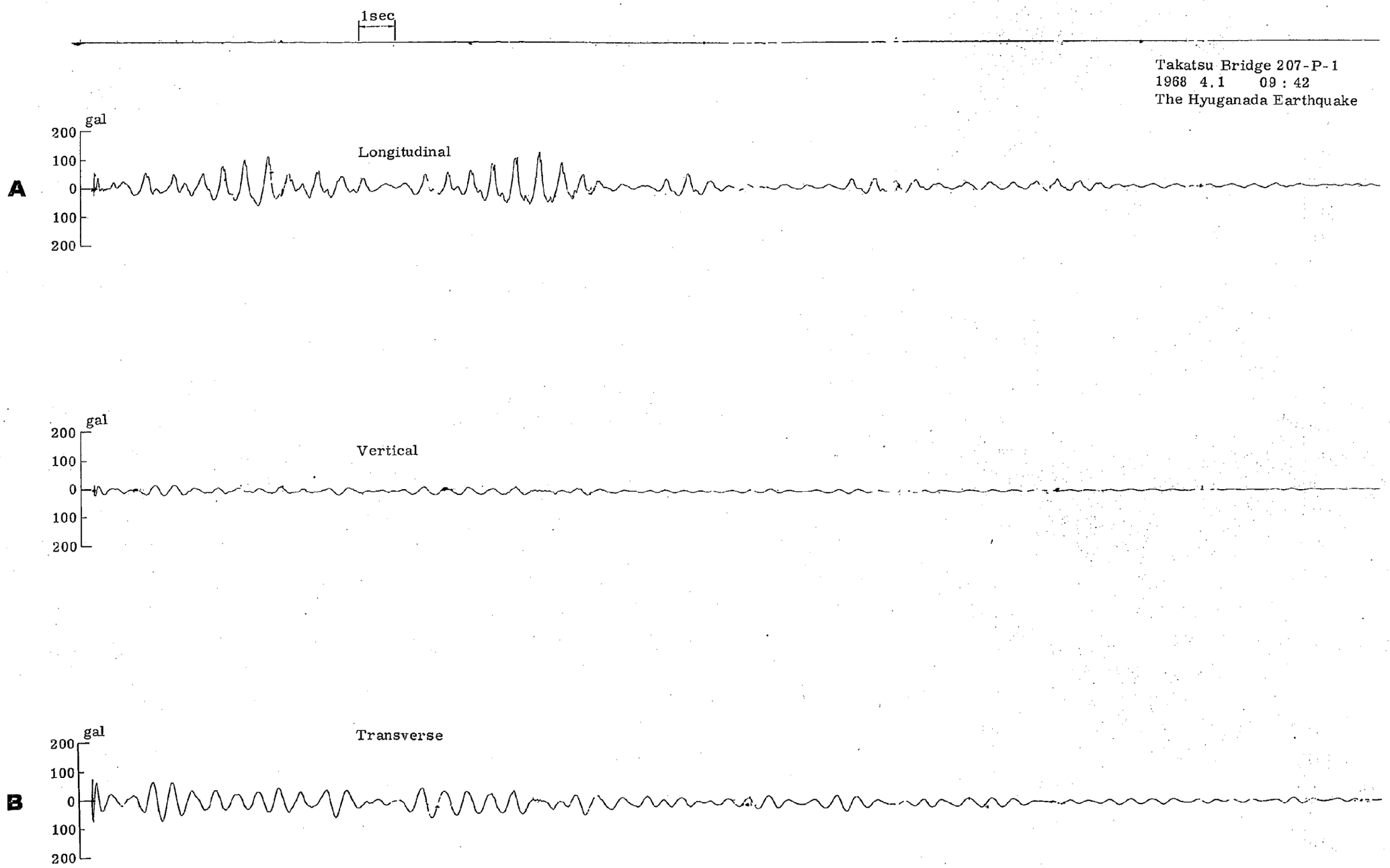
100
200
Transverse


1sec
Takatsu Bridge 207-P-1
1968 4.1 09 : 42
The Hyuganada Earthquake
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gal
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Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
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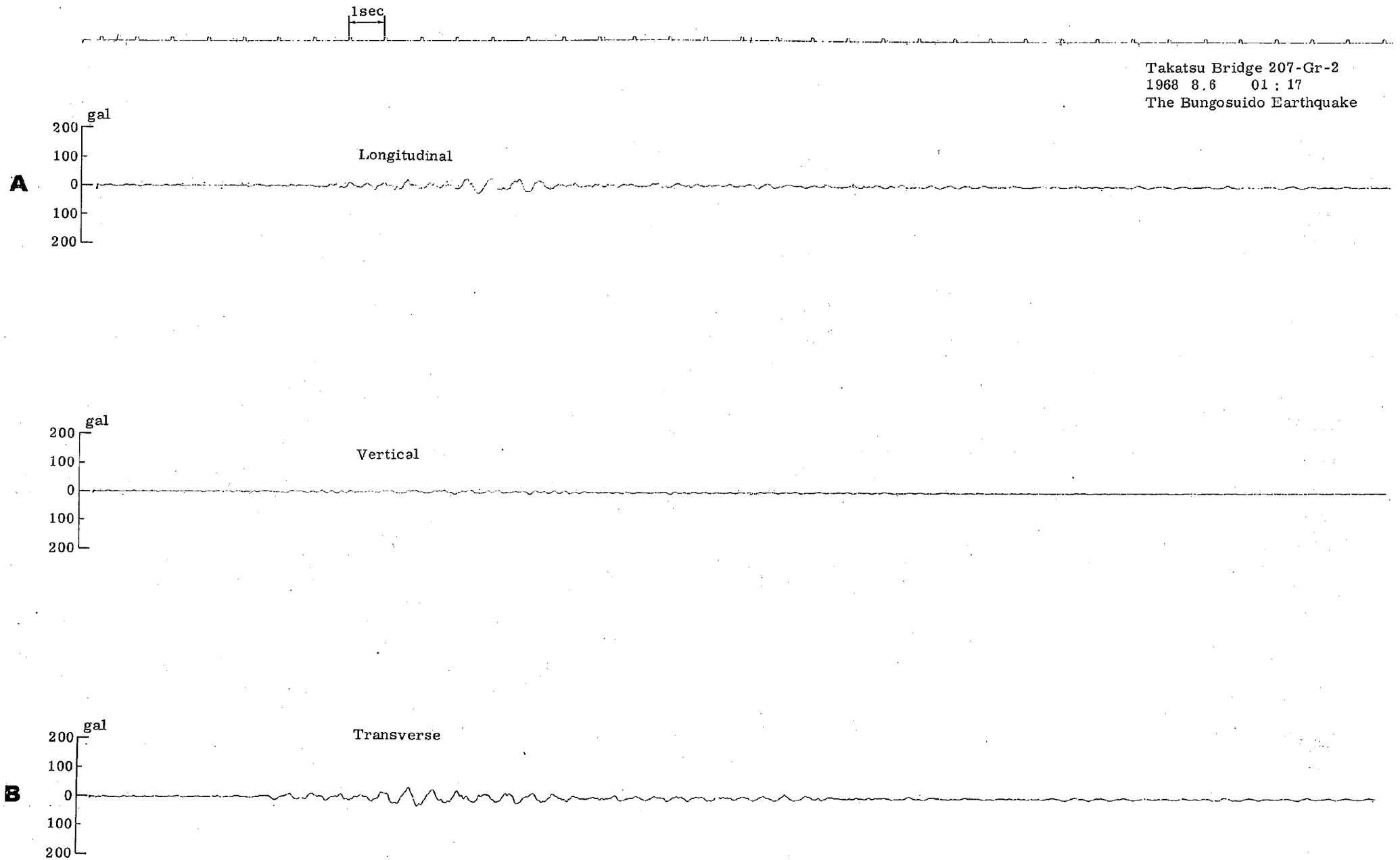
0
100
200
Transverse


1sec
Takatsu Bridge 207-Gr-2
1968 8.6 01 : 17
The Bungosuido Earthquake
A
gal
200
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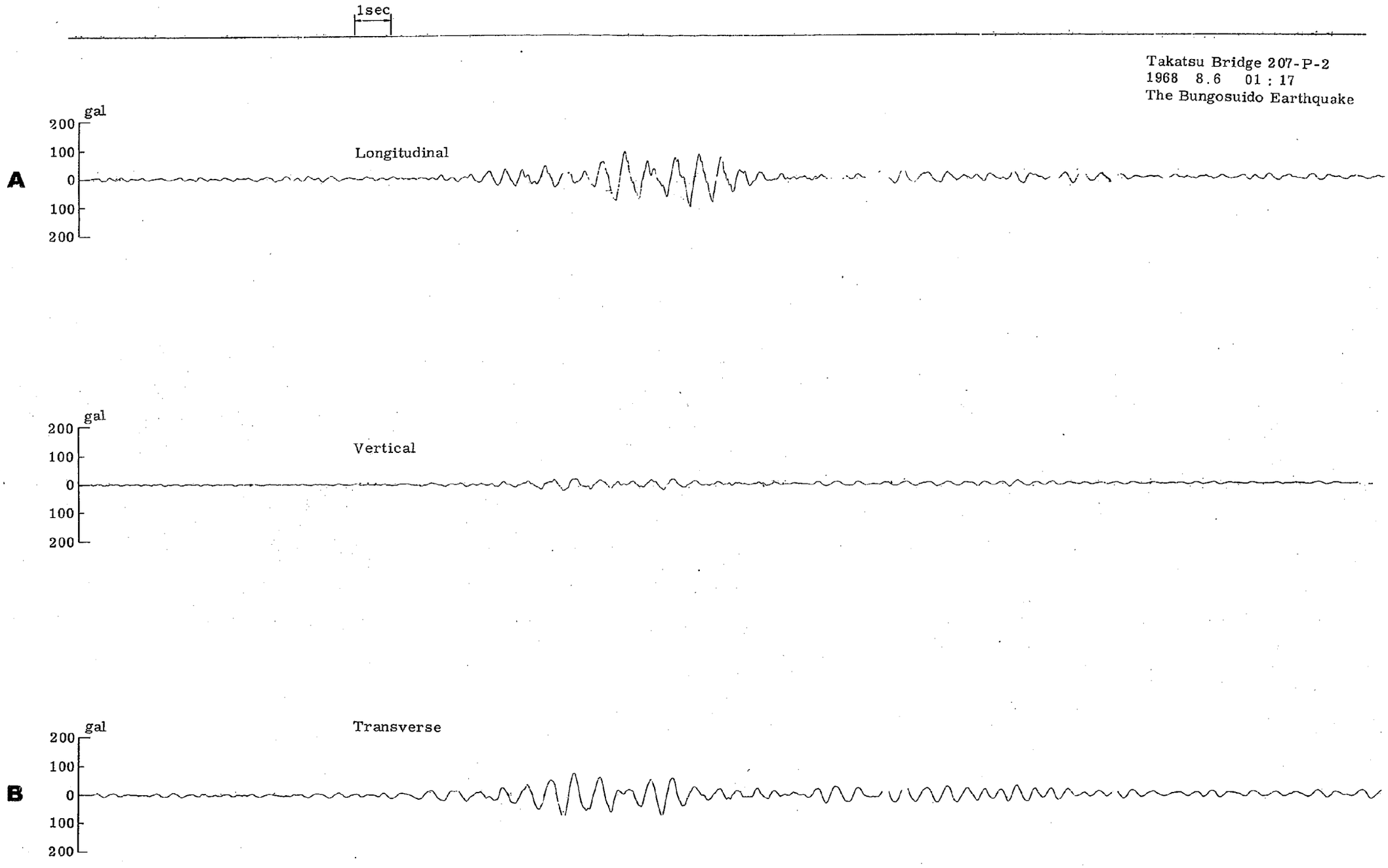
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse


1sec
Takatsu Bridge 207-P-2
1968 8.6 01 : 17
The Bungosuido Earthquake
A
gal
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Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
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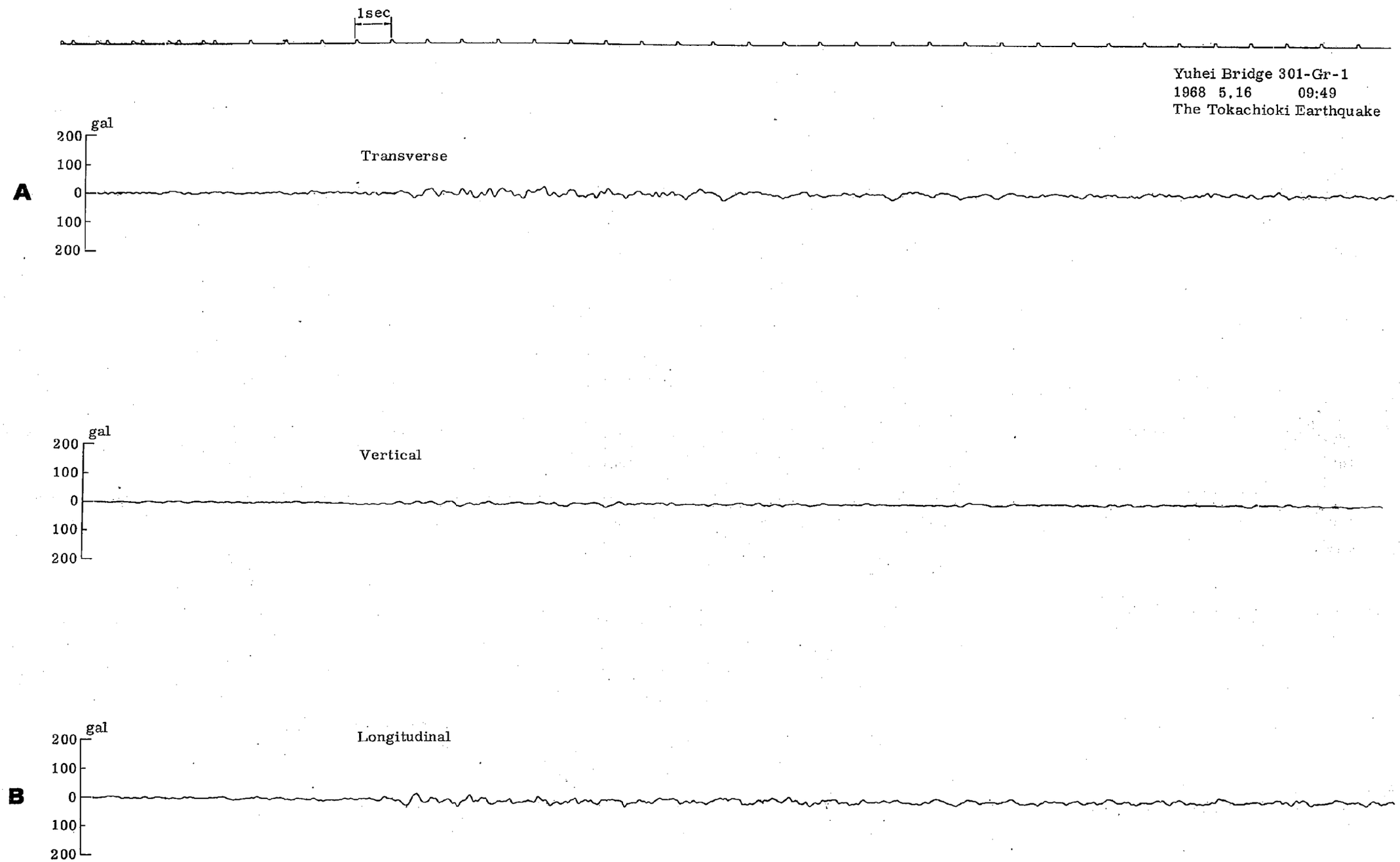
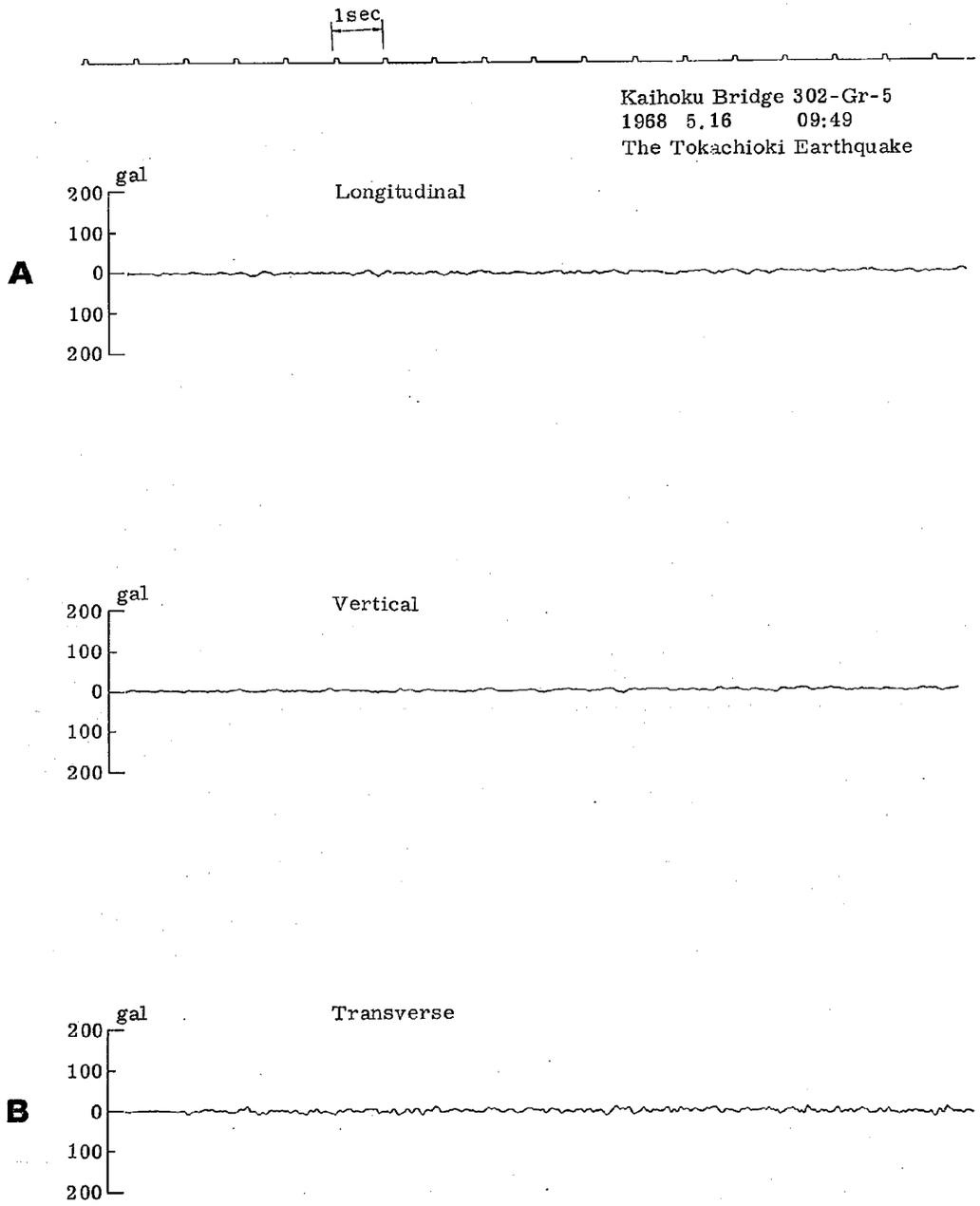
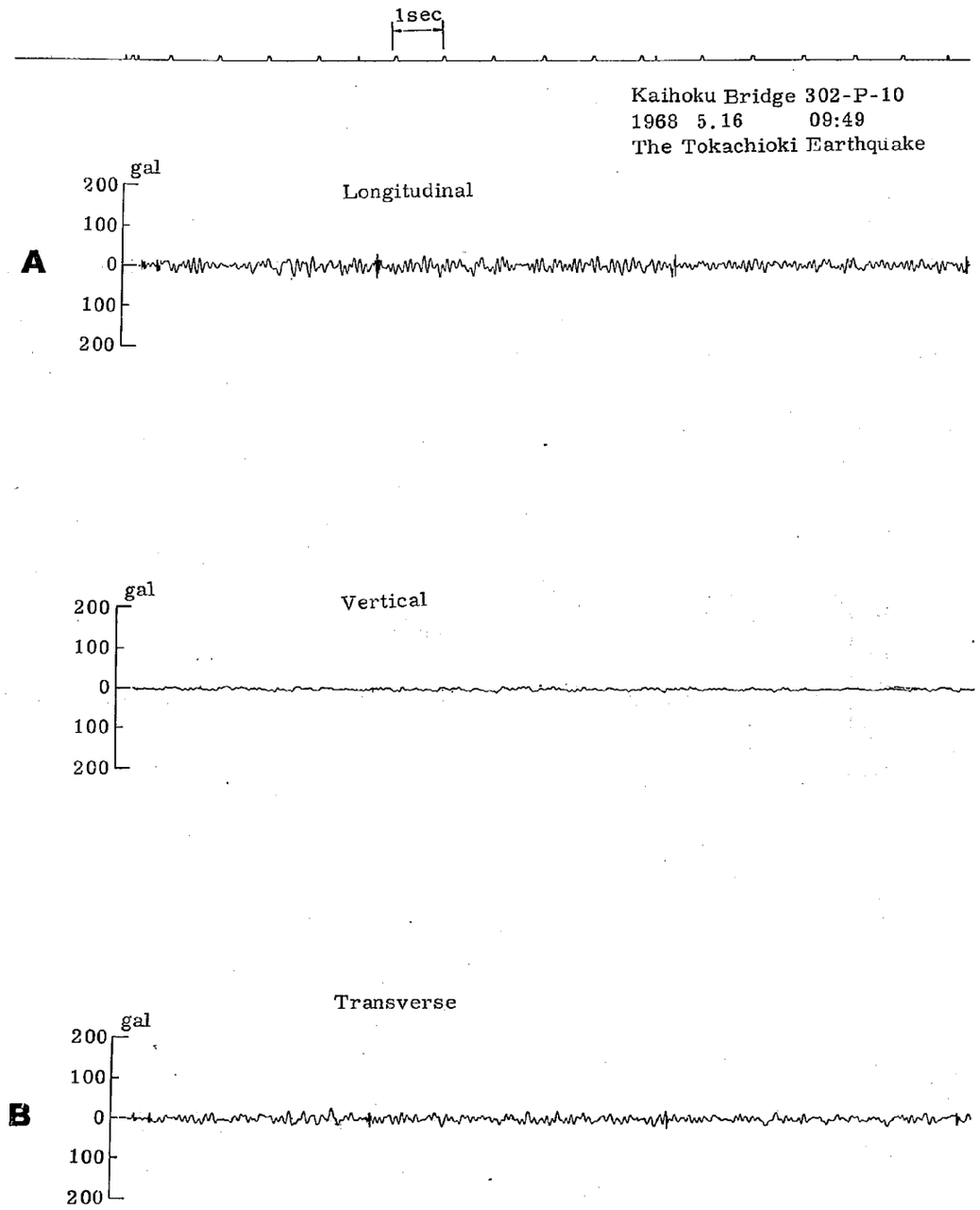
100
0
100
200
Transverse


1sec
Yuhei Bridge 301-Gr-1
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal


1sec
Kaihoku Bridge 302-Gr-5
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse


1sec
Kaihoku Bridge 302-P-10
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
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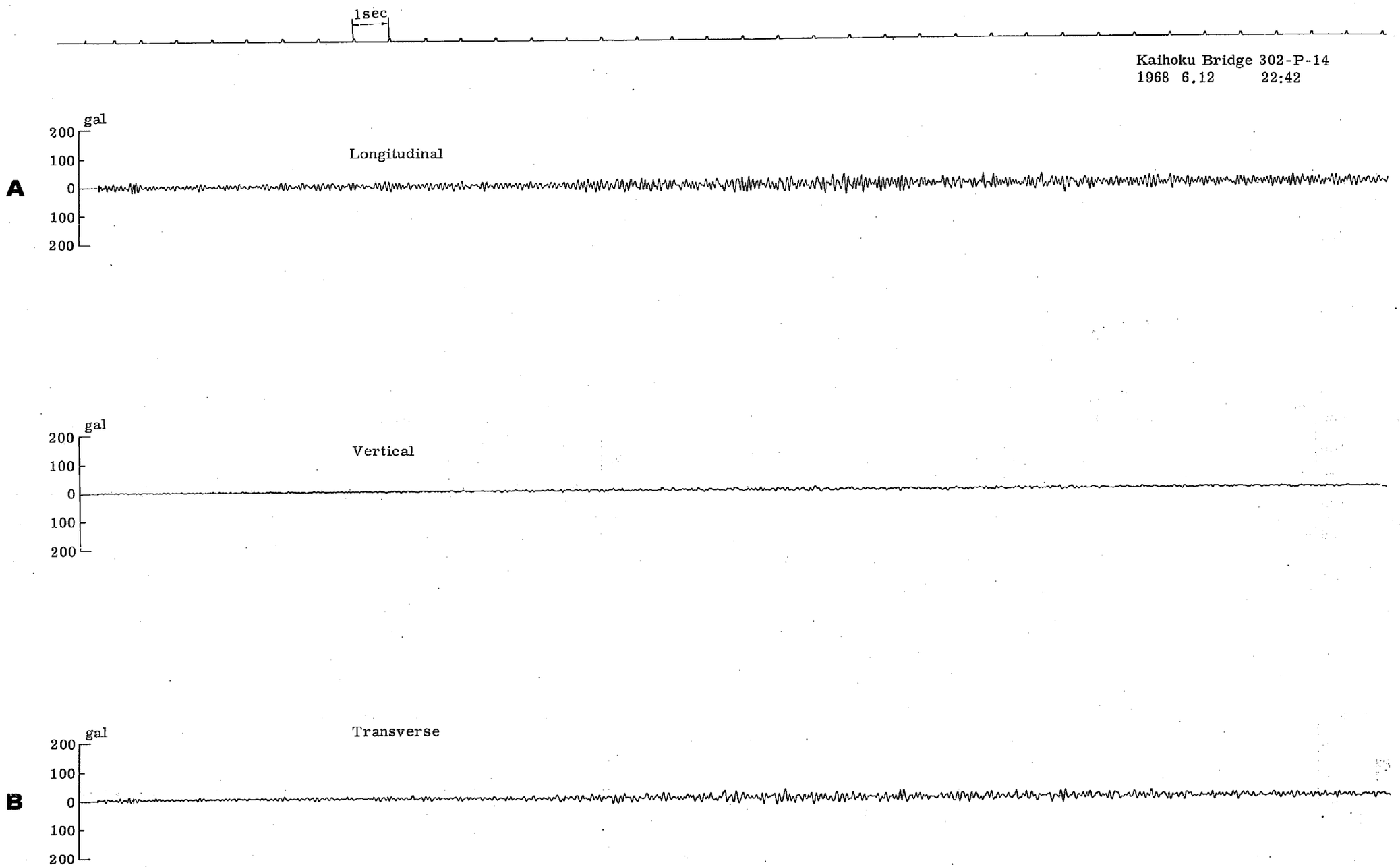
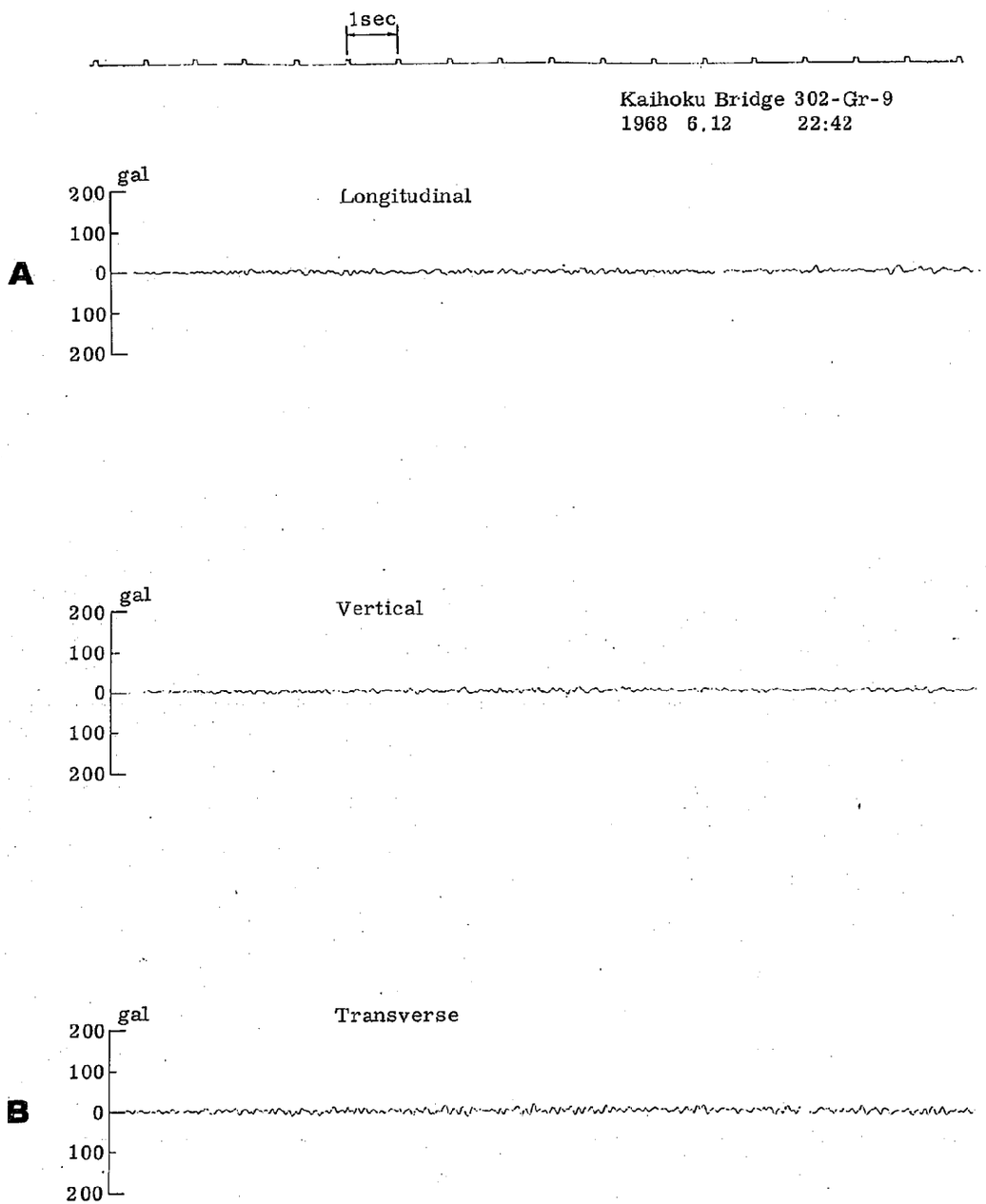
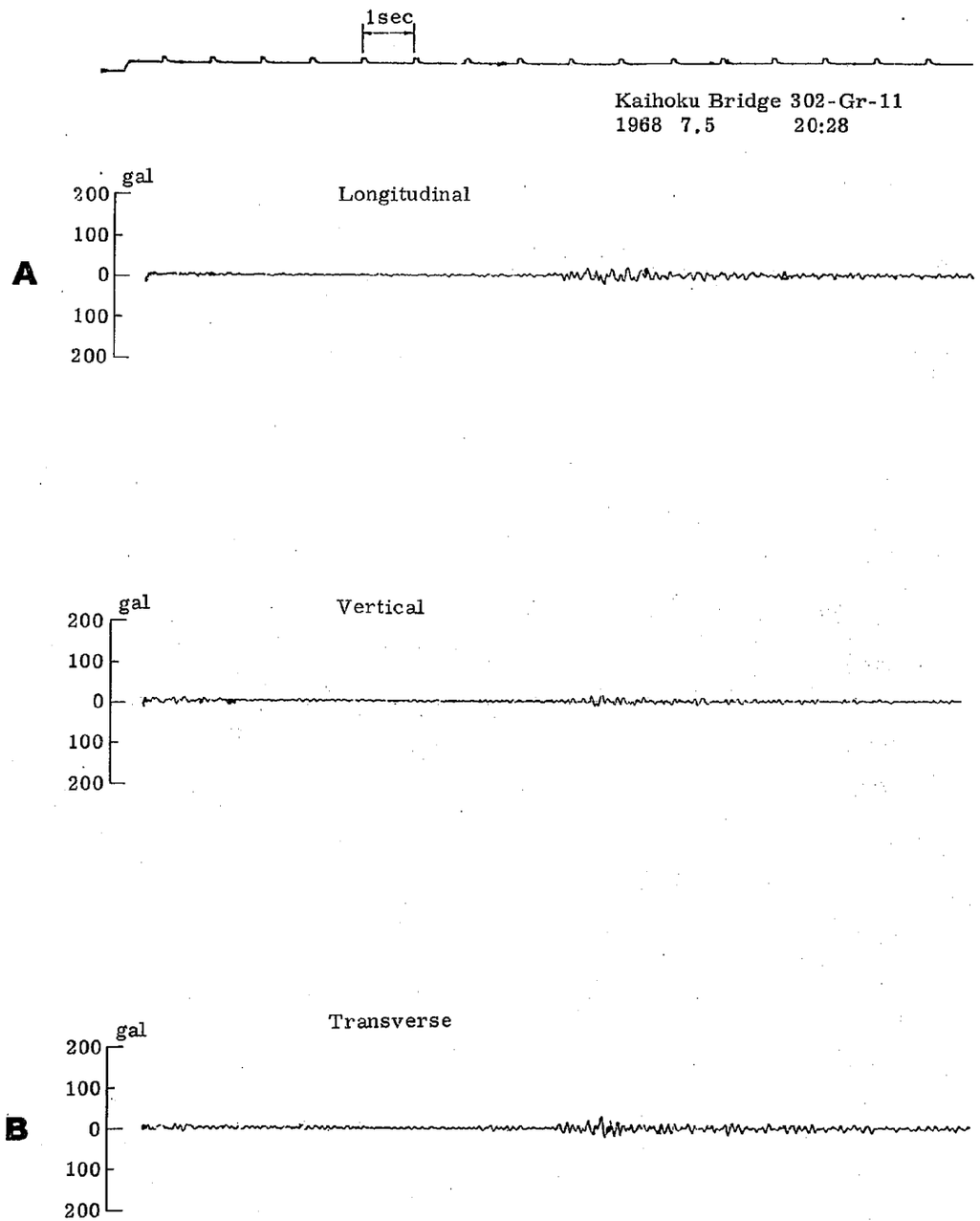
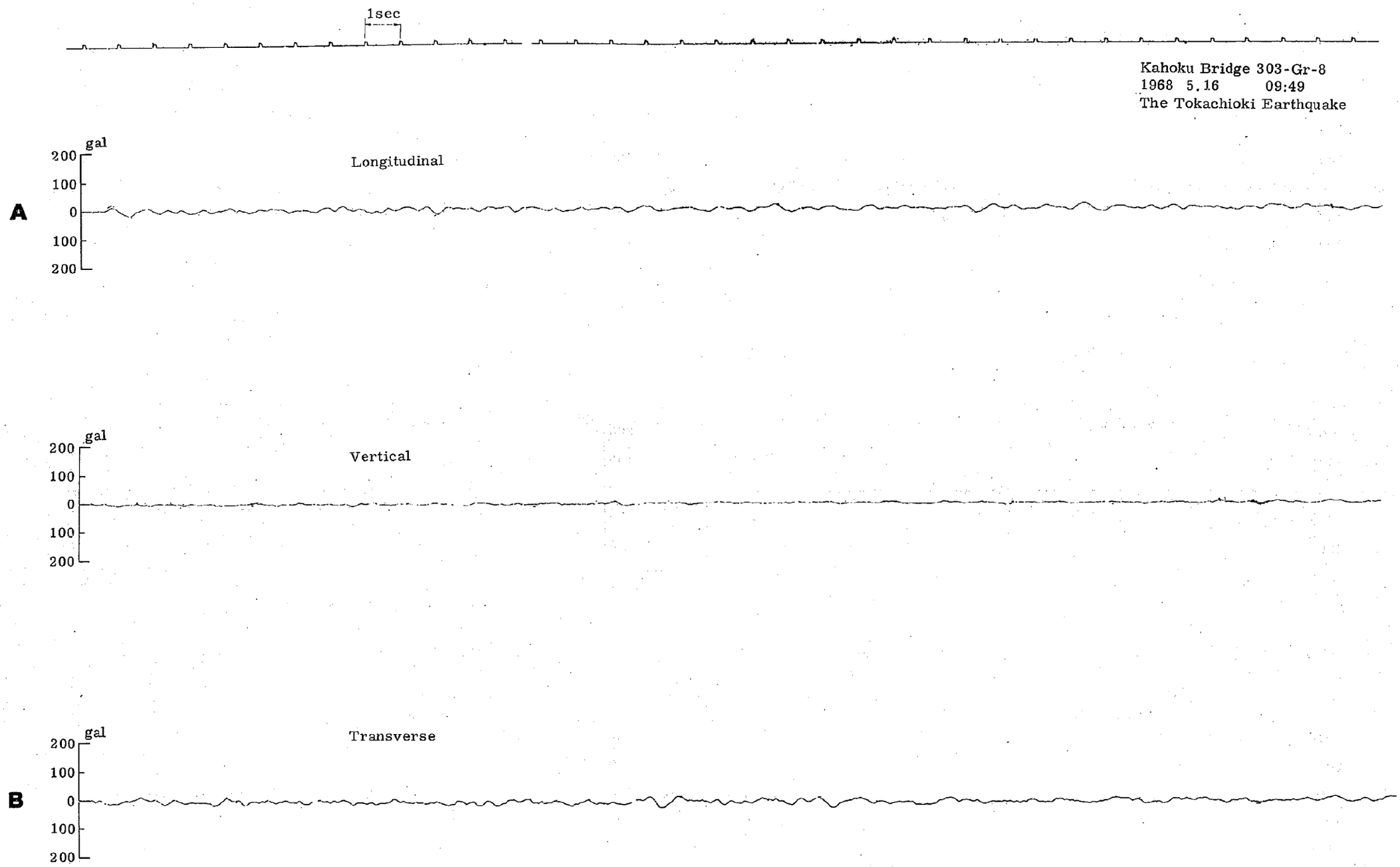
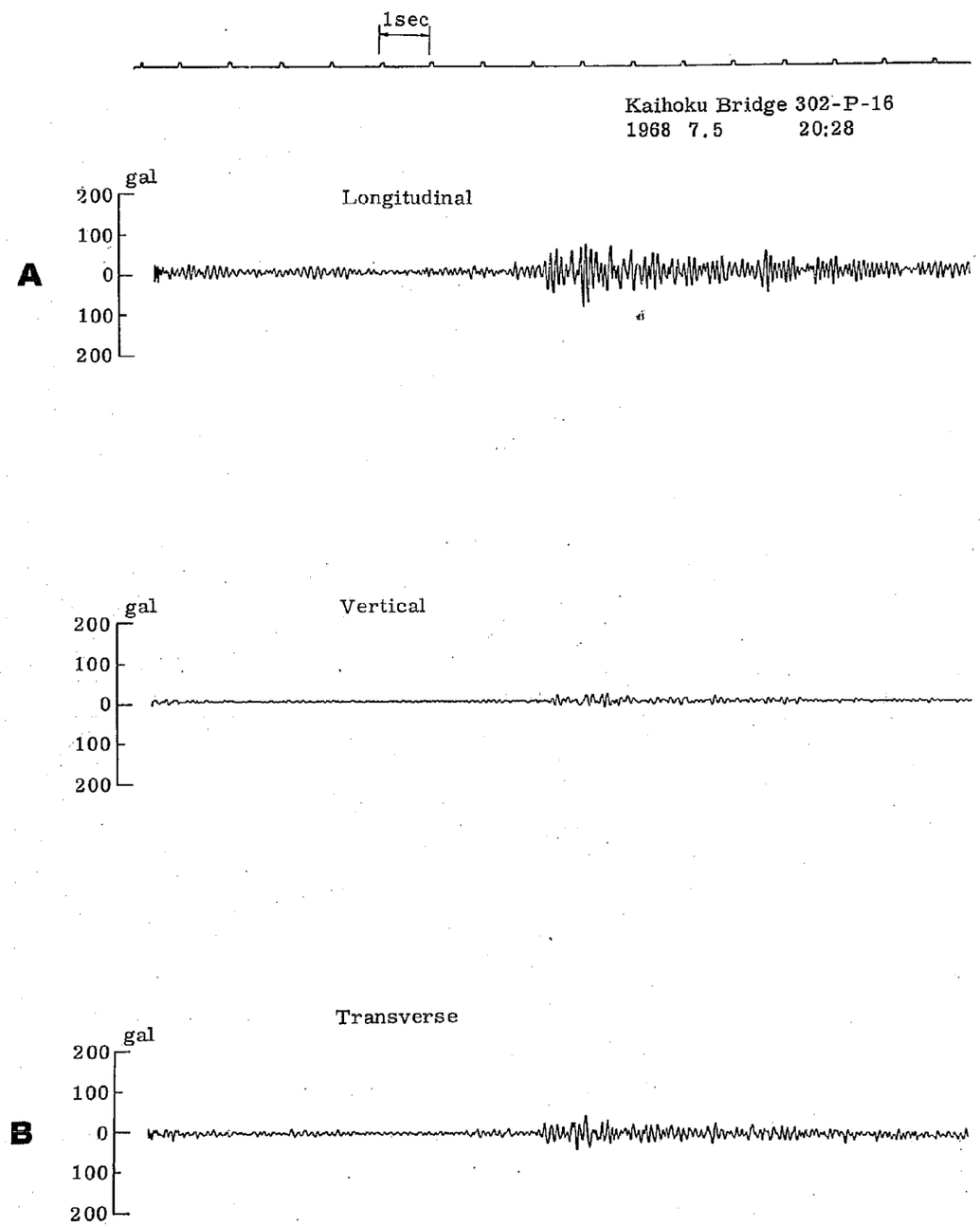
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

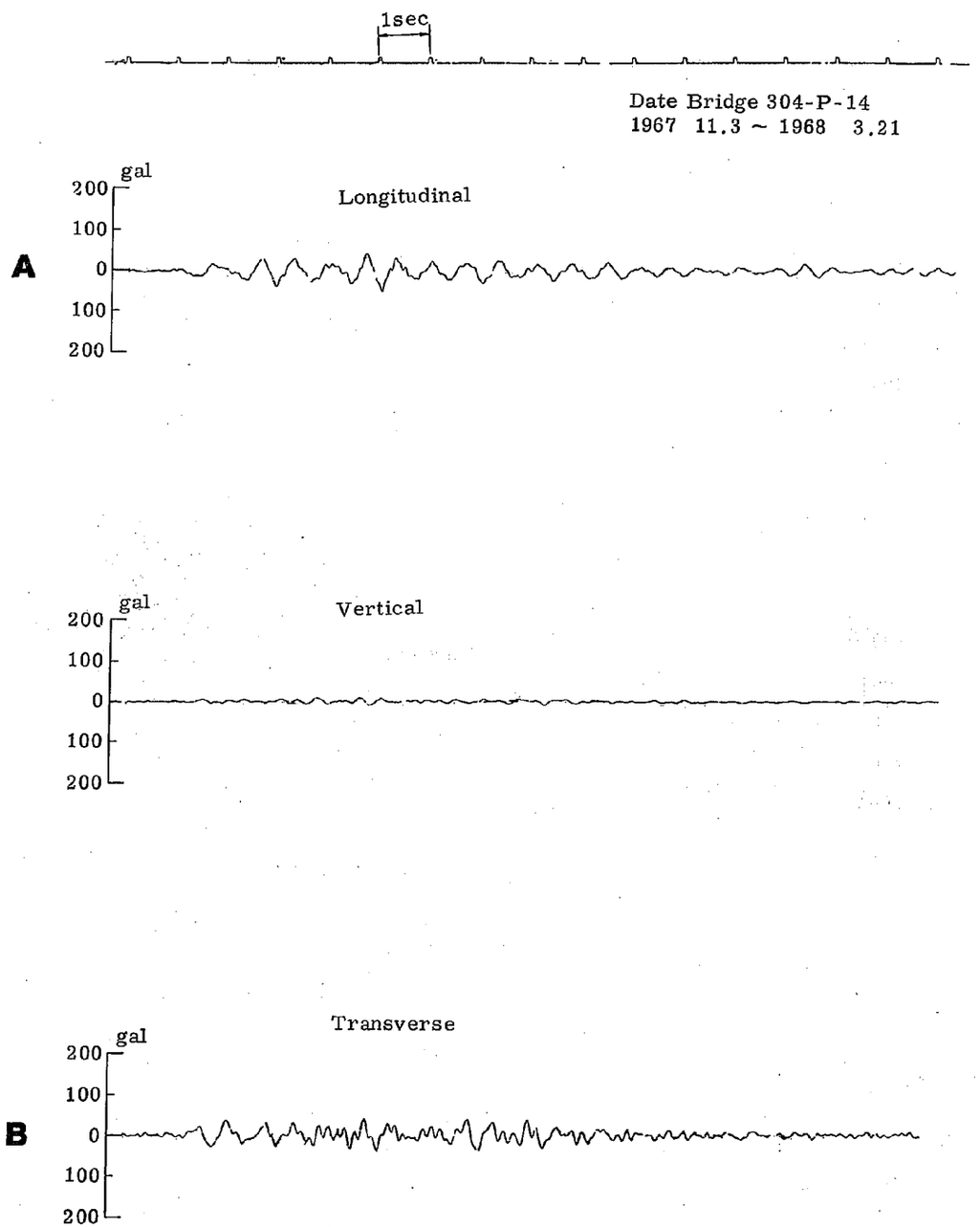

1sec
Kaihoku Bridge 302-P-14
1968 6.12 22:42
gal
200
100
0
100
200
Longitudinal
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
Transverse
B

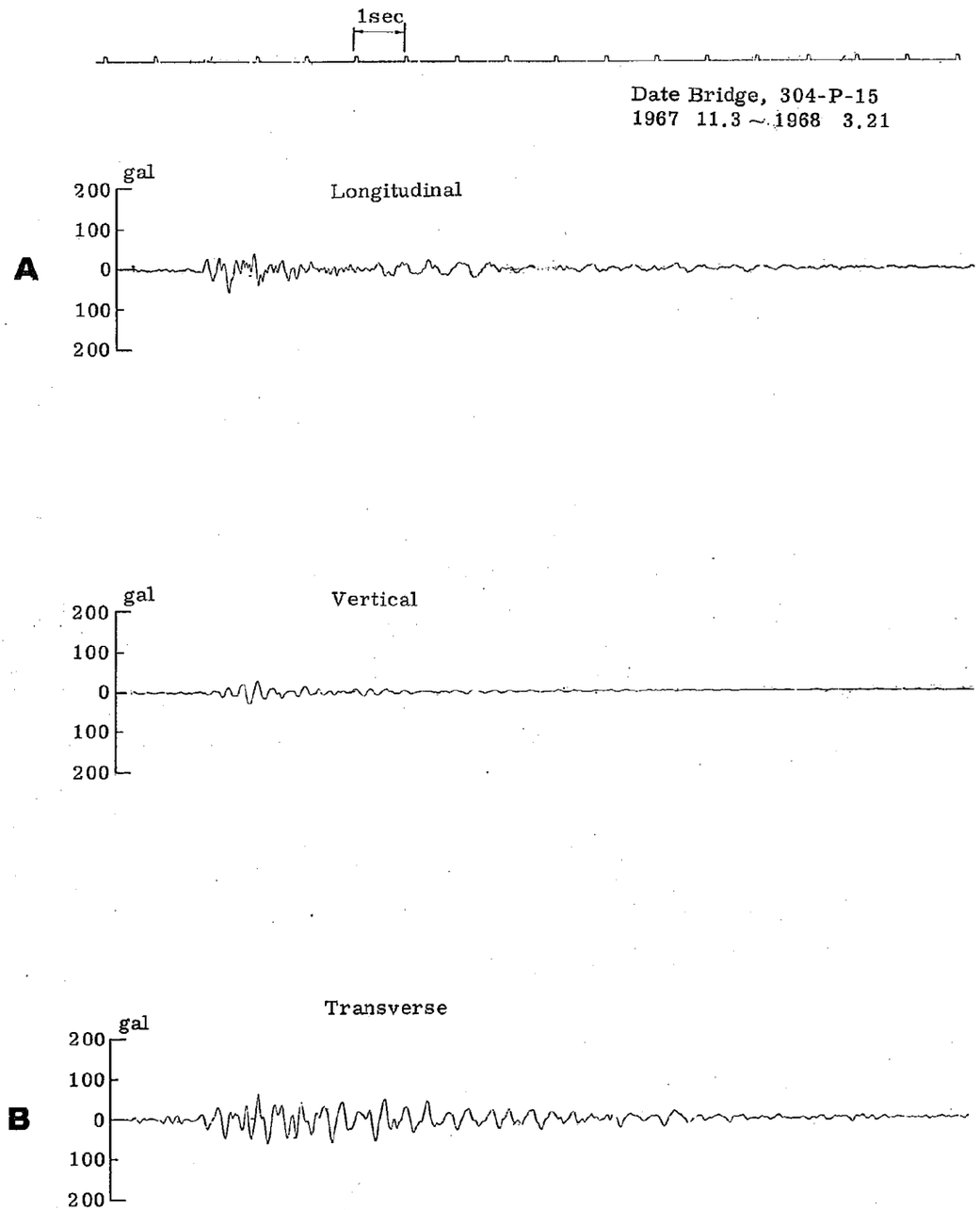

1sec
Kaihoku Bridge 302-Gr-9
1968 6.12 22:42
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

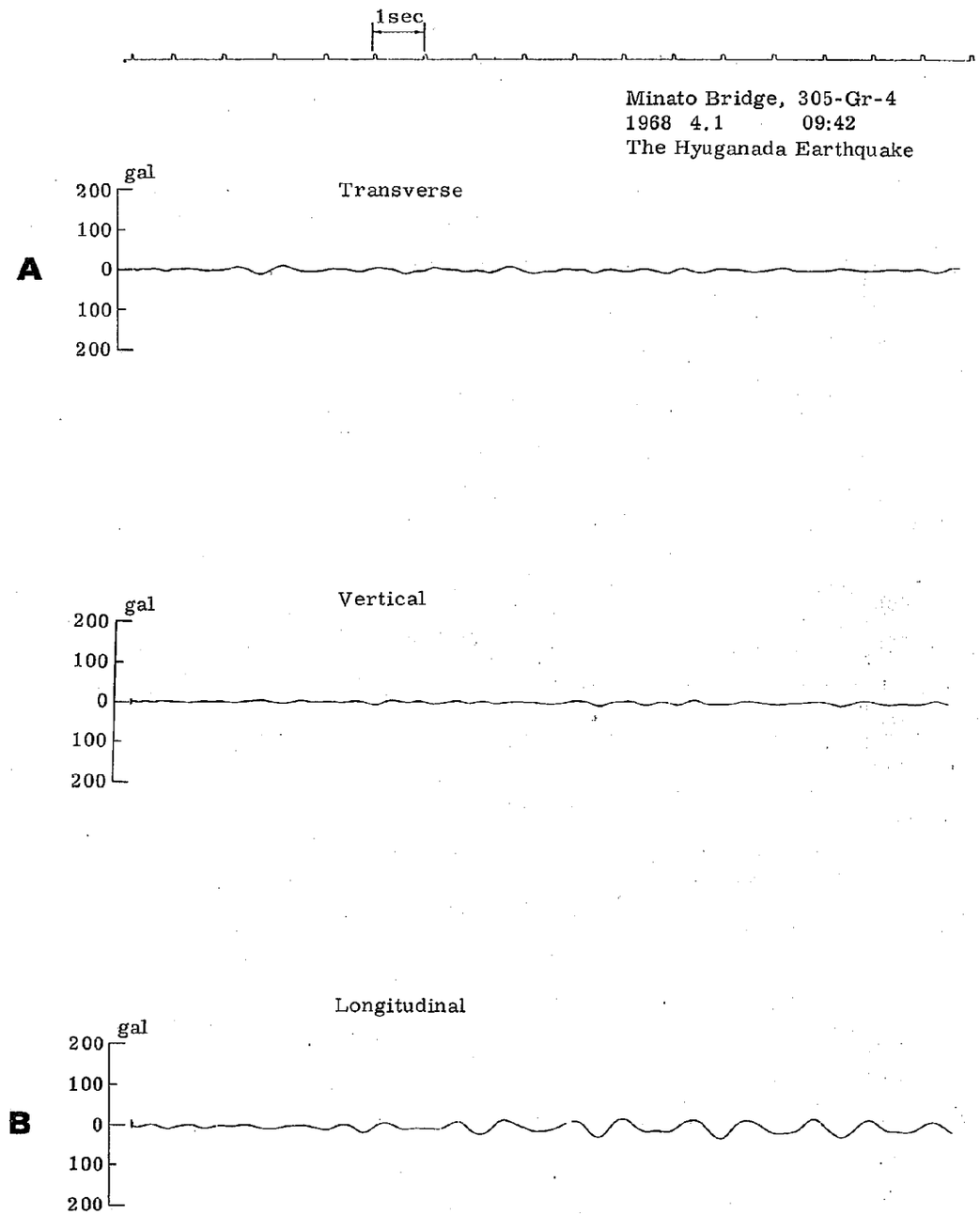

1sec
Kaihoku Bridge 302-Gr-11
1968 7.5 20:28
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

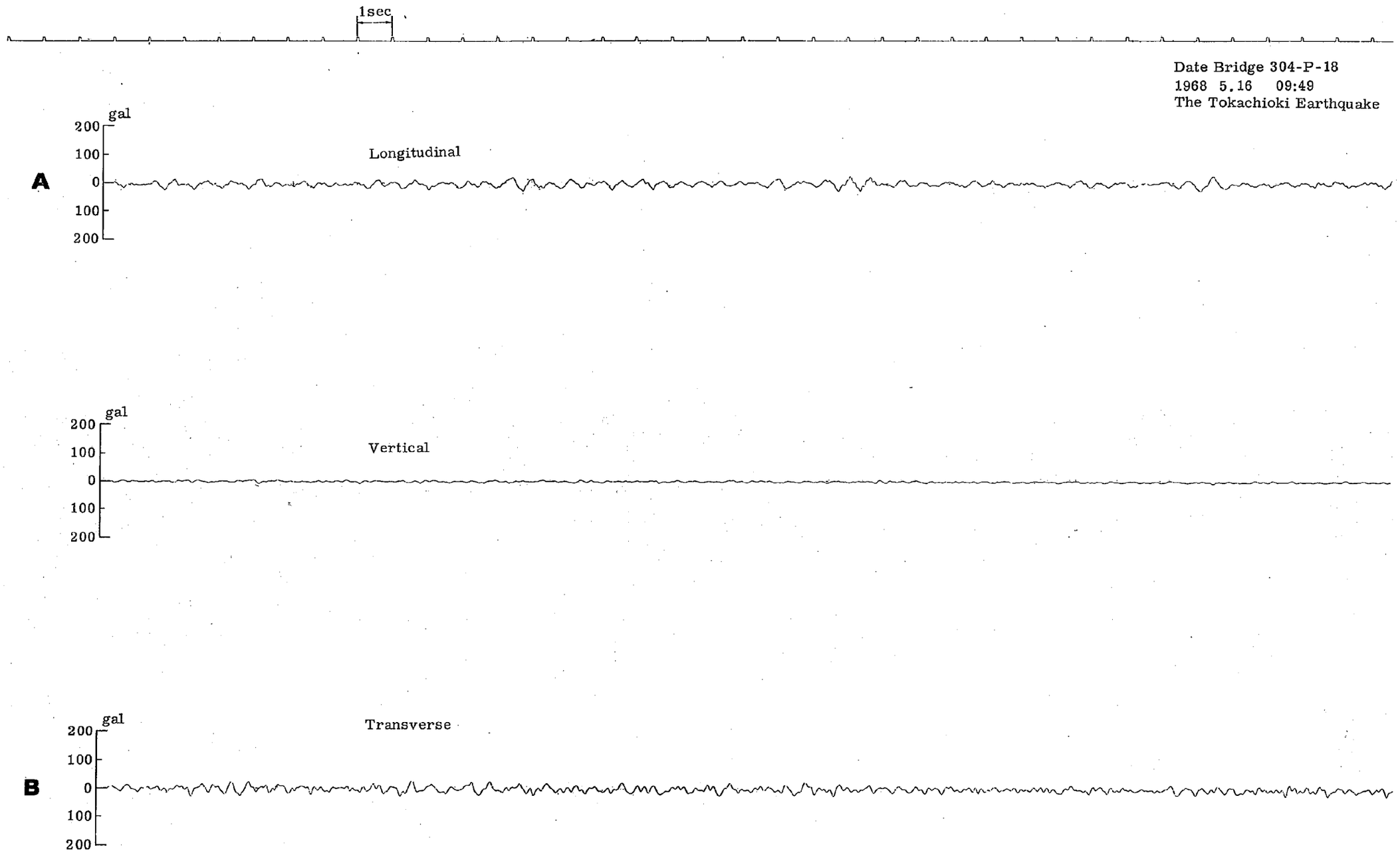

1sec
Kahoku Bridge 303-Gr-8
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

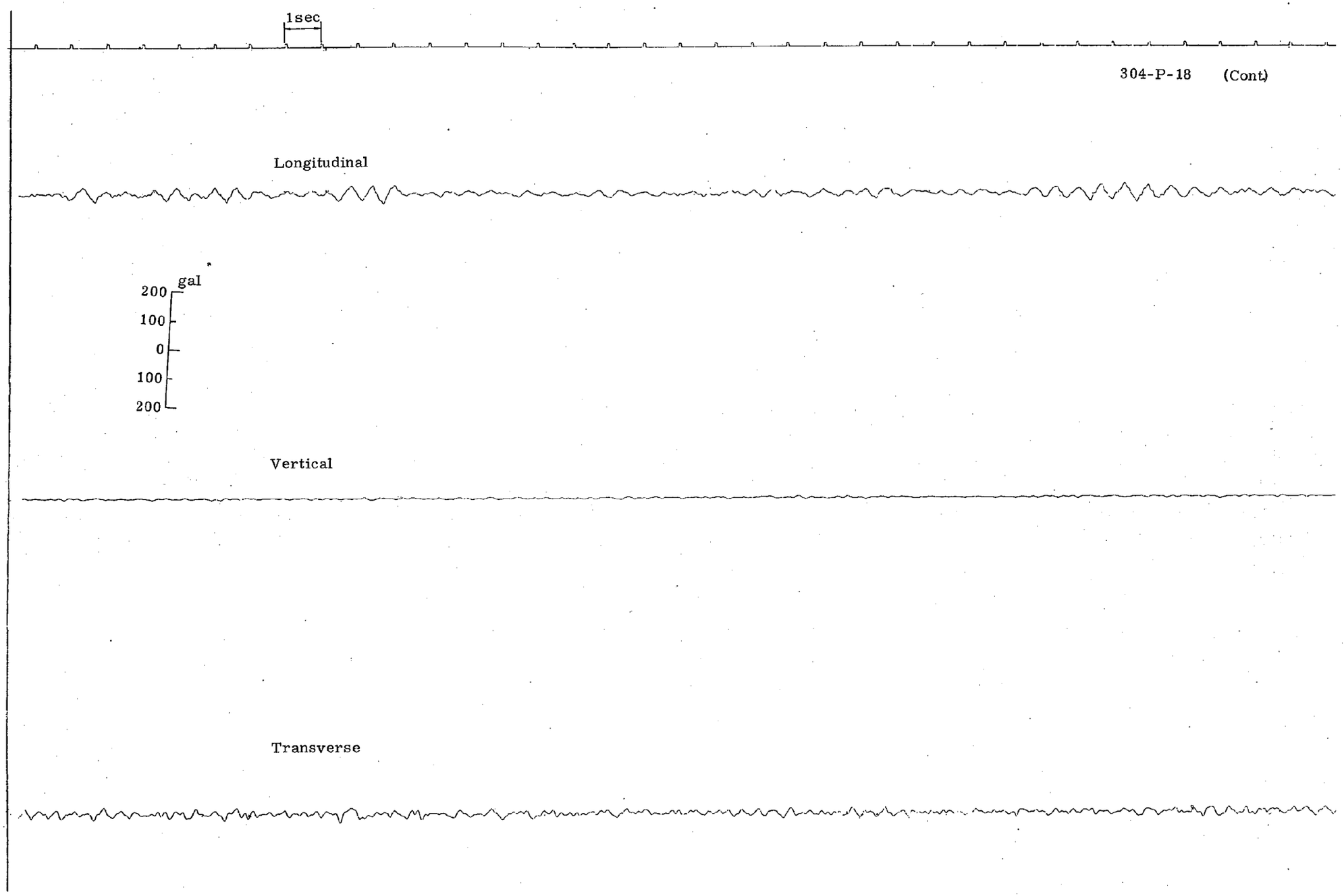

1sec
Kaihoku Bridge 302-P-16
1968 7.5 20:28
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
Transverse
gal
200
100
0
100
200

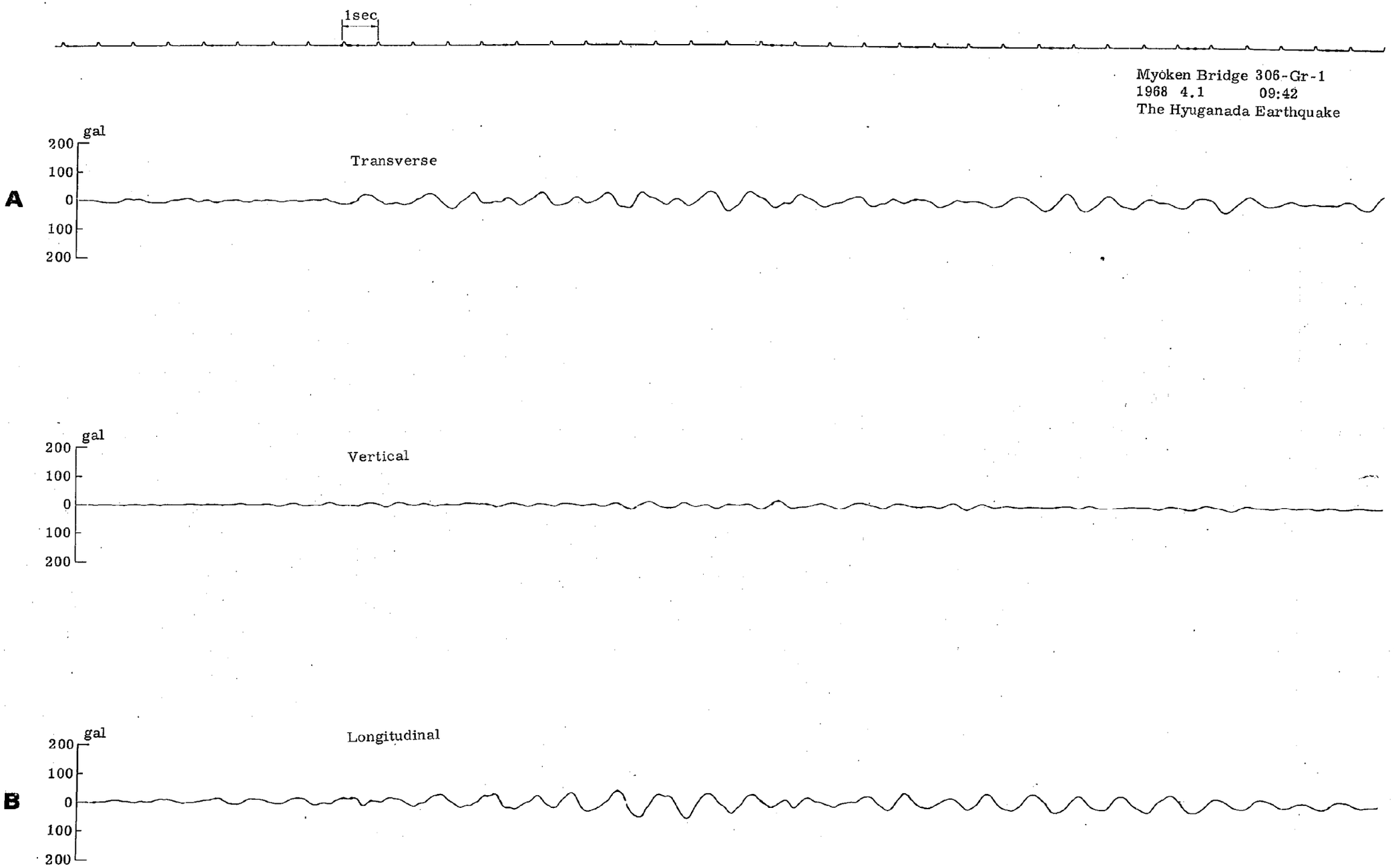

1sec
Date Bridge 304-P-14
1967 11.3 ~ 1968 3.21
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
Transverse
gal
200
100
0
100
200

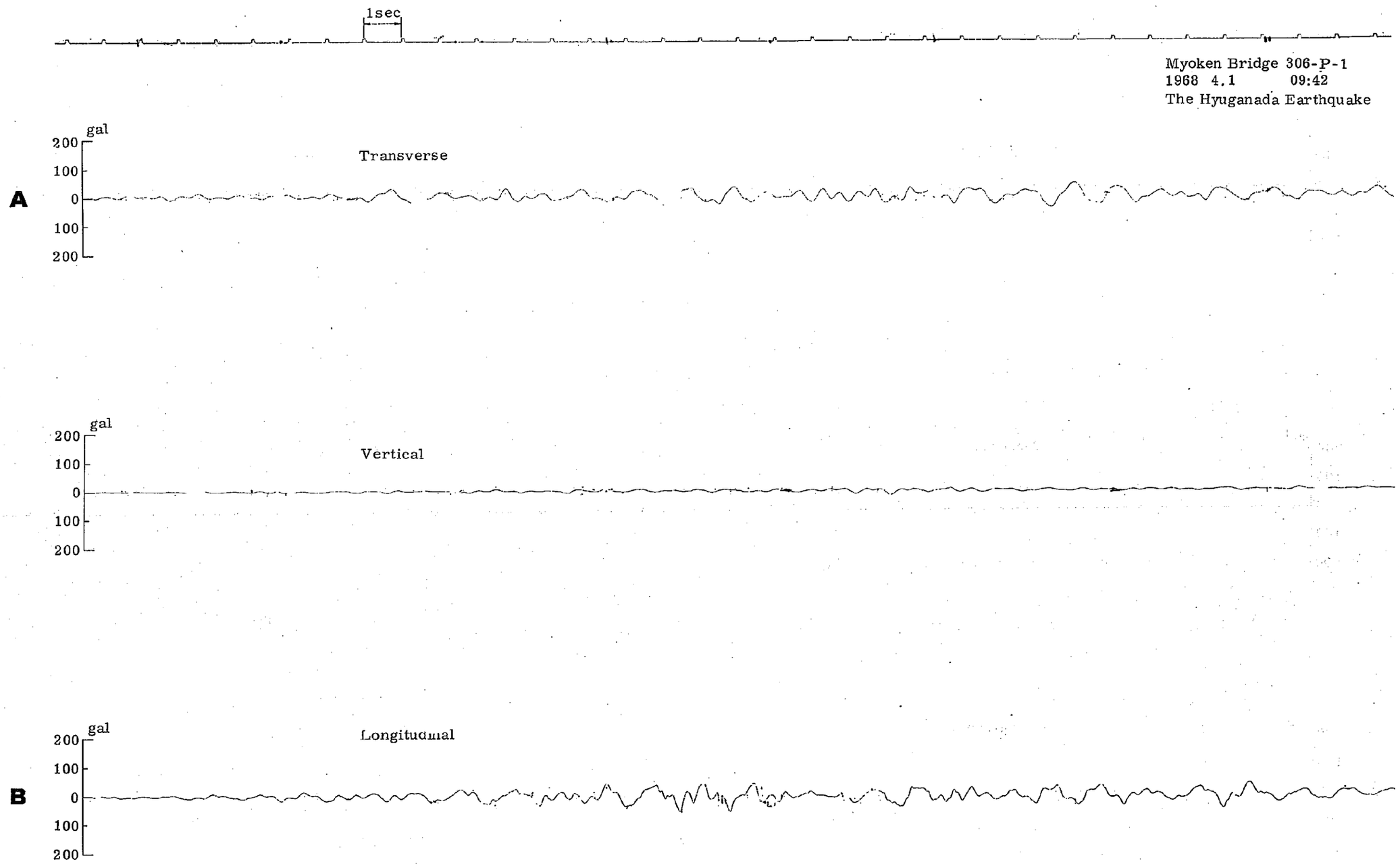

1sec
Date Bridge, 304-P-15
1967 11.3 ~ 1968 3.21
A
Longitudinal
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Transverse
gal
200
100
0
100
200

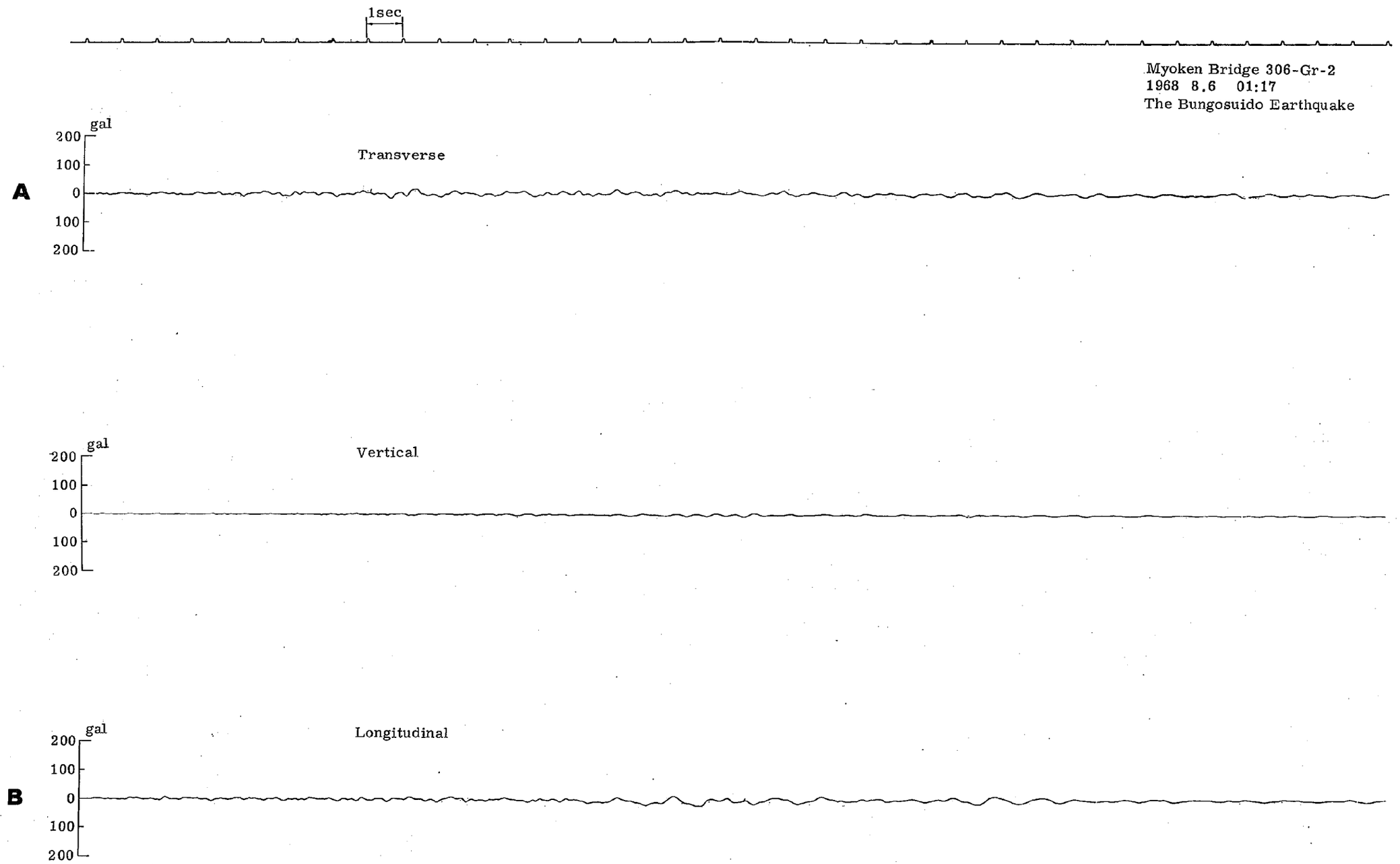

1sec
Minato Bridge, 305-Gr-4
1968 4.1 09:42
The Hyuganada Earthquake
A
Transverse
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Longitudinal
gal
200
100
0
100
200

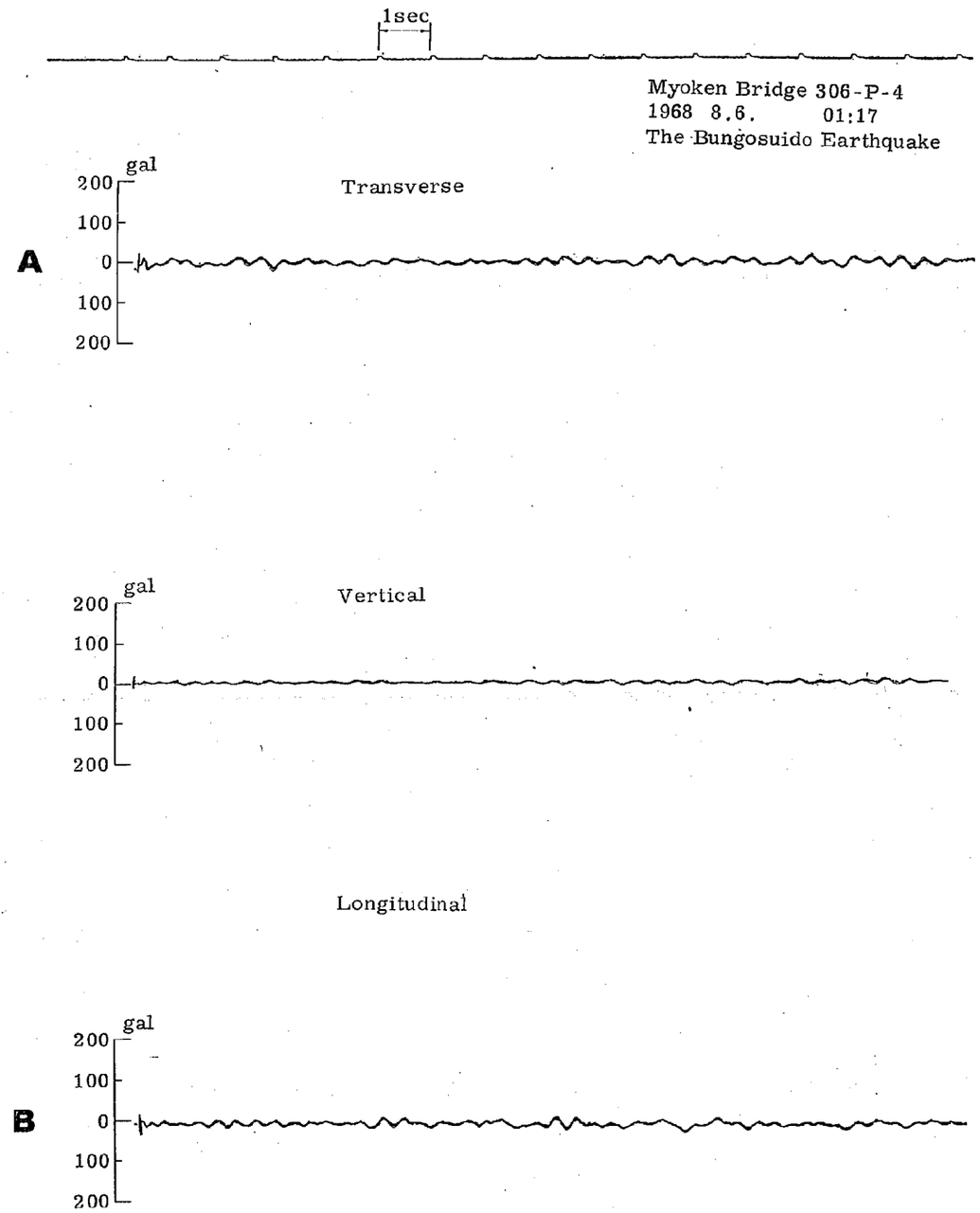

1sec
Date Bridge 304-P-18
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

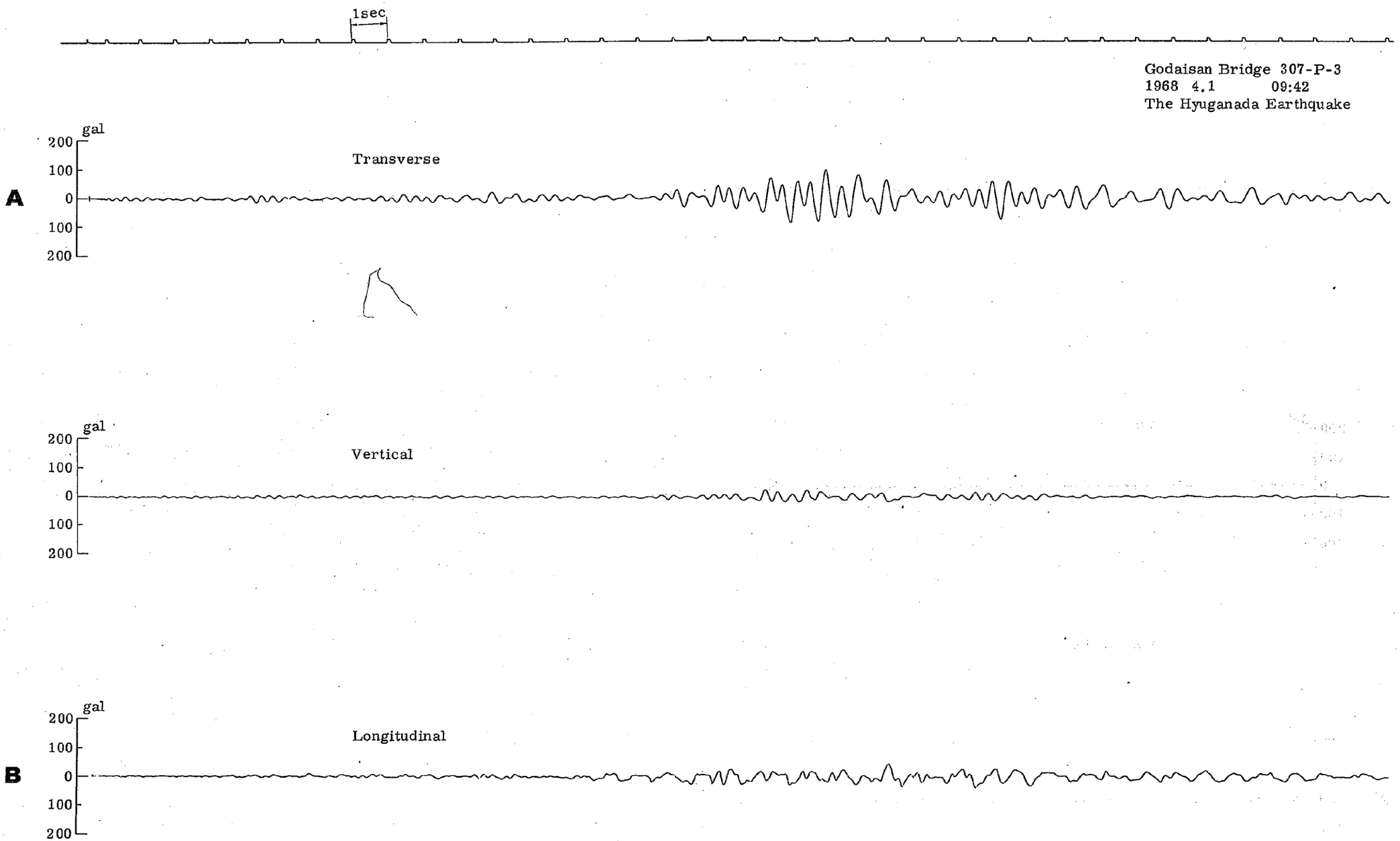

1sec
304-P-18 (Cont)
Longitudinal
gal
200
100
0
100
200
Vertical
Transverse

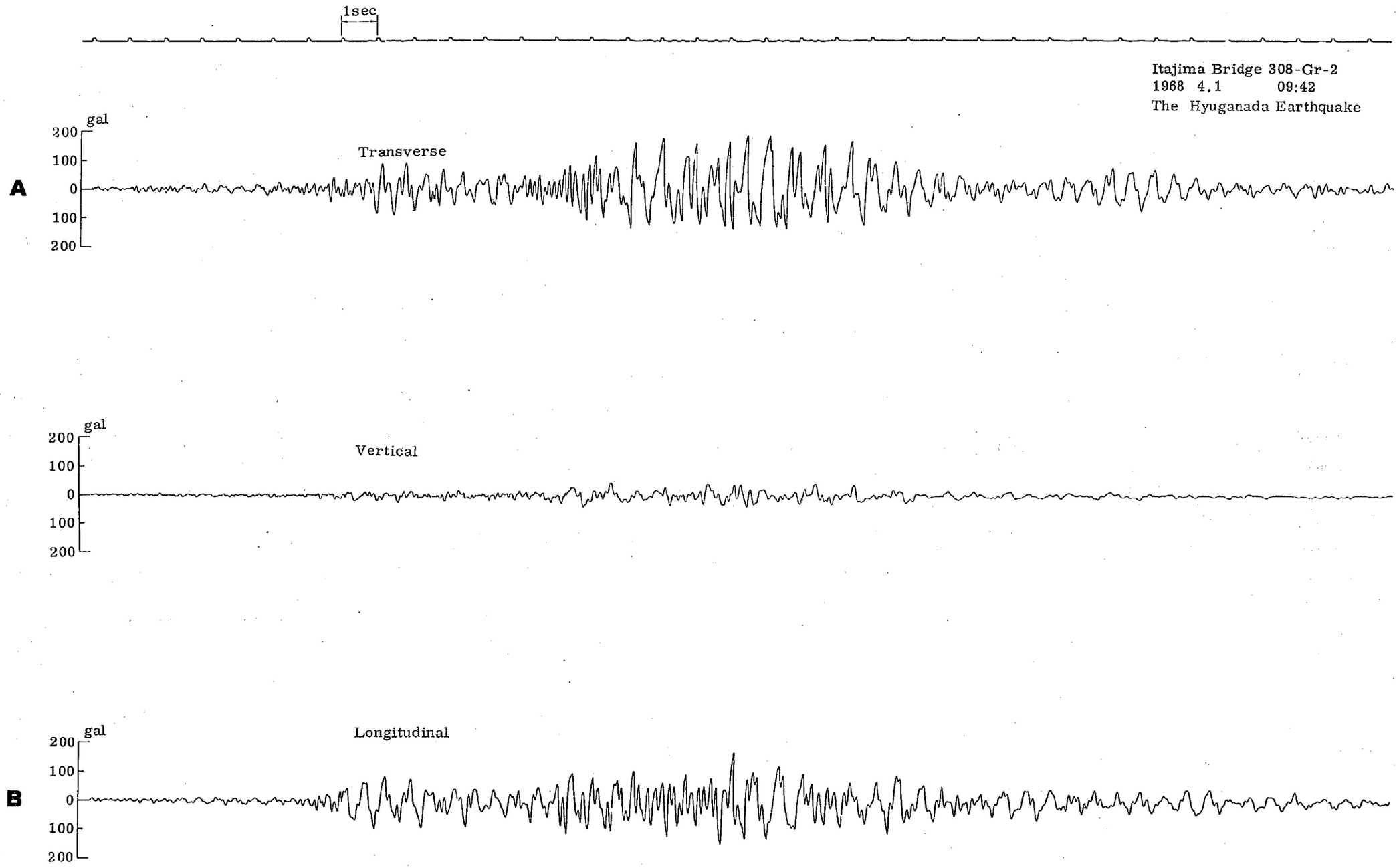

1sec
Myoken Bridge 306-Gr-1
1968 4.1 09:42
The Hyuganada Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

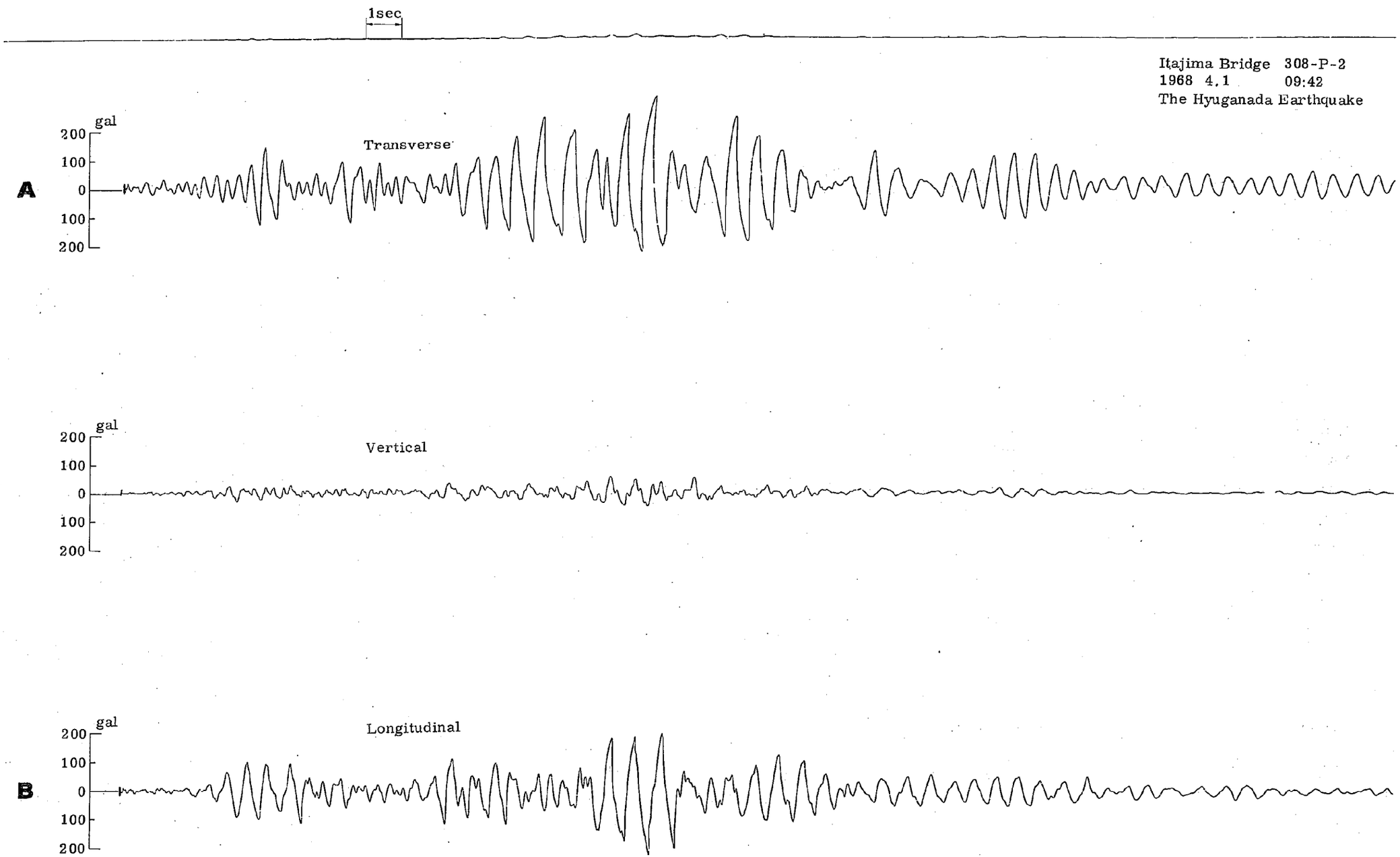

1sec
Myoken Bridge 306-P-1
1968 4.1 09:42
The Hyuganada Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

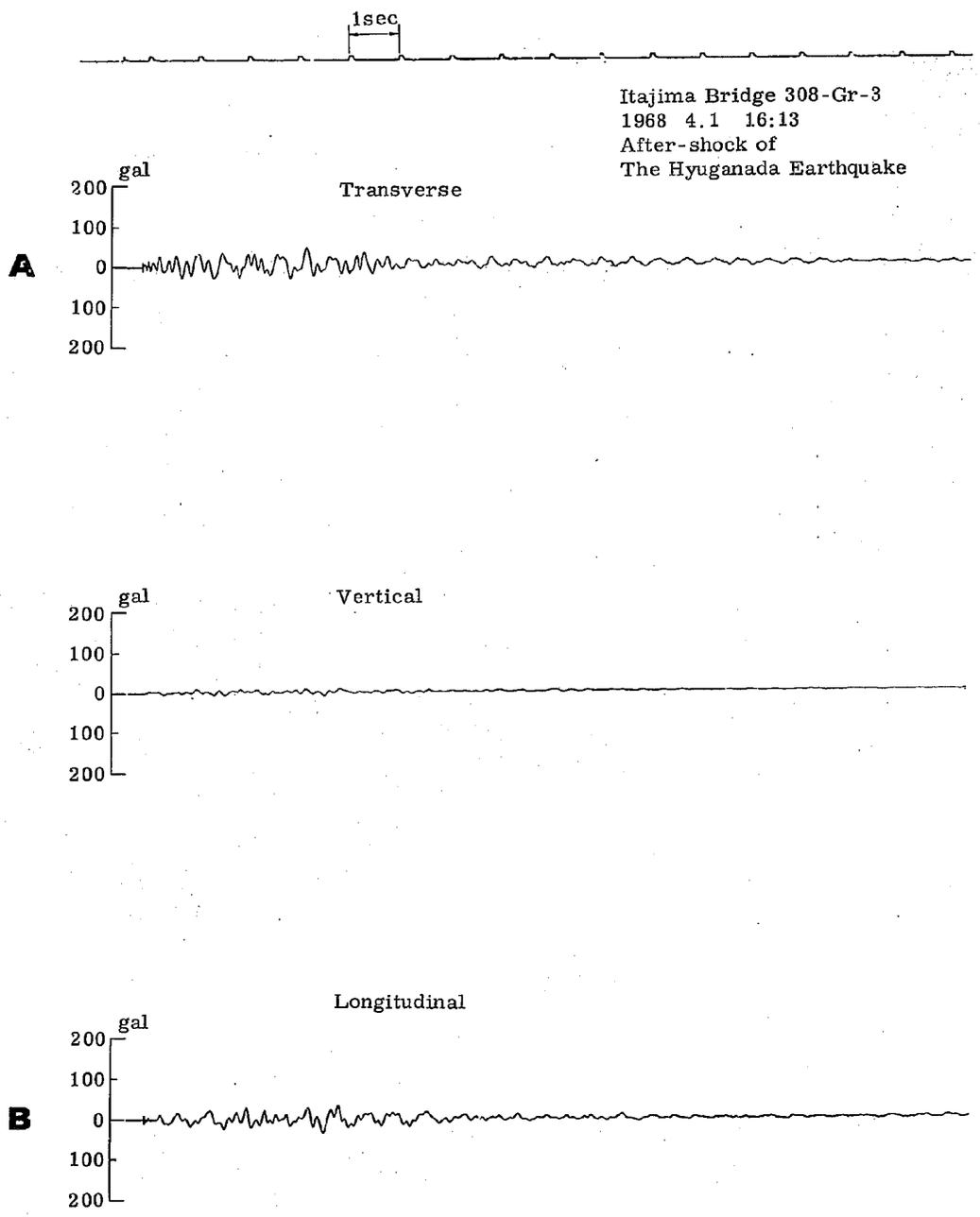

1sec
Myoken Bridge 306-Gr-2
1968 8.6 01:17
The Bungosuido Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

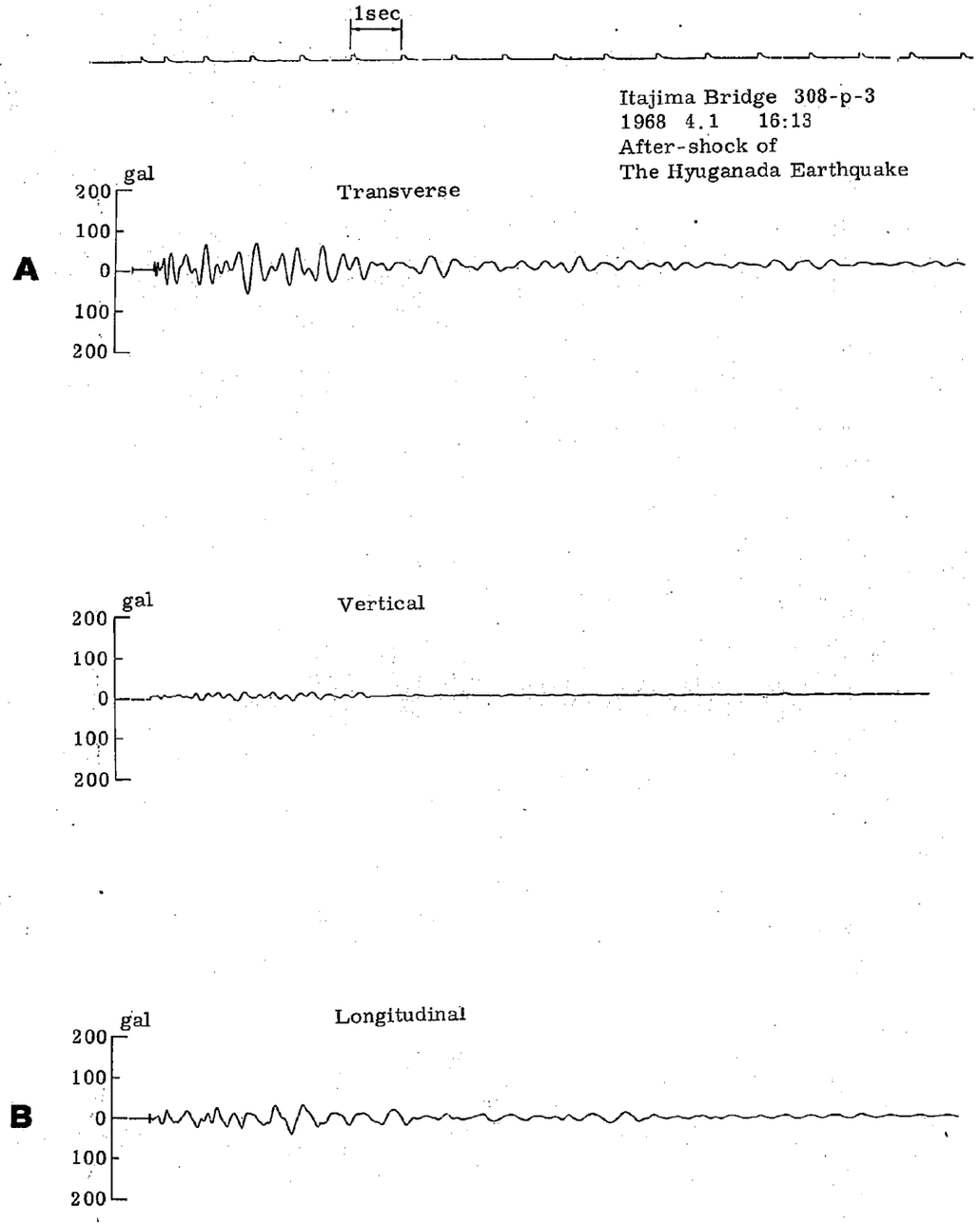

1sec
Myoken Bridge 306-P-4
1968 8.6. 01:17
The Bungosuido Earthquake
gal
200
100
0
100
200
Transverse
A
gal
200
100
0
100
200
Vertical
Longitudinal
gal
200
100
0
100
200
B

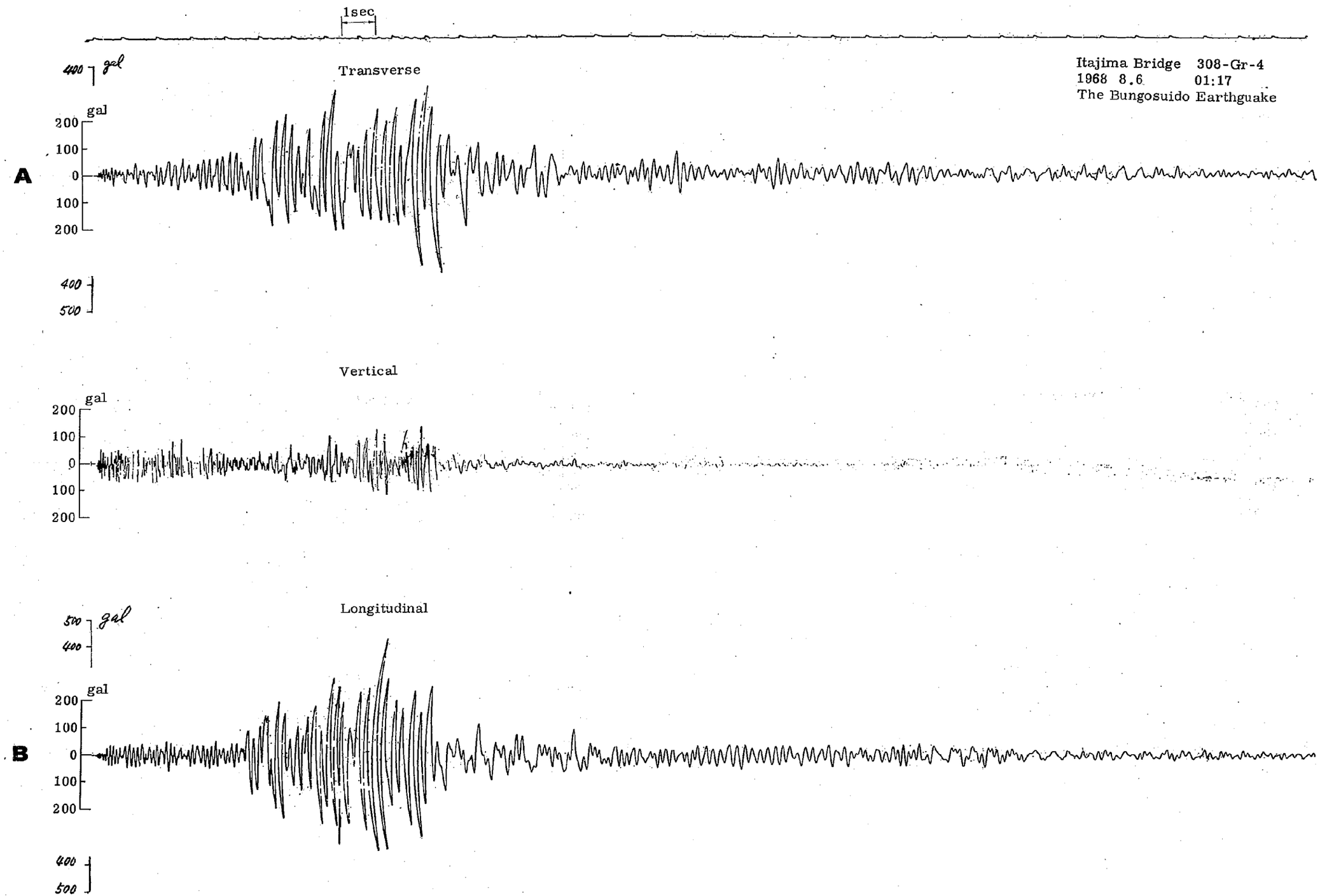

1sec
Godaisan Bridge 307-P-3
1968 4.1 09:42
The Hyuganada Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

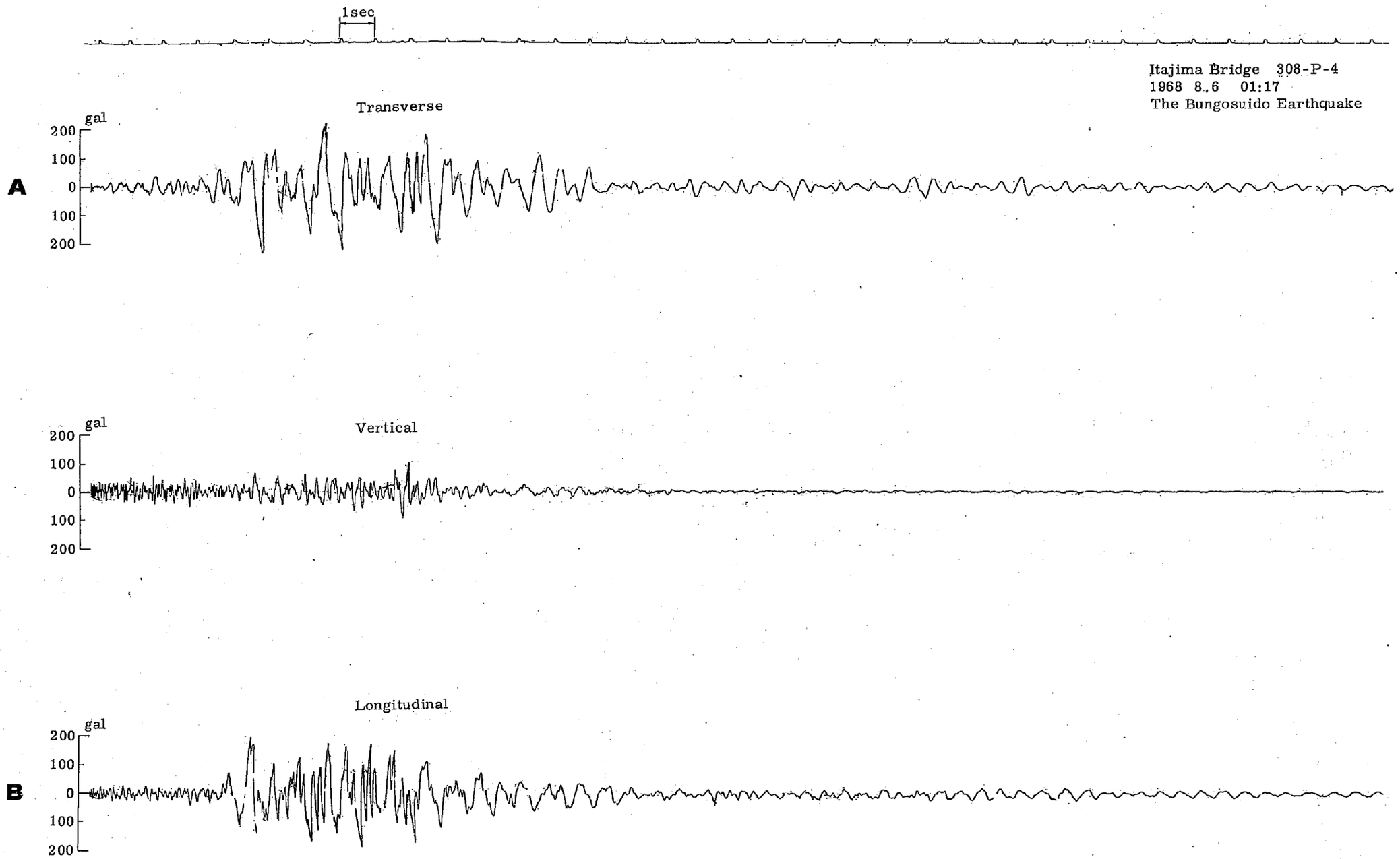

1sec
Itajima Bridge 308-Gr-2
1968 4.1 09:42
The Hyuganada Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

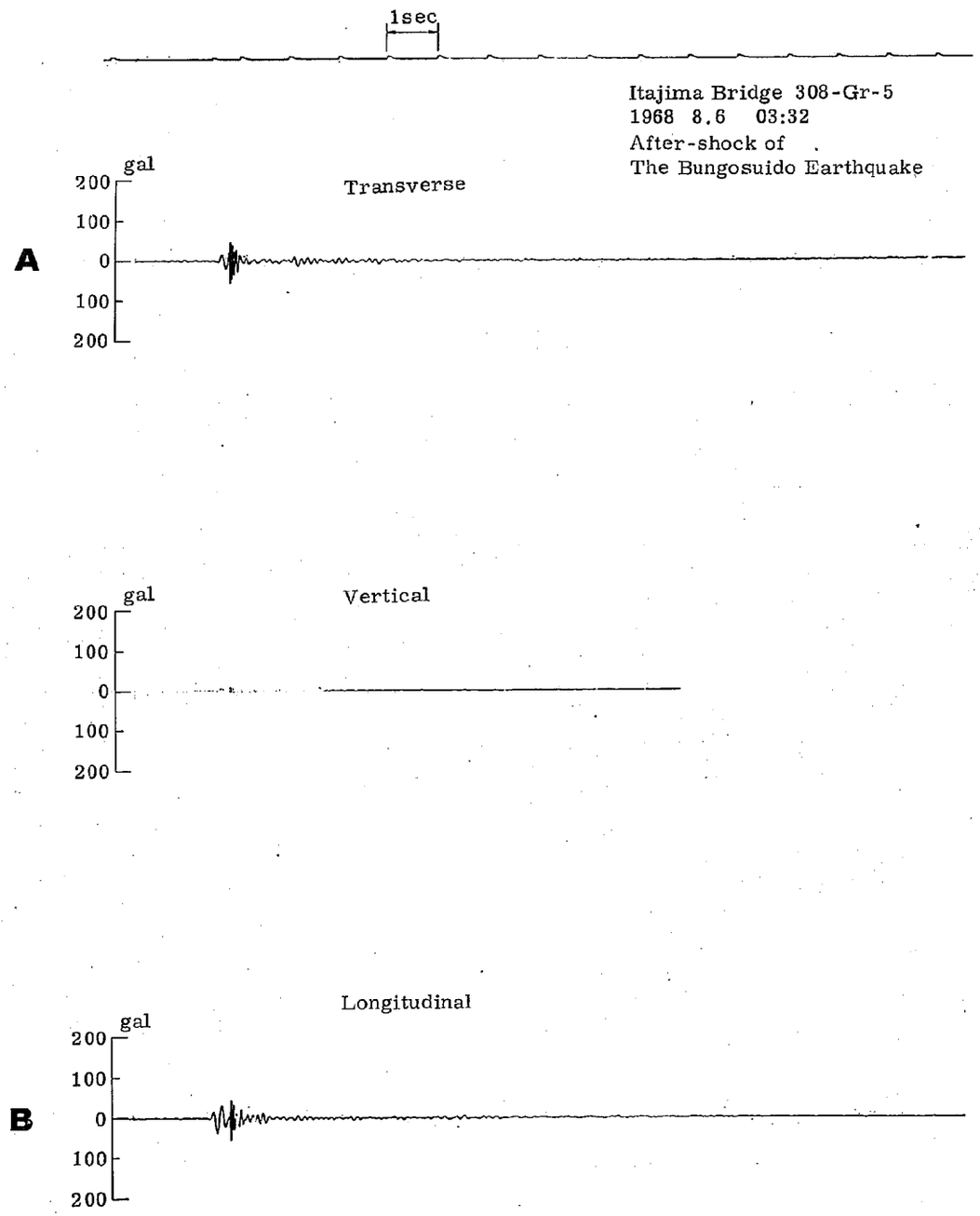

1sec
Itajima Bridge 308-P-2
1968 4.1 09:42
The Hyuganada Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

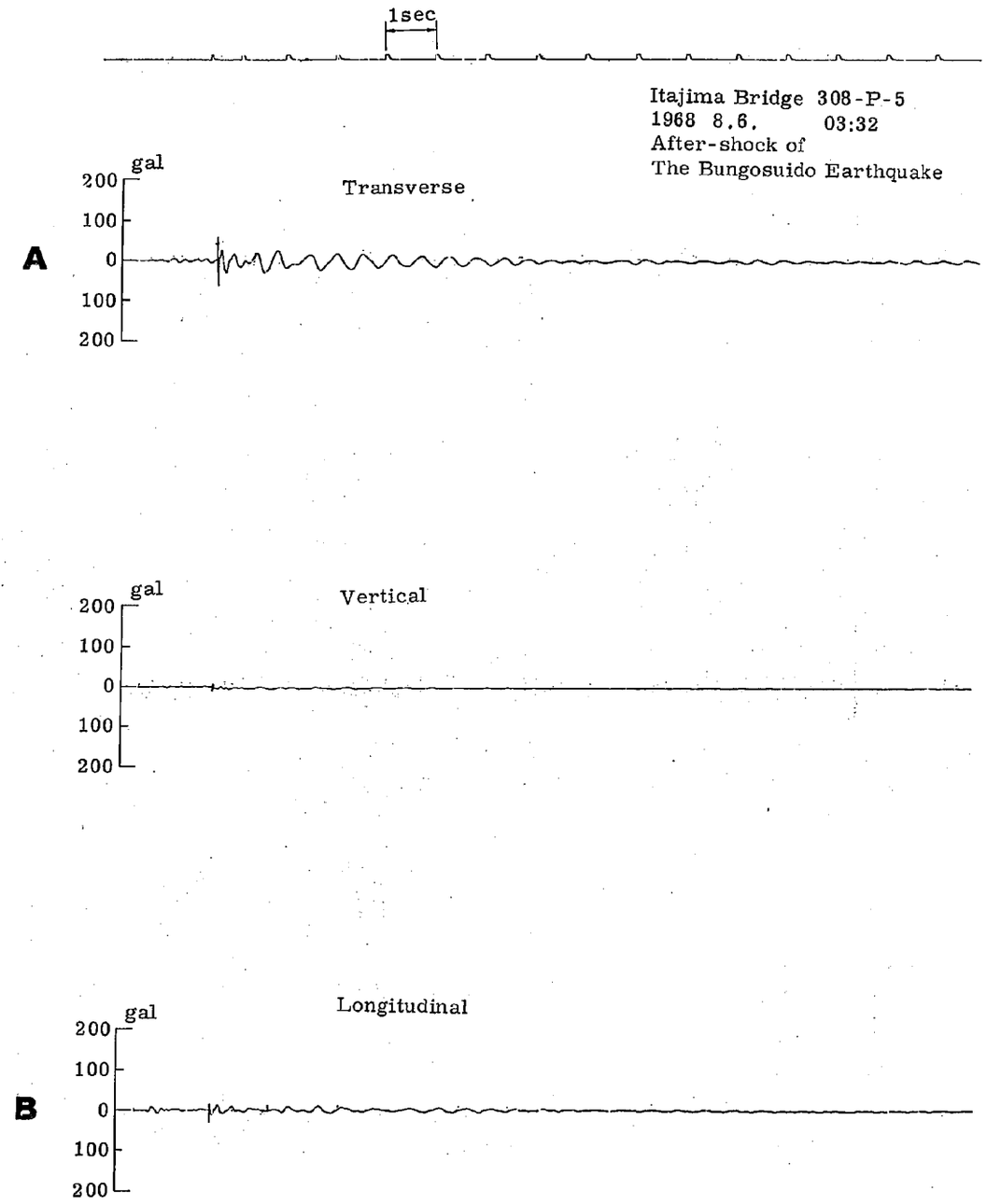

1sec
Itajima Bridge 308-Gr-3
1968 4.1 16:13
After-shock of
The Hyuganada Earthquake
gal
Transverse
A
200
100
0
100
200
gal
Vertical
200
100
0
100
200
Longitudinal
gal
B
200
100
0
100
200

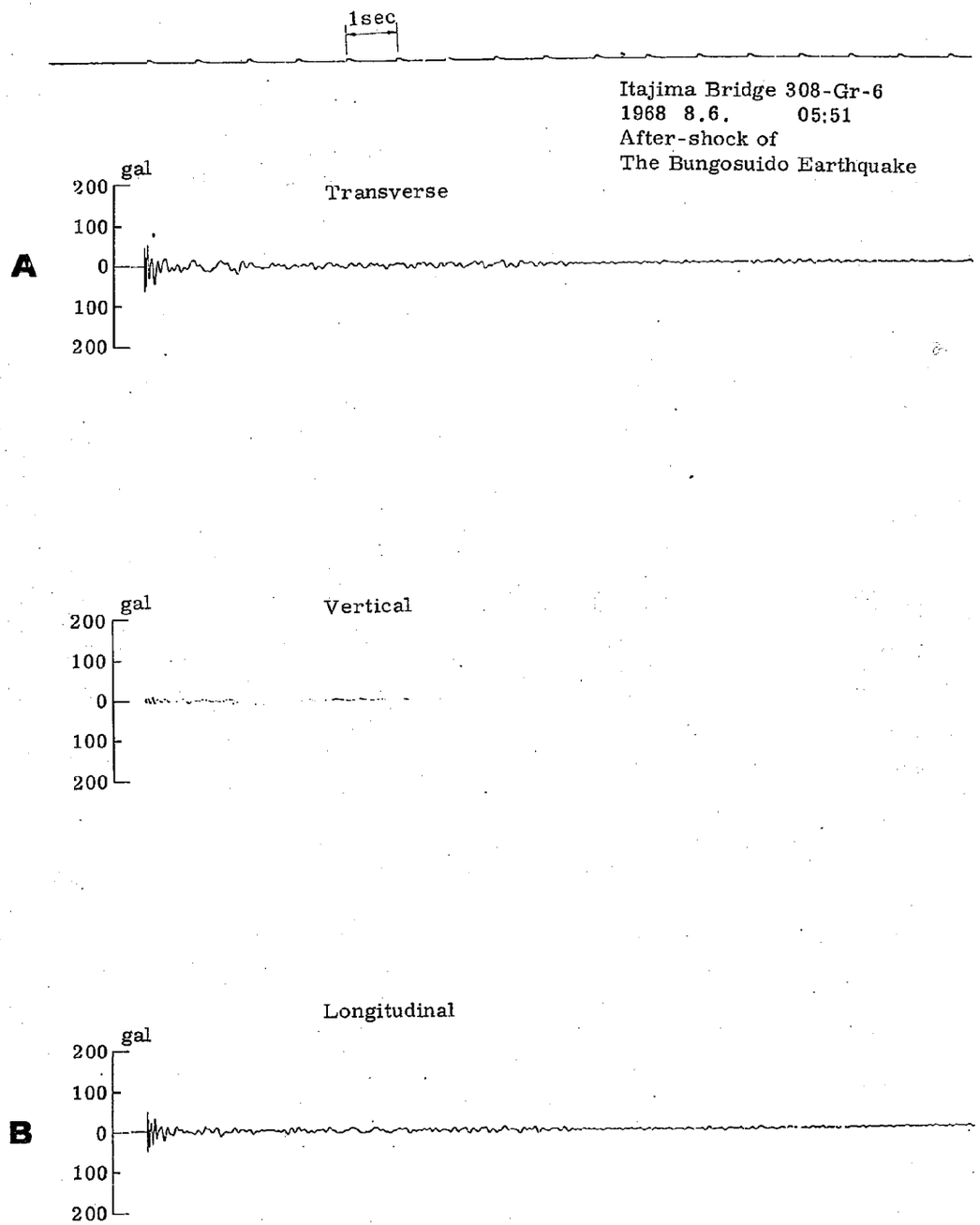

1sec
Itajima Bridge 308-p-3
1968 4.1 16:13
After-shock of
The Hyuganada Earthquake
gal
Transverse
A
200
100
0
100
200
gal
Vertical
200
100
0
100
200
Longitudinal
gal
B
200
100
0
100
200

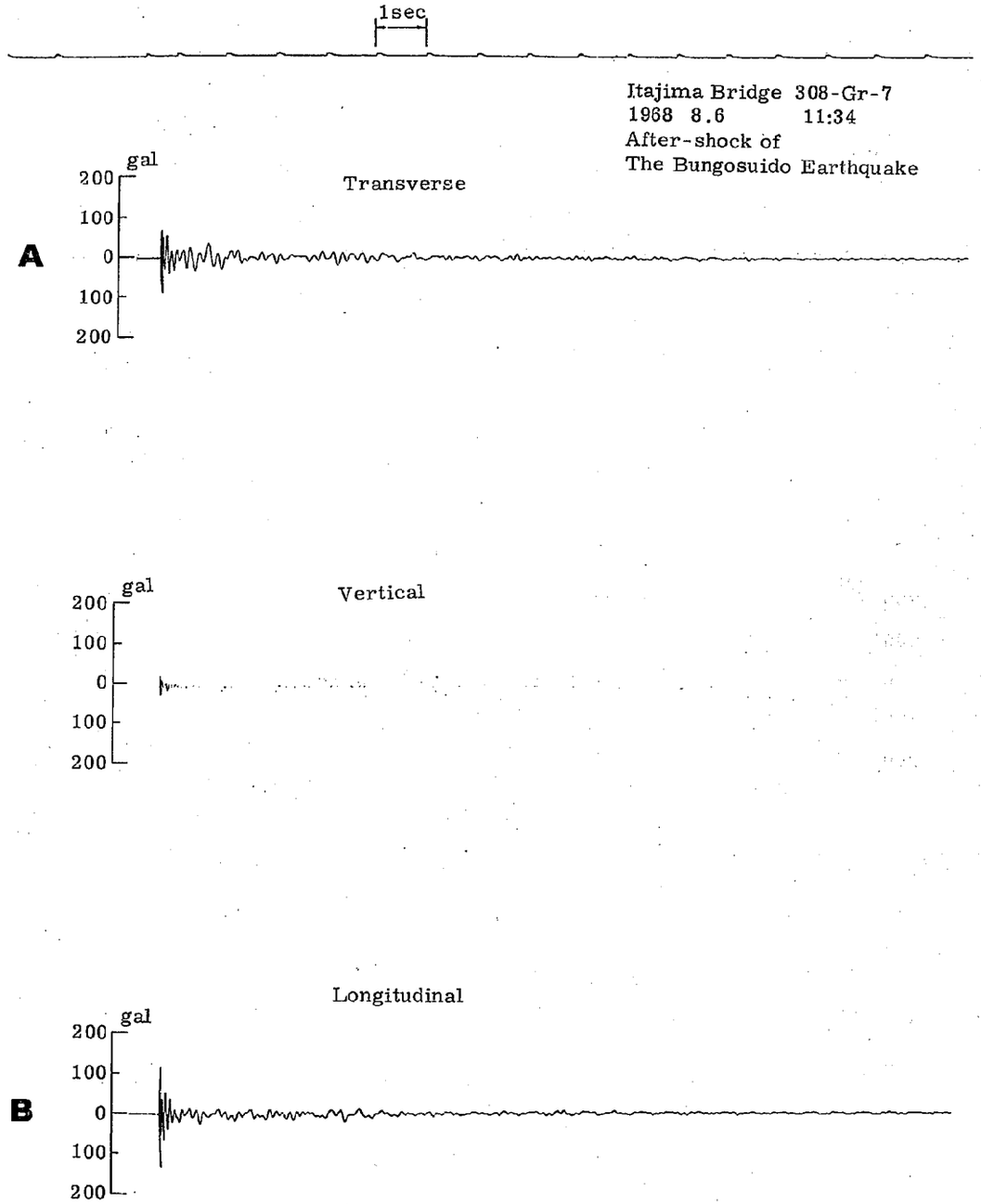

1sec
Itajima Bridge 308-Gr-4
1968 8.6 01:17
The Bungosuido Earthguake
A
Transverse
gal
400
500
Vertical
B
Longitudinal

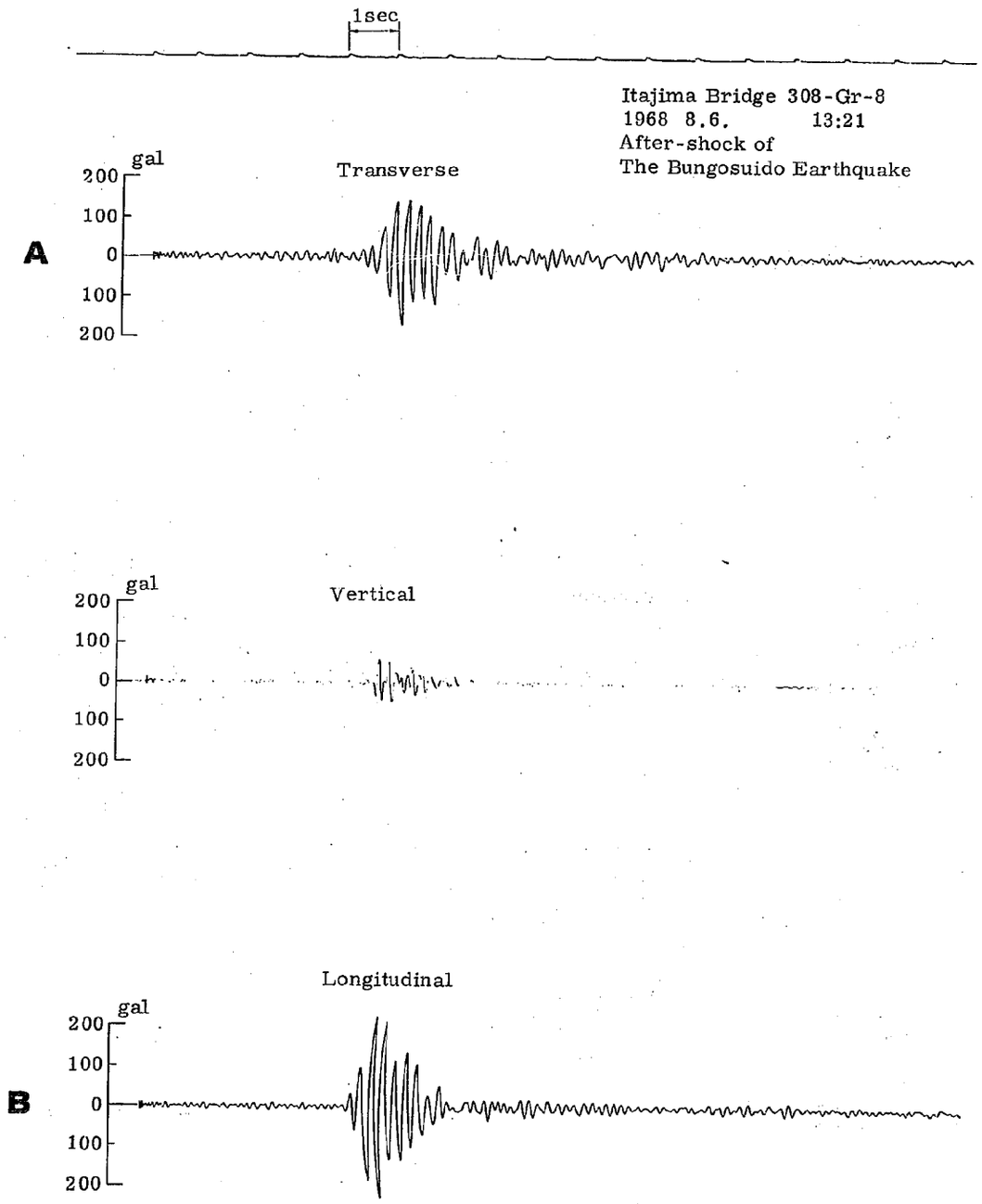

1sec
Itajima Bridge 308-P-4
1968 8.6 01:17
The Bungosuido Earthquake
Transverse
gal
200
100
0
100
200
A
Vertical
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
B

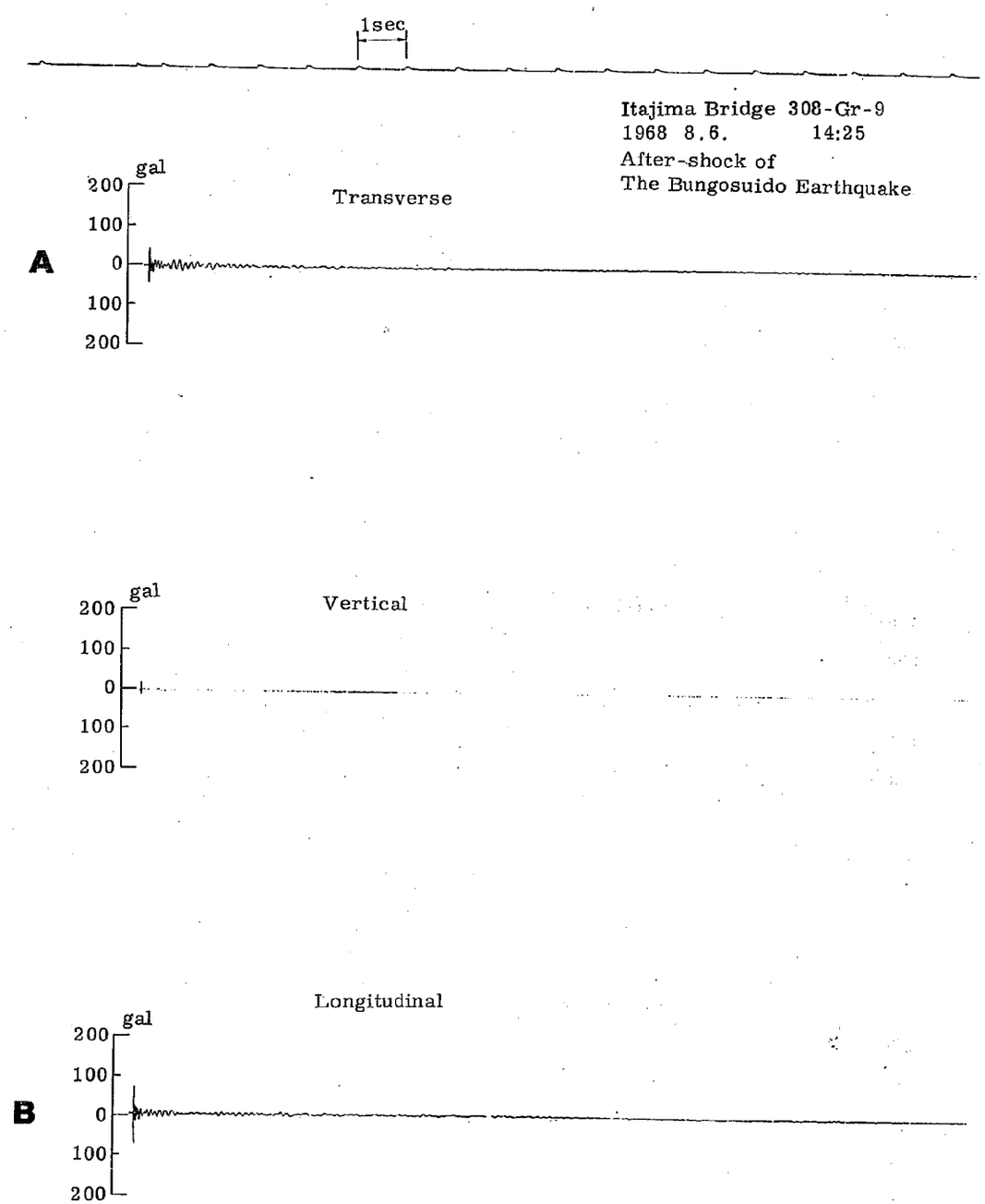

1sec
Itajima Bridge 308-Gr-5
1968 8.6 03:32
After-shock of
The Bungosuido Earthquake
A
gal
200
100
0
100
200
Transverse
Vertical
Longitudinal
B

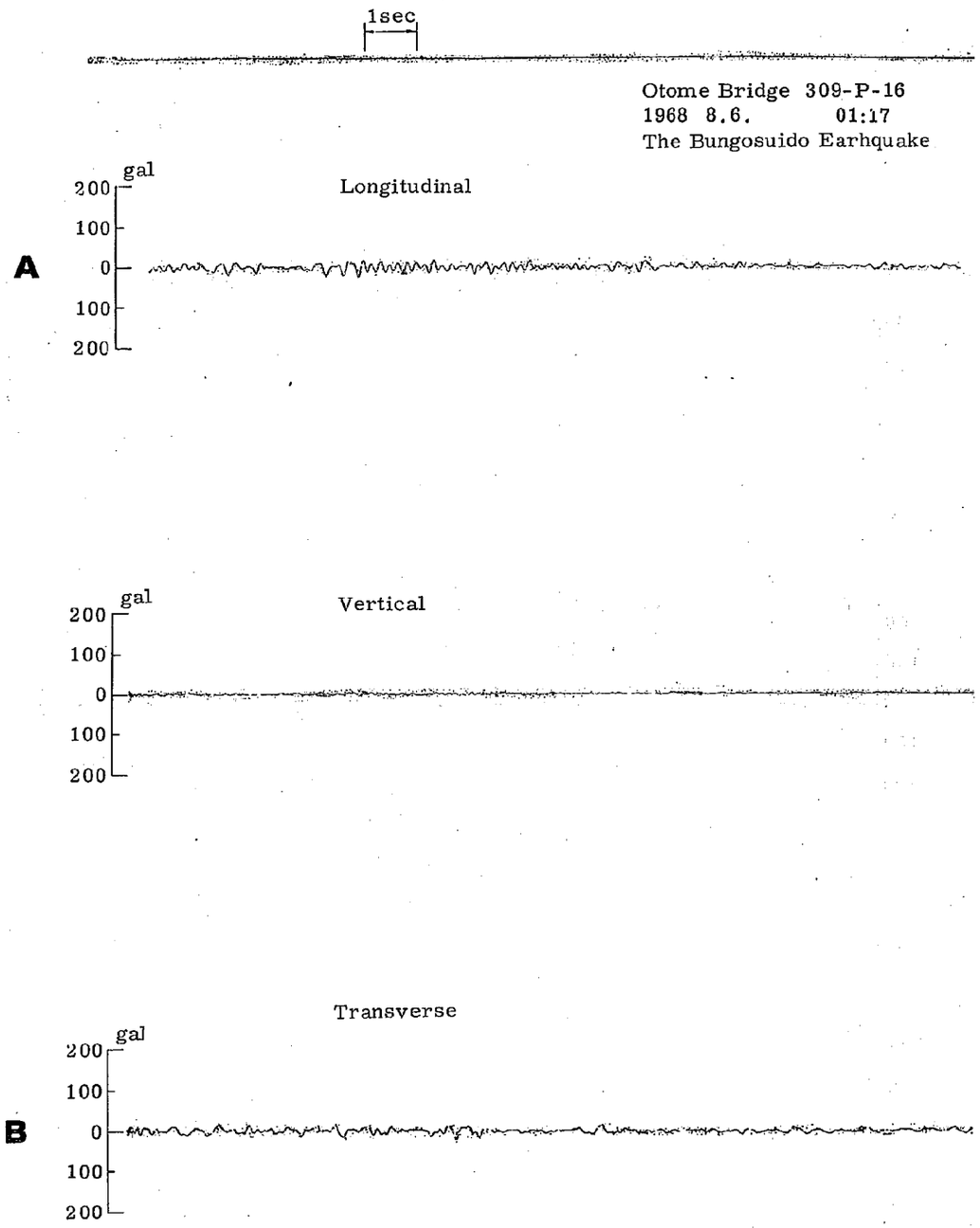

1sec
Itajima Bridge 308-P-5
1968 8.6. 03:32
After-shock of
The Bungosuido Earthquake
A
gal
200
100
0
100
200
Transverse
Vertical
Longitudinal
B

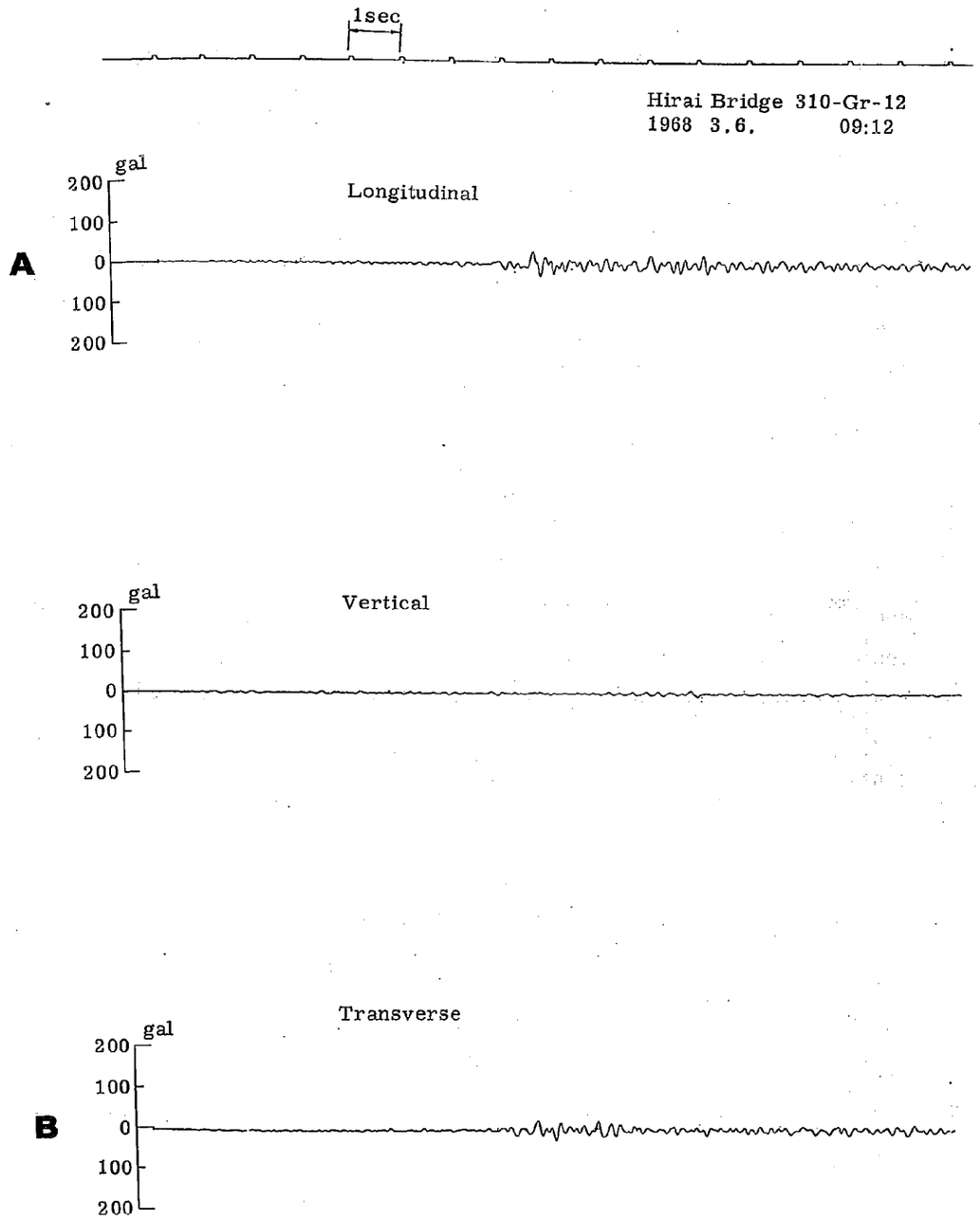

1sec
Itajima Bridge 308-Gr-6
1968 8.6. 05:51
After-shock of
The Bungosuido Earthquake
gal
Transverse
A
200
100
0
100
200
gal
Vertical
200
100
0
100
200
Longitudinal
gal
B
200
100
0
100
200

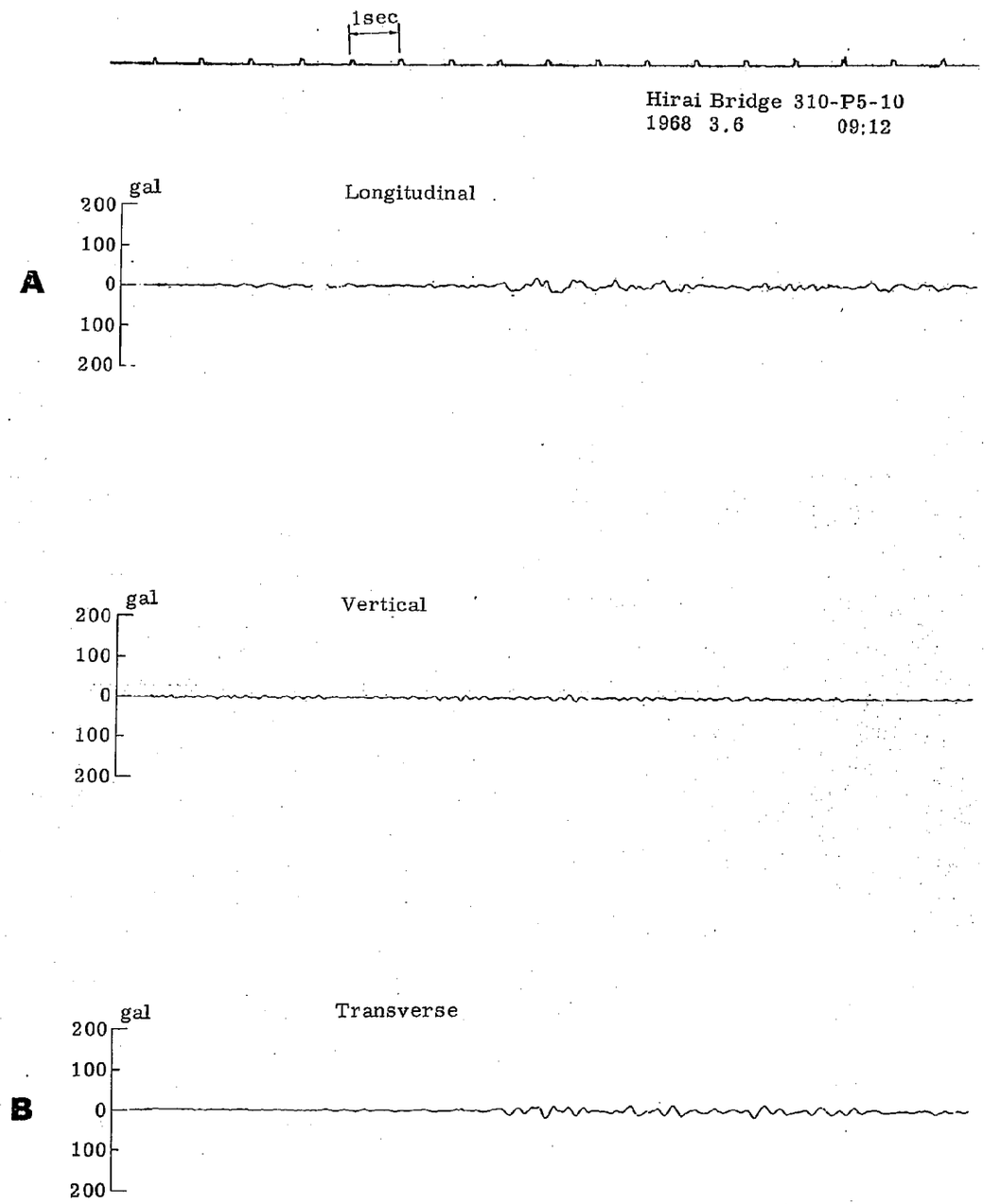

1sec
Itajima Bridge 308-Gr-7
1968 8.6 11:34
After-shock of
The Bungosuido Earthquake
gal
Transverse
A
200
100
0
100
200
gal
Vertical
200
100
0
100
200
Longitudinal
gal
B
200
100
0
100
200

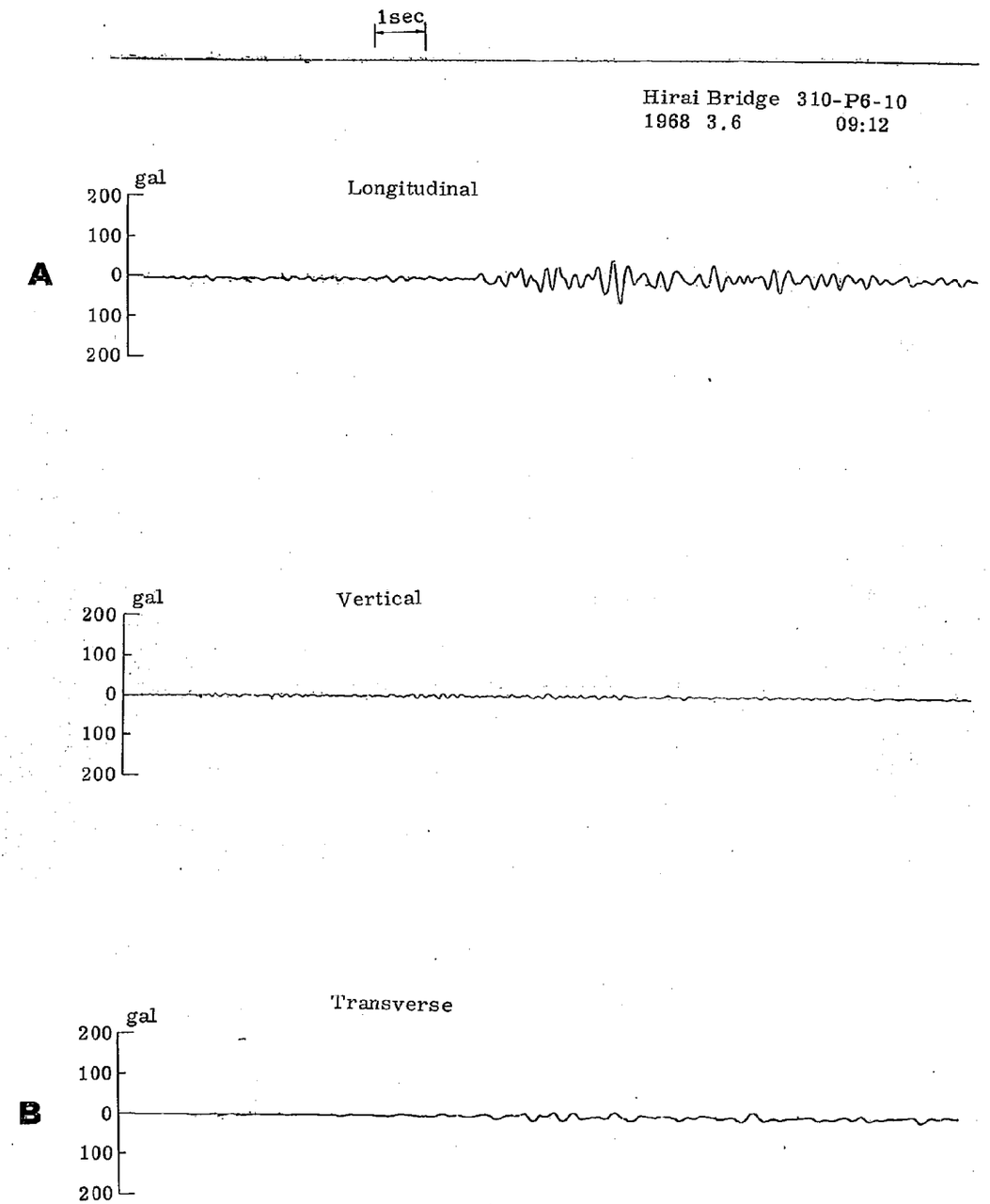

1sec
Itajima Bridge 308-Gr-8
1968 8.6. 13:21
After-shock of
The Bungosuido Earthquake
A
gal
200
100
0
100
200
Transverse
Vertical
Longitudinal
B

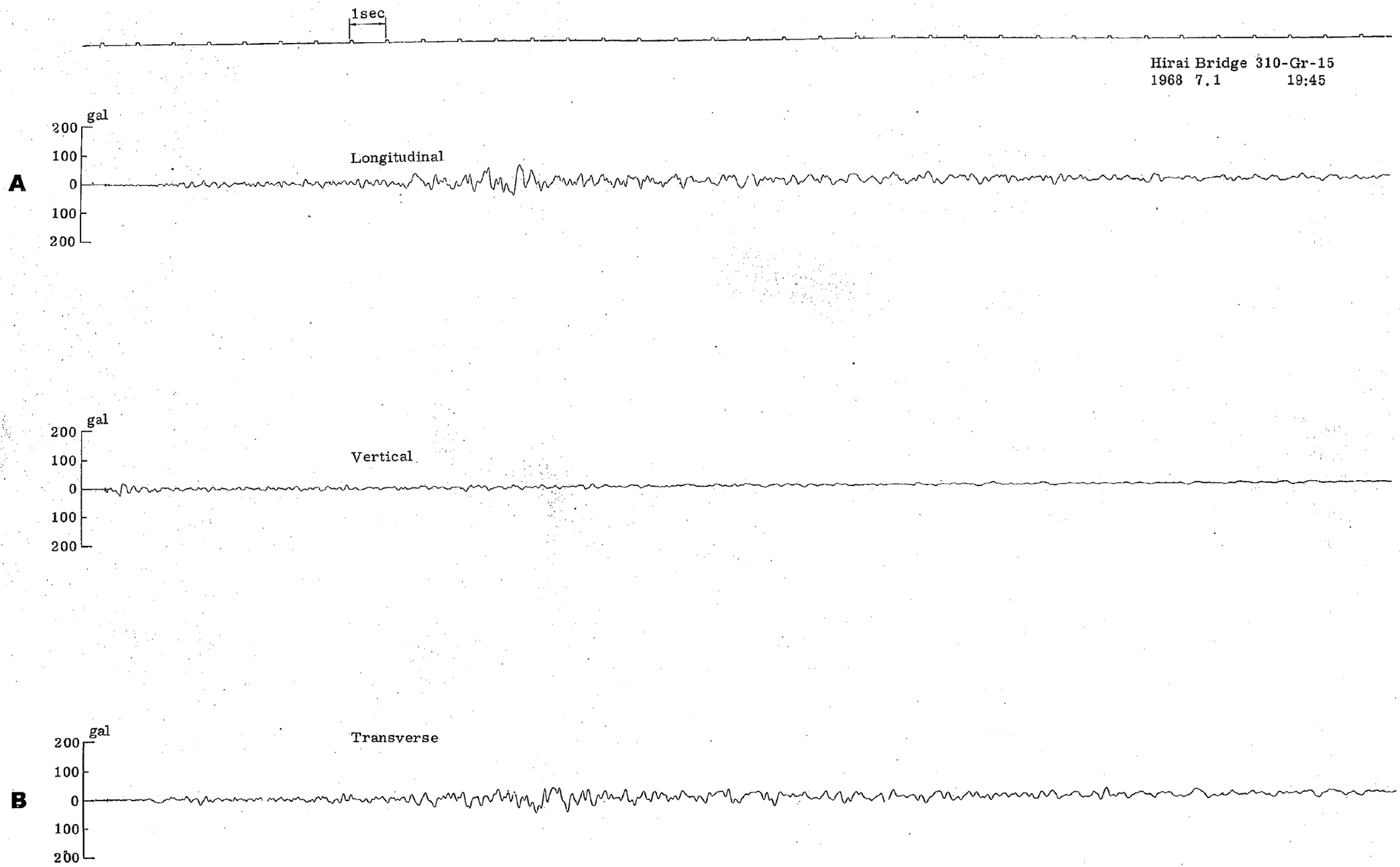

1sec
Itajima Bridge 308-Gr-9
1968 8.6. 14:25
After-shock of
The Bungosuido Earthquake
A
gal
200
100
0
100
200
Transverse
Vertical
Longitudinal
B

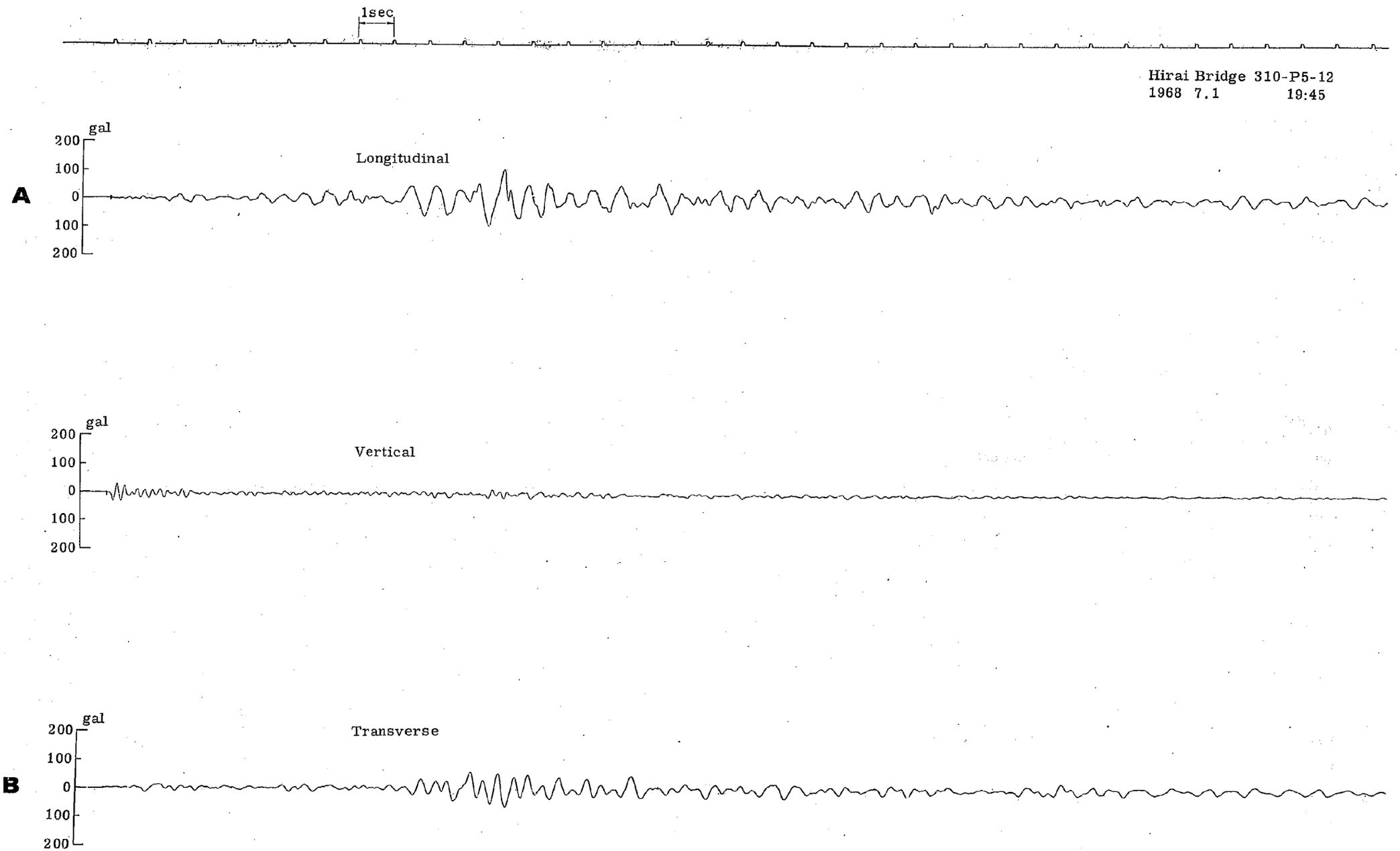

1sec
Otome Bridge 309-P-16
1968 8.6. 01:17
The Bungosuido Earhquake
A
gal
200
100
0
100
200
Longitudinal
Vertical
B
Transverse

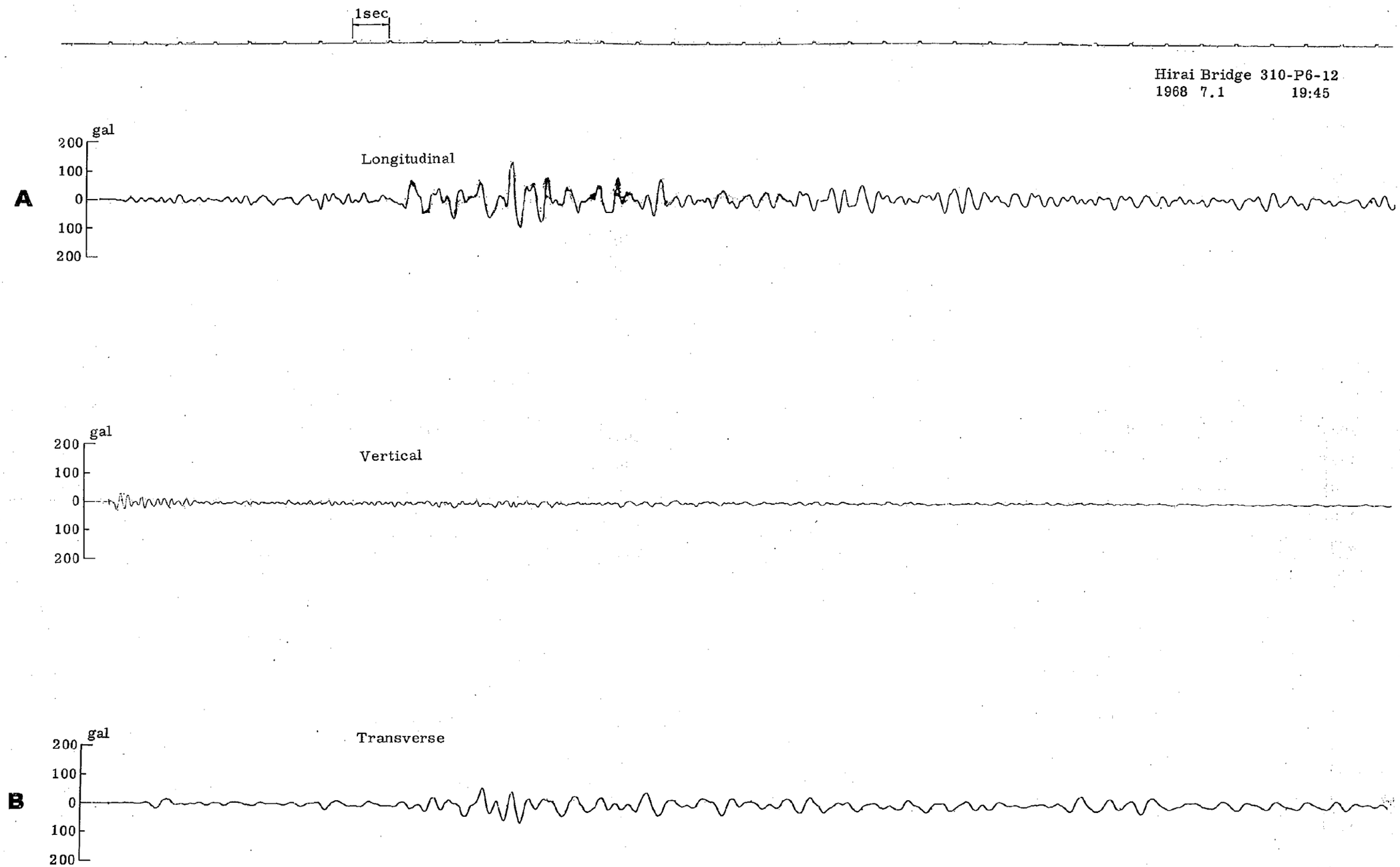

1sec
Hirai Bridge 310-Gr-12
1968 3.6. 09:12
A
gal
200
100
0
100
200
Longitudinal
Vertical
B
Transverse

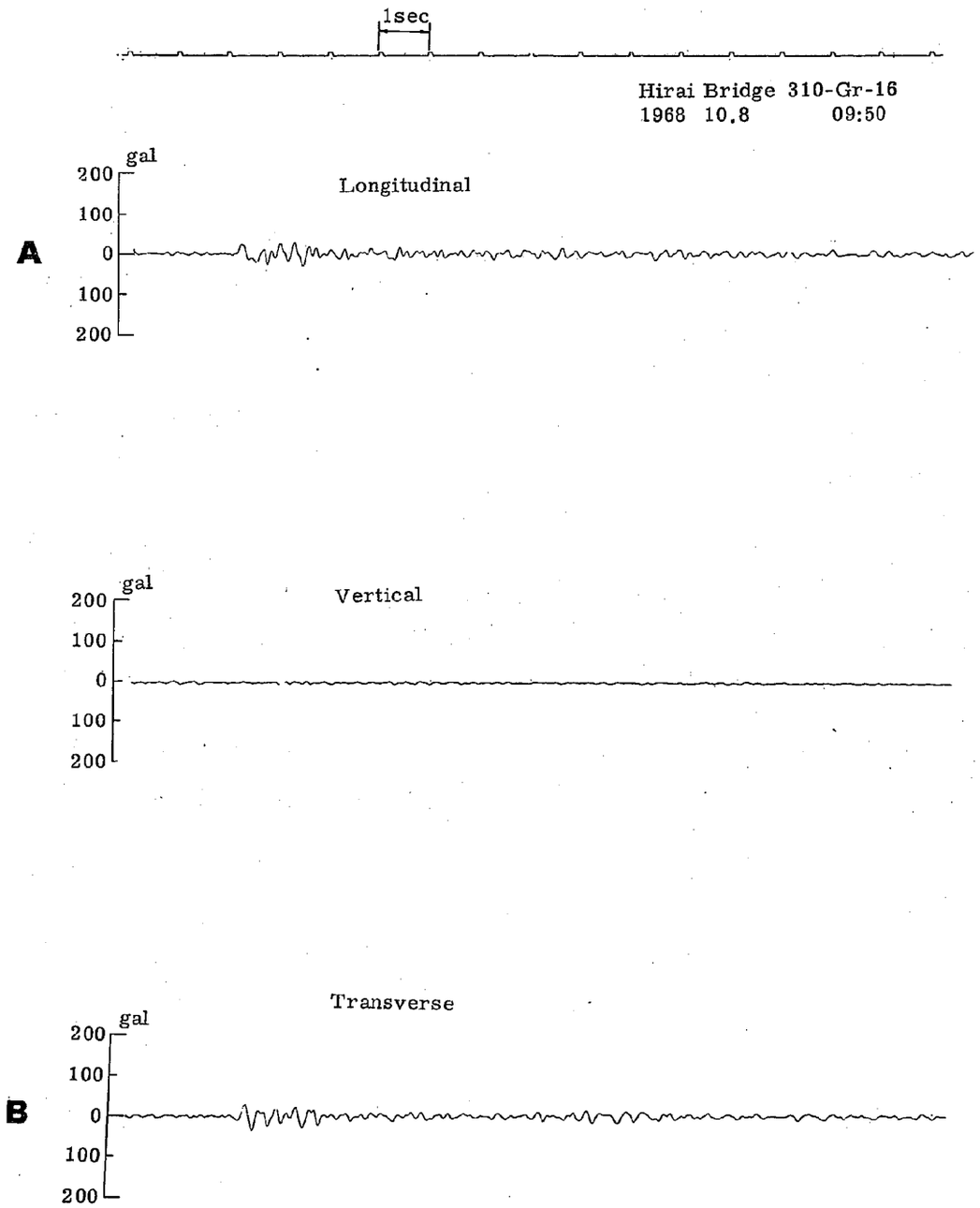

1sec
Hirai Bridge 310-P5-10
1968 3.6 09:12
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

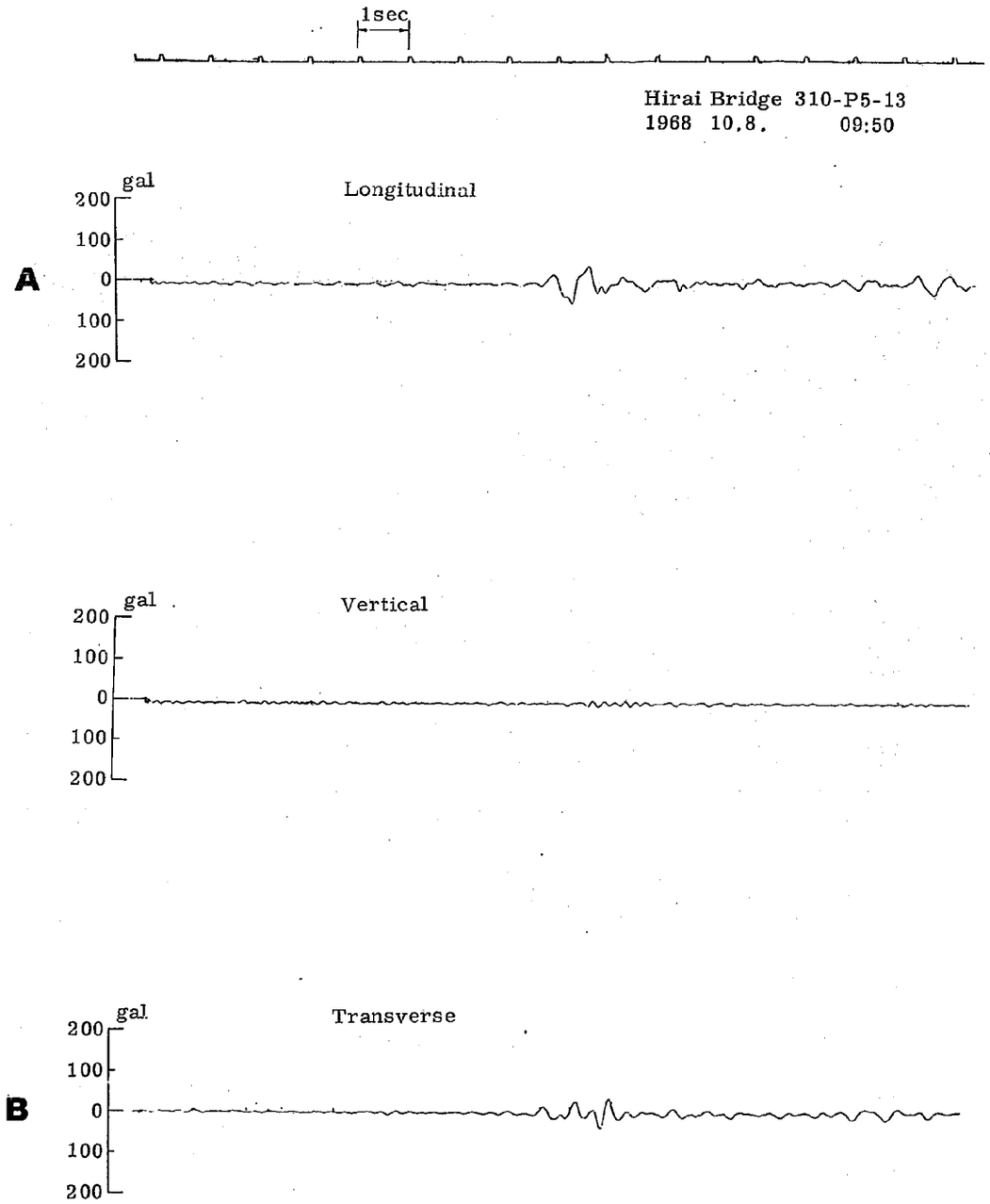

1sec
Hirai Bridge 310-P6-10
1968 3.6 09:12
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

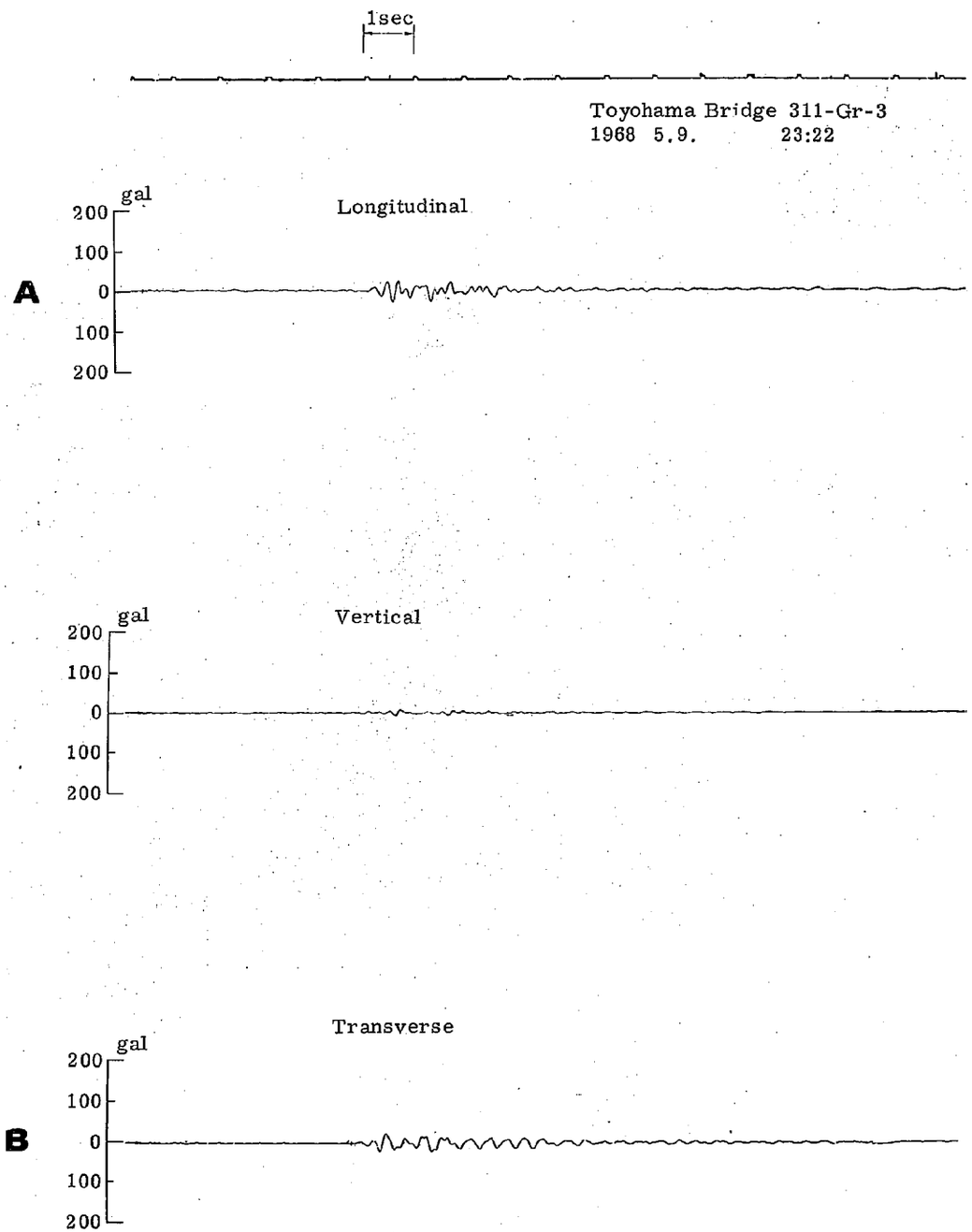

1sec
Hirai Bridge 310-Gr-15
1968 7.1 19:45
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

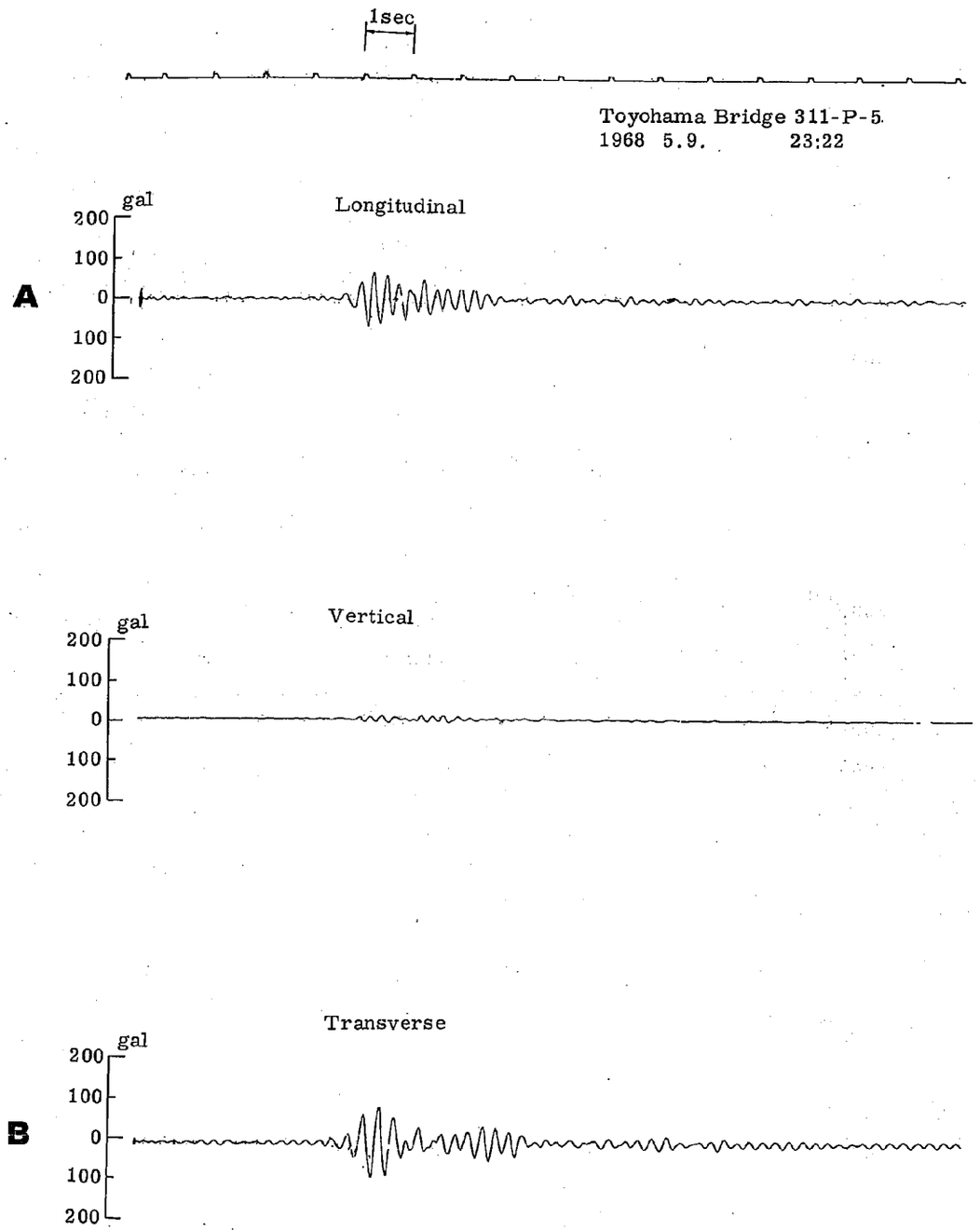

1sec
Hirai Bridge 310-P5-12
1968 7.1 19:45
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

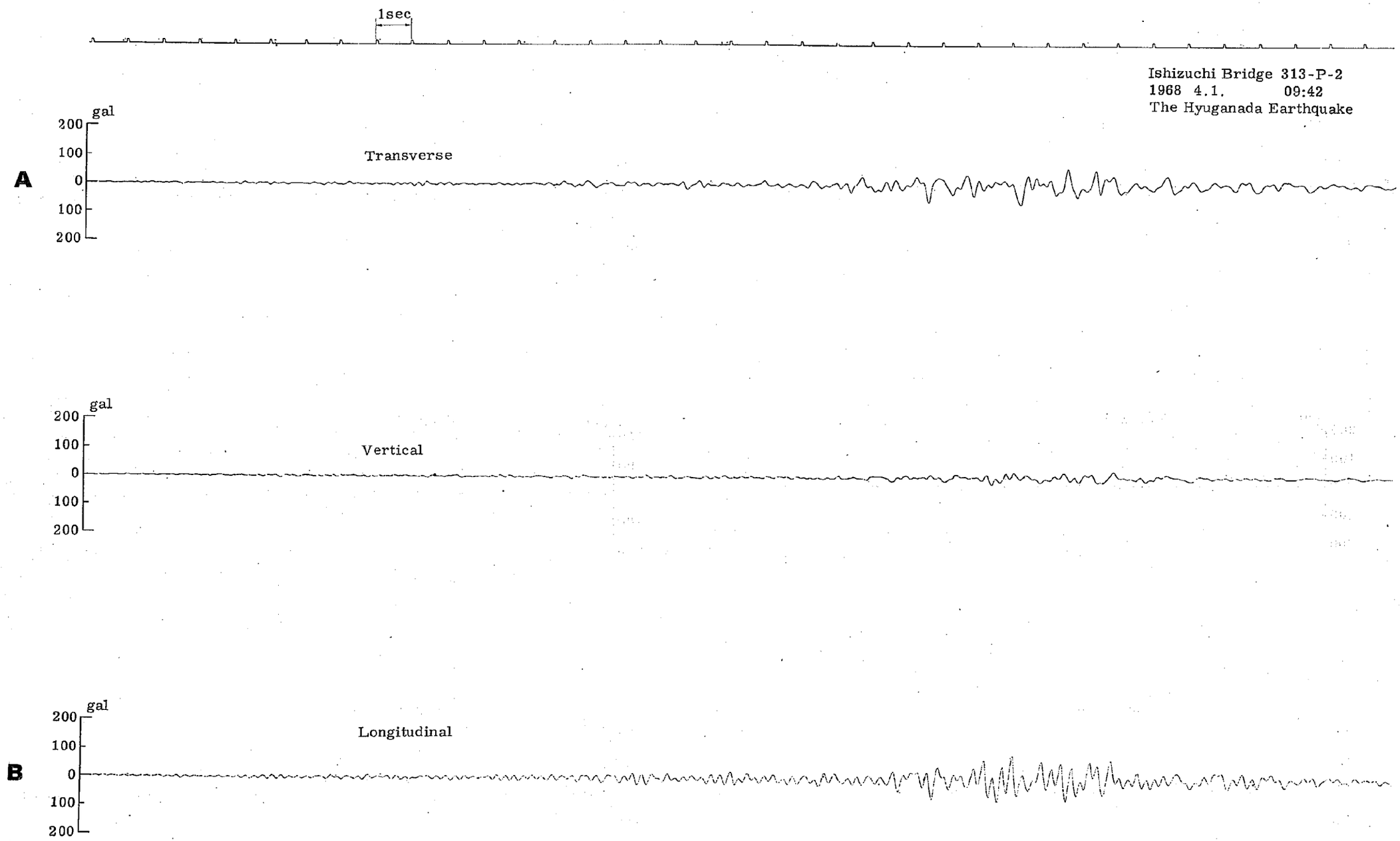

1sec
Hirai Bridge 310-P6-12
1968 7.1 19:45
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

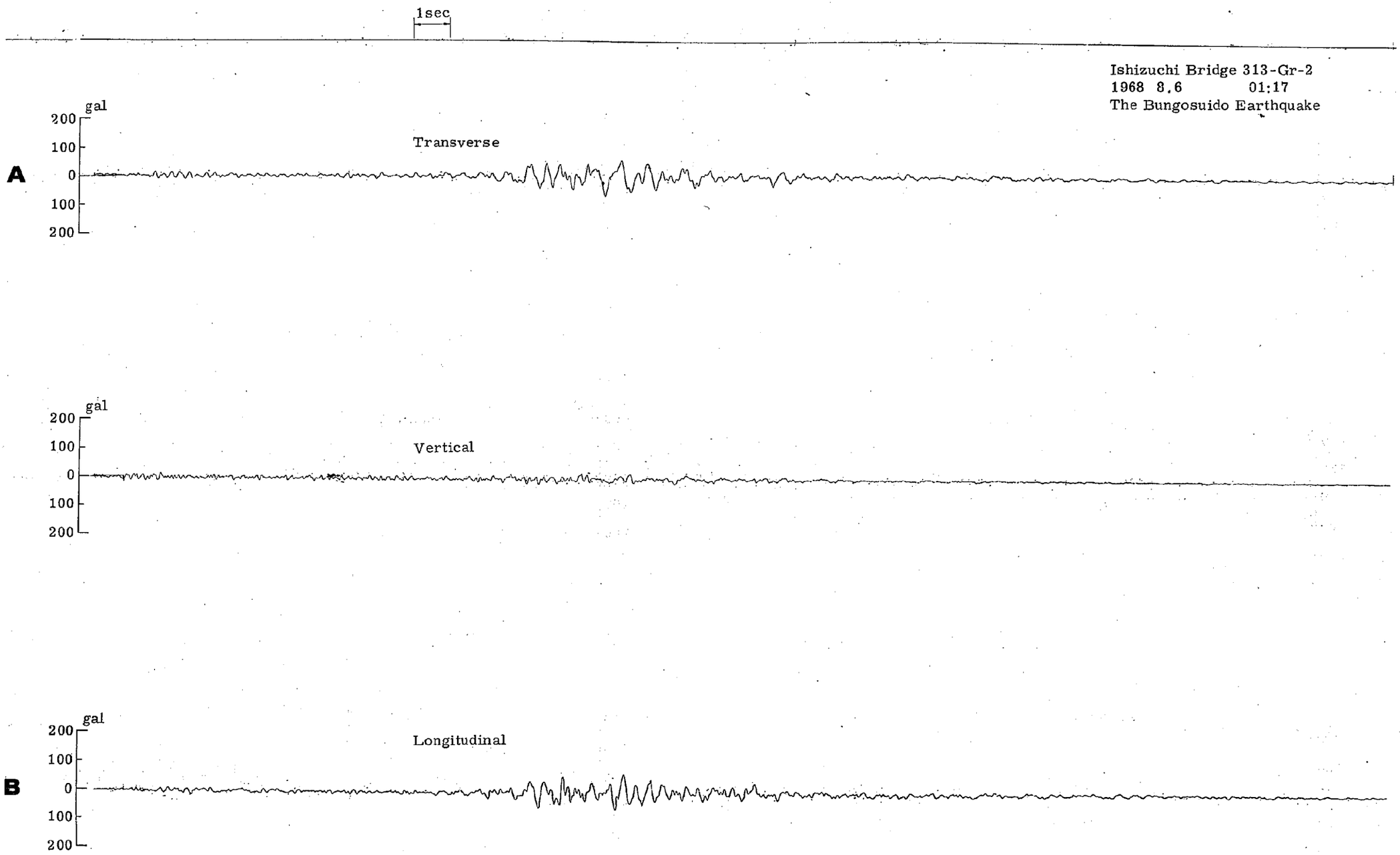

1sec
Hirai Bridge 310-Gr-16
1968 10.8 09:50
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
Transverse
gal
200
100
0
100
200

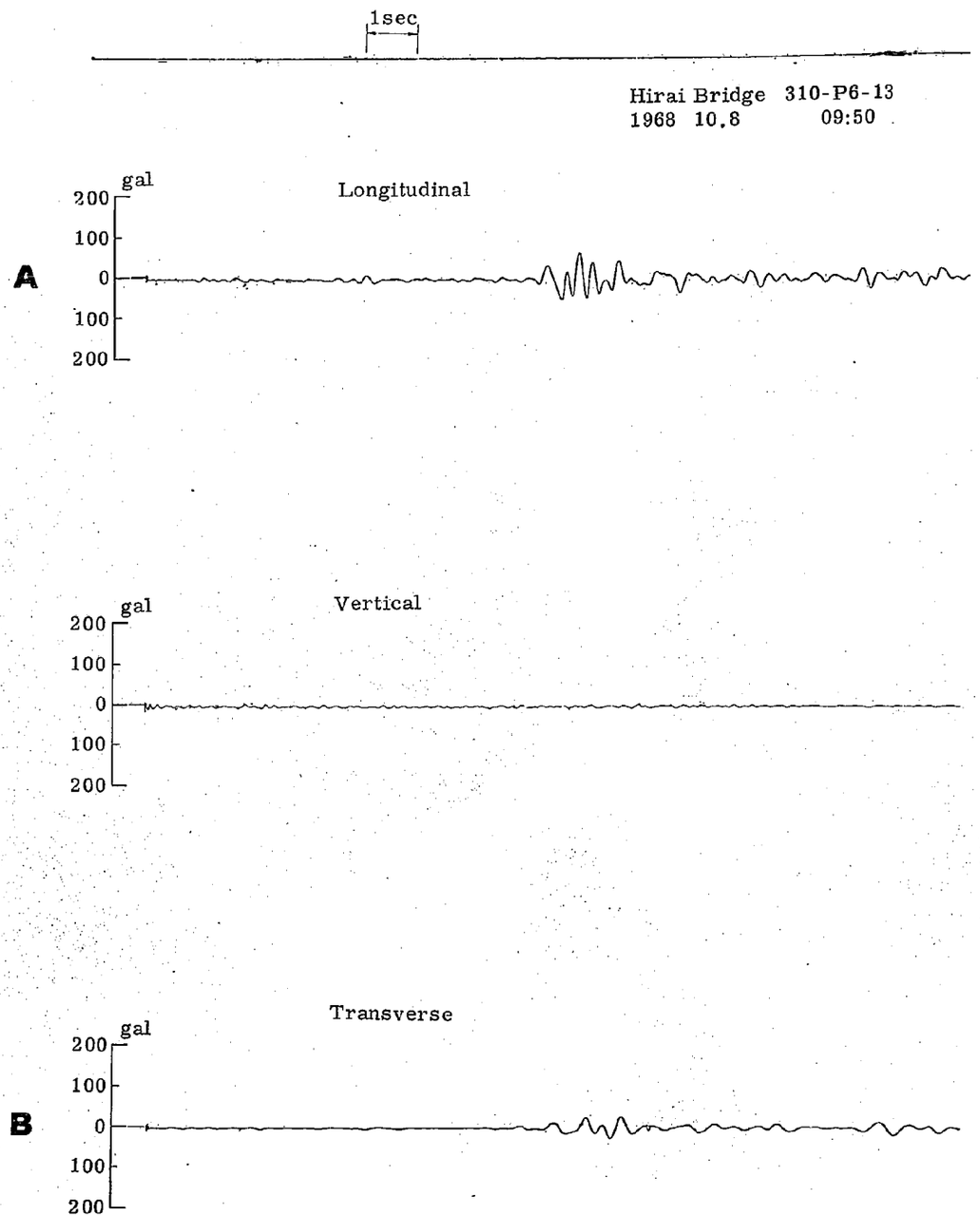

1sec
Hirai Bridge 310-P5-13
1968 10.8. 09:50
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
Transverse
gal
200
100
0
100
200

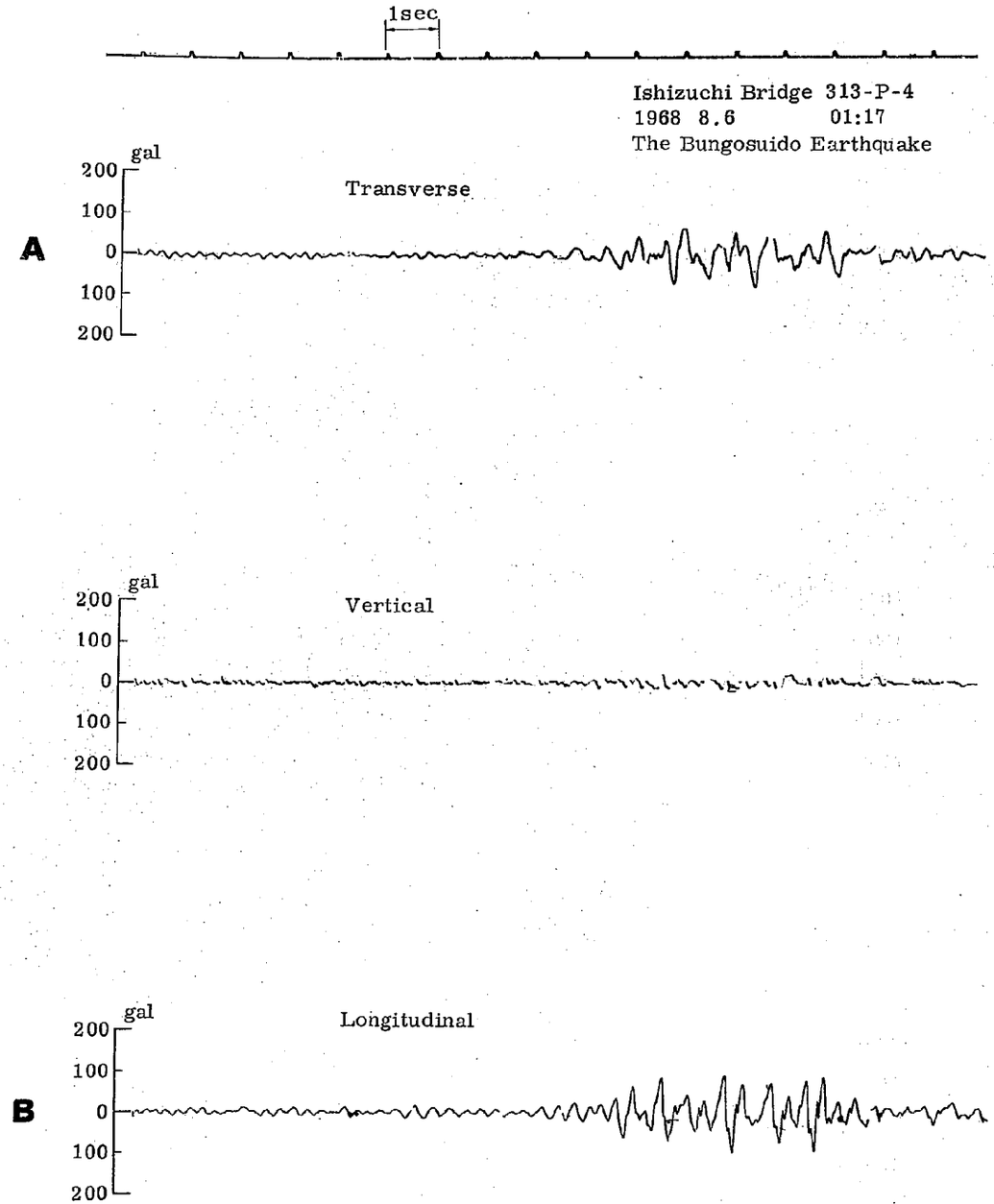

1sec
Toyohama Bridge 311-Gr-3
1968 5.9. 23:22
A
gal
200
100
0
100
200
Longitudinal
Vertical
B
Transverse

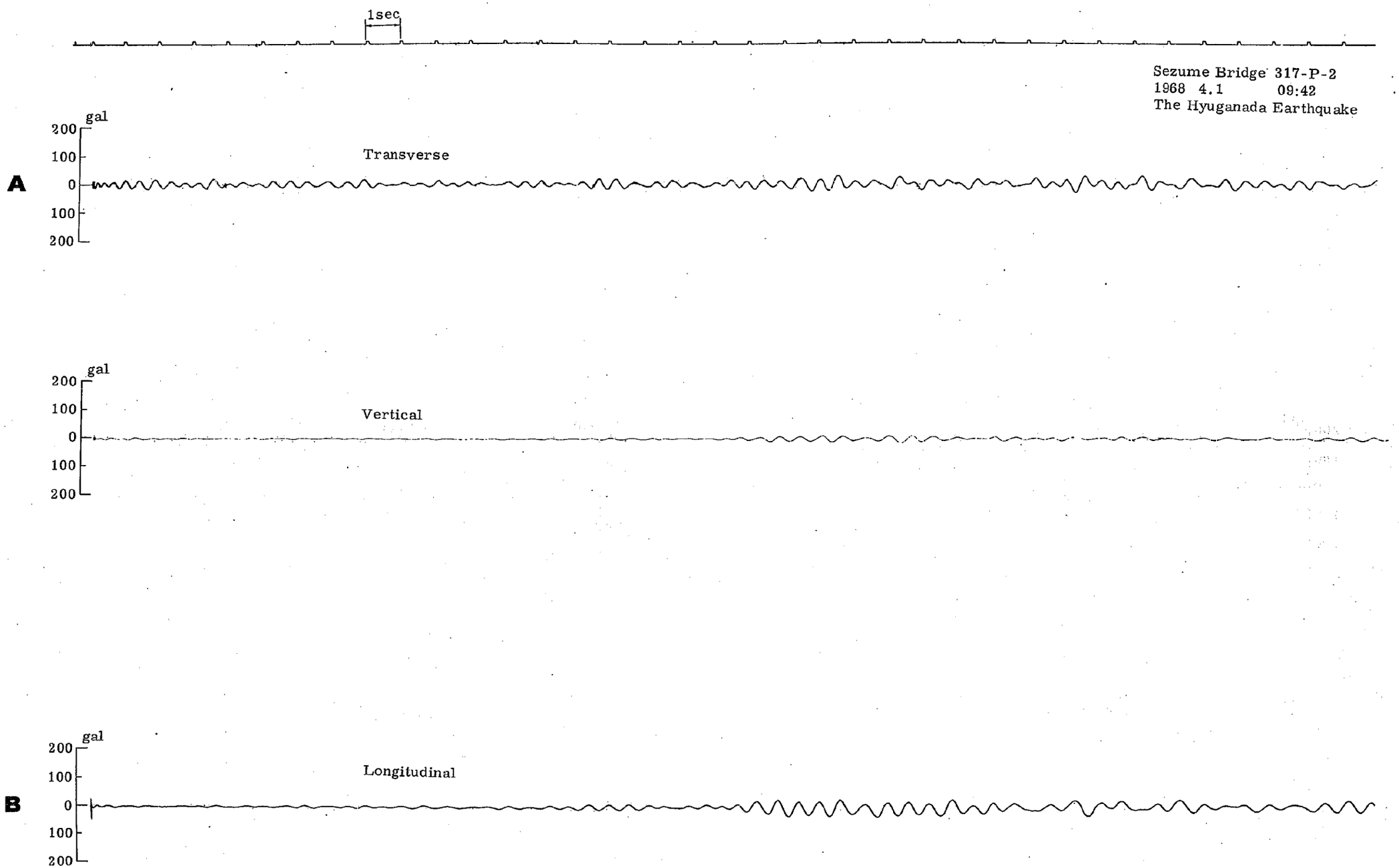

1sec
Toyohama Bridge 311-P-5
1968 5.9. 23:22
A
gal
200
100
0
100
200
Longitudinal
Vertical
B
Transverse

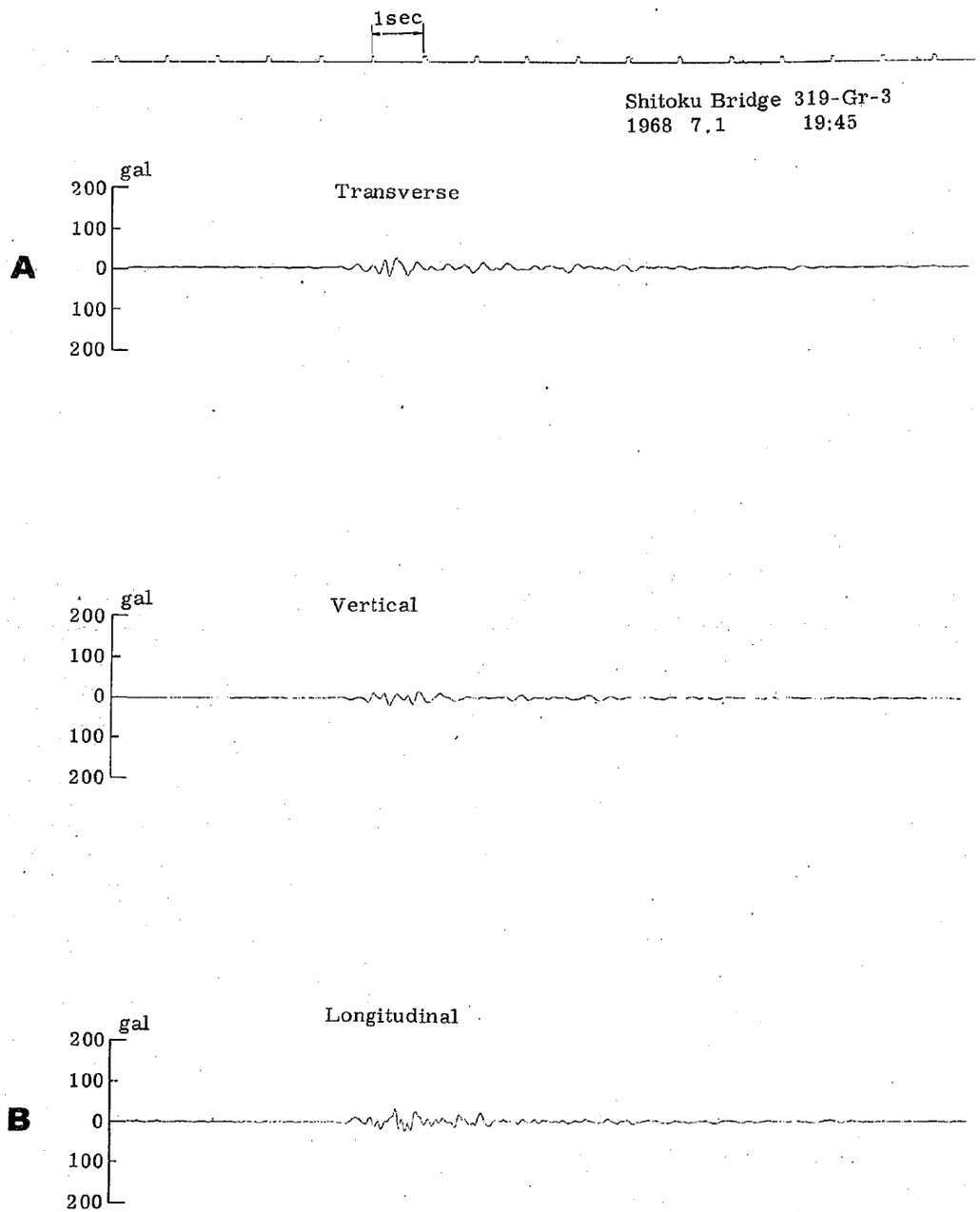

1sec
Ishizuchi Bridge 313-P-2
1968 4.1. 09:42
The Hyuganada Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

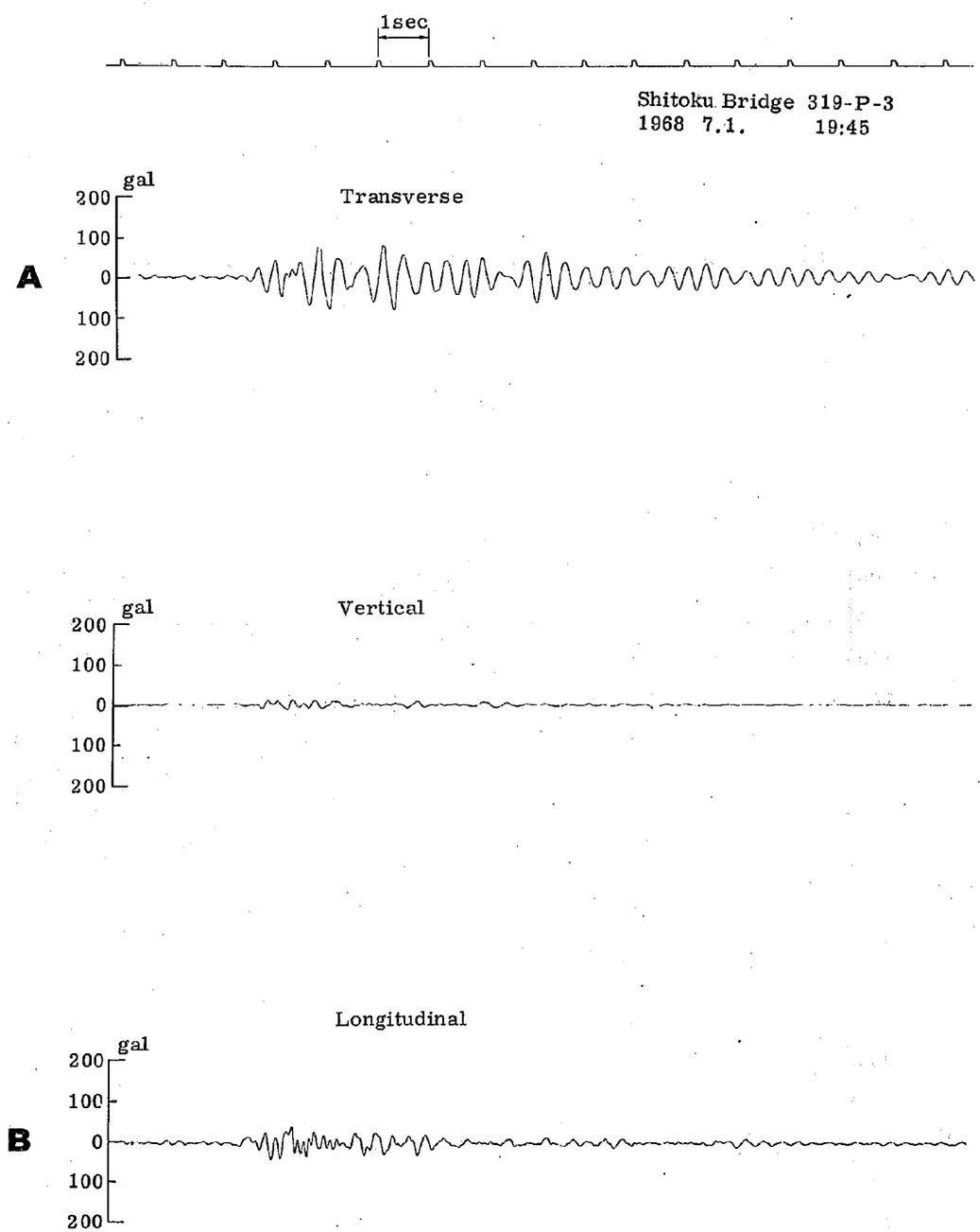

1sec
Ishizuchi Bridge 313-Gr-2
1968 8.6 01:17
The Bungosuido Earthquake
gal
200
100
0
100
200
Transverse
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
Longitudinal
B

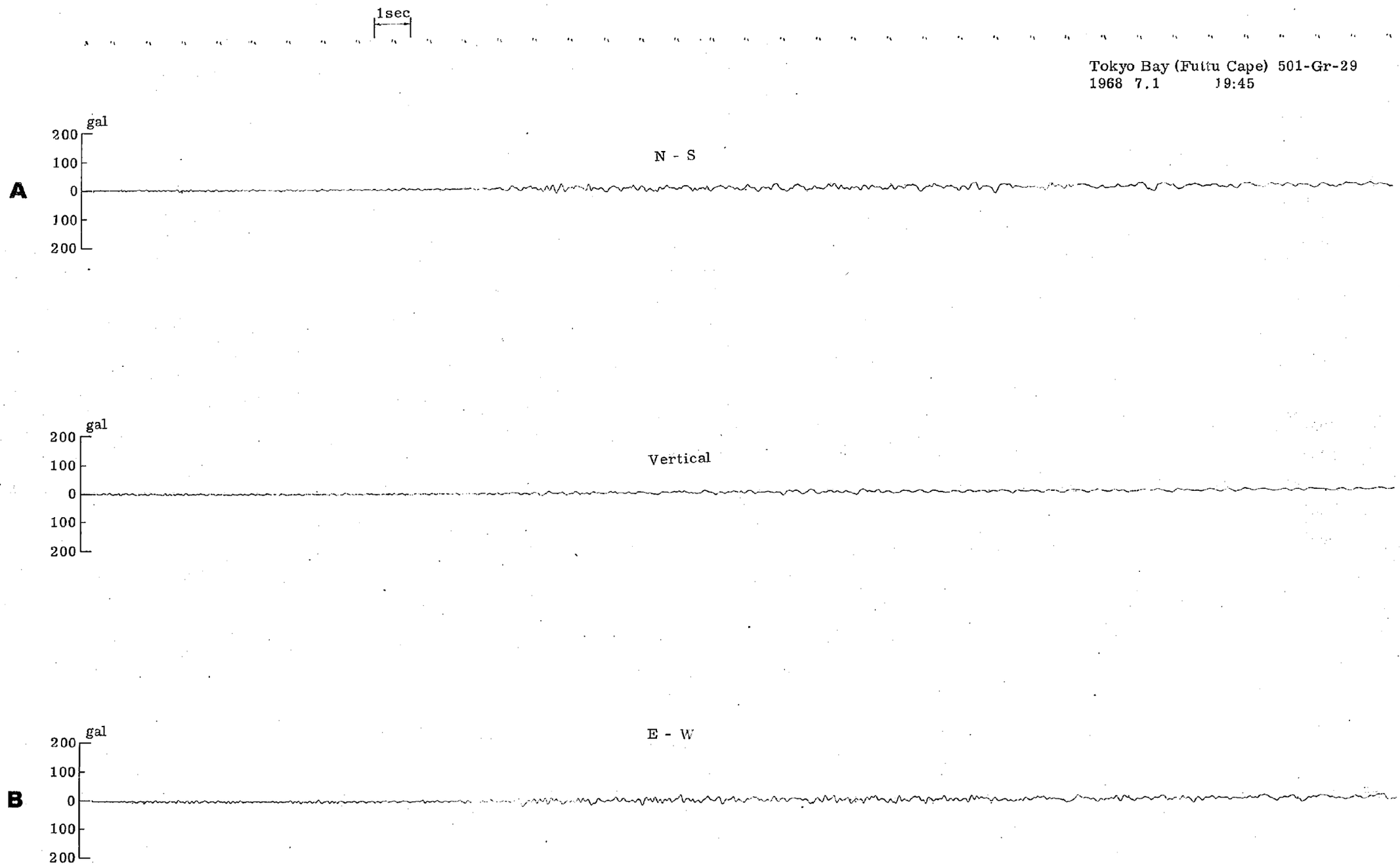

1sec
Hirai Bridge 310-P6-13
1968 10.8 09:50
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
Transverse
gal
200
100
0
100
200

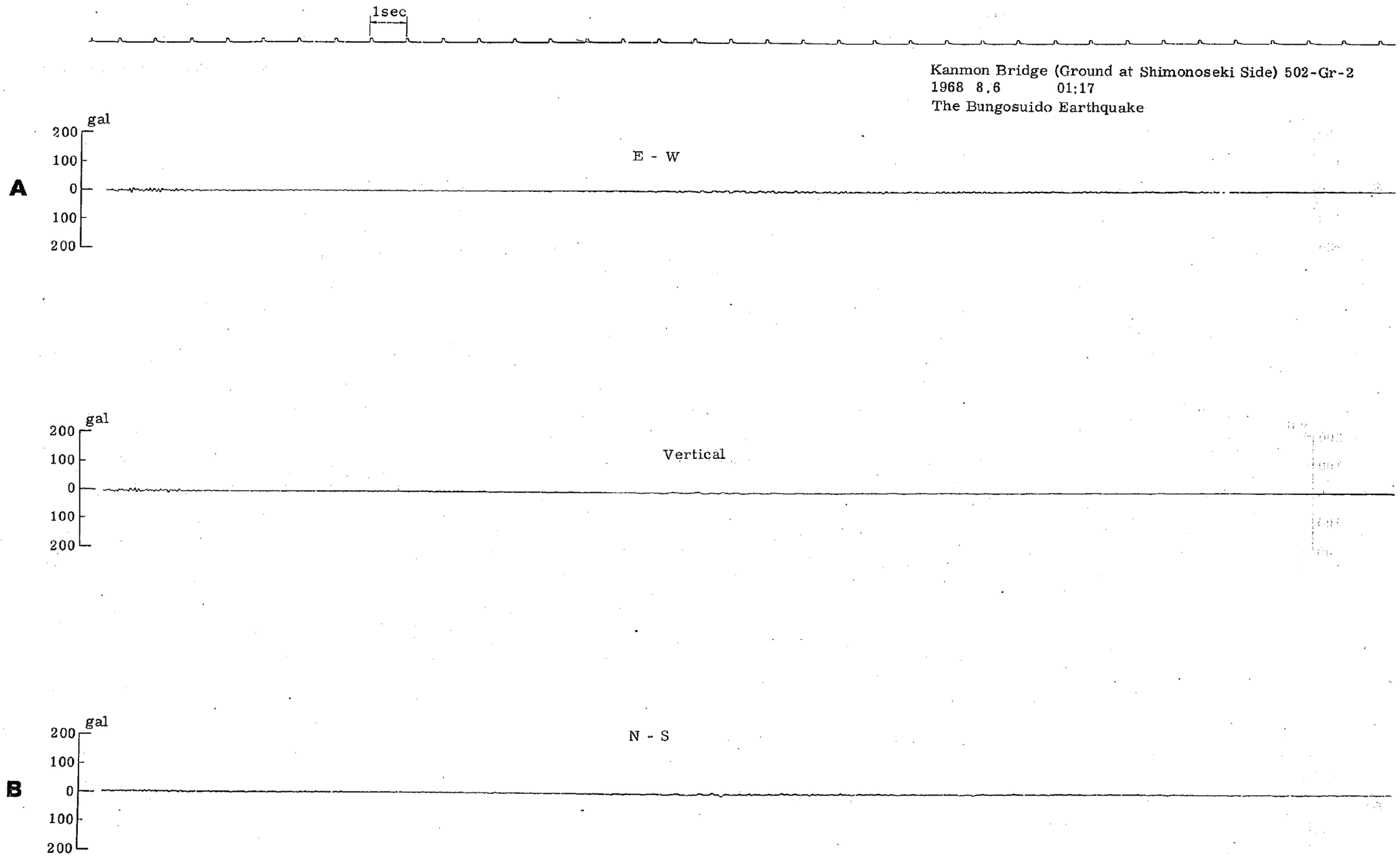

1sec
Ishizuchi Bridge 313-P-4
1968 8.6 01:17
The Bungosuido Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
Longitudinal
gal
200
100
0
100
200

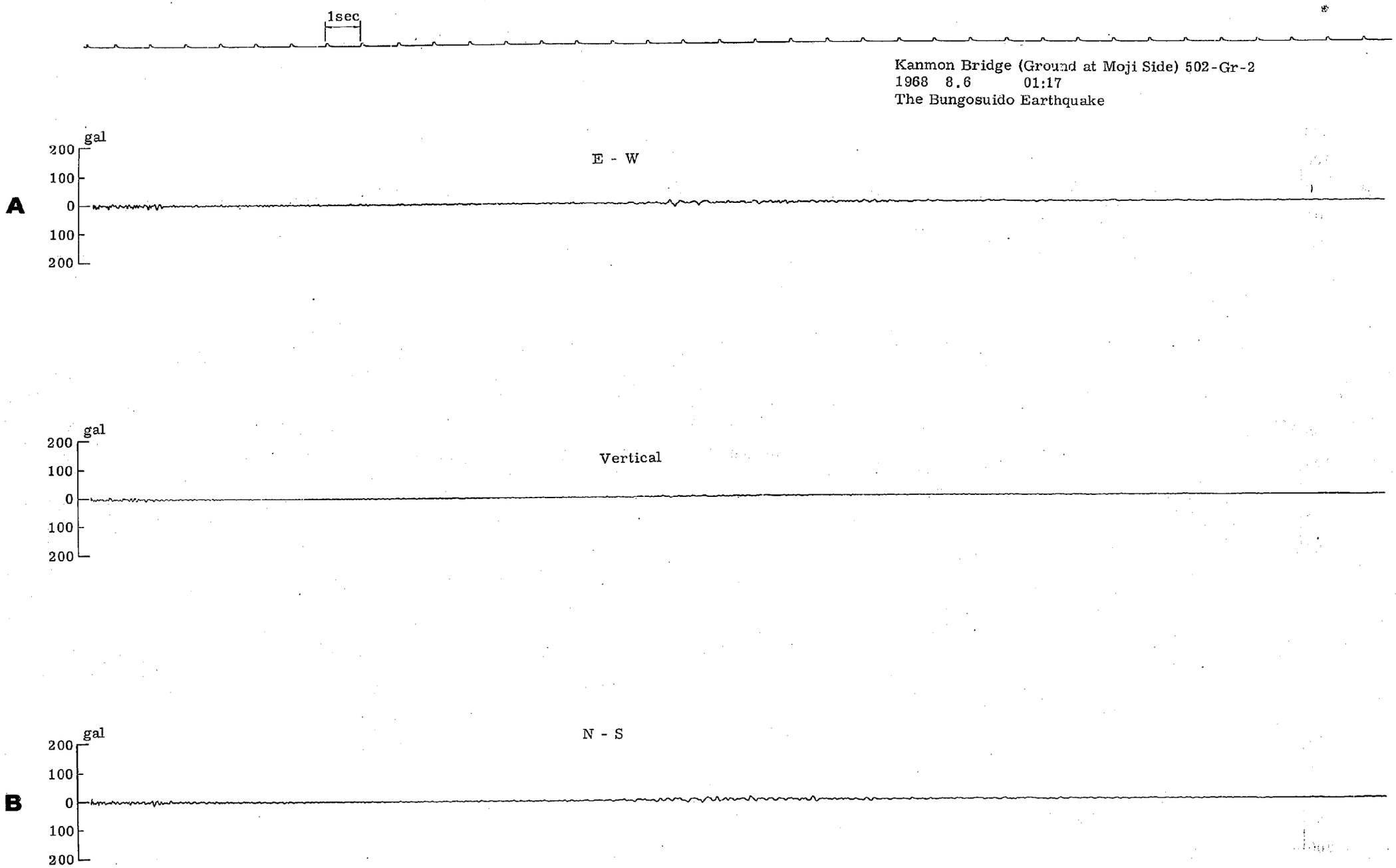

1sec
Sezume Bridge 317-P-2
1968 4.1 09:42
The Hyuganada Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

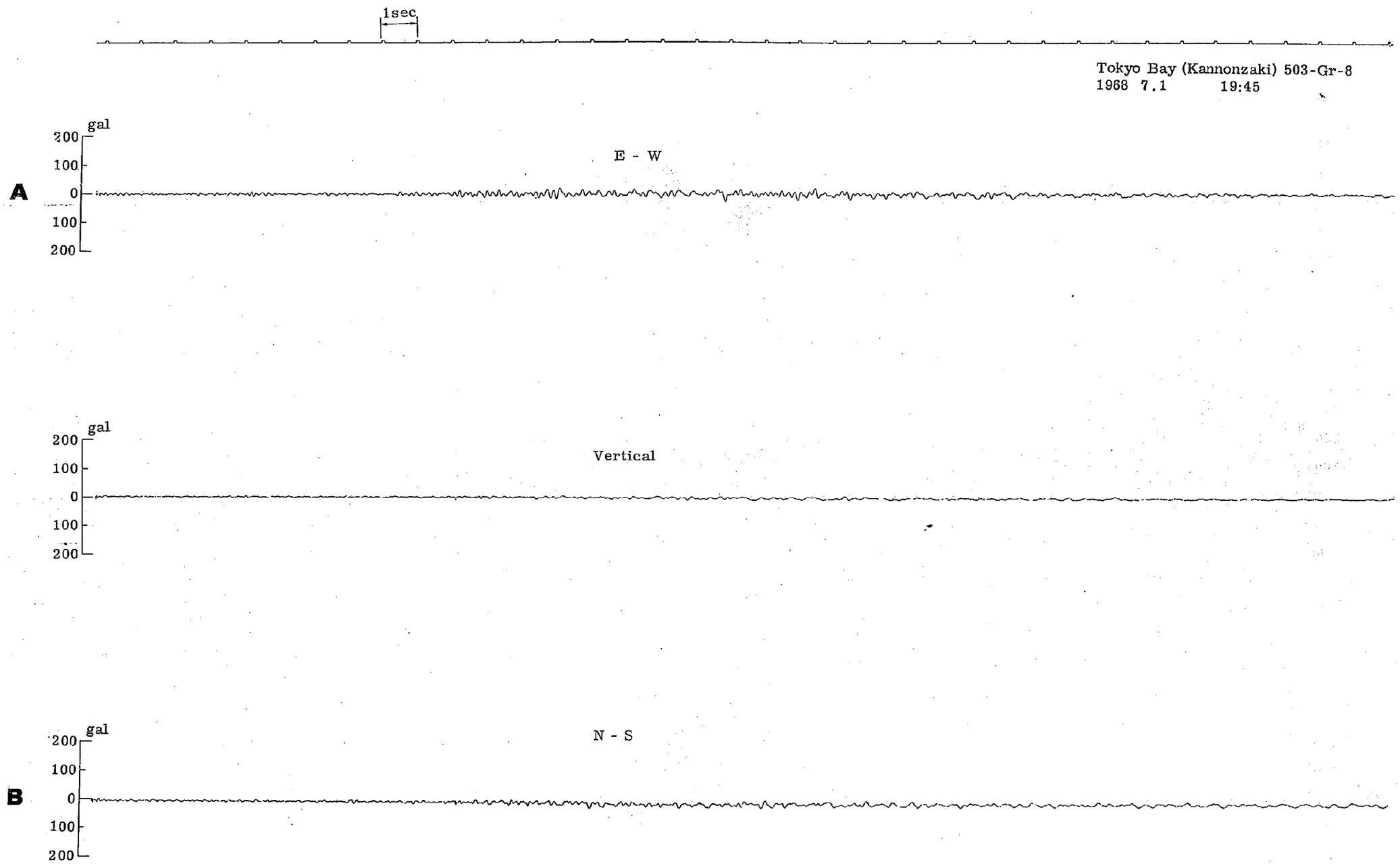

1sec
Shitoku Bridge 319-Gr-3
1968 7.1 19:45
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal

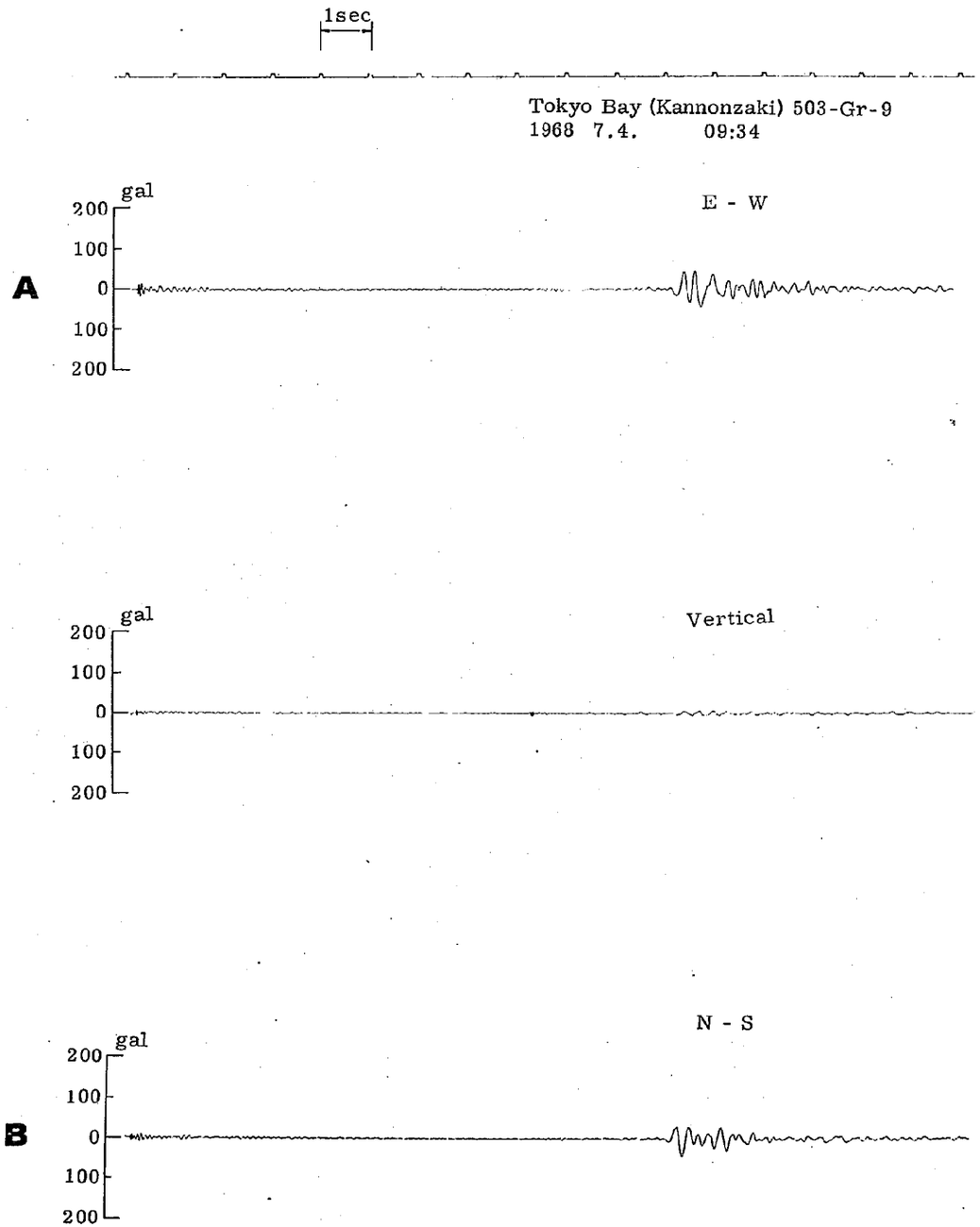

1sec
Shitoku Bridge 319-P-3
1968 7.1. 19:45
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal

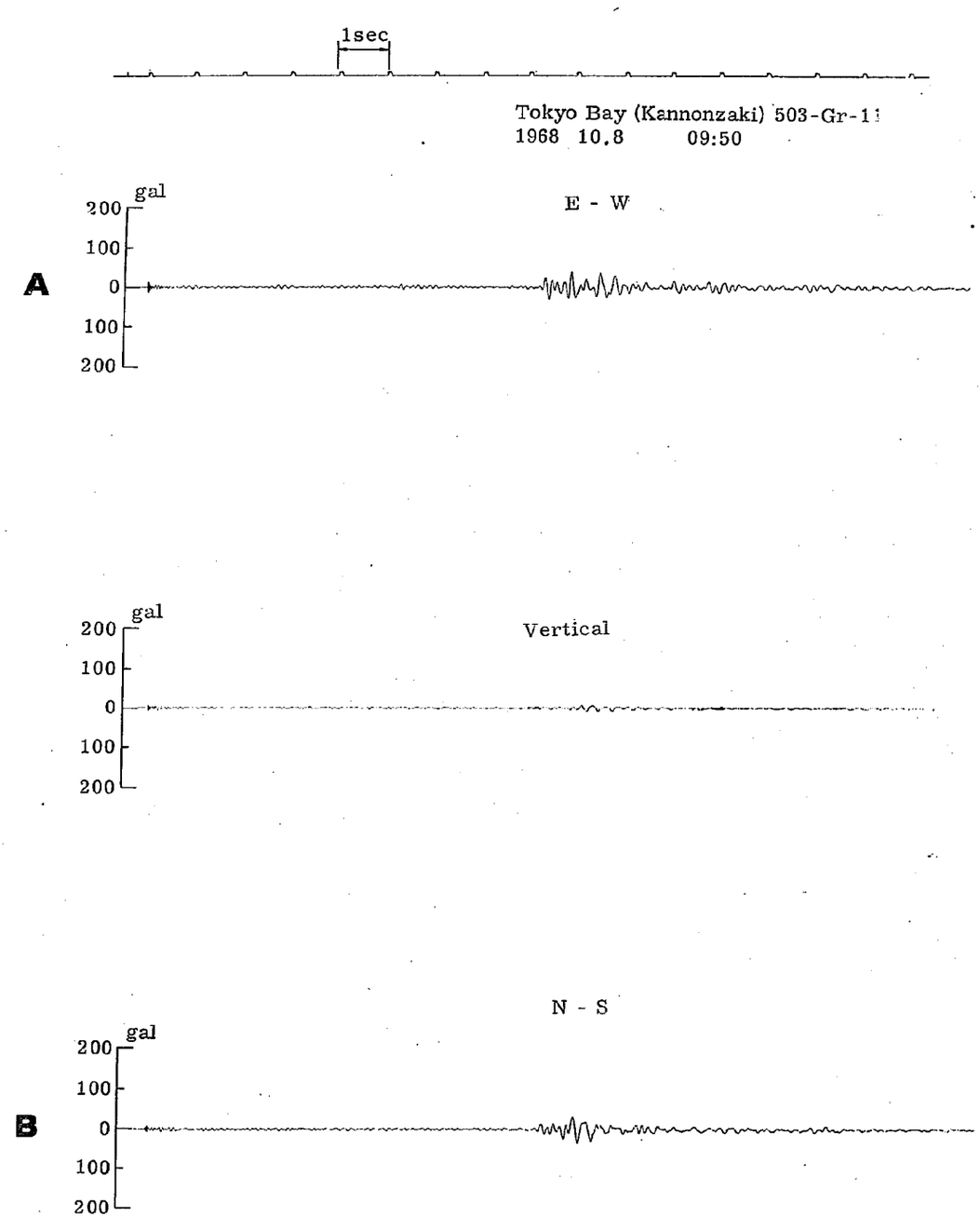

1sec
Tokyo Bay (Futtu Cape) 501-Gr-29
1968 7.1 19:45
gal
200
100
0
100
200
A
N - S
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
E - W

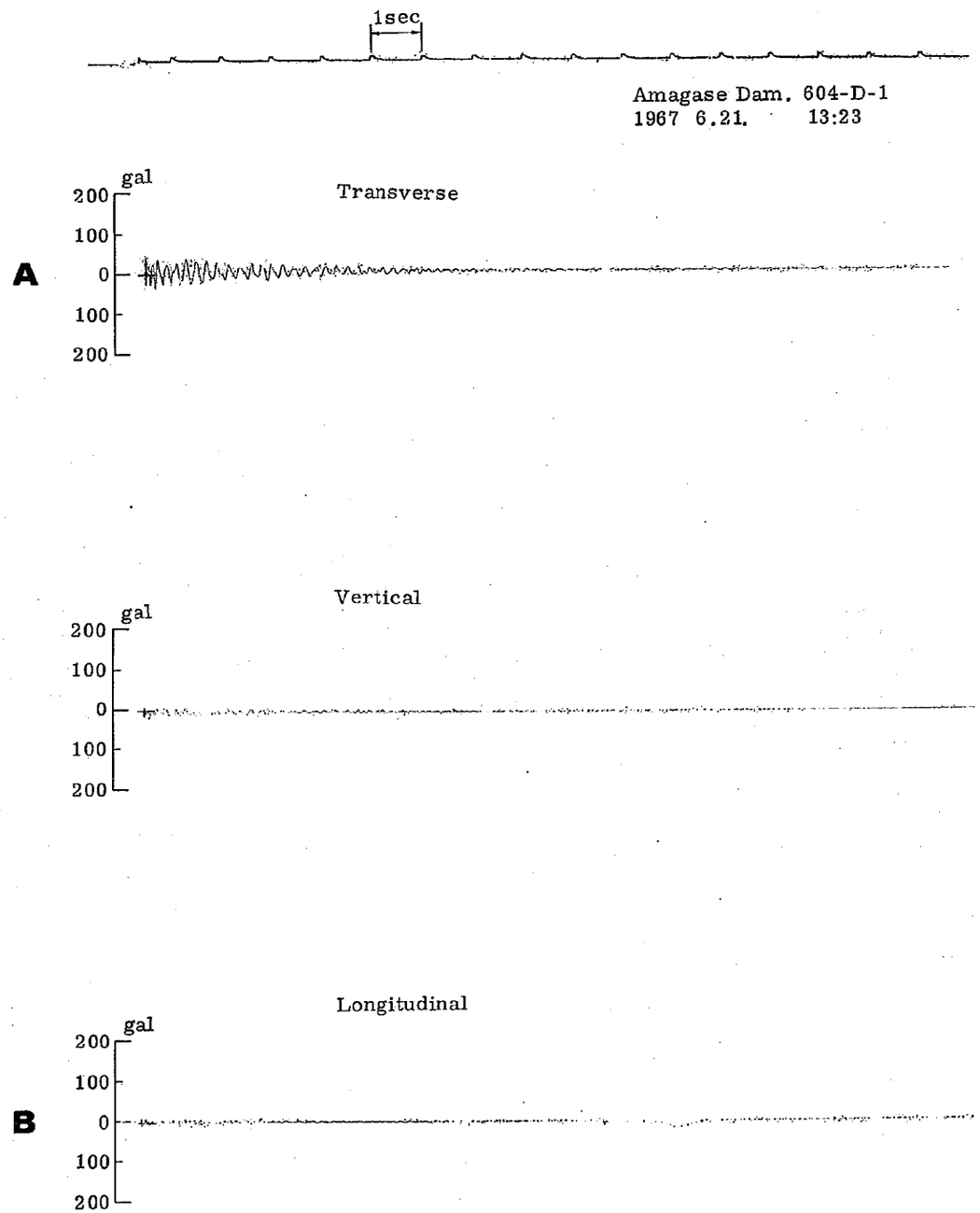

1sec
Kanmon Bridge (Ground at Shimonoseki Side) 502-Gr-2
1968 8.6 01:17
The Bungosuido Earthquake
A
gal
200
100
0
100
200
E - W
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
N - S

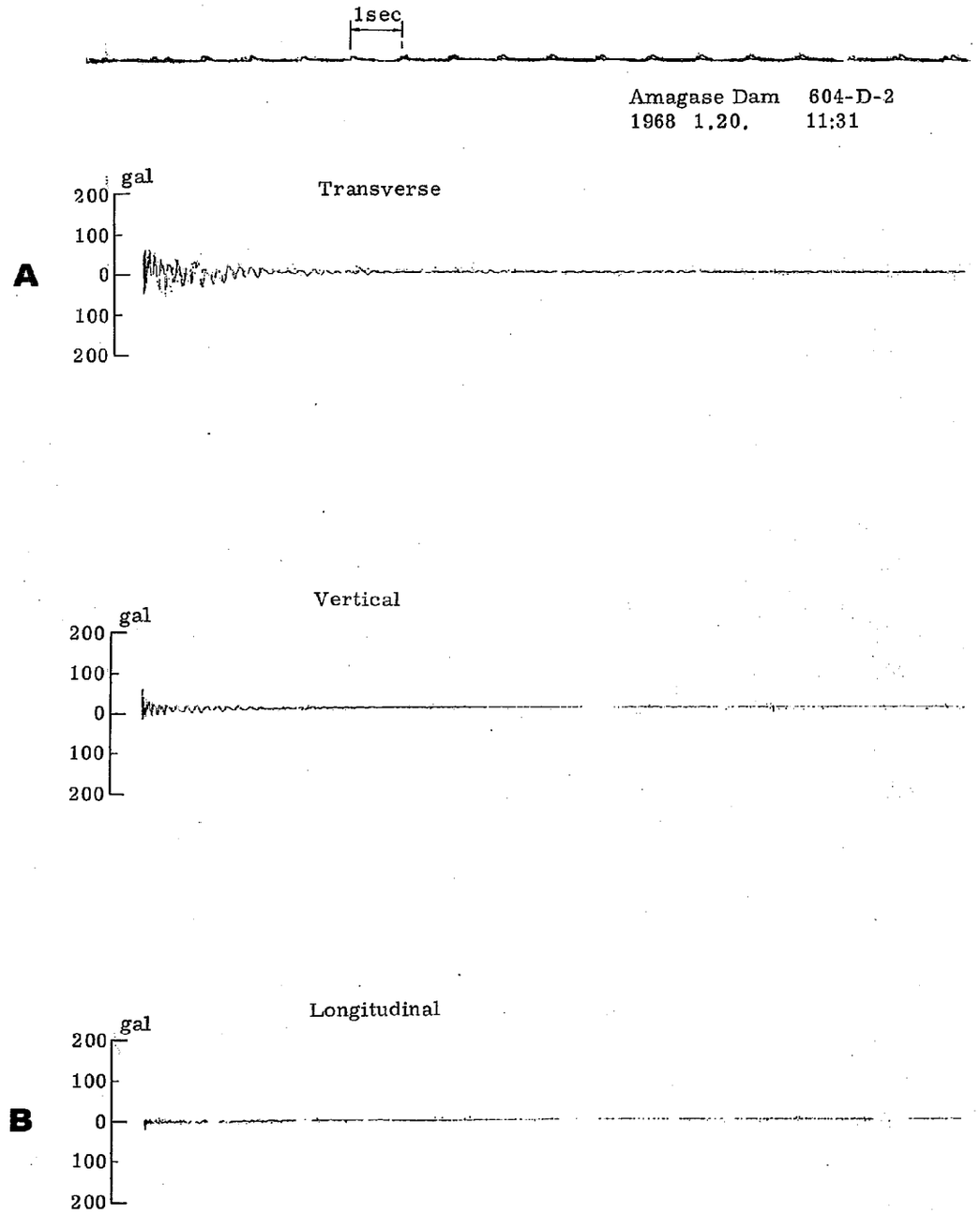

1sec
Kanmon Bridge (Ground at Moji Side) 502-Gr-2
1968 8.6 01:17
The Bungosuido Earthquake
A
gal
200
100
0
100
200
E - W
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
N - S

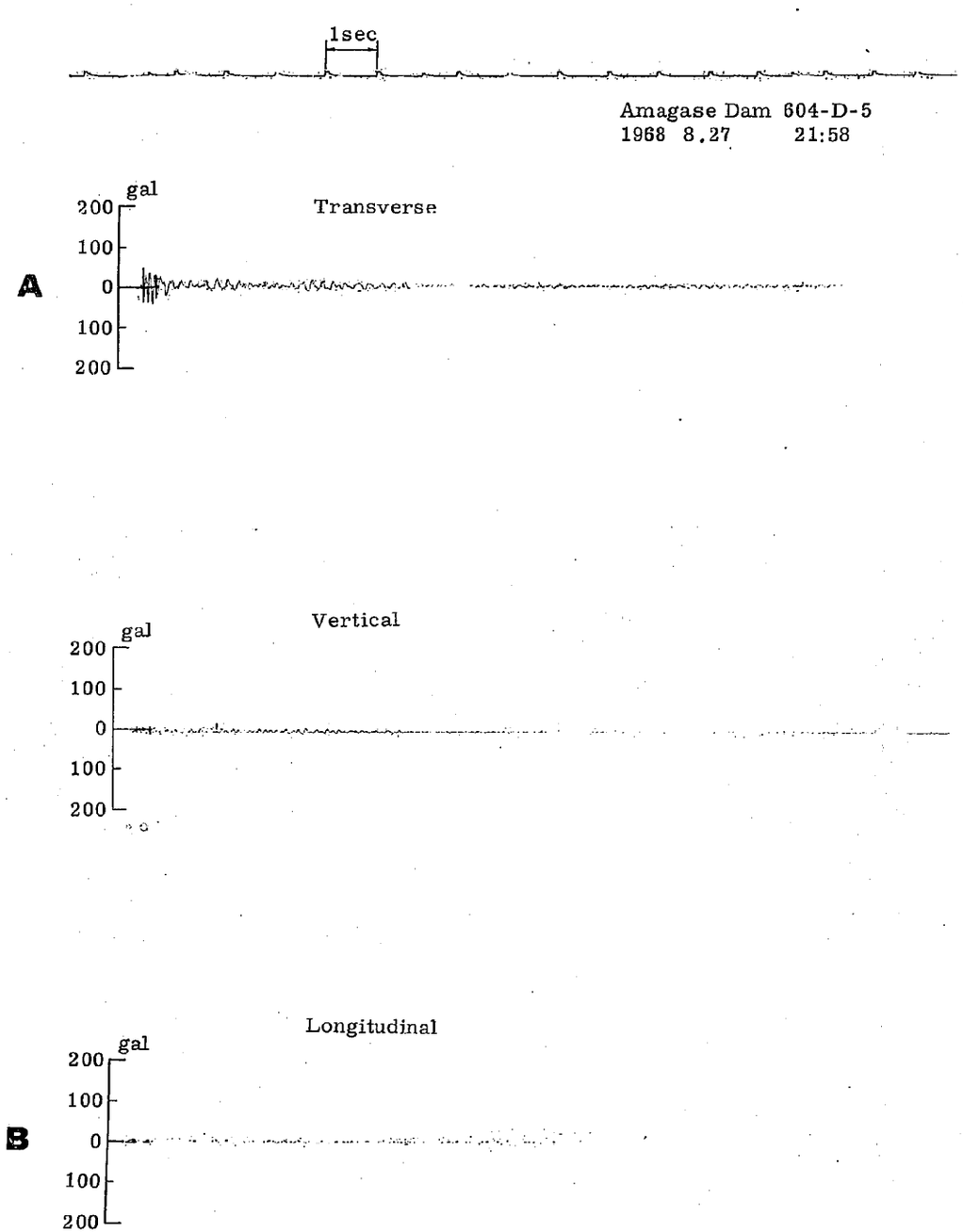

1sec
Tokyo Bay (Kannonzaki) 503-Gr-8
1968 7.1 19:45
A
gal
200
100
0
100
200
E - W
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
N - S

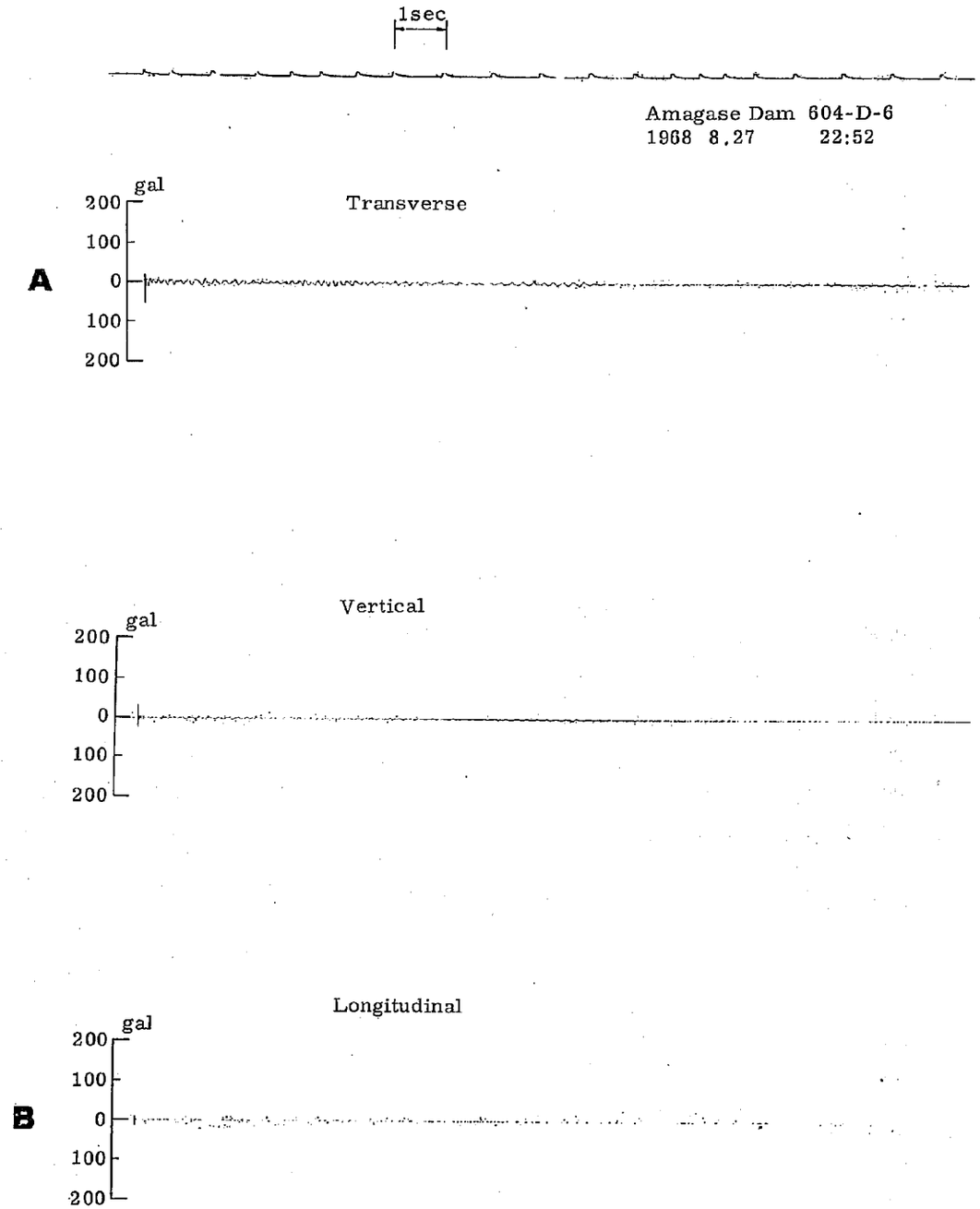

1sec
Tokyo Bay (Kannonzaki) 503-Gr-9
1968 7.4. 09:34
A
gal
200
100
0
100
200
E - W
Vertical
B
N - S

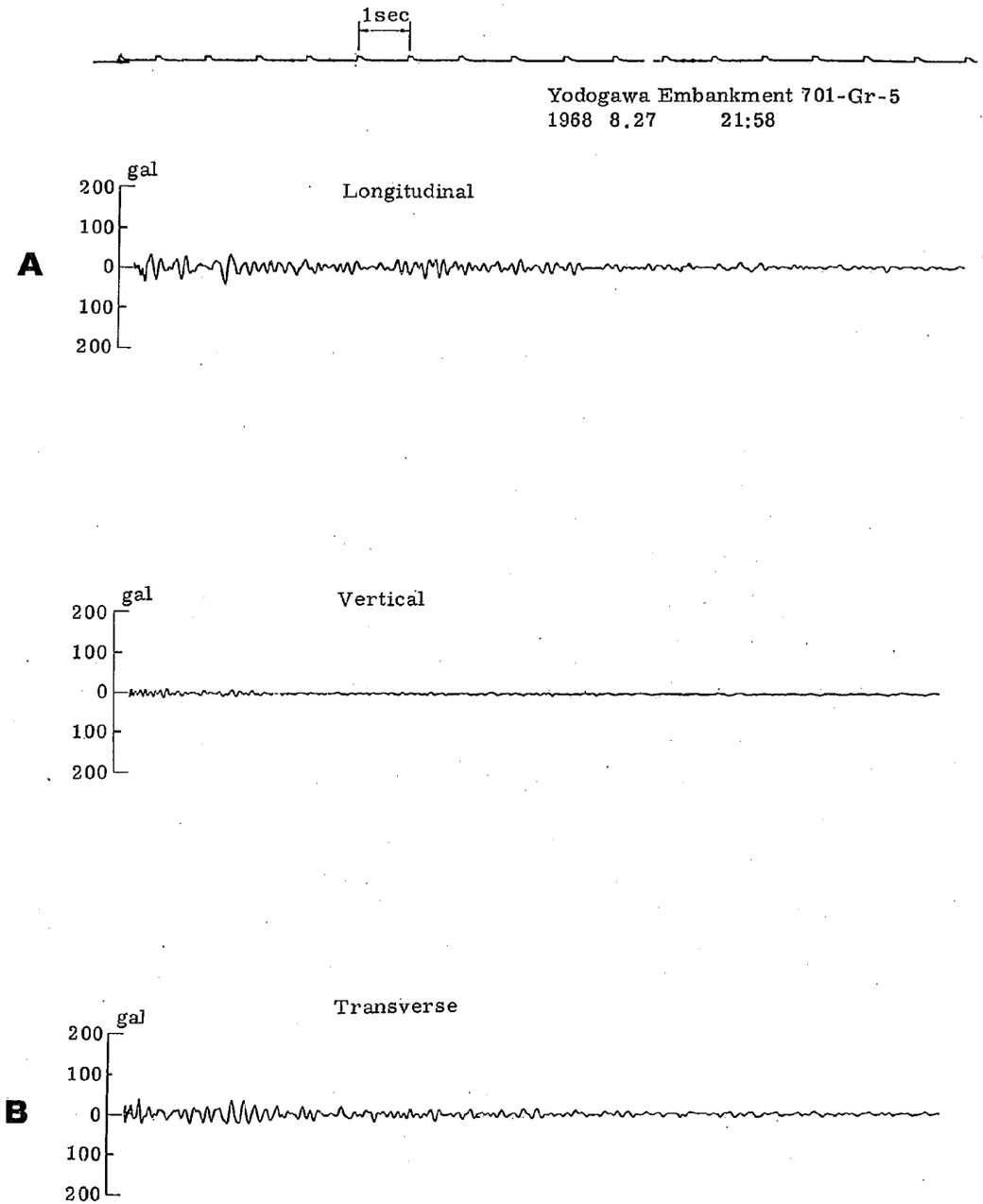

1sec
Tokyo Bay (Kannonzaki) 503-Gr-11
1968 10.8 09:50
A
gal
200
100
0
100
200
E - W
Vertical
B
N - S

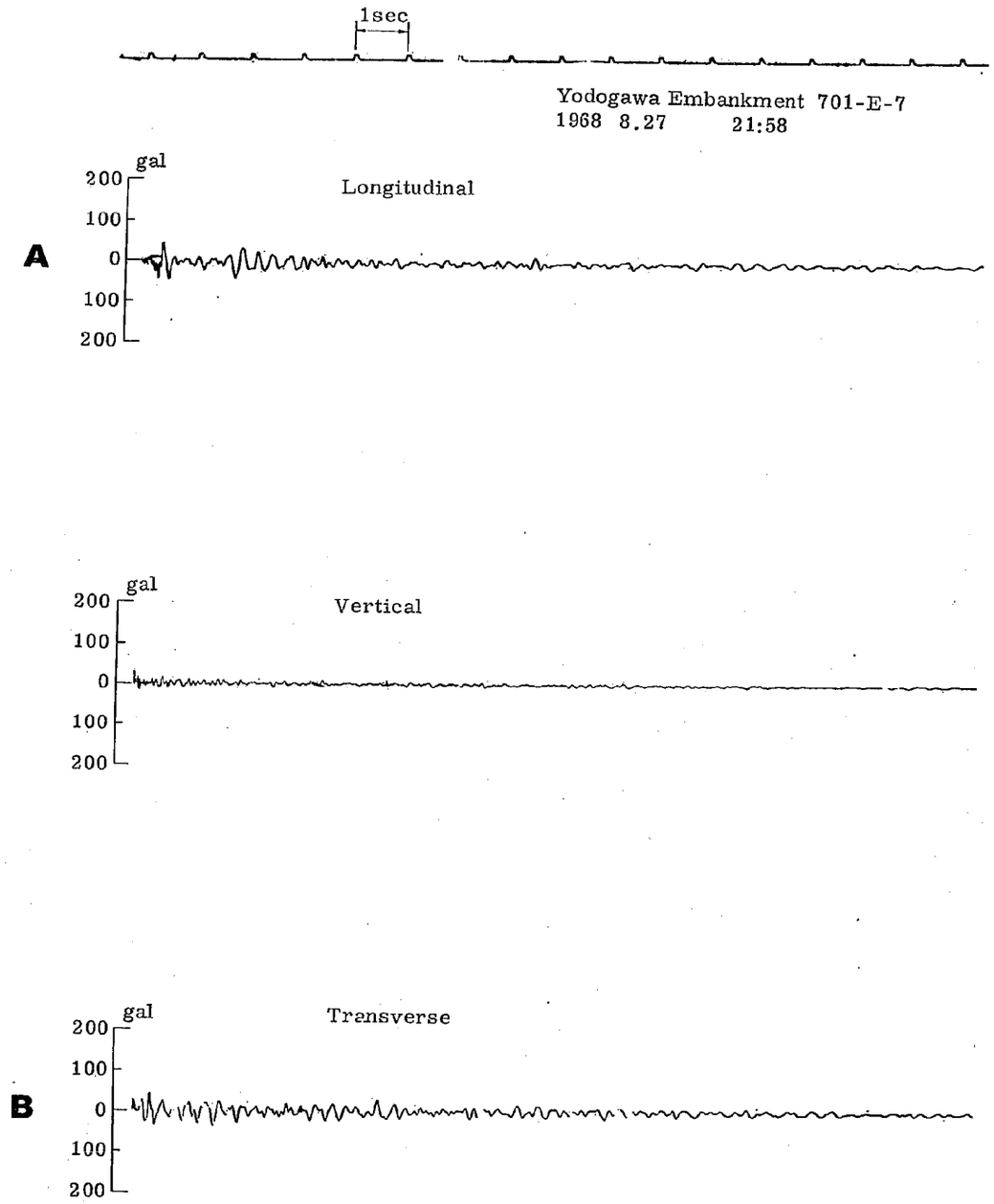

1sec
Amagase Dam. 604-D-1
1967 6.21. 13:23
A
gal
200
100
0
100
200
Transverse
Vertical
gal
200
100
0
100
200
Longitudinal
B
gal
200
100
0
100
200

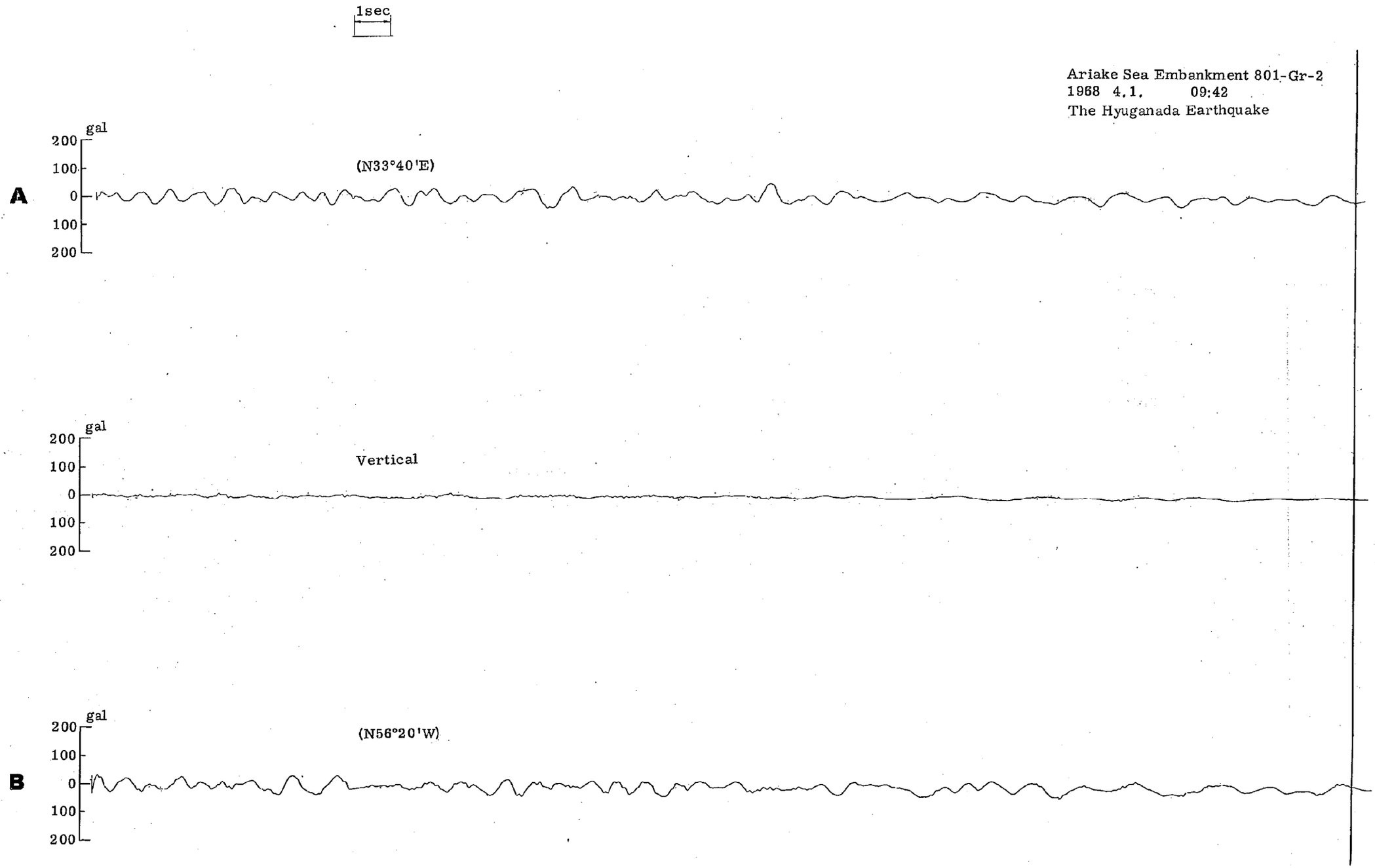

1sec
Amagase Dam 604-D-2
1968 1.20. 11:31
A
gal
200
100
0
100
200
Transverse
Vertical
gal
200
100
0
100
200
Longitudinal
B
gal
200
100
0
100
200

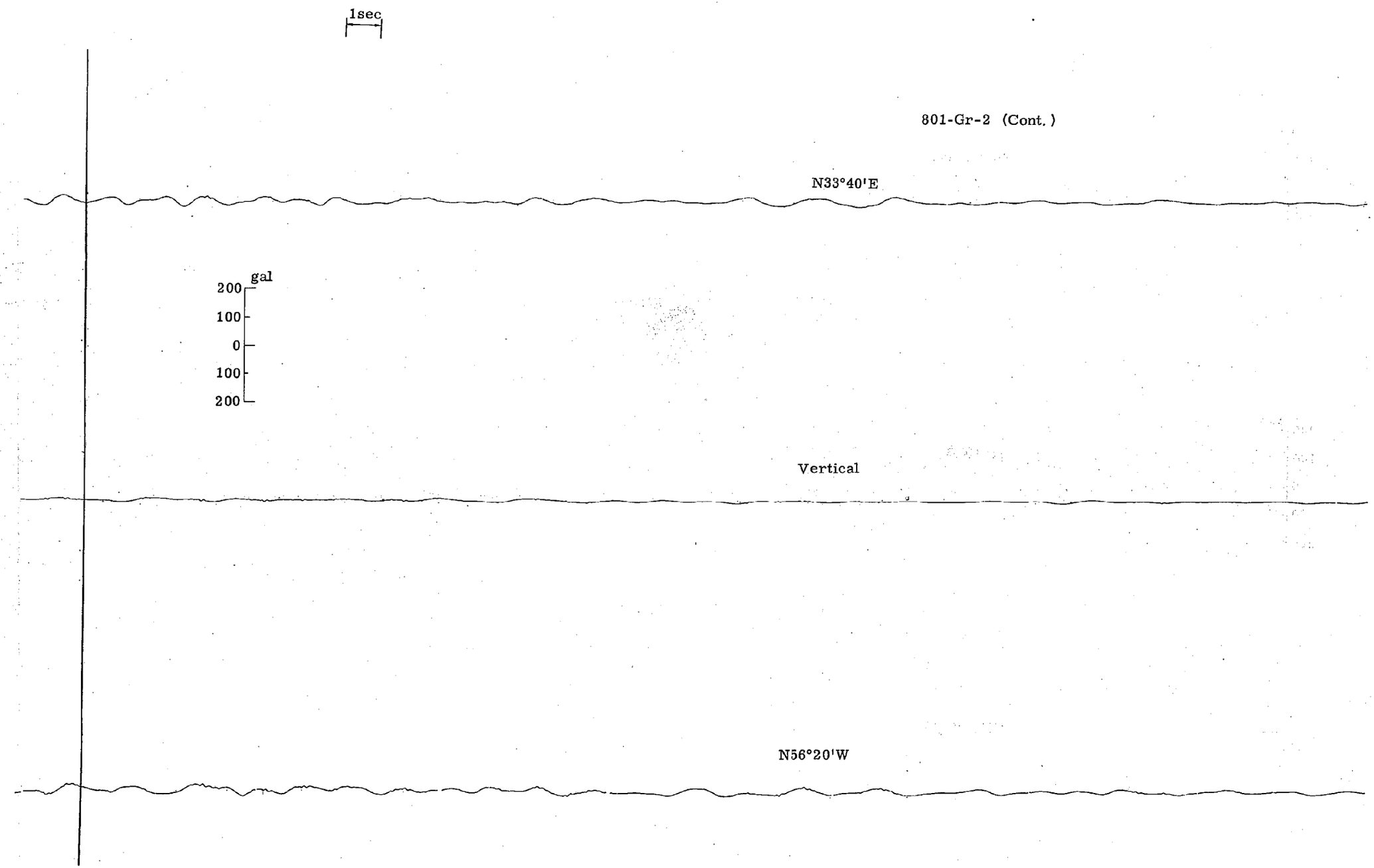

1sec
Amagase Dam 604-D-5
1968 8.27 21:58
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal

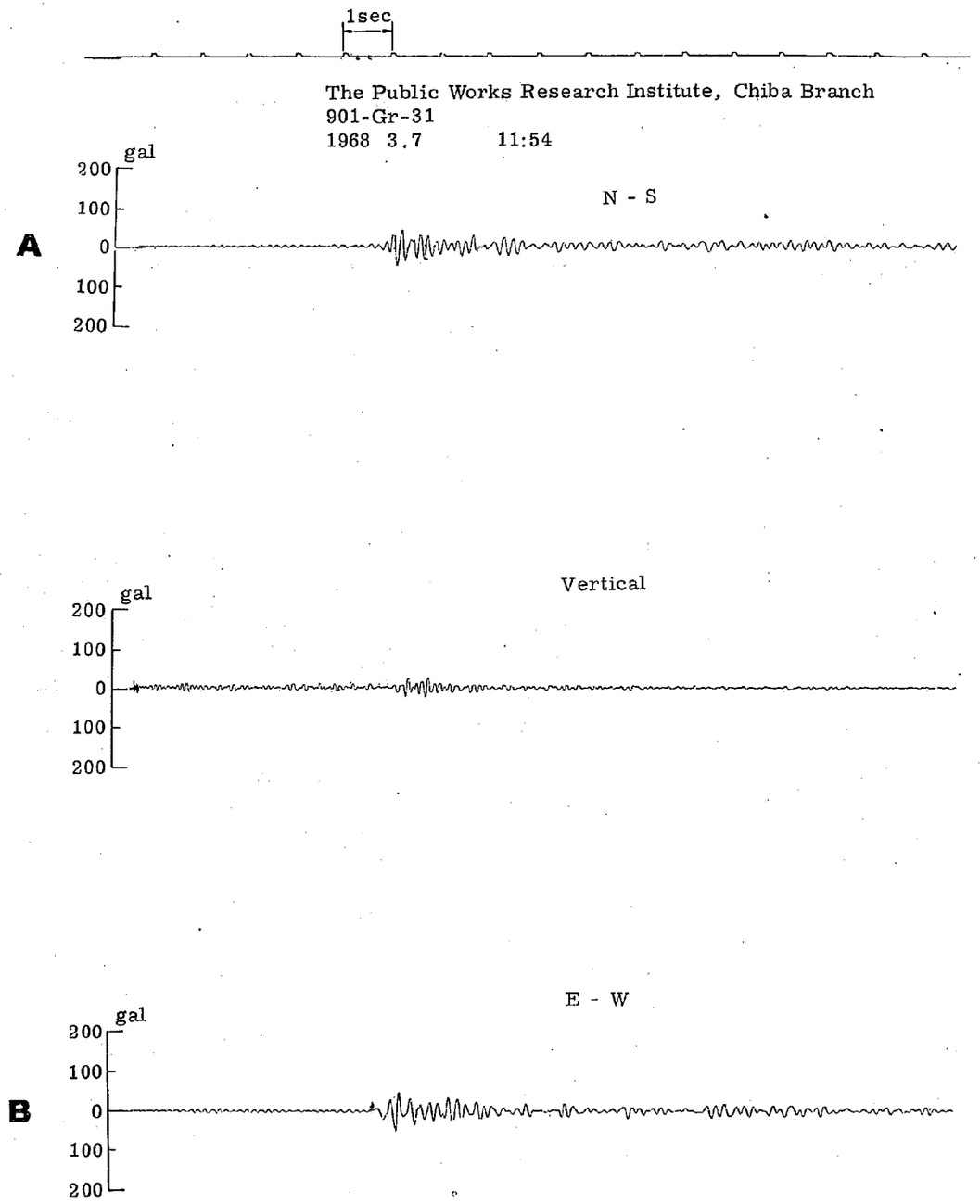

1sec
Amagase Dam 604-D-6
1968 8.27 22:52
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal

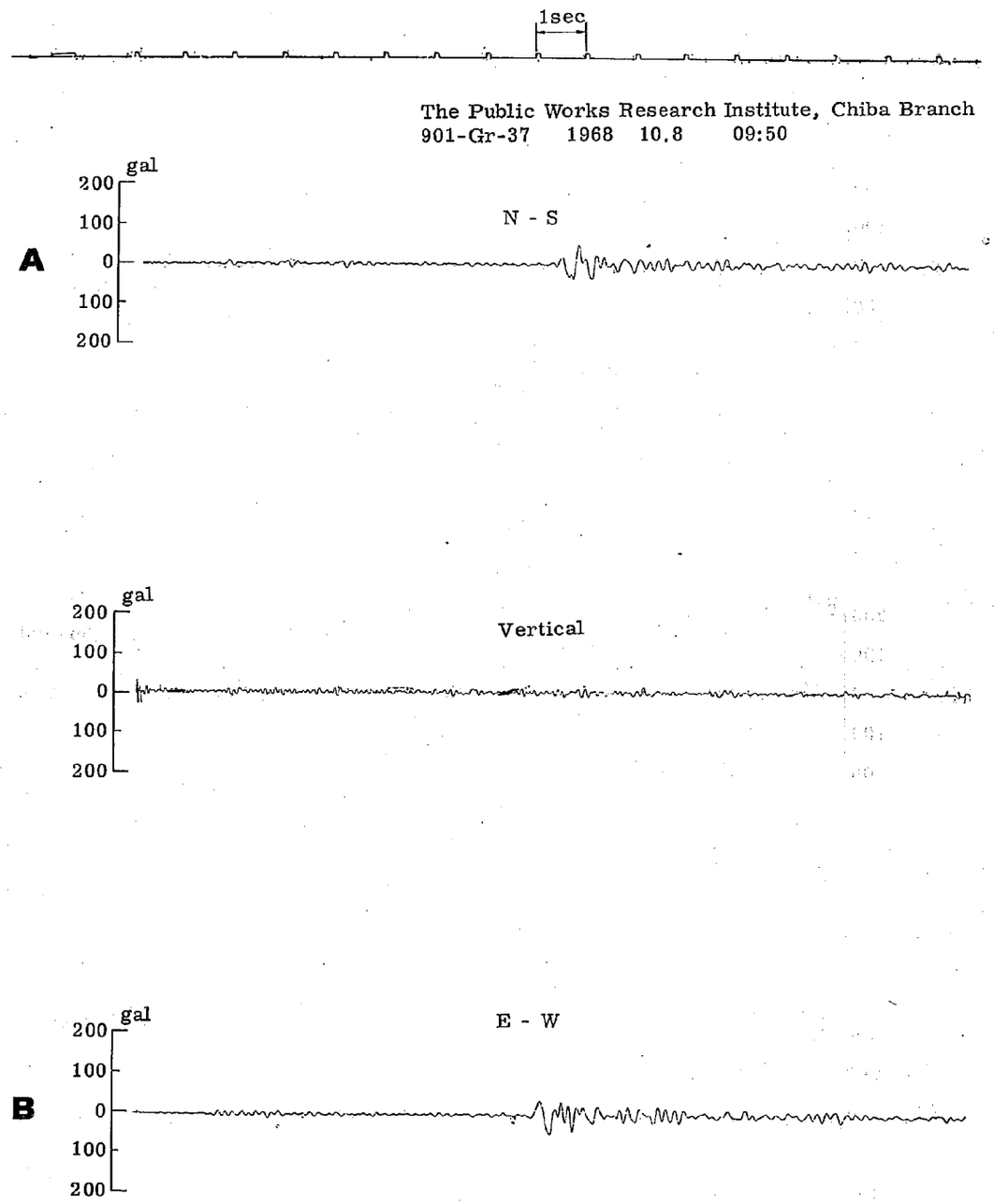

1sec
Yodogawa Embankment 701-Gr-5
1968 8.27 21:58
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

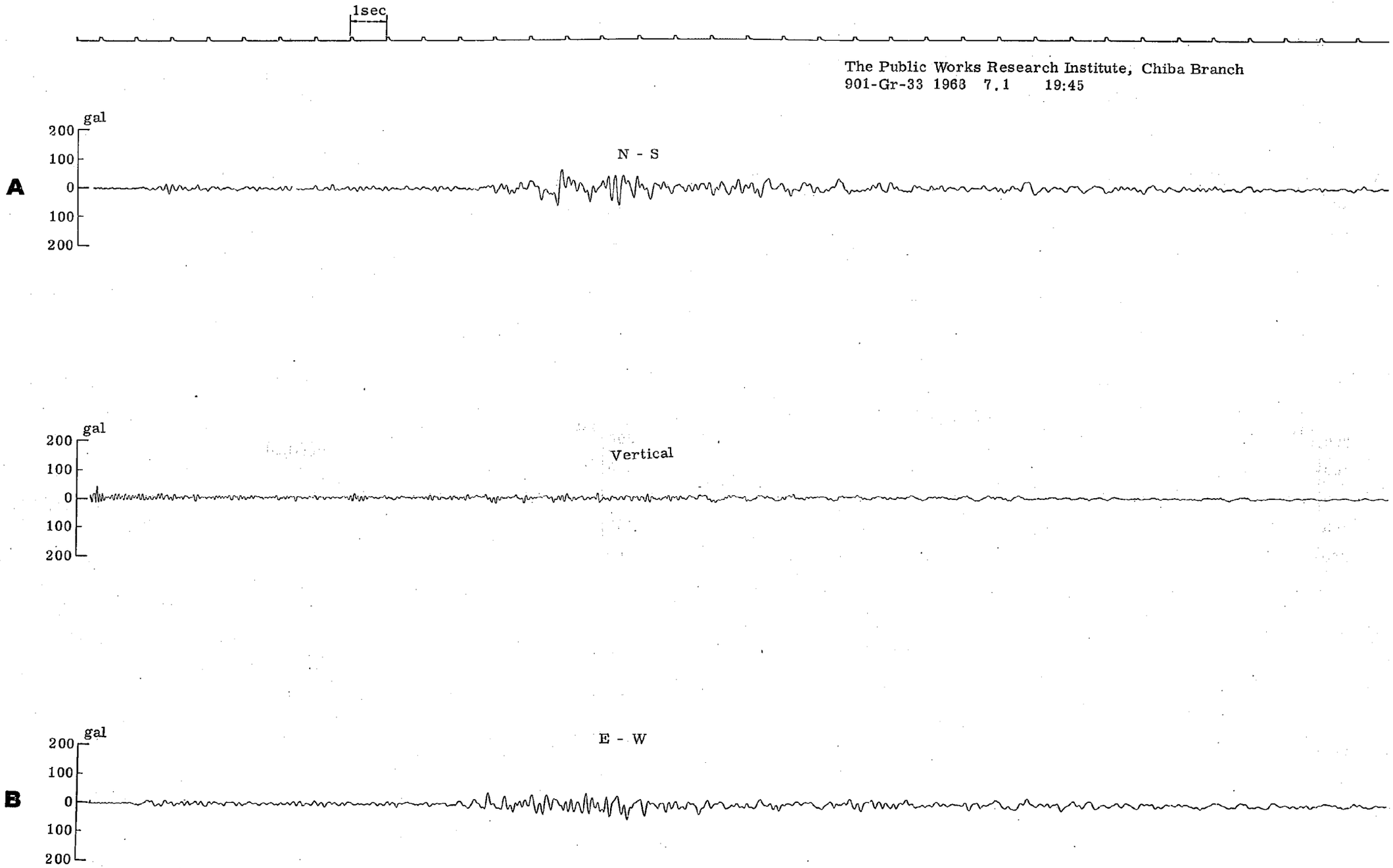

1sec
Yodogawa Embankment 701-E-7
1968 8.27 21:58
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

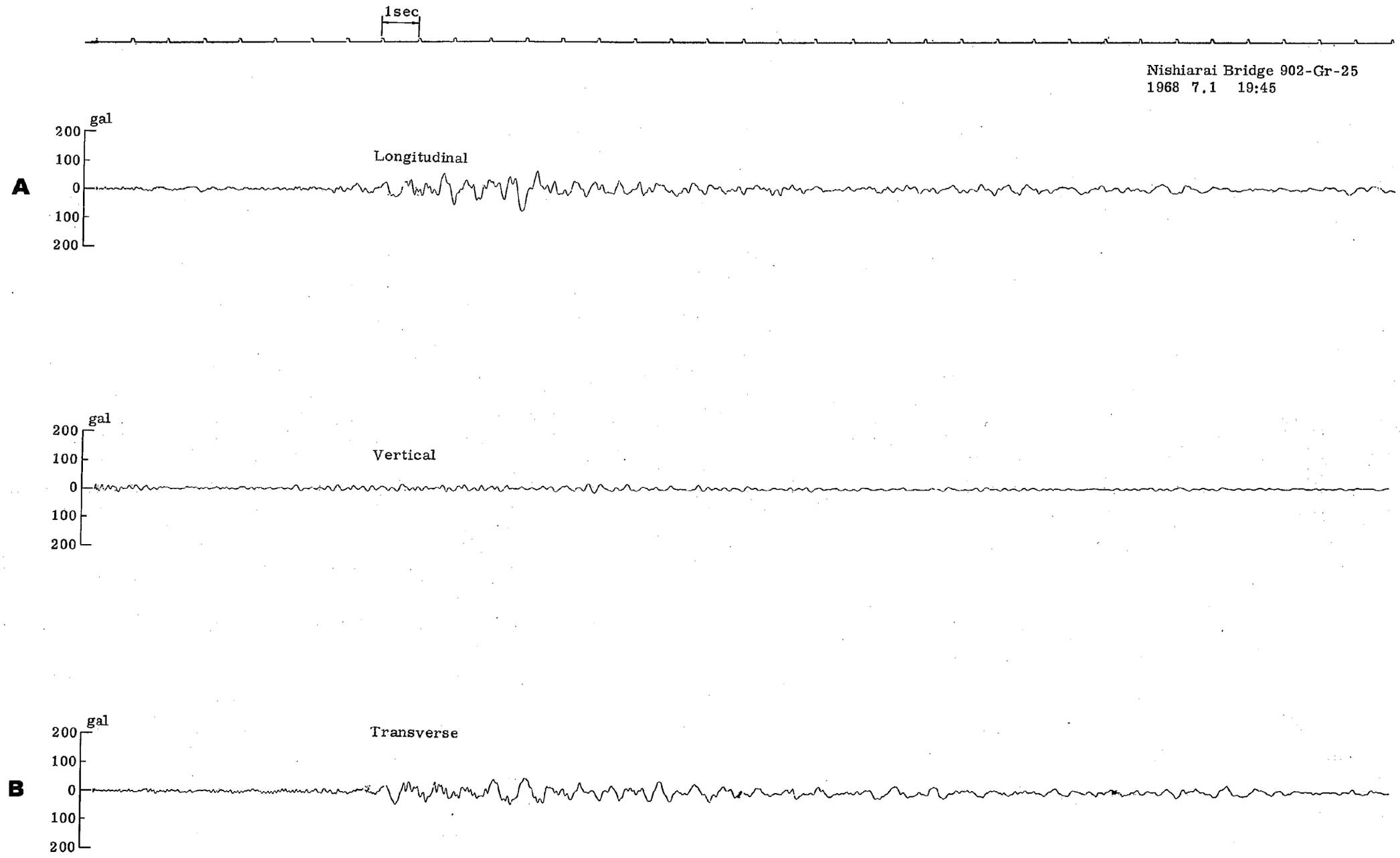

1sec
Ariake Sea Embankment 801-Gr-2
1968 4.1. 09:42
The Hyuganada Earthquake
A
gal
200
100
0
100
200
(N33°40'E)
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
(N56°20'W)

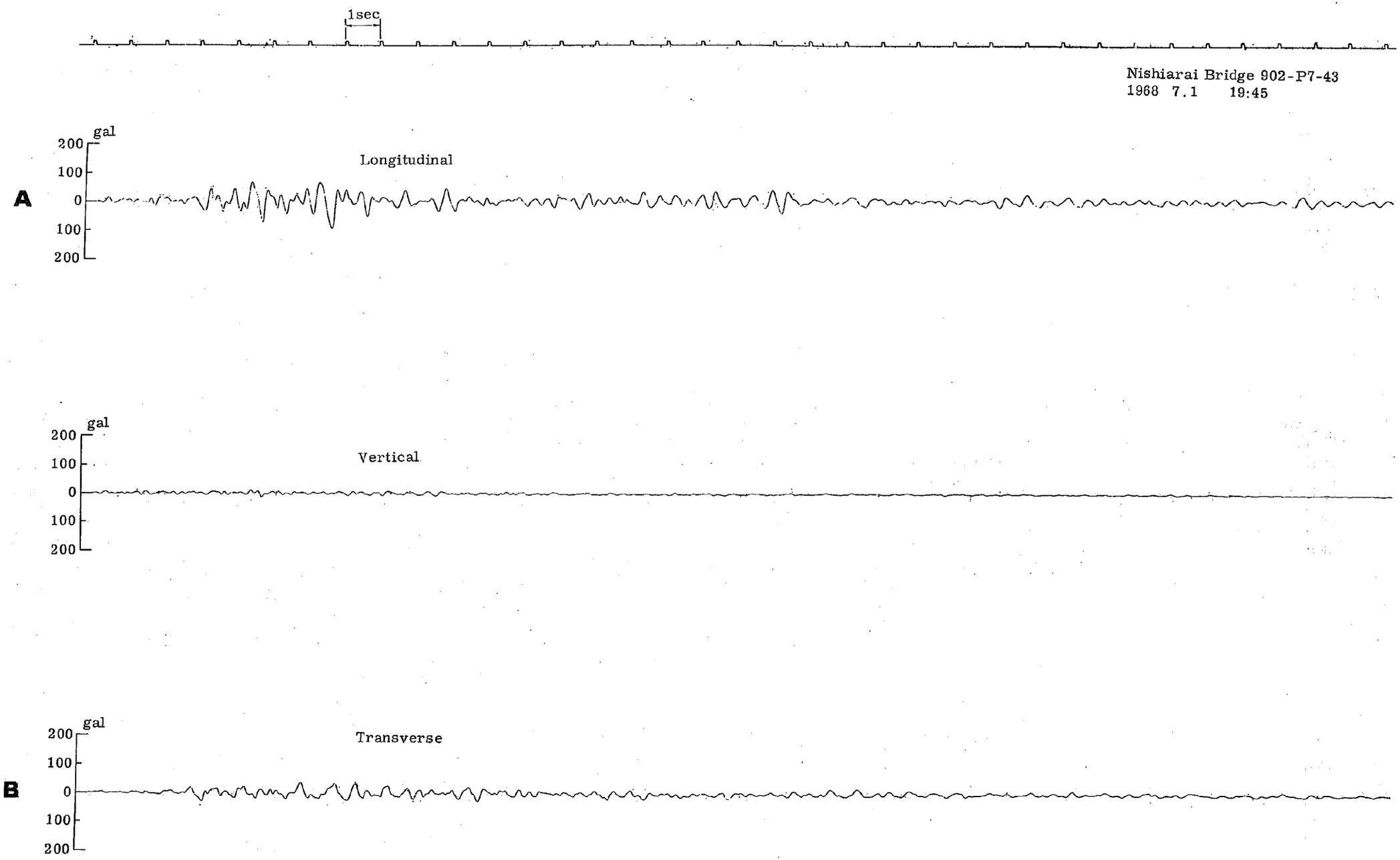

1sec
801-Gr-2 (Cont.)
N33°40'E
gal
200
100
0
100
200
Vertical
N56°20'W

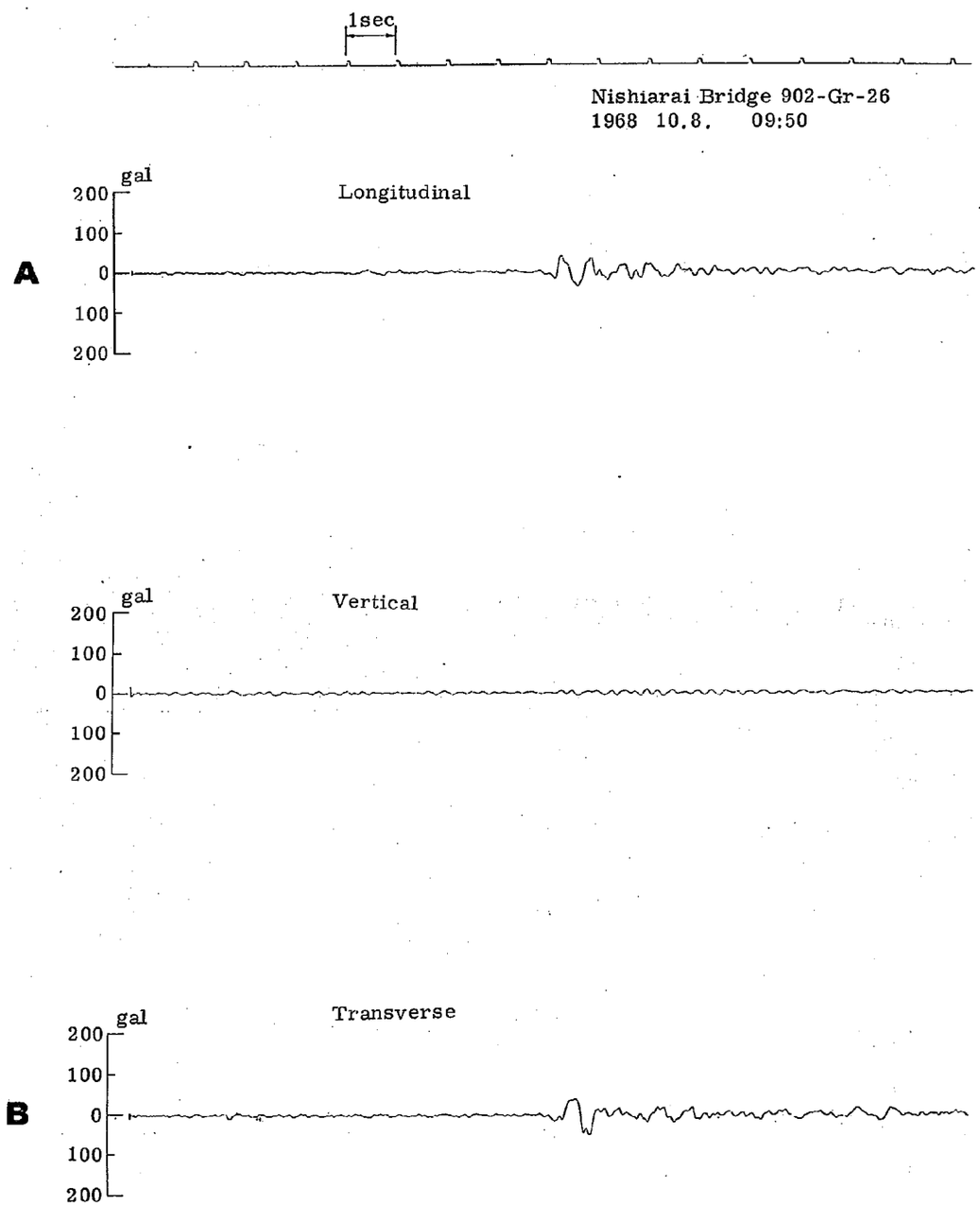

1sec
The Public Works Research Institute, Chiba Branch
901-Gr-31
1968 3.7 11:54
A
B
N - S
Vertical
E - W
gal
200
100
0
100
200

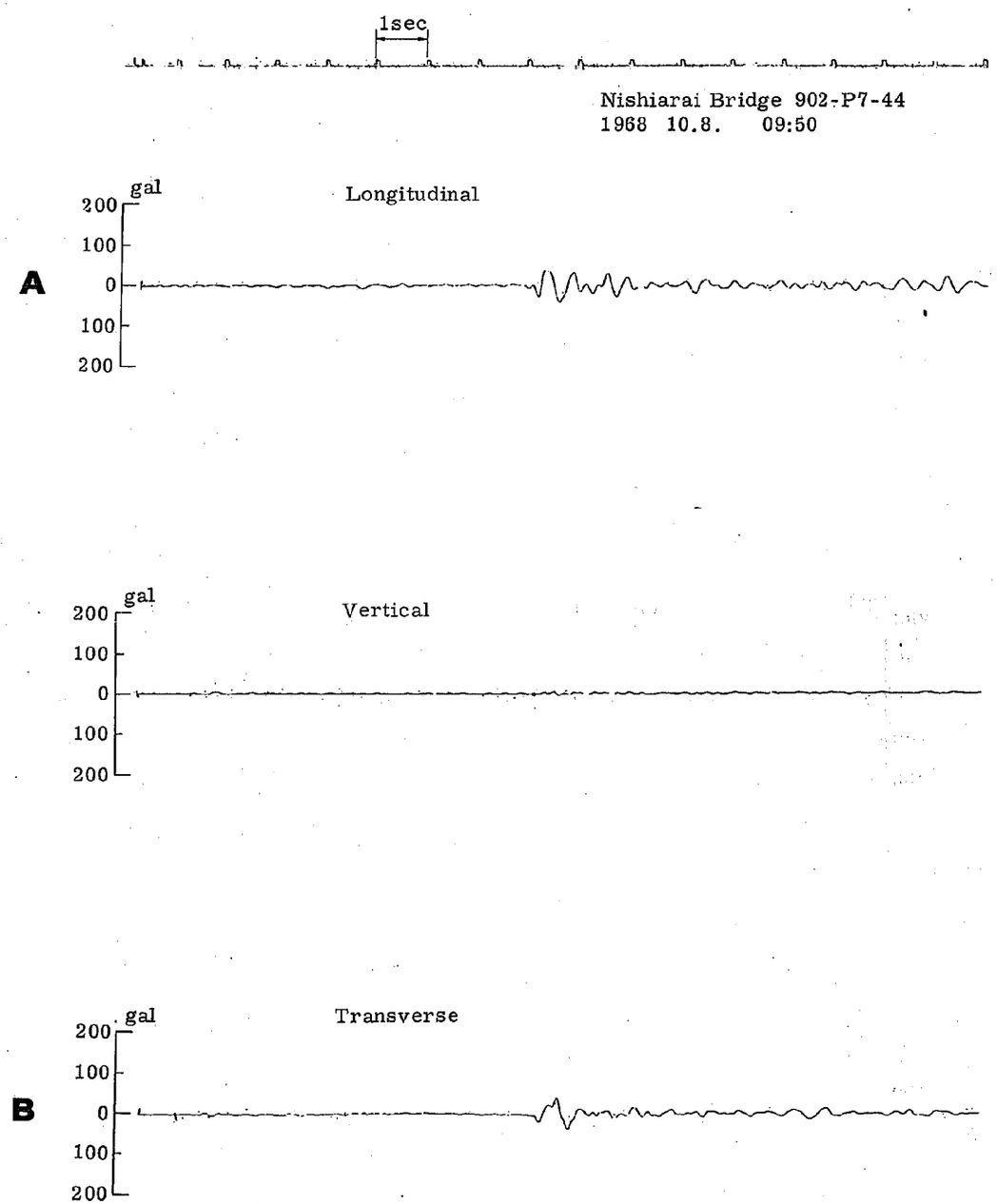

1sec
The Public Works Research Institute, Chiba Branch
901-Gr-37 1968 10.8 09:50
A
B
N - S
Vertical
E - W
gal
200
100
0
100
200

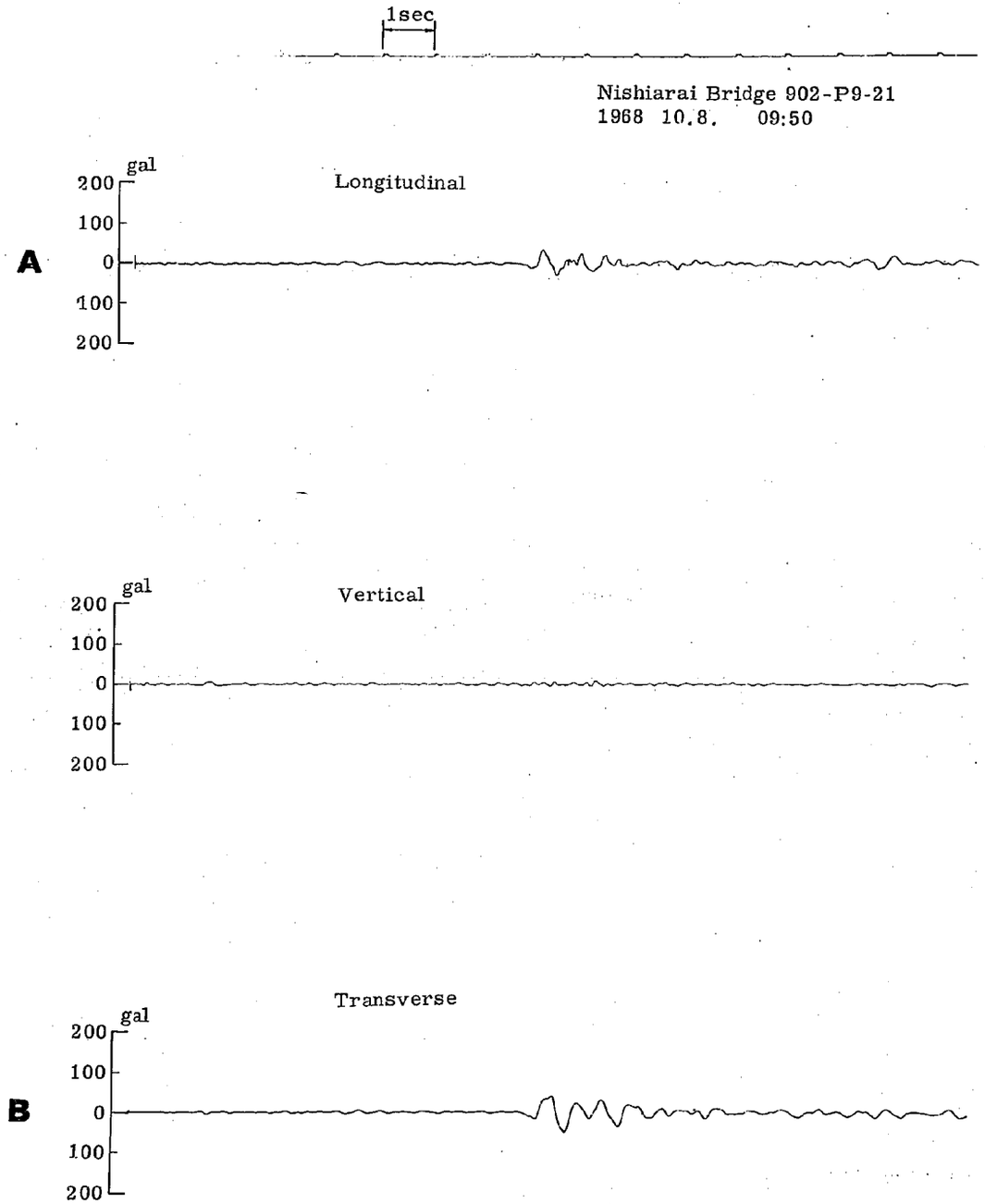

1sec
The Public Works Research Institute, Chiba Branch
901-Gr-33 1963 7.1 19:45
gal
200
100
0
100
200
N - S
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
E - W
B

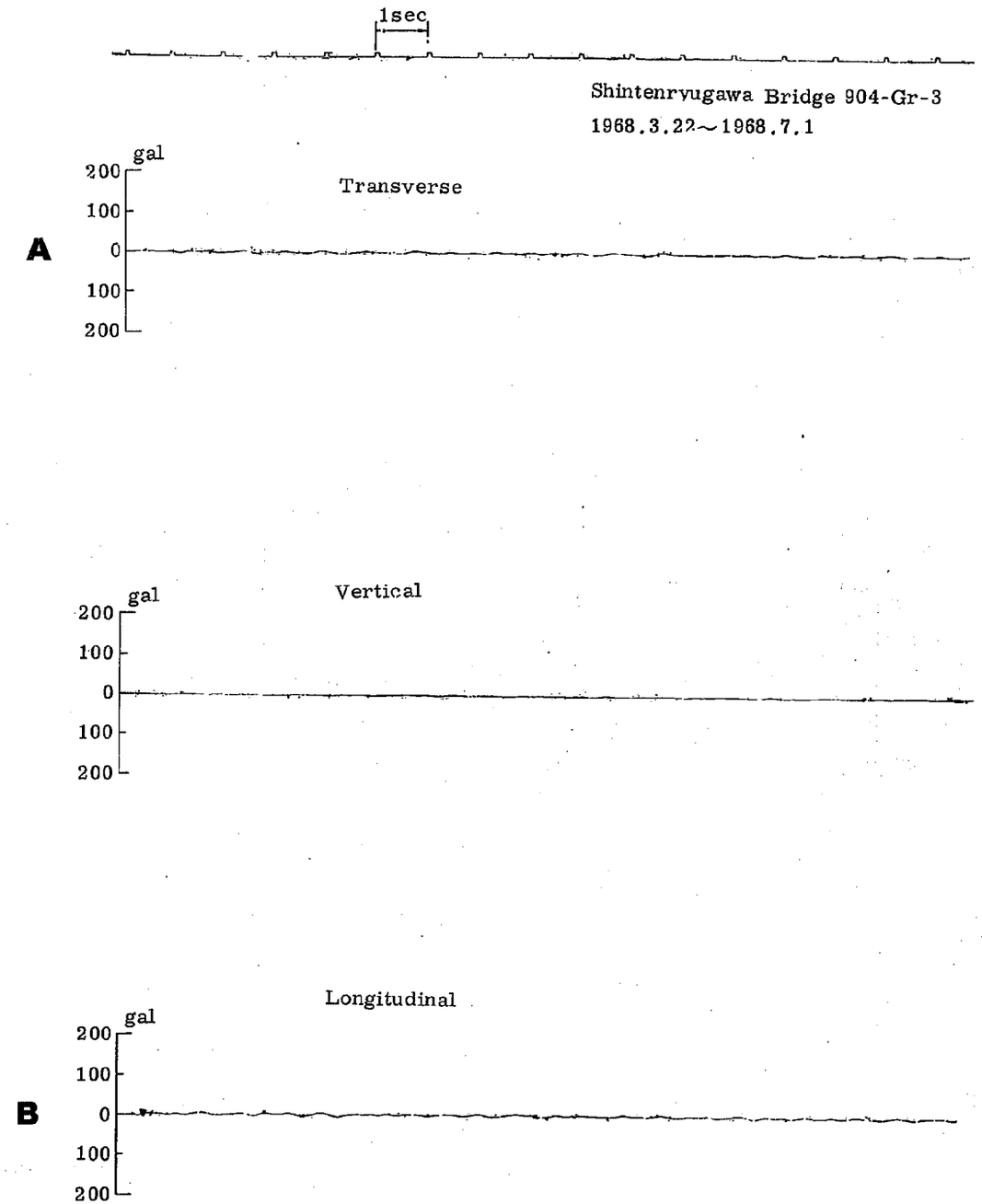

1sec
Nishiarai Bridge 902-Gr-25
1968 7.1 19:45
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

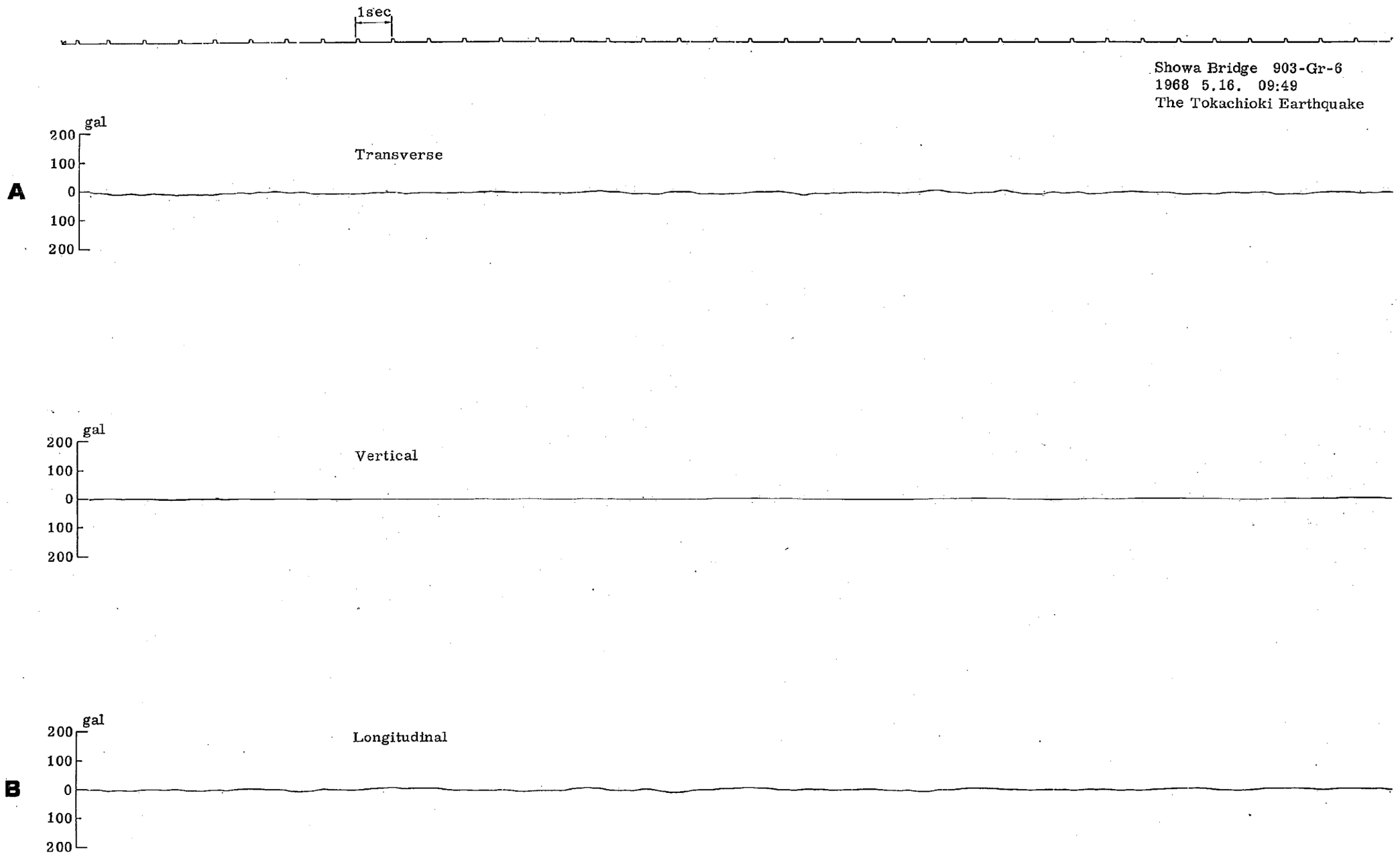

1sec
Nishiarai Bridge 902-P7-43
1968 7.1 19:45
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

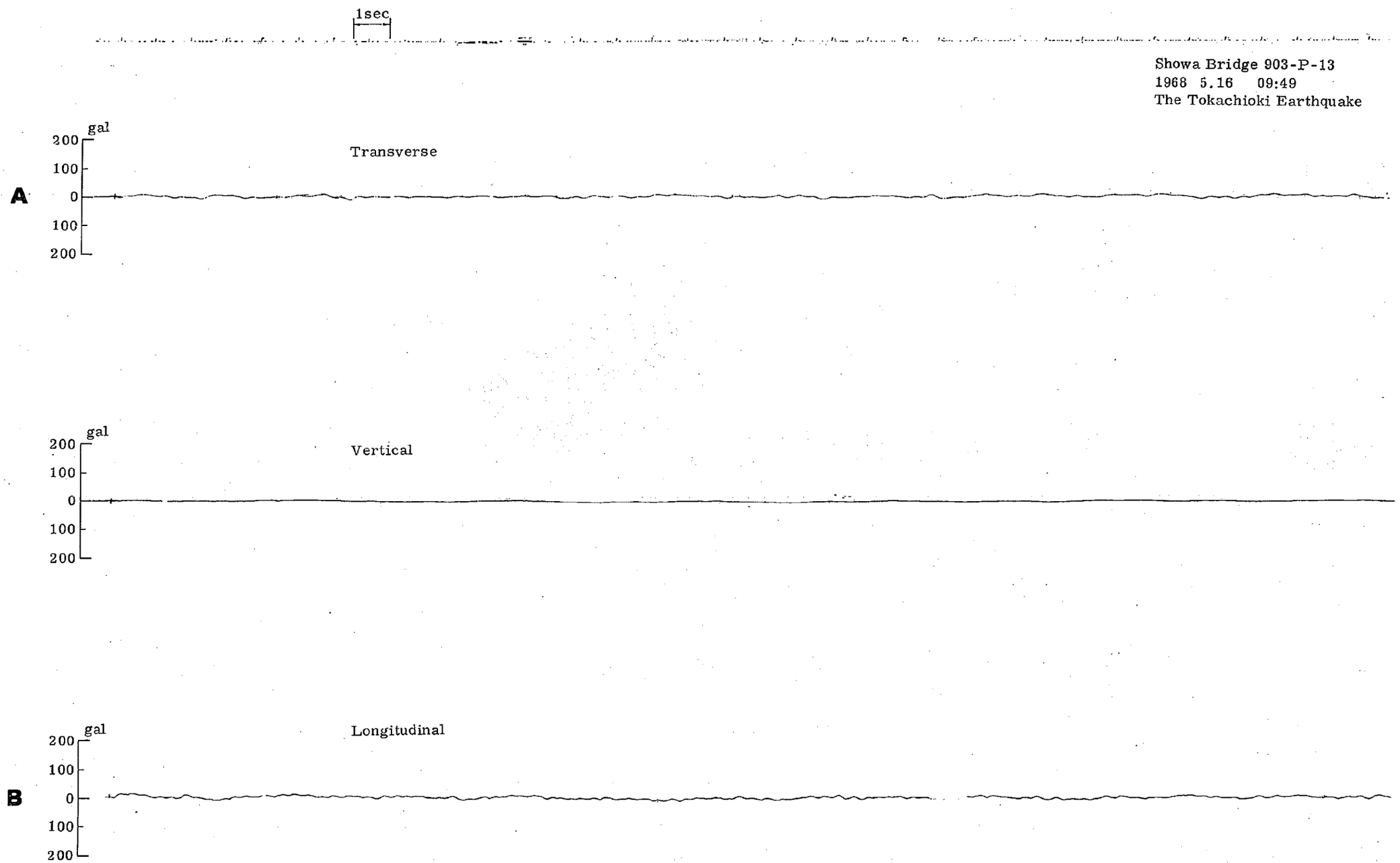

1sec
Nishiarai Bridge 902-Gr-26
1968 10.8. 09:50
A
gal
200
100
0
100
200
Longitudinal
Vertical
B
Transverse

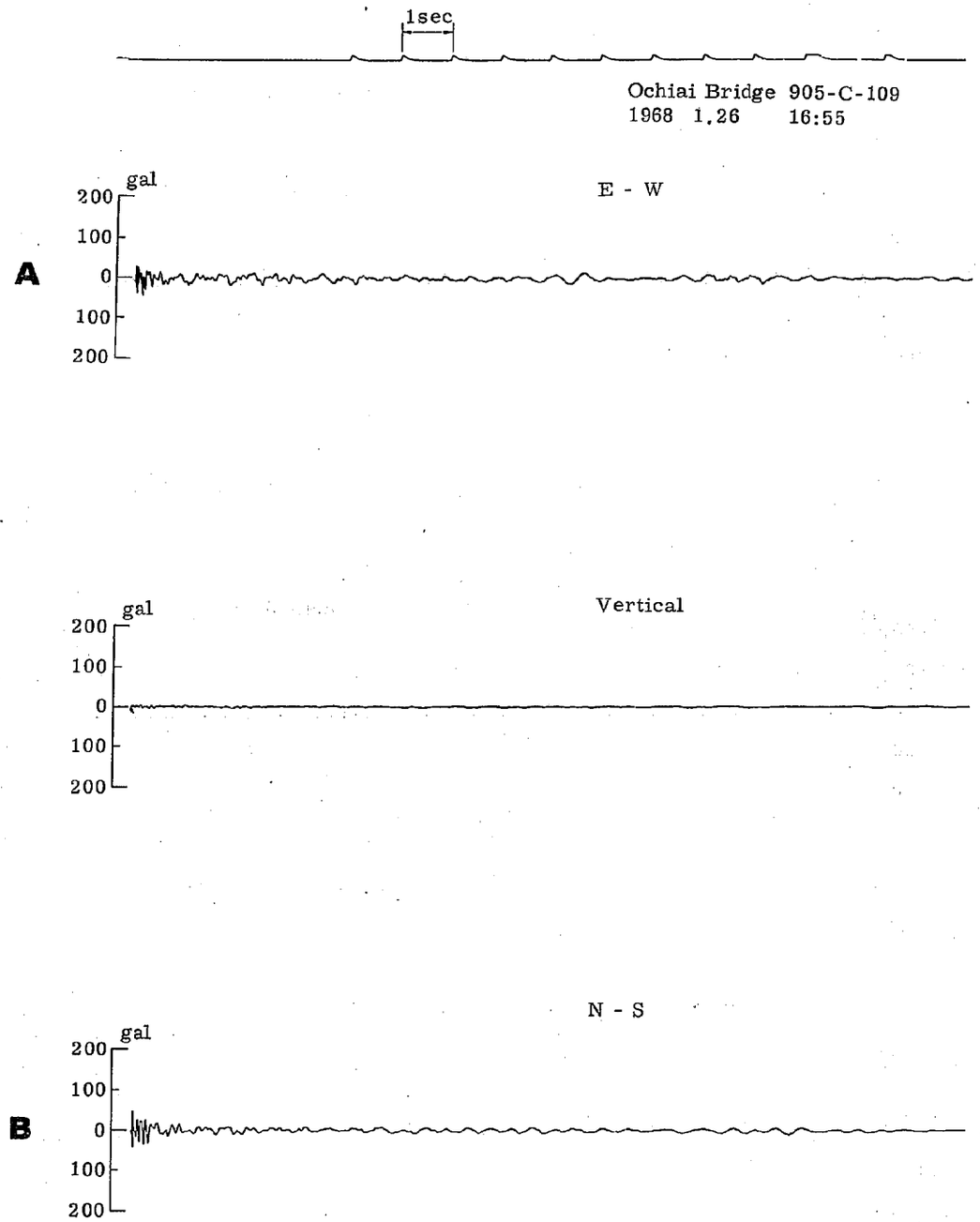

1sec
Nishiarai Bridge 902-P7-44
1968 10.8. 09:50
A
gal
200
100
0
100
200
Longitudinal
Vertical
B
Transverse

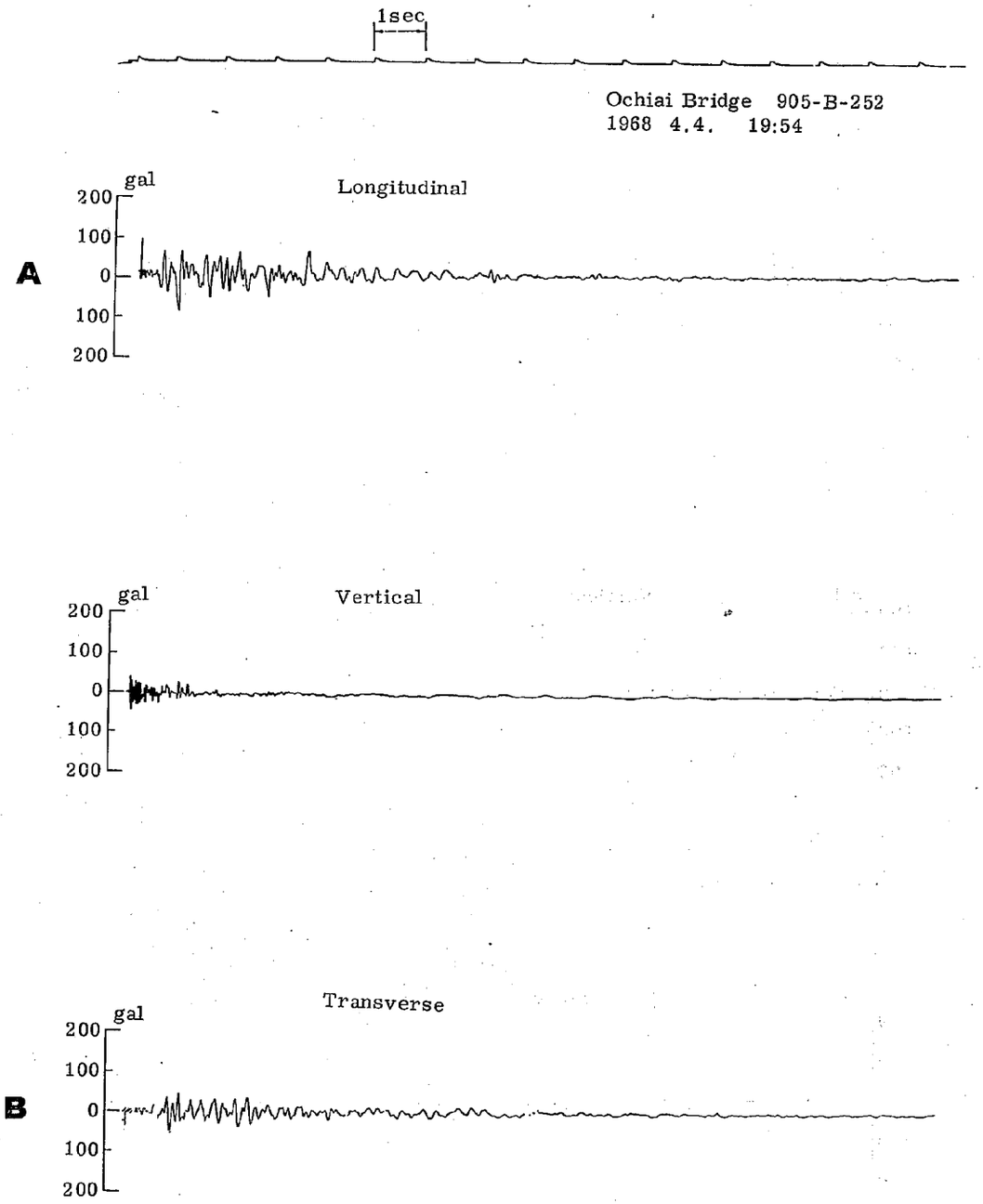

1sec
Nishiarai Bridge 902-P9-21
1968 10.8. 09:50
A
Longitudinal
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Transverse
gal
200
100
0
100
200

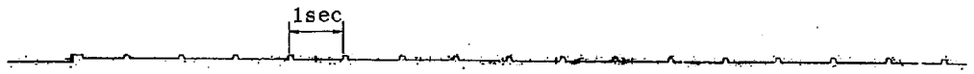

1sec
Shintenryugawa Bridge 904-Gr-3
1968.3.22～1968.7.1
A
Transverse
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Longitudinal
gal
200
100
0
100
200


1sec
Showa Bridge 903-Gr-6
1968 5.16. 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal


1sec
Showa Bridge 903-P-13
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

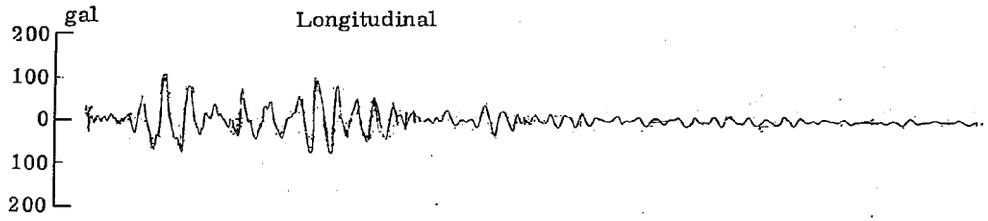

1sec
Ochiai Bridge 905-C-109
1968 1.26 16:55
A
gal
200
100
0
100
200
E - W
Vertical
B
N - S

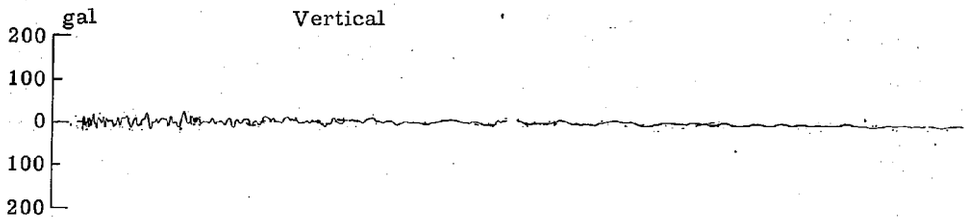

1sec
Ochiai Bridge 905-B-252
1968 4.4. 19:54
A
gal
200
100
0
100
200
Longitudinal
Vertical
B
Transverse



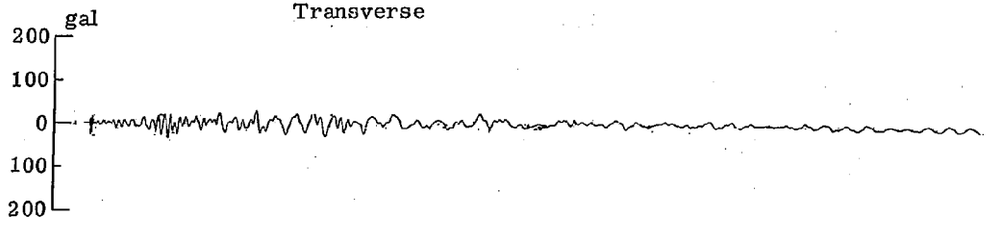
Ochiai Bridge 905-A-400
1968 4.4 19:54

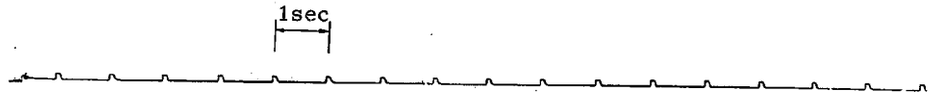
A





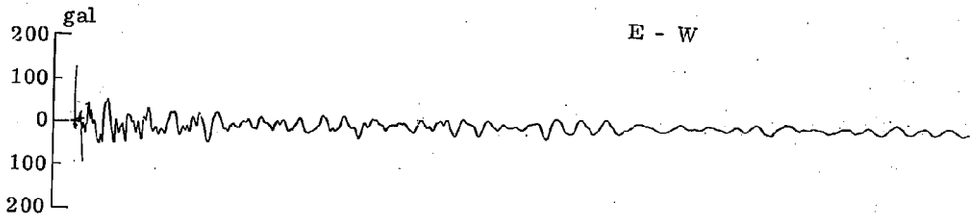
B

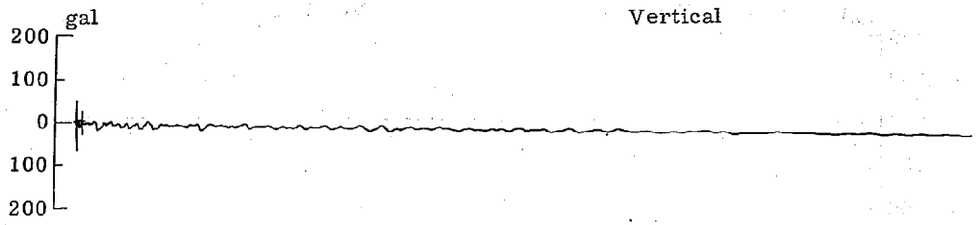




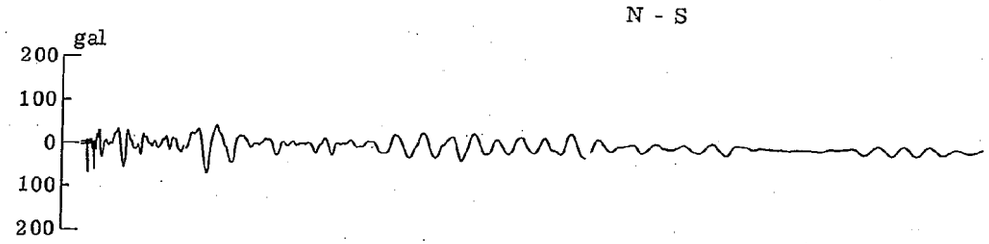
Ochiai Bridge 905-C-110
1968 4.4. 19:54

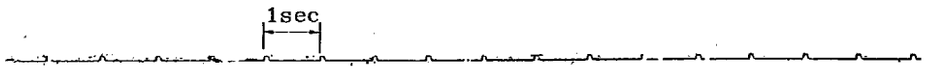
A





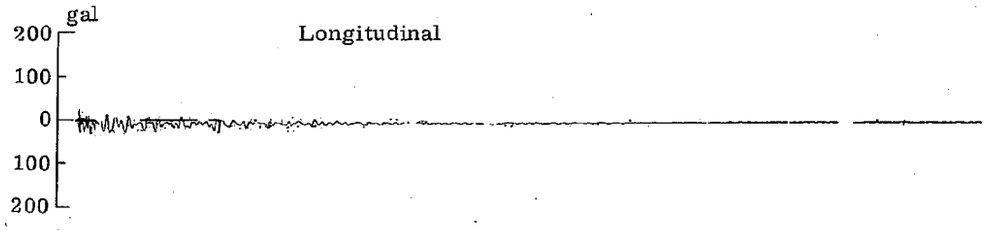
B

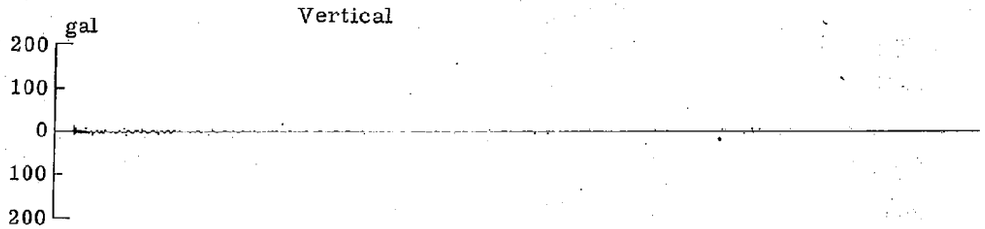




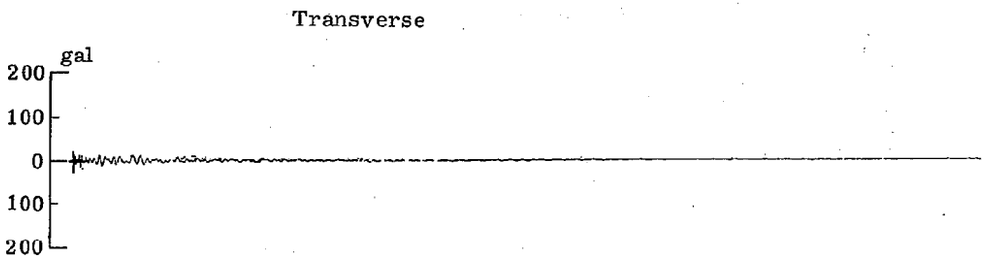
Ochiai Bridge 905-B-257
1968 7.30 ~ 1968 9.16

A



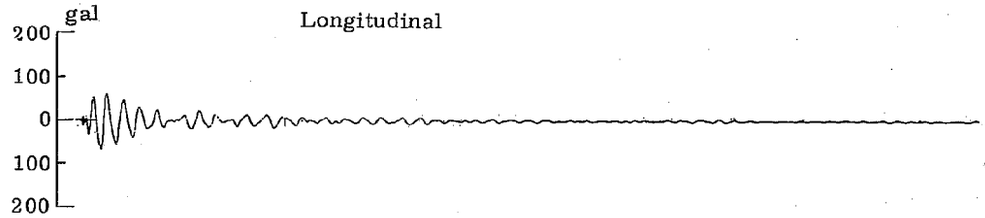


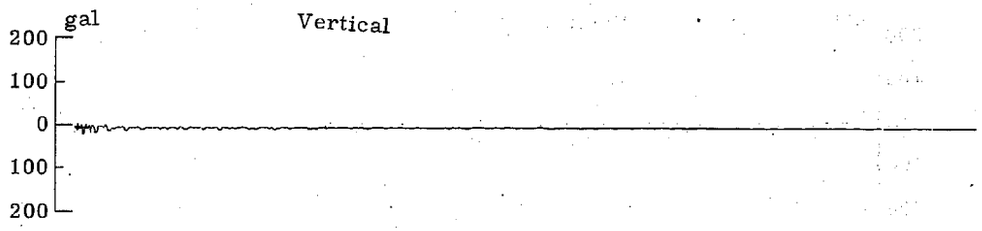
B



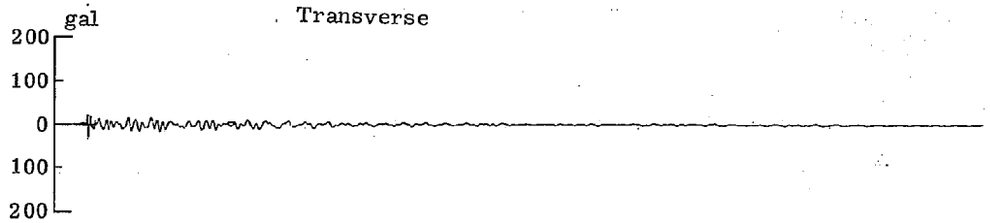
Ochiai Bridge 905-A-407
1967 7.30 ~ 1968 9.16

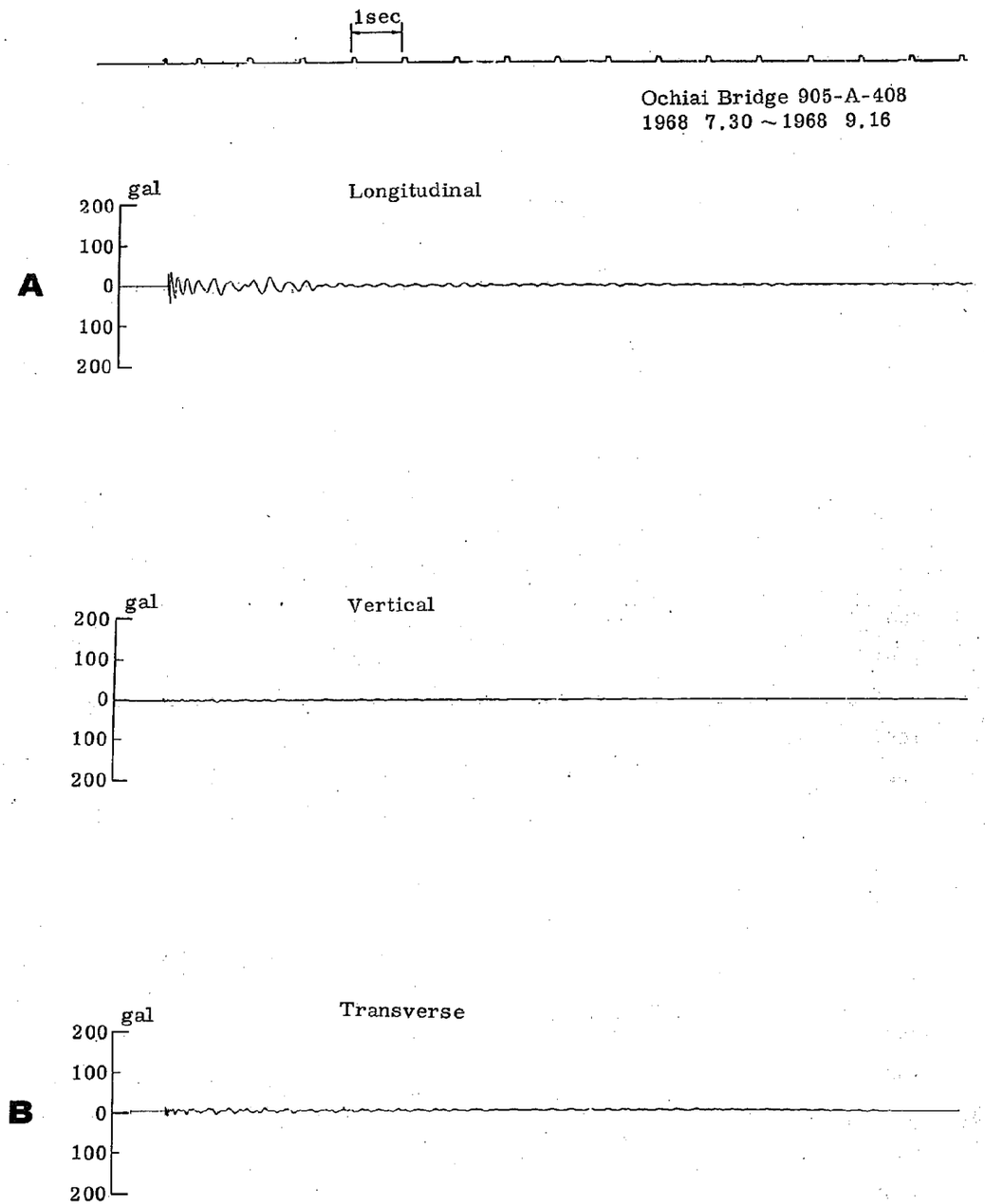
A

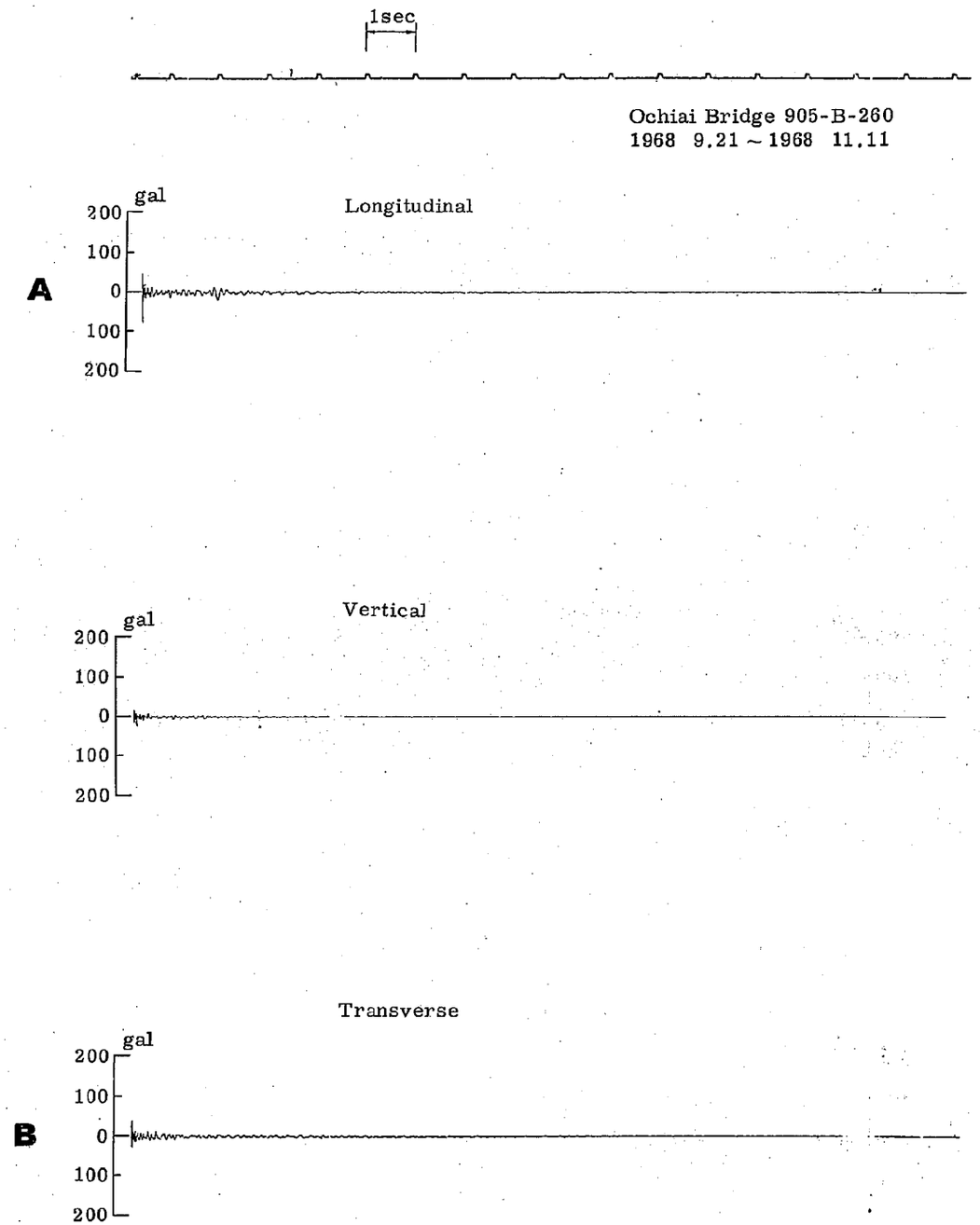


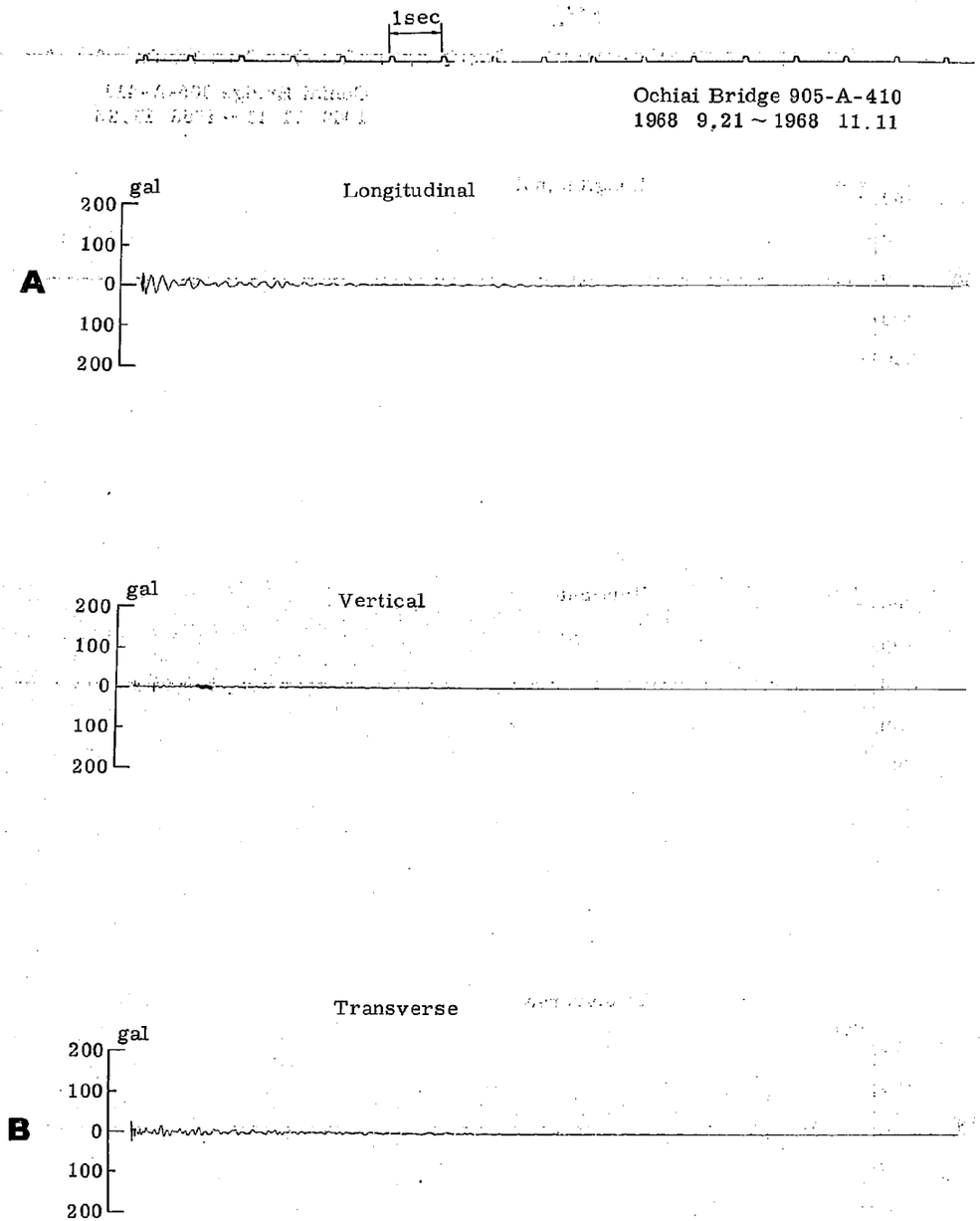


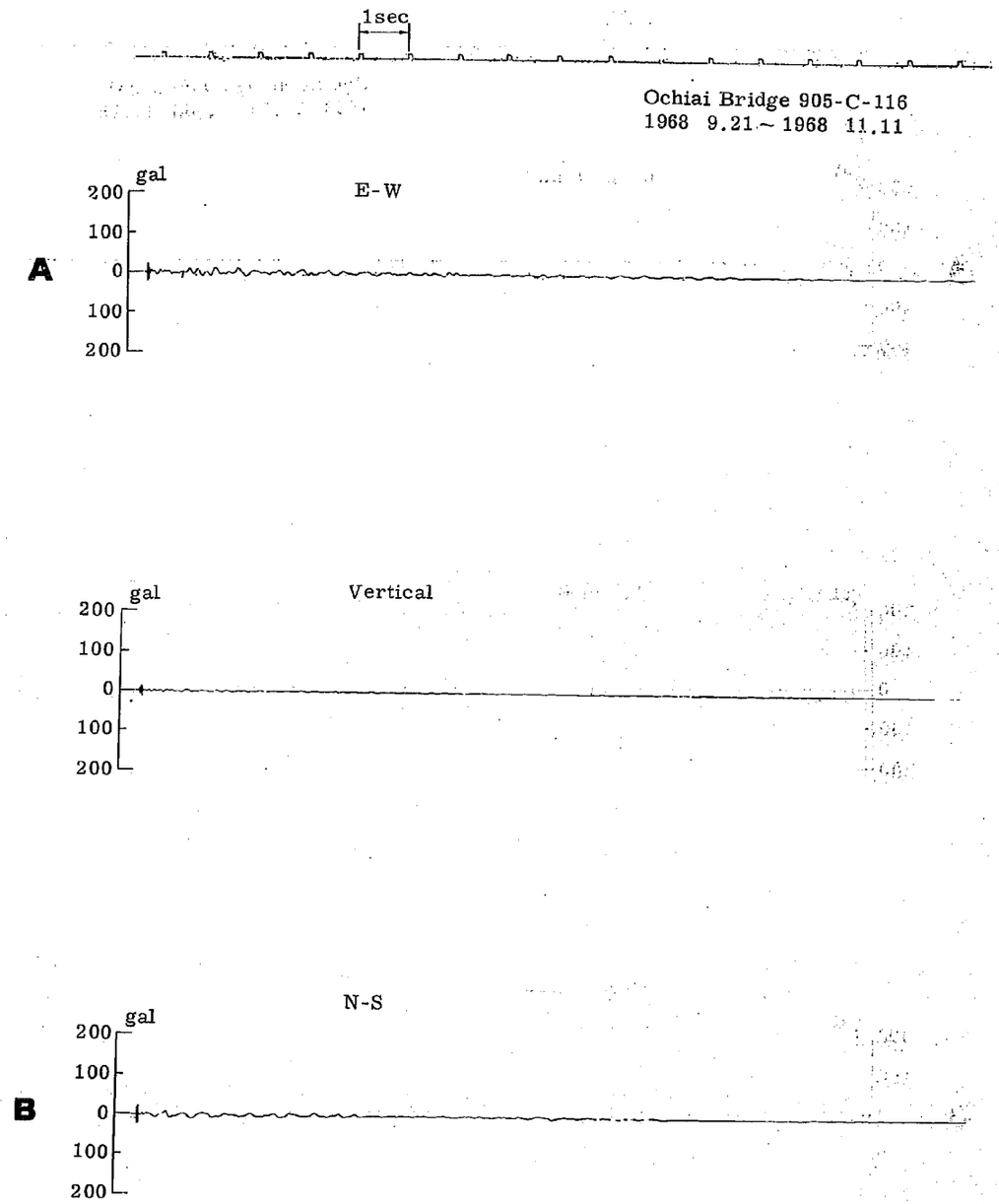
B




1sec
Ochiai Bridge 905-A-408
1968 7.30 ~ 1968 9.16
A
gal
Longitudinal
200
100
0
100
200
gal
Vertical
200
100
0
100
200
B
gal
Transverse
200
100
0
100
200

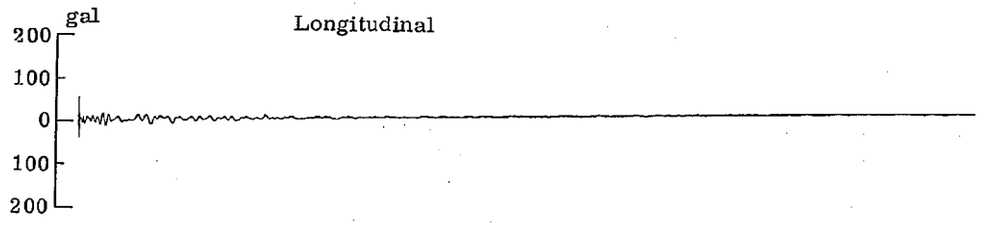

1sec
Ochiai Bridge 905-B-260
1968 9.21 ~ 1968 11.11
A
gal
Longitudinal
200
100
0
100
200
gal
Vertical
200
100
0
100
200
B
gal
Transverse
200
100
0
100
200

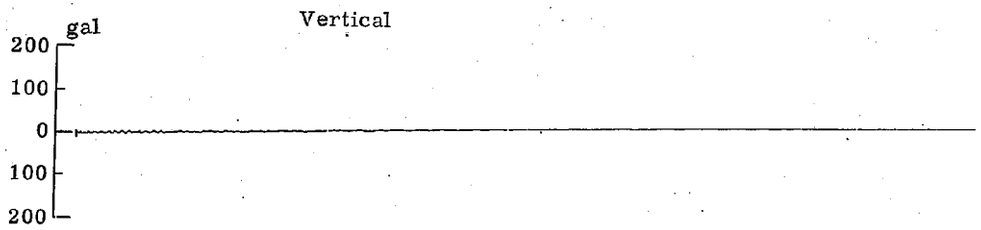

1sec
Ochiai Bridge 905-A-410
1968 9.21 ~ 1968 11.11
A
Longitudinal
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Transverse
gal
200
100
0
100
200


1sec
Ochiai Bridge 905-C-116
1968 9.21 ~ 1968 11.11
A
E-W
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
N-S
gal
200
100
0
100
200

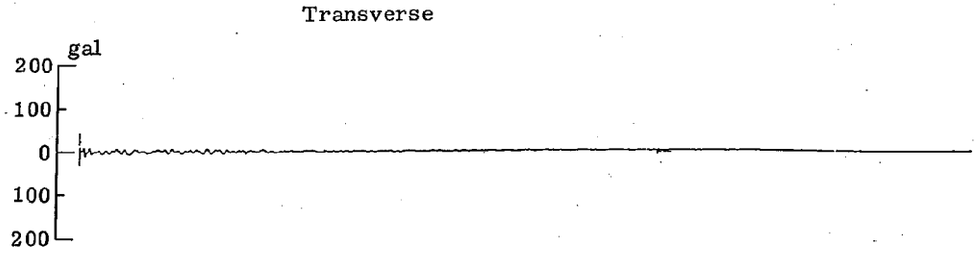
Ochiai Bridge 905-B-261
1968 11.11～1968 11.25

A



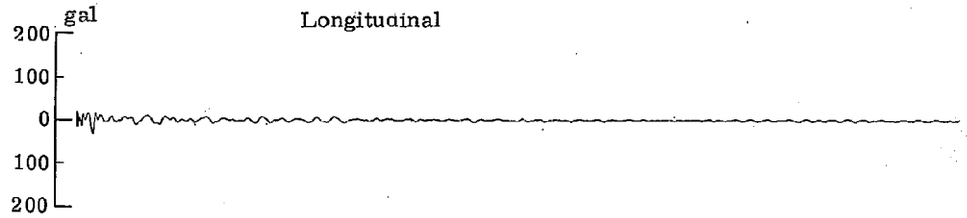


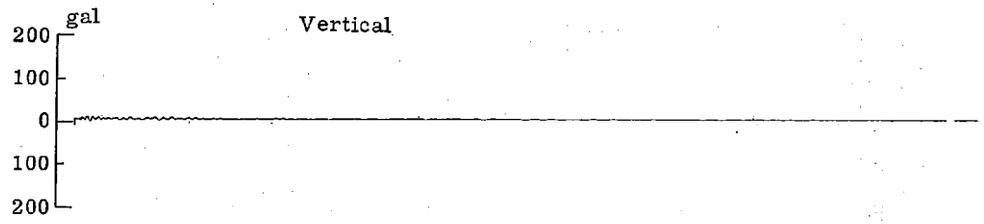
B



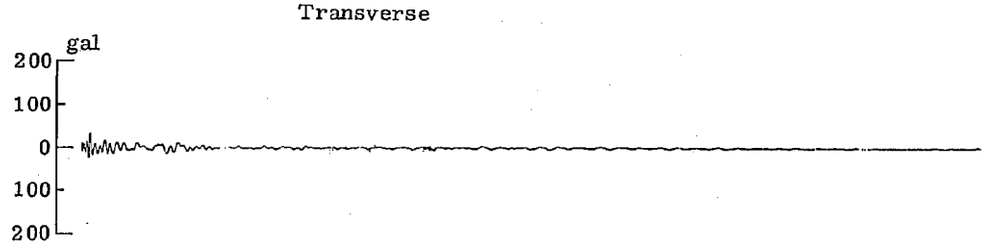
Ochiai Bridge 905-A-411
1968 11.11～1968 11.25

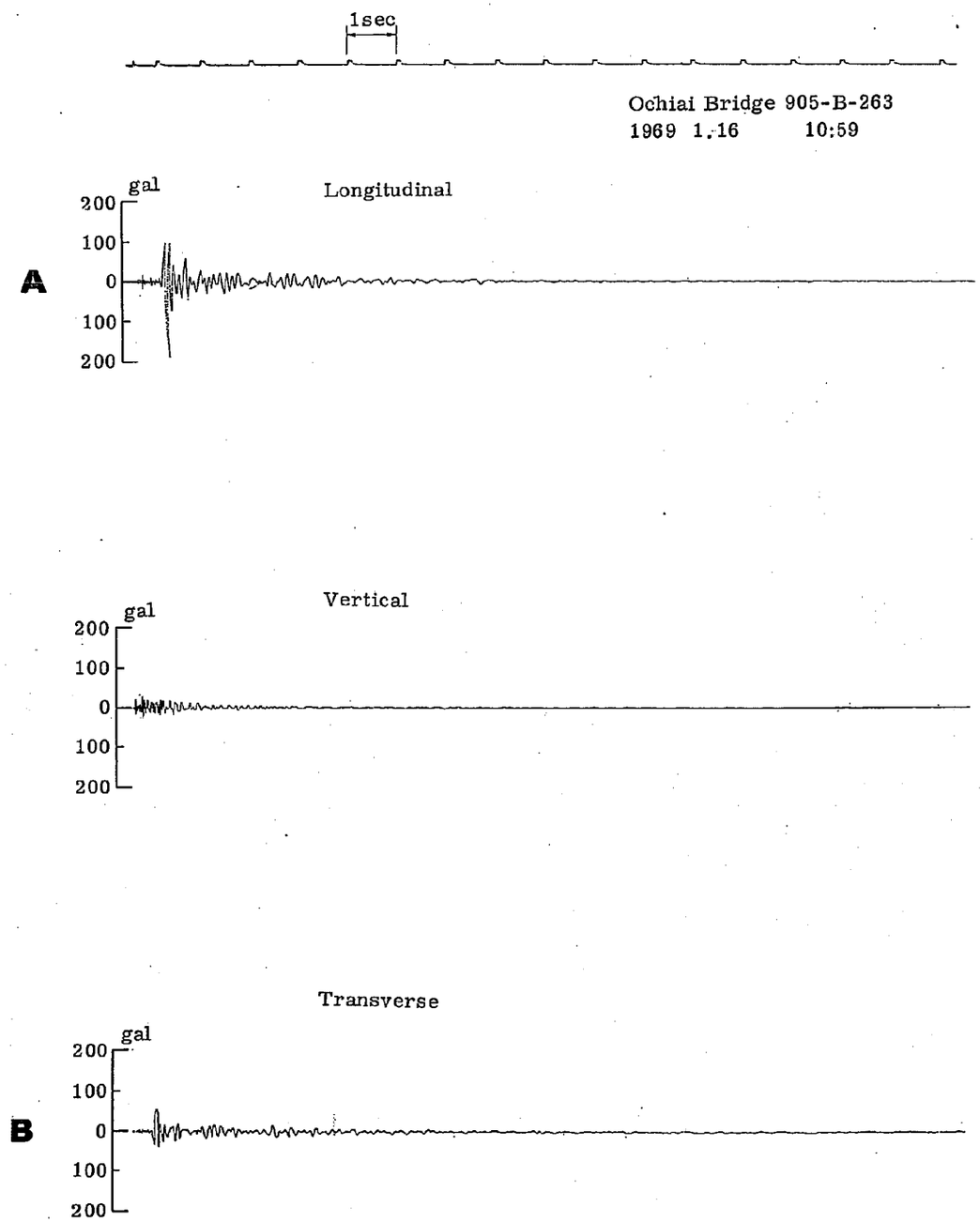
A

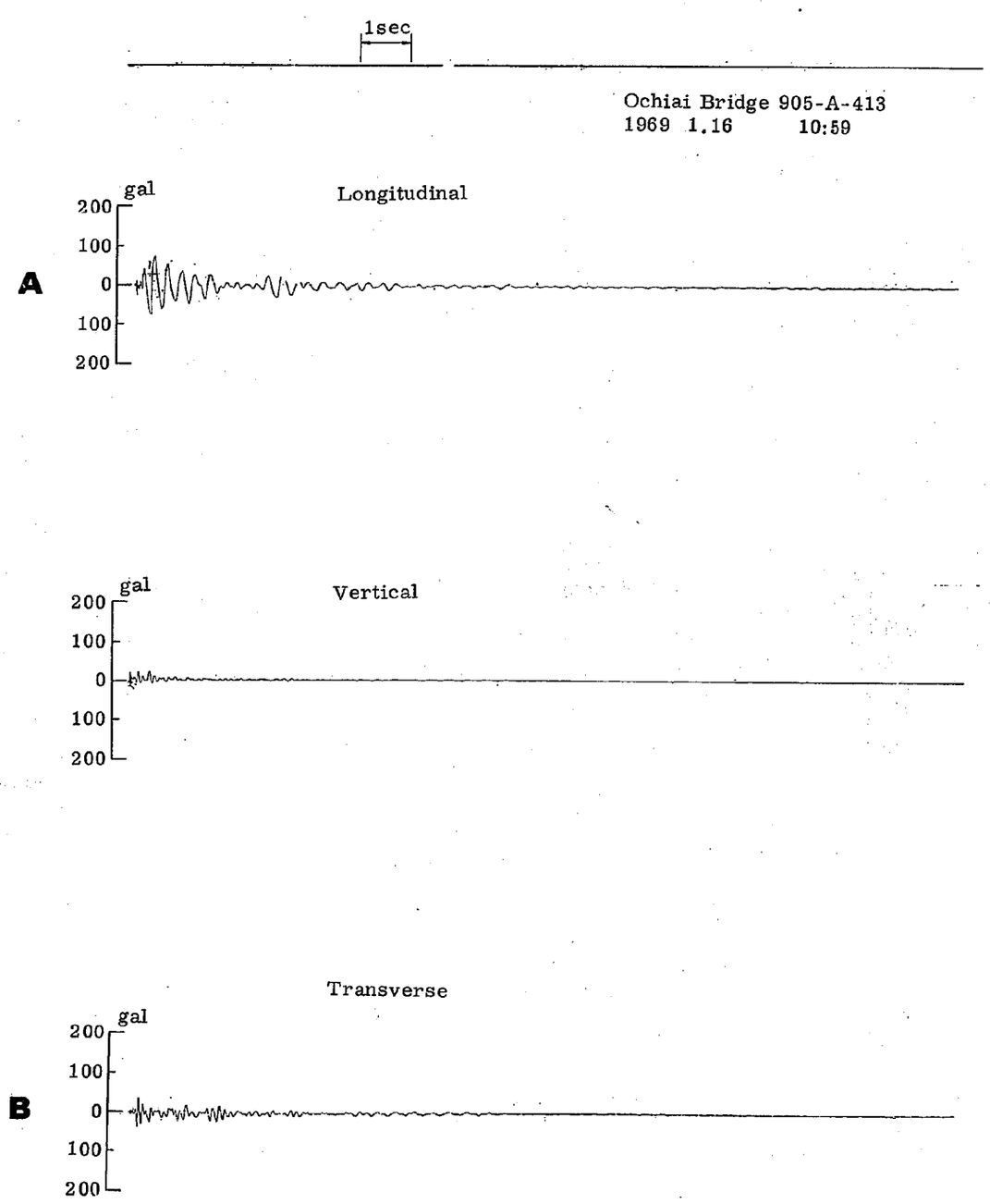


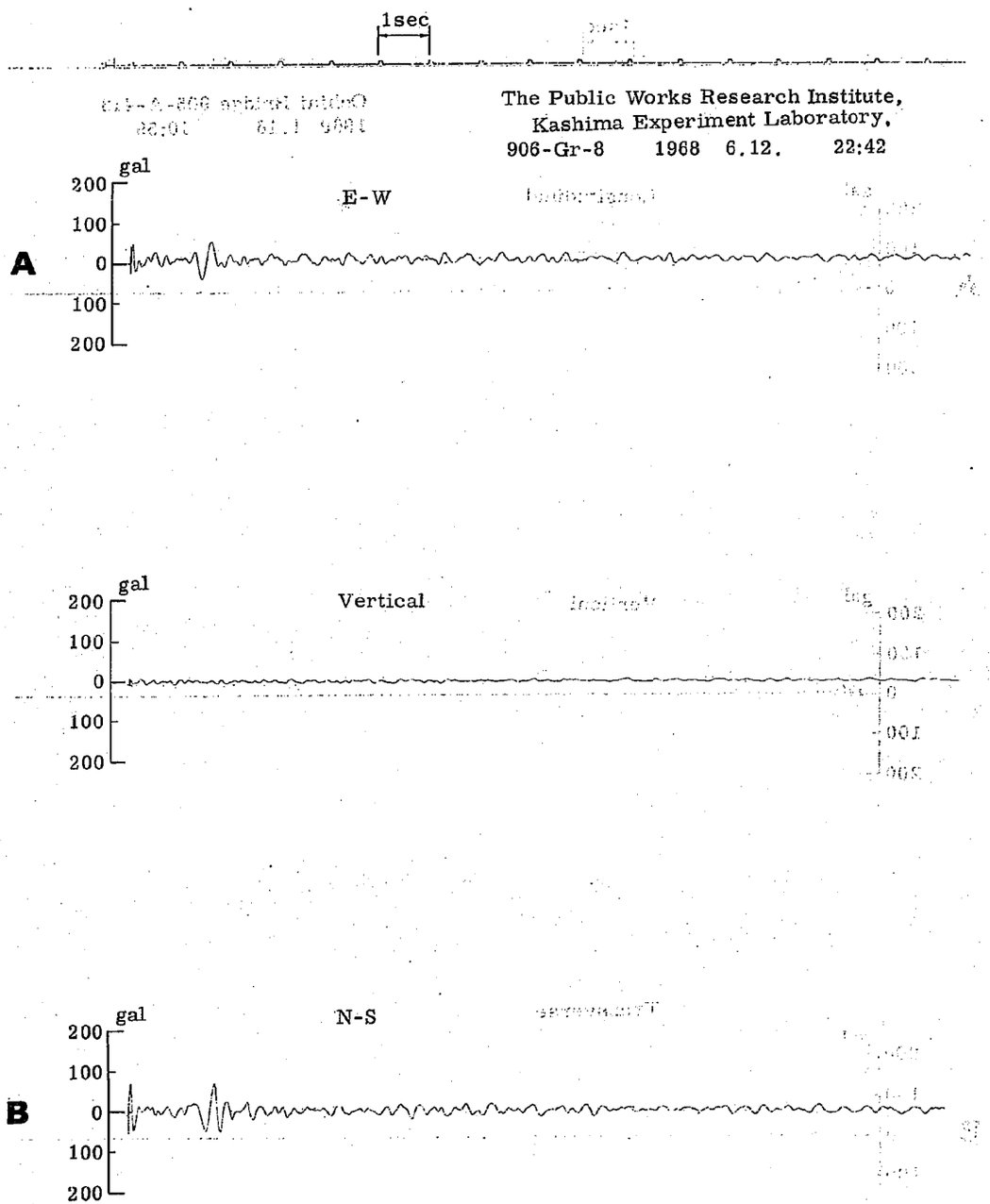


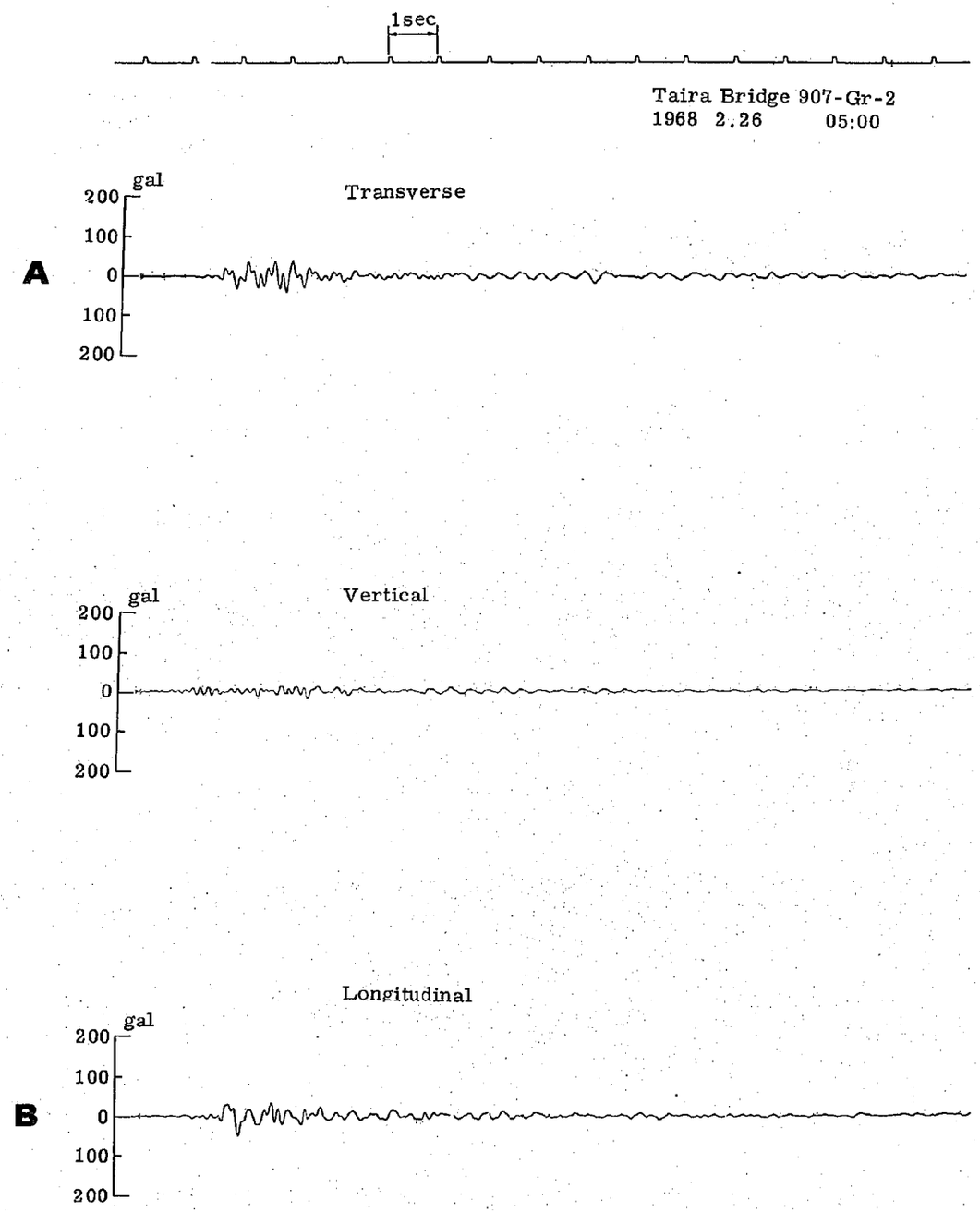
B

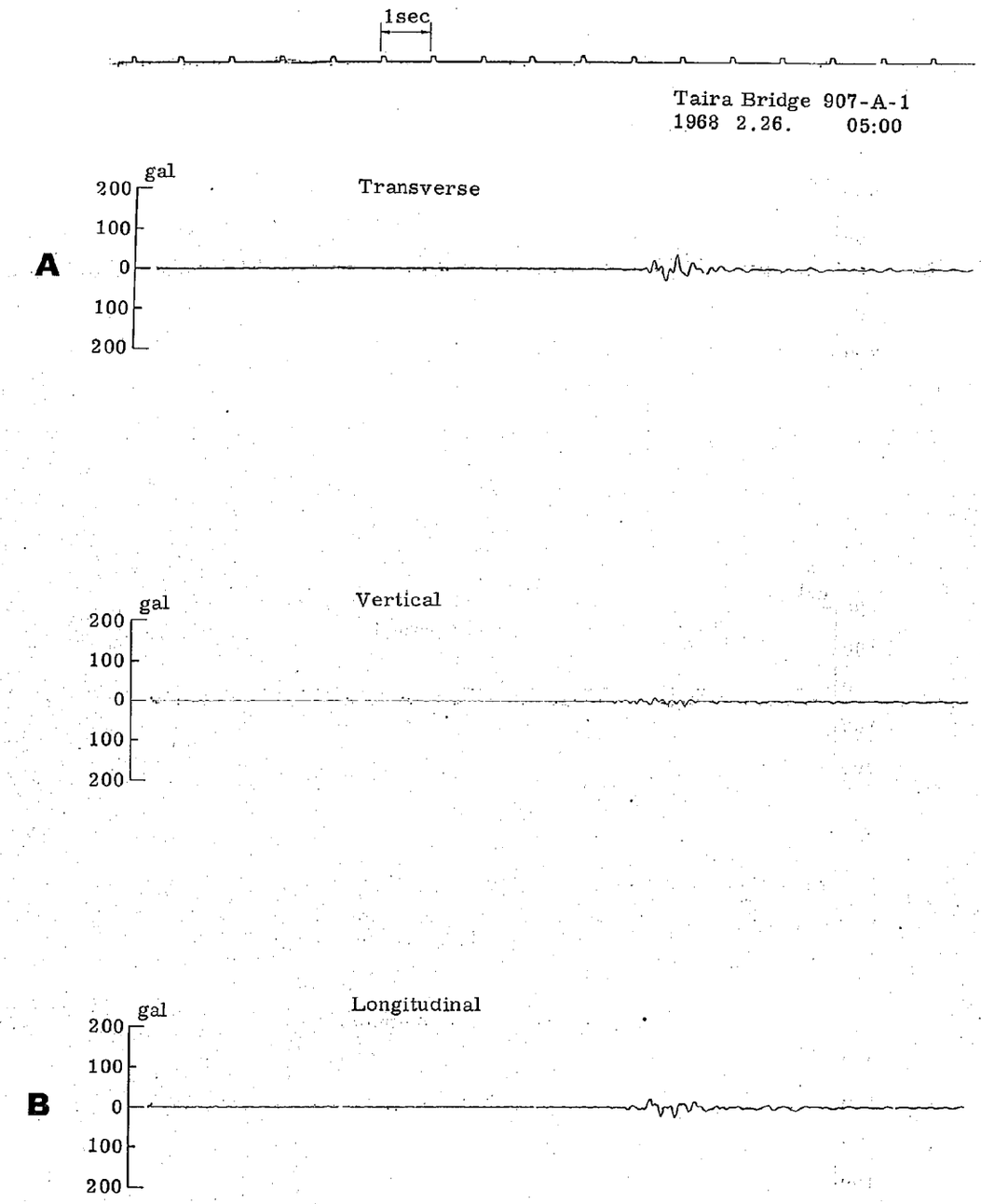


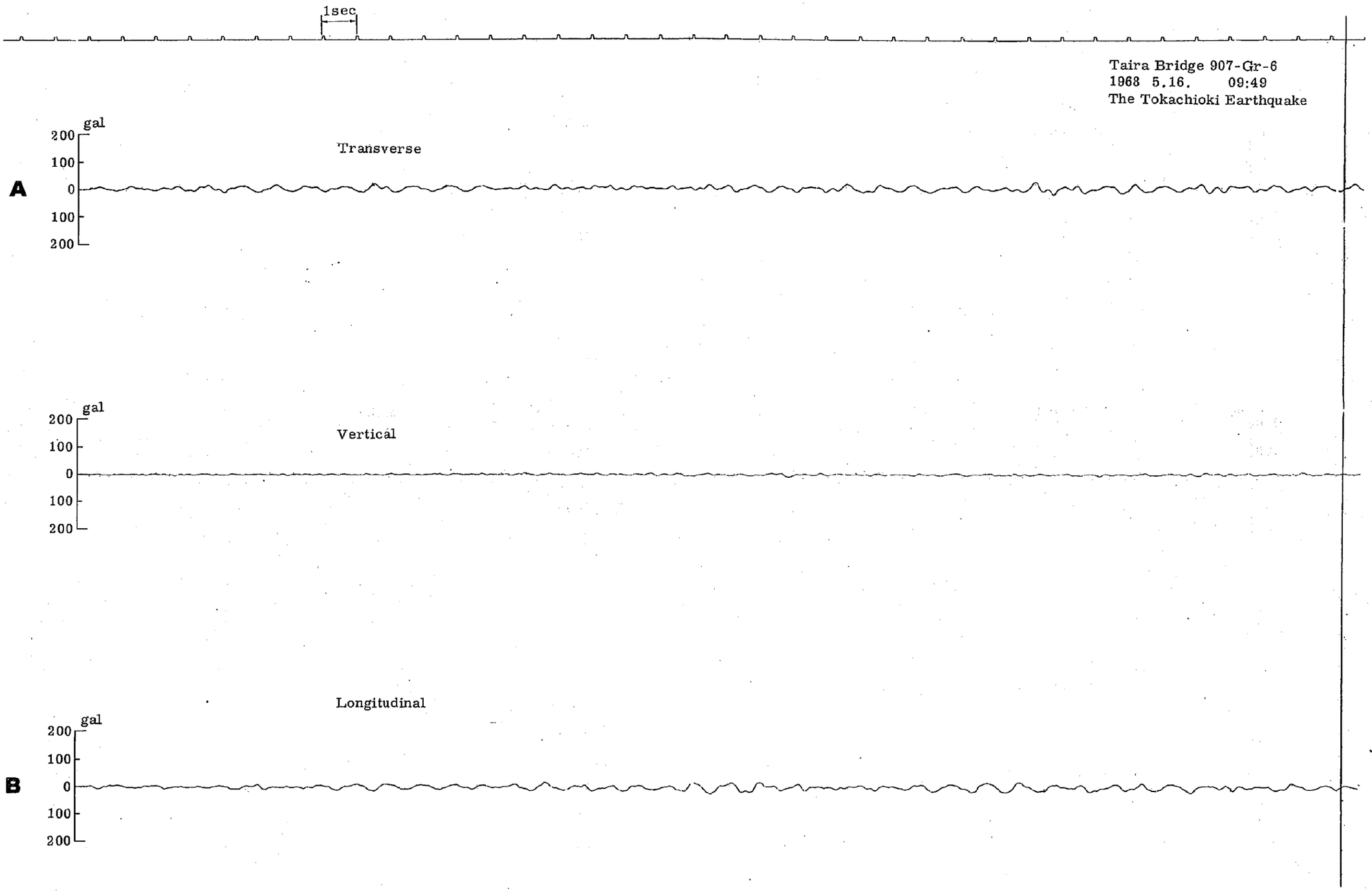

1sec
Ochiai Bridge 905-B-263
1969 1.16 10:59
A
gal
Longitudinal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Transverse
gal
200
100
0
100
200

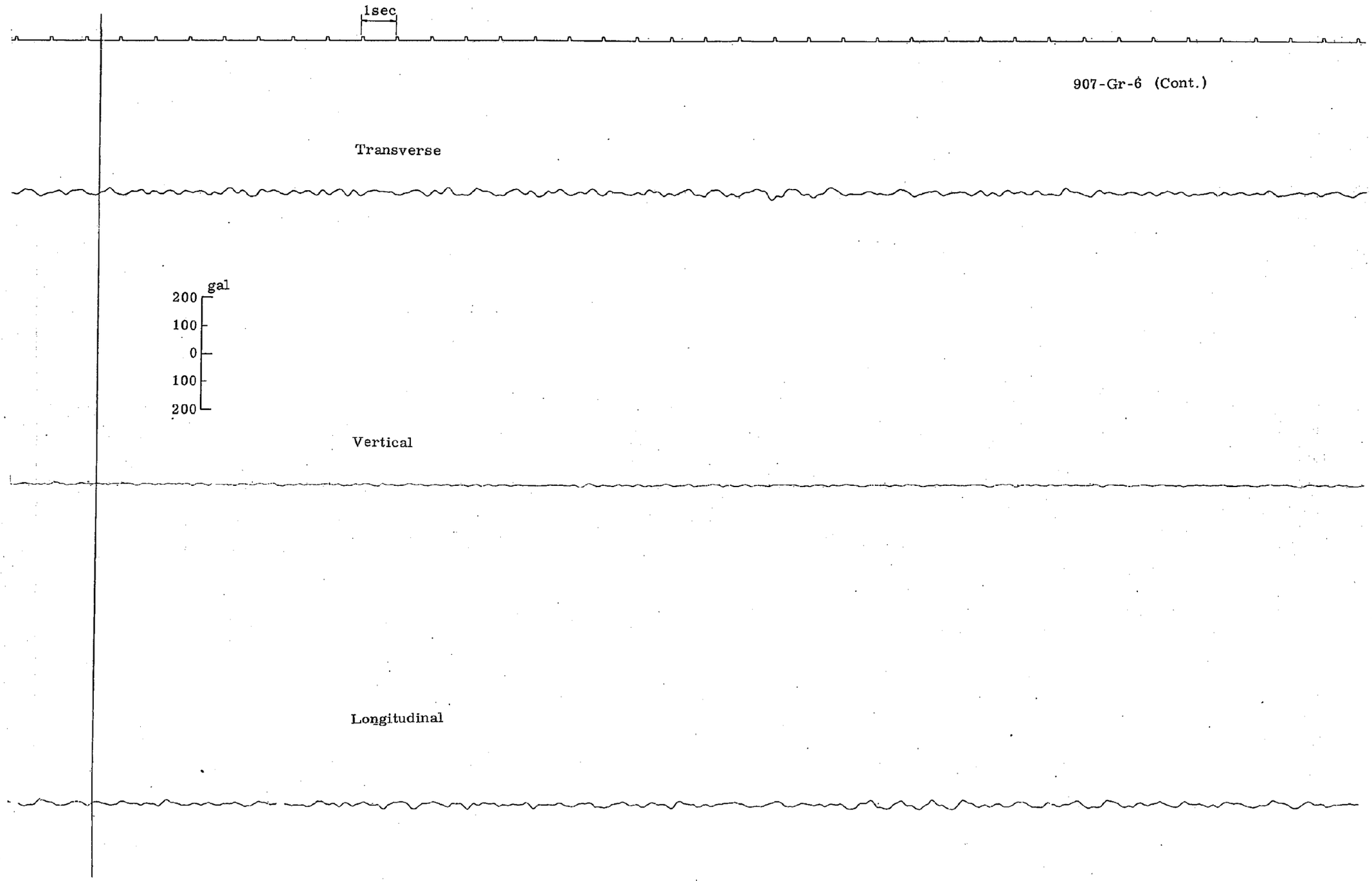

1sec
Ochiai Bridge 905-A-413
1969 1.16 10:59
A
gal
Longitudinal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Transverse
gal
200
100
0
100
200

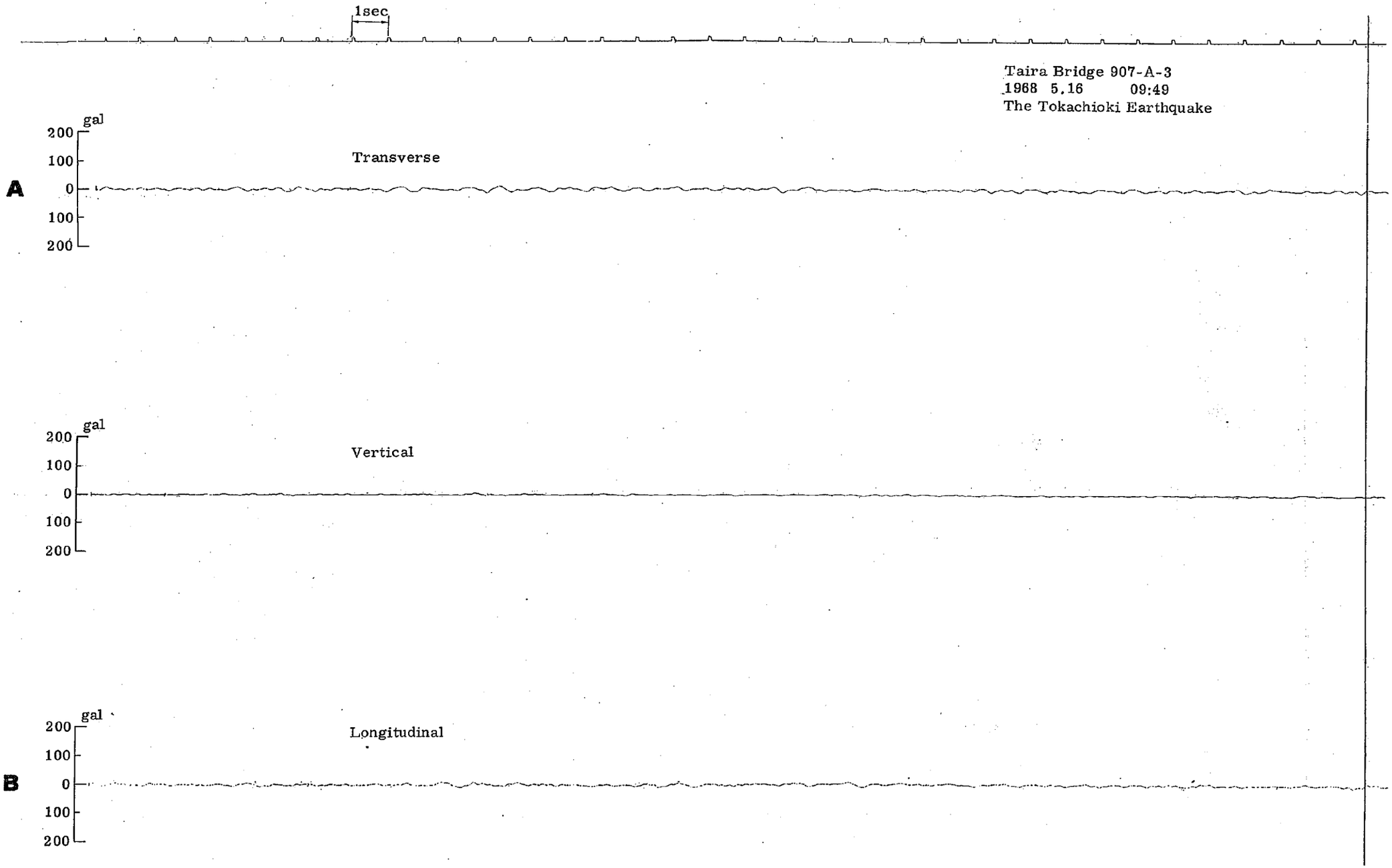

1sec
The Public Works Research Institute,
Kashima Experiment Laboratory,
906-Gr-8 1968 6.12. 22:42
gal
200
100
0
100
200
E-W
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
N-S
B

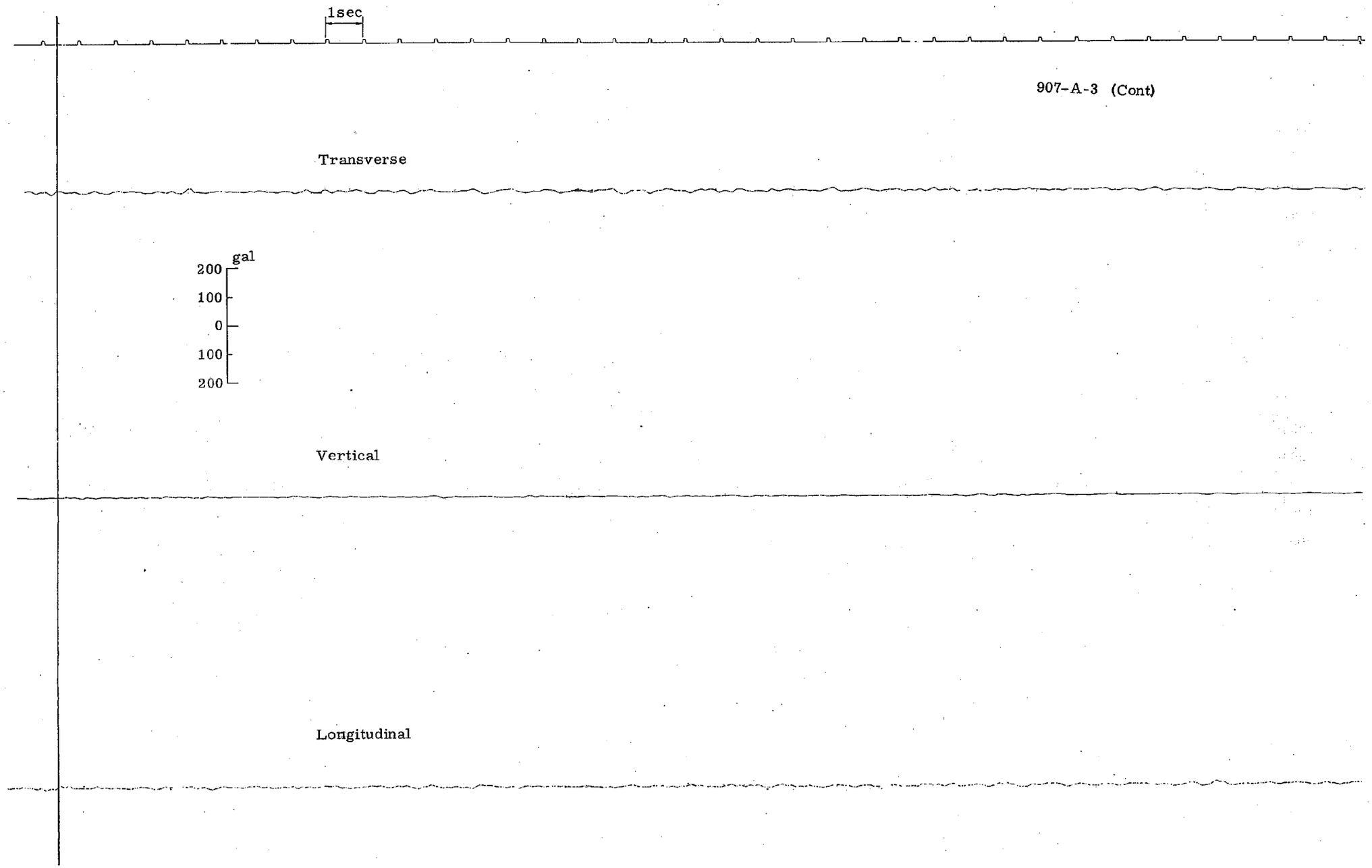

1sec
Taira Bridge 907-Gr-2
1968 2.26 05:00
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal
B
gal
200
100
0
100
200

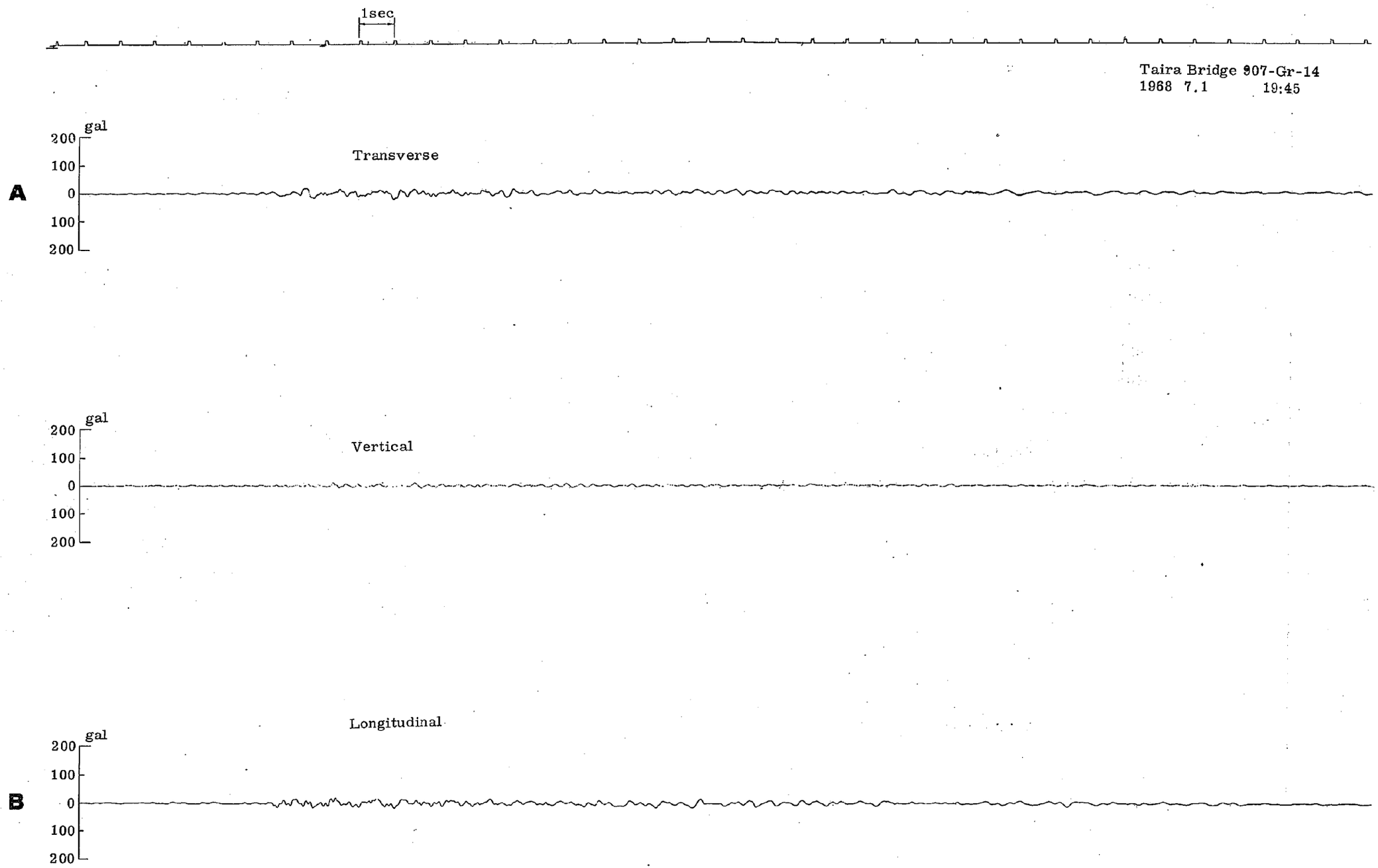

1sec
Taira Bridge 907-A-1
1968 2.26. 05:00
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal
B
gal
200
100
0
100
200

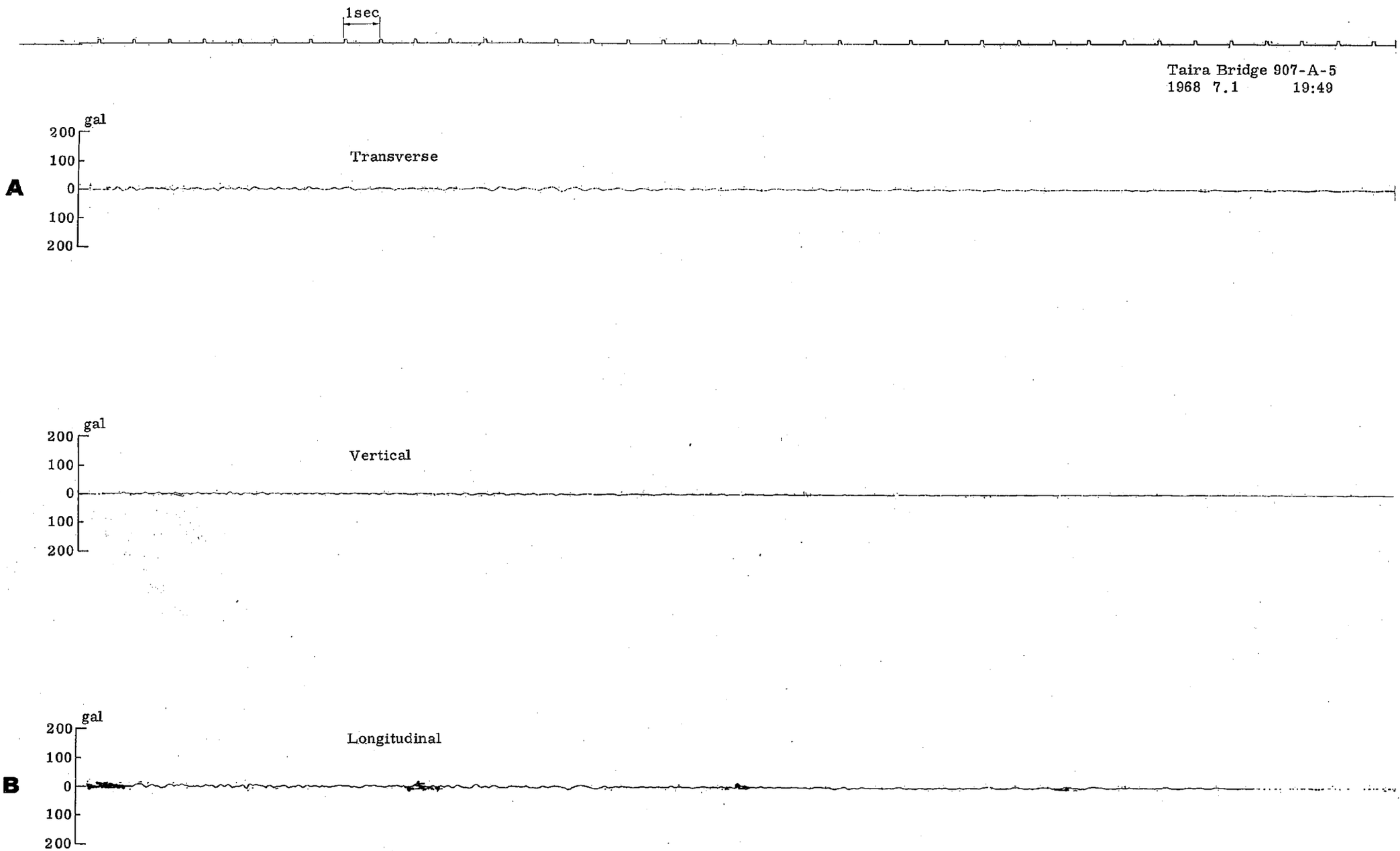

1sec
Taira Bridge 907-Gr-6
1968 5.16. 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

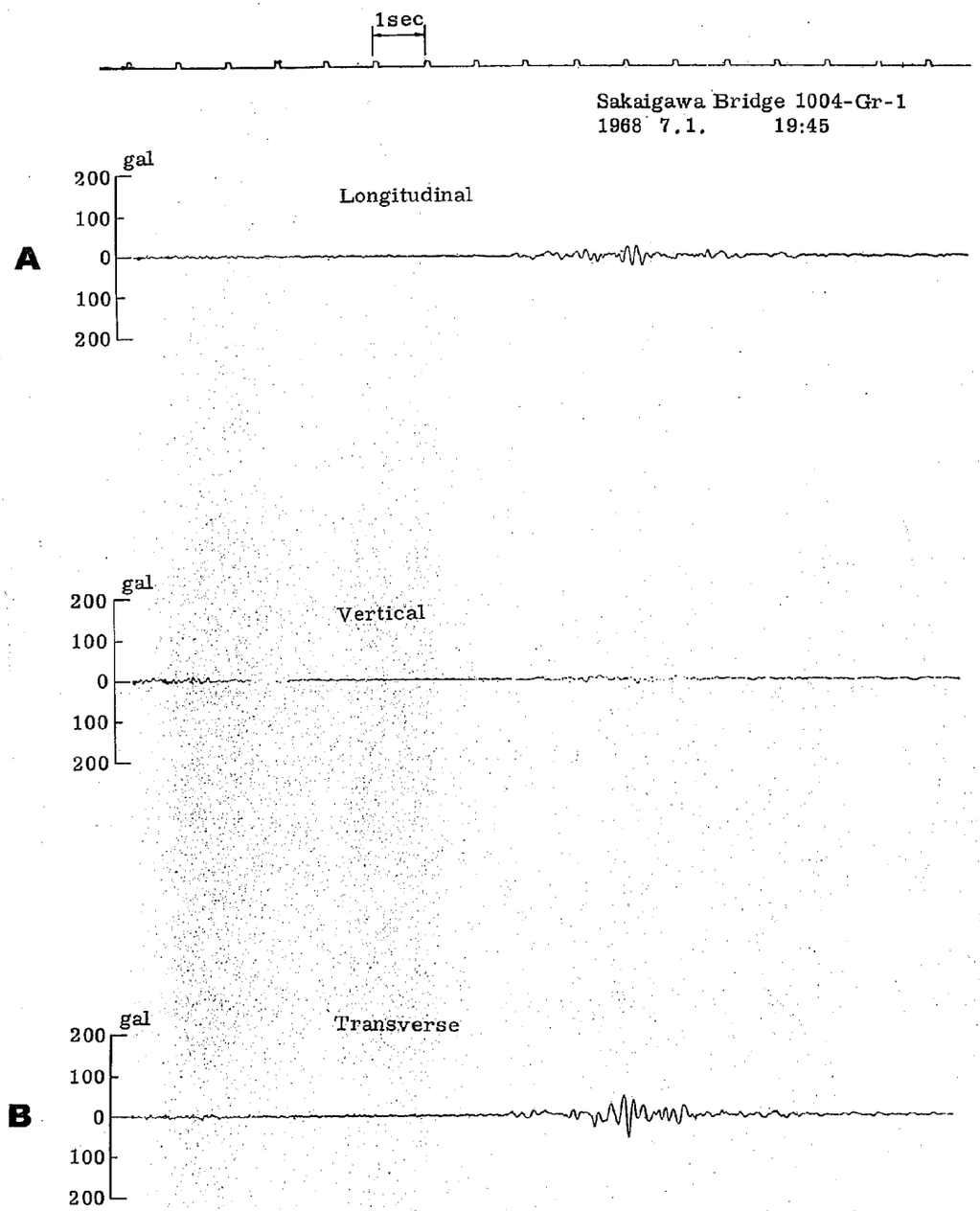

1sec
907-Gr-6 (Cont.)
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal

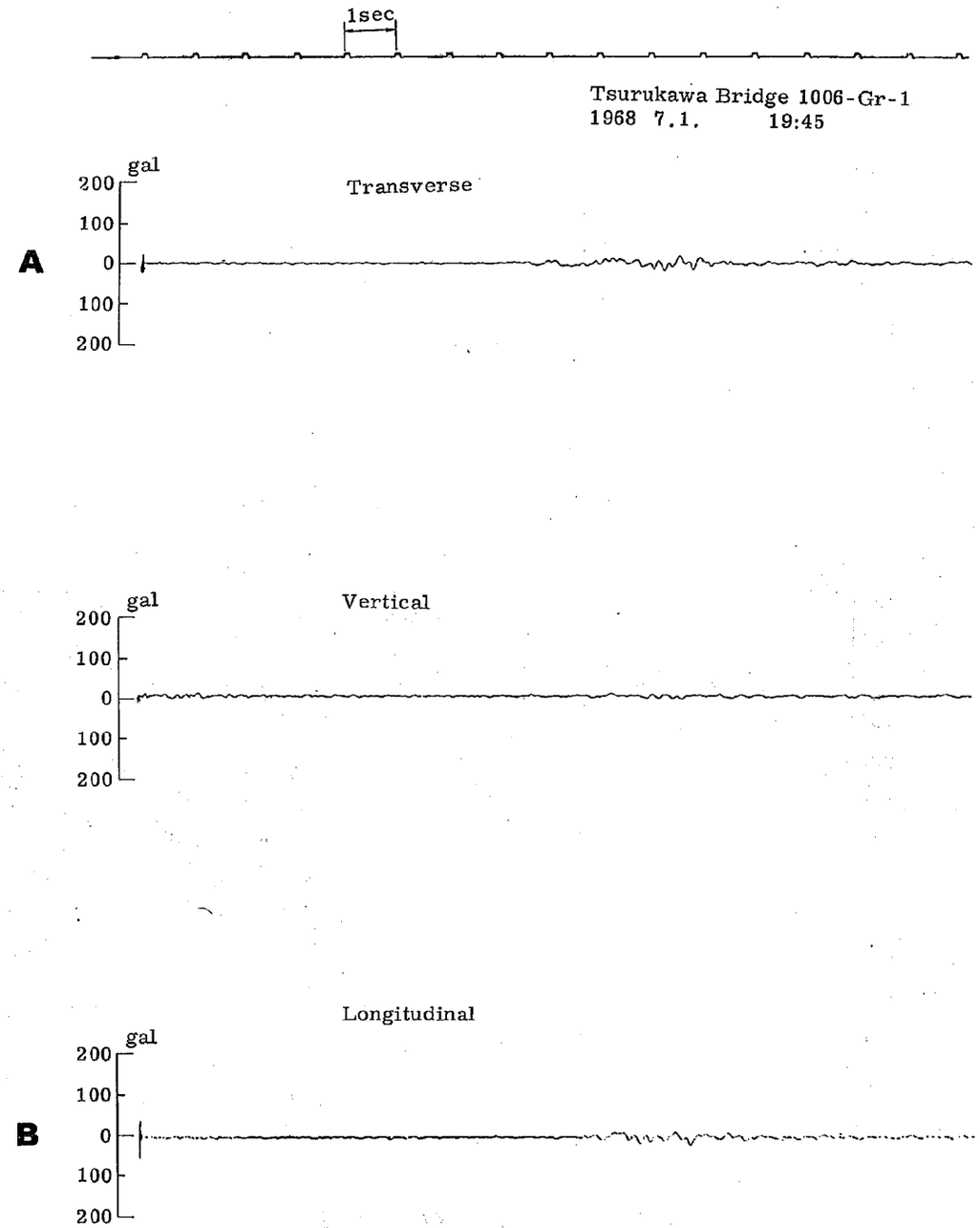

1sec
Taira Bridge 907-A-3
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

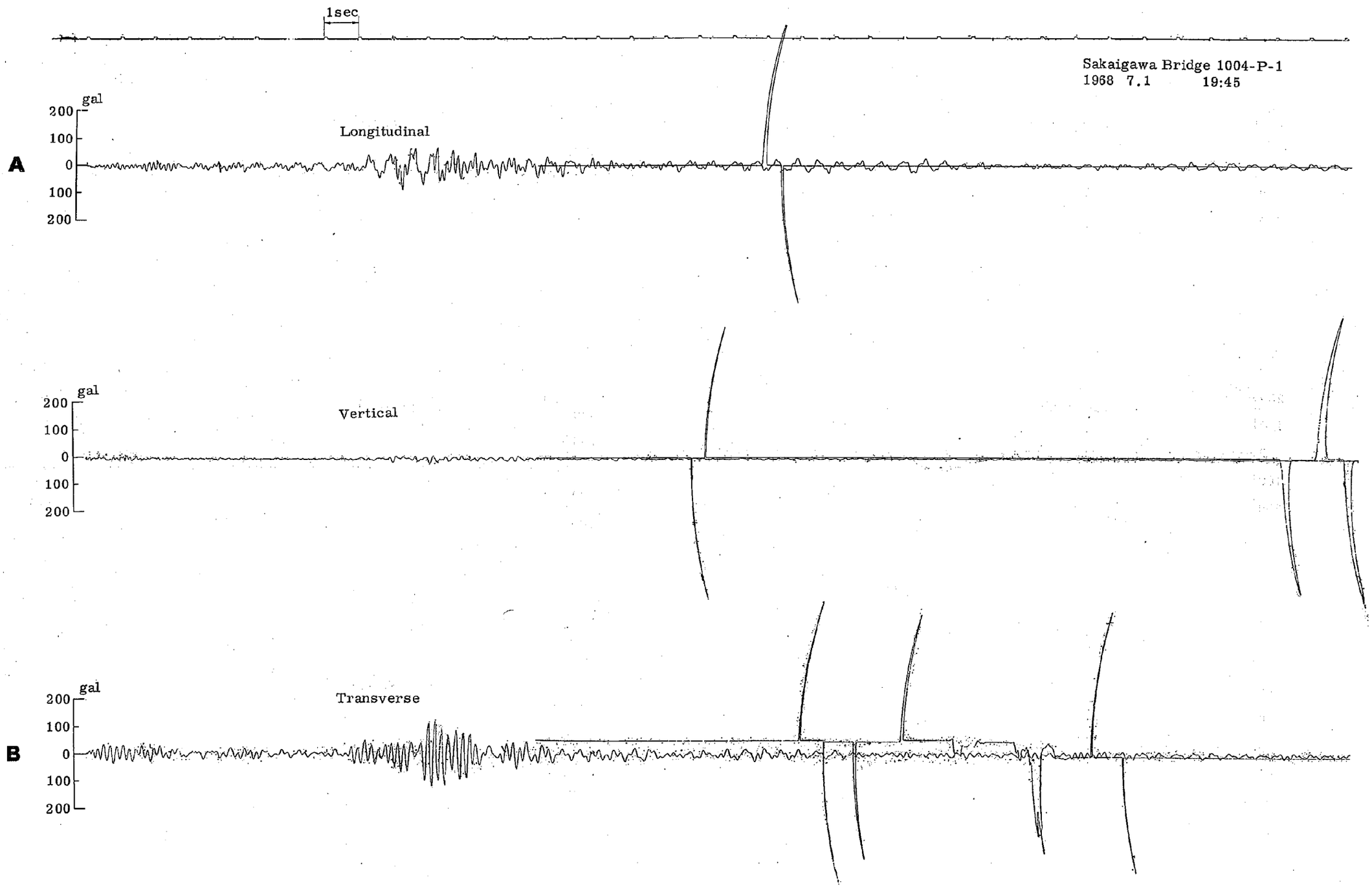

1sec
907-A-3 (Cont)
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal

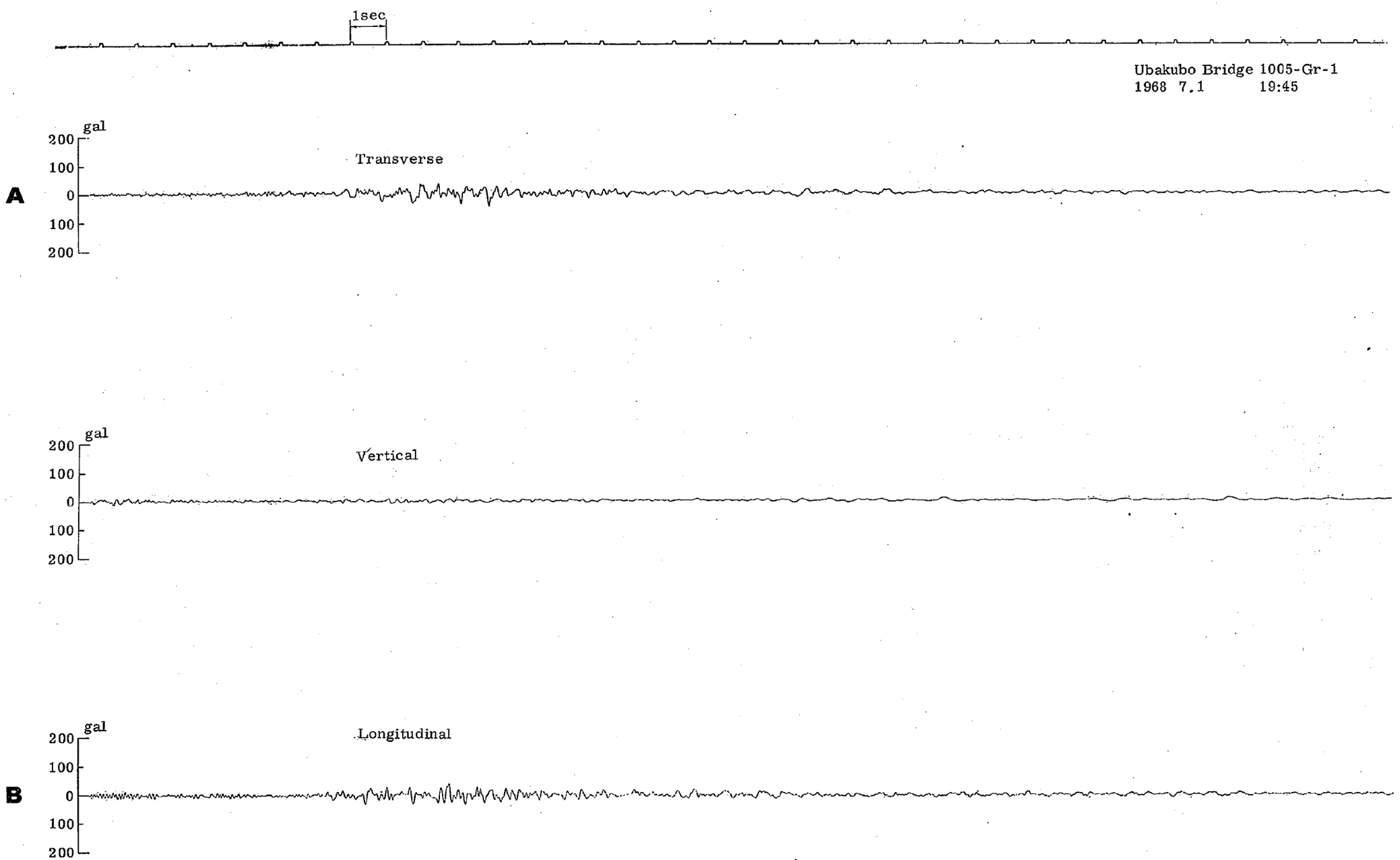

1sec
Taira Bridge 907-Gr-14
1968 7.1 19:45
gal
200
100
0
100
200
Transverse
A
gal
200
100
0
100
200
Vertical
Longitudinal
gal
200
100
0
100
200
B

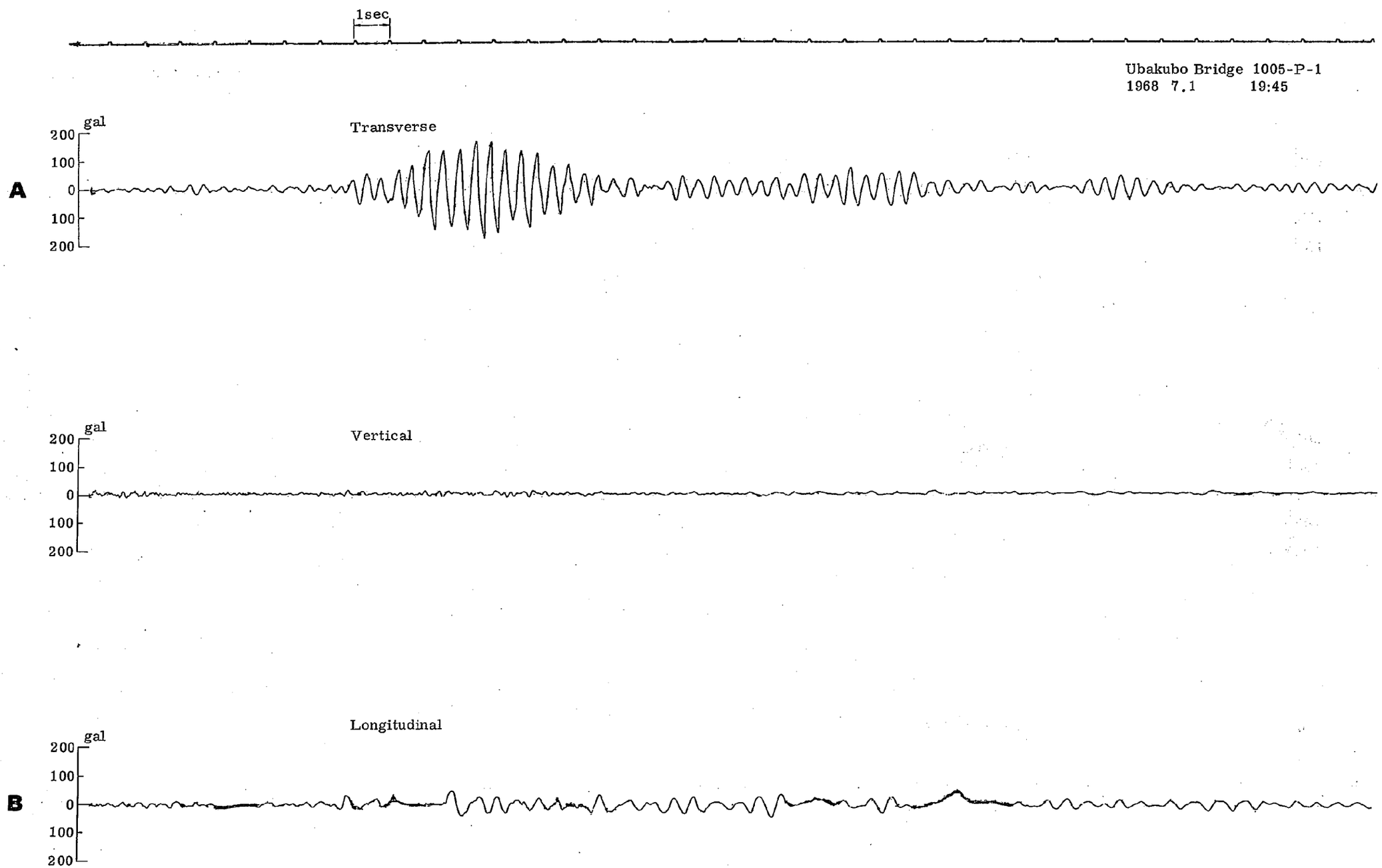

1sec
Taira Bridge 907-A-5
1968 7.1 19:49
gal
200
100
0
100
200
Transverse
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
Longitudinal
B

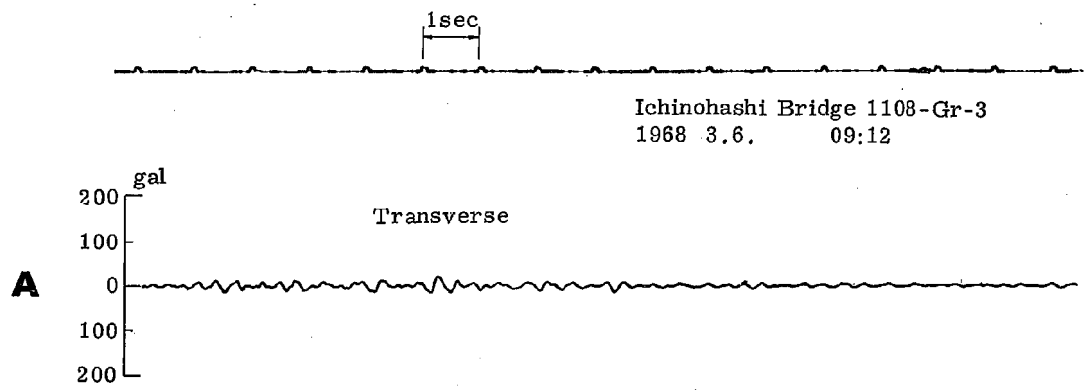

1sec
Sakaigawa Bridge 1004-Gr-1
1968 7.1. 19:45
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse


1sec
Tsurukawa Bridge 1006-Gr-1
1968 7.1. 19:45
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal


1sec
Sakaigawa Bridge 1004-P-1
1968 7.1 19:45
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse


1sec
Ubakubo Bridge 1005-Gr-1
1968 7.1 19:45
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal


1sec
Ubakubo Bridge 1005-P-1
1968 7.1 19:45
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal


1sec
Ichinohashi Bridge 1108-Gr-3
1968 3.6. 09:12
gal
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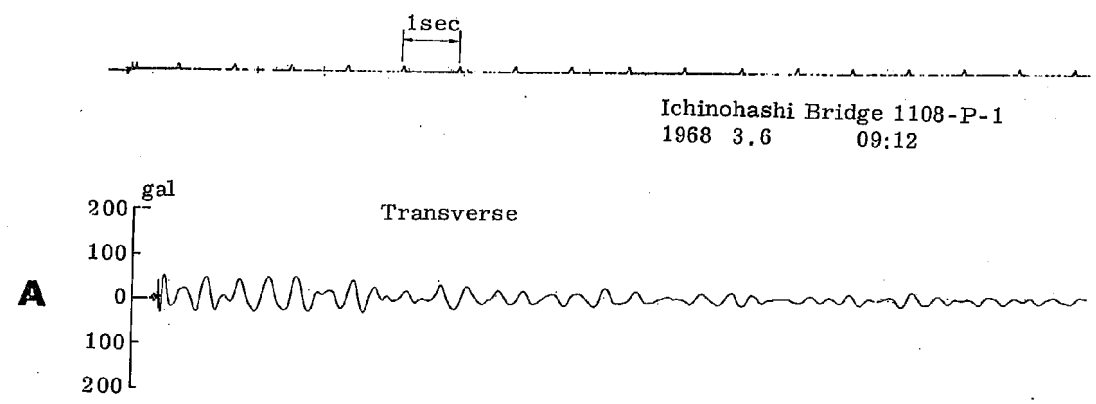
0
100
200
Transverse
A


1sec
Ichinohashi Bridge 1108-P-1
1968 3.6 09:12
gal
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100
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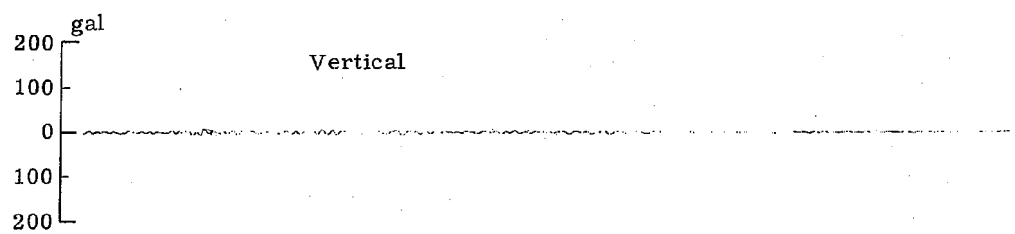
Transverse
A


gal
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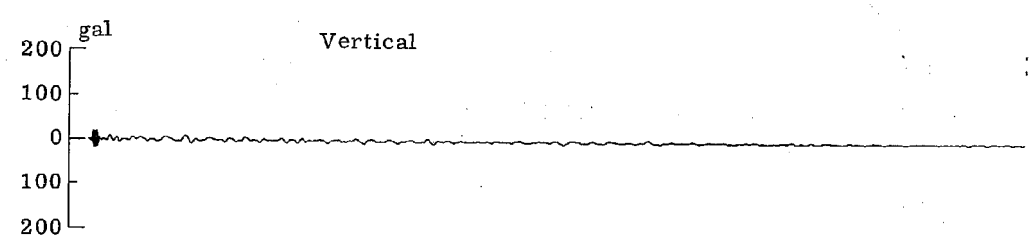
200
Vertical


gal
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100
0
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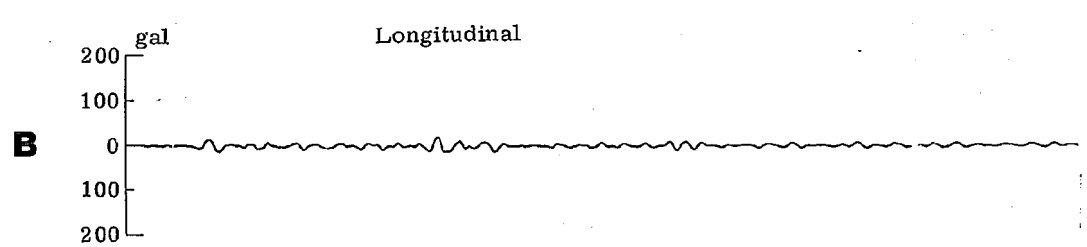
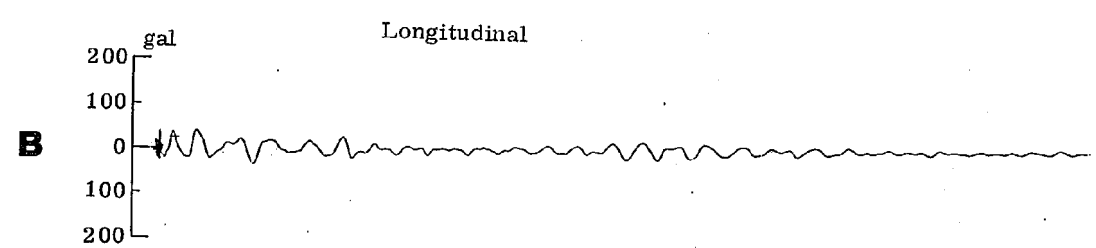
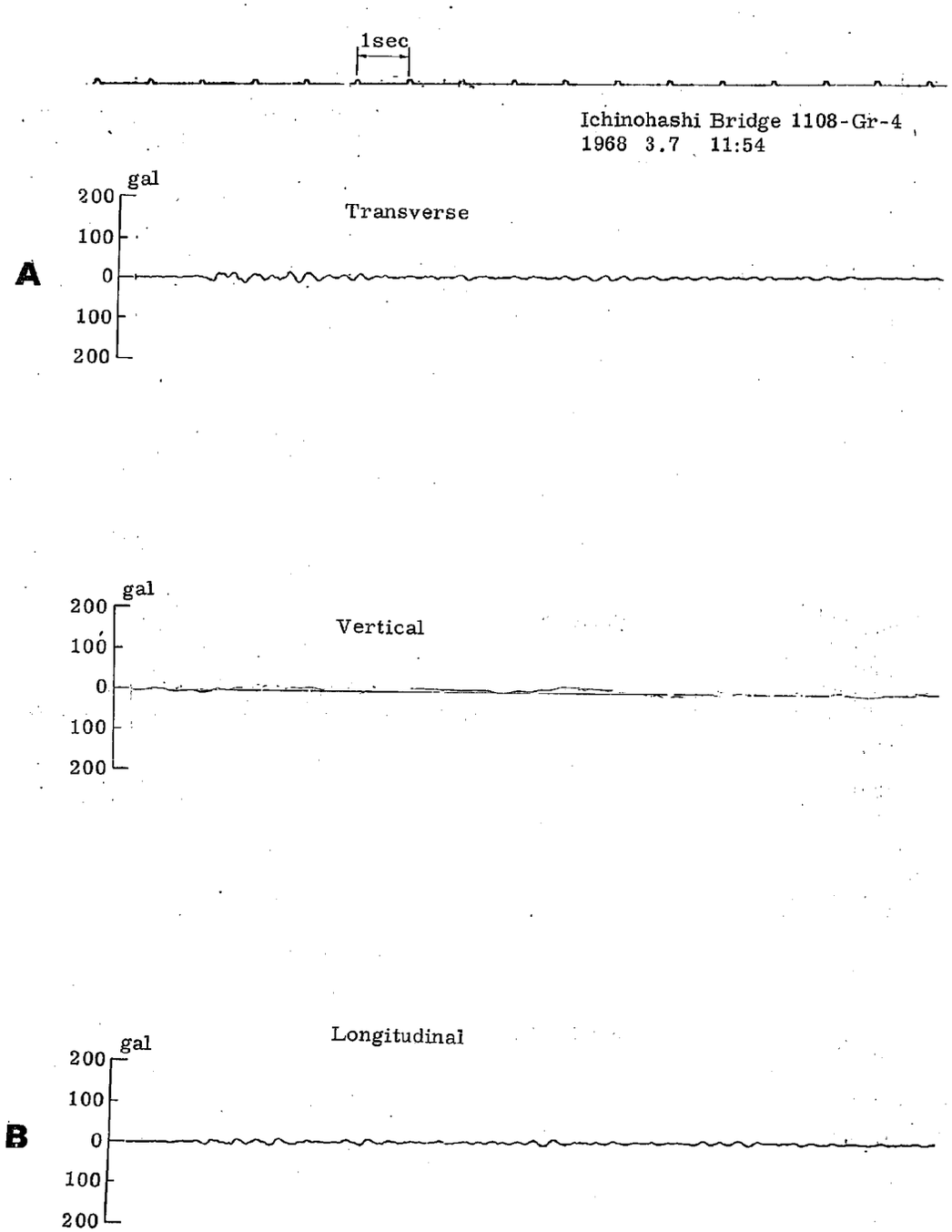
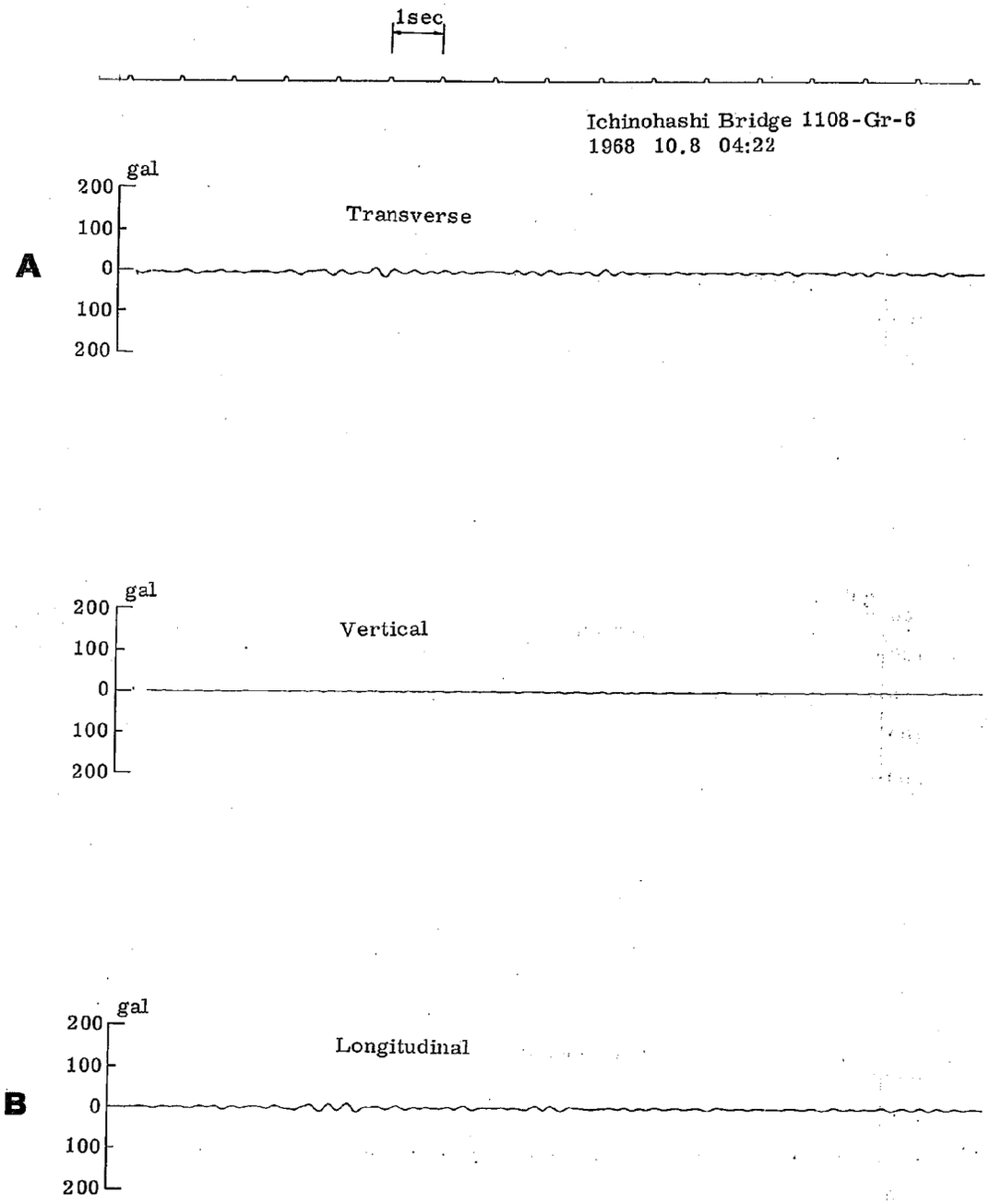
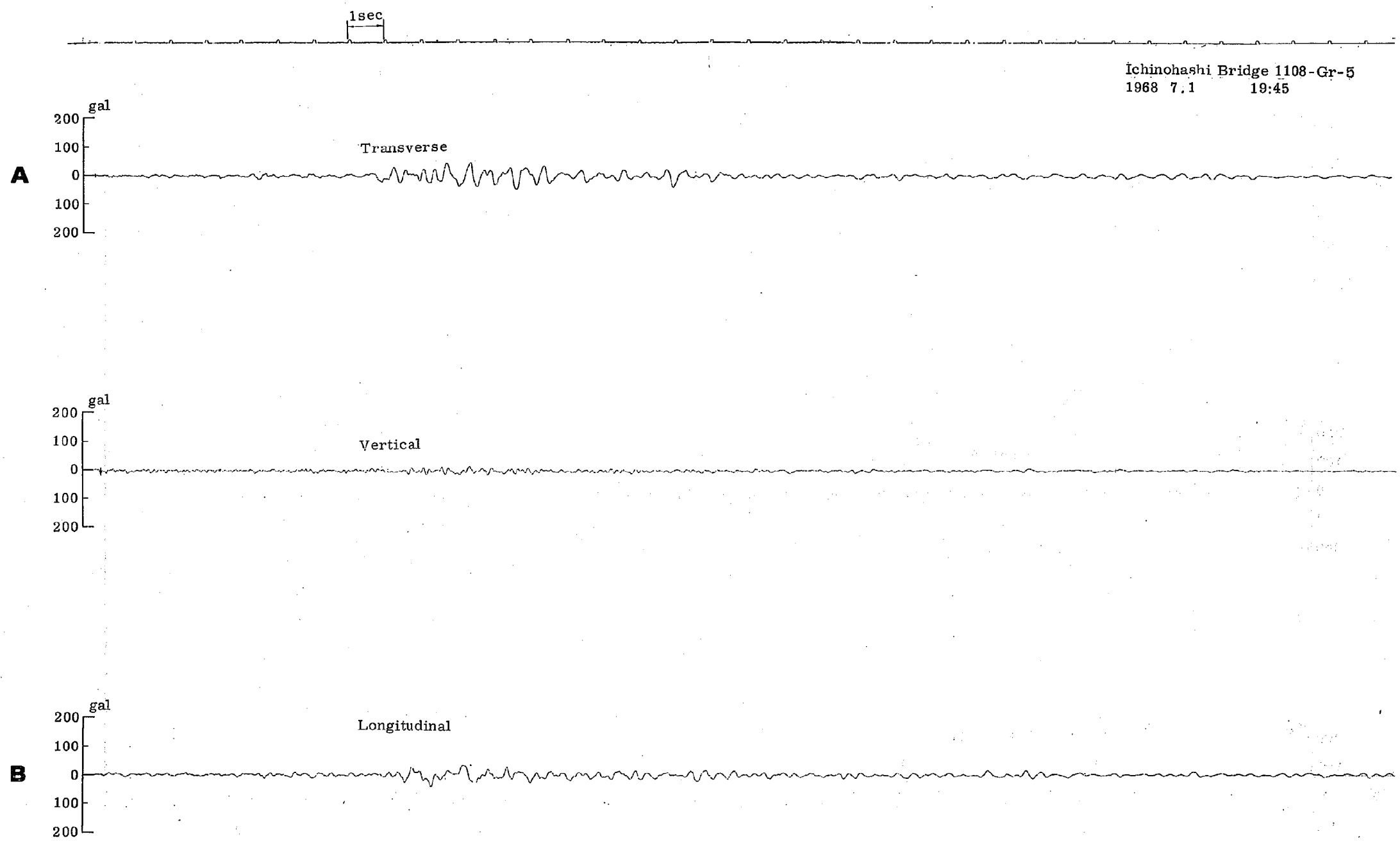
200
Vertical

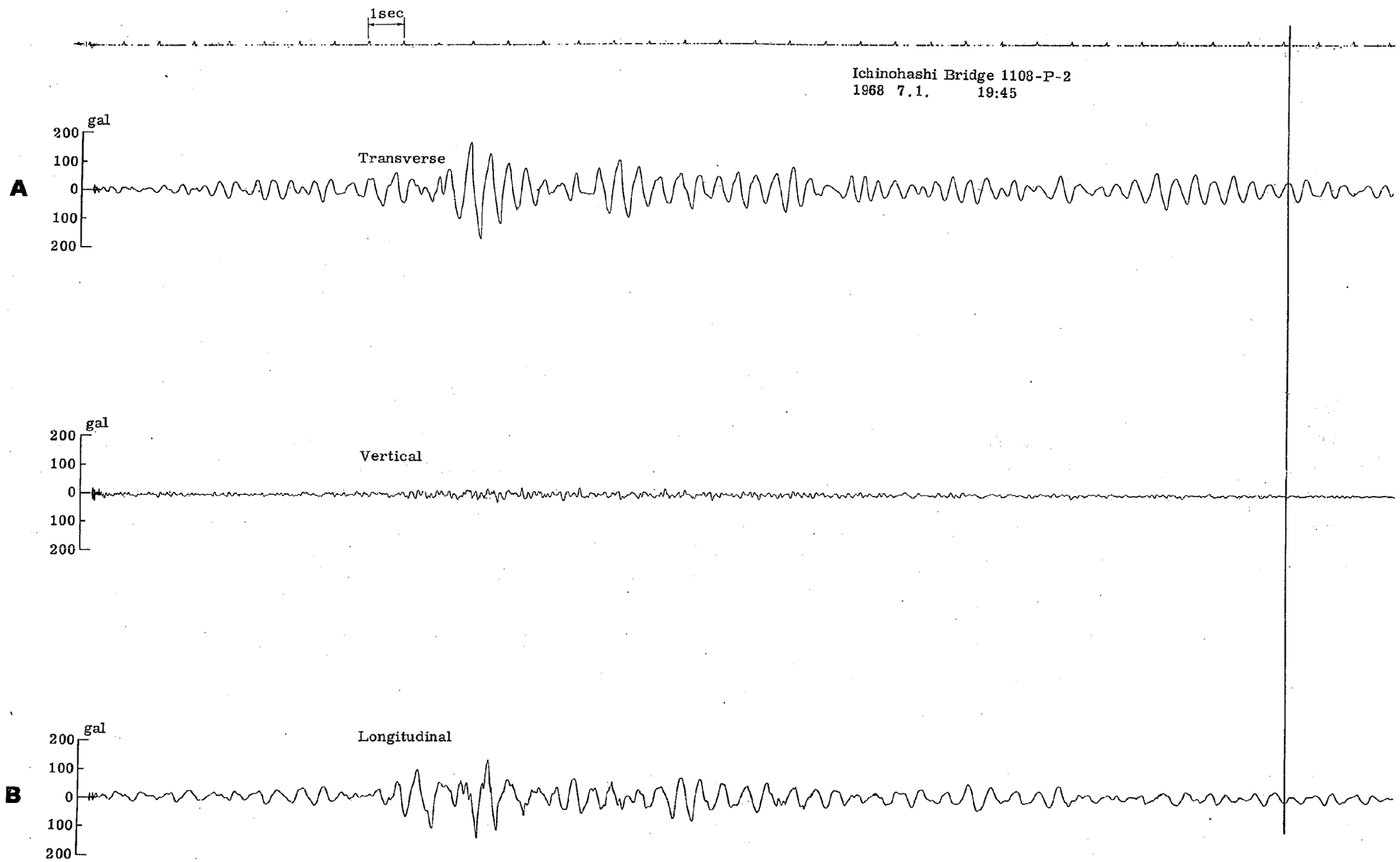

gal
200
100
0
100
200
Longitudinal
B

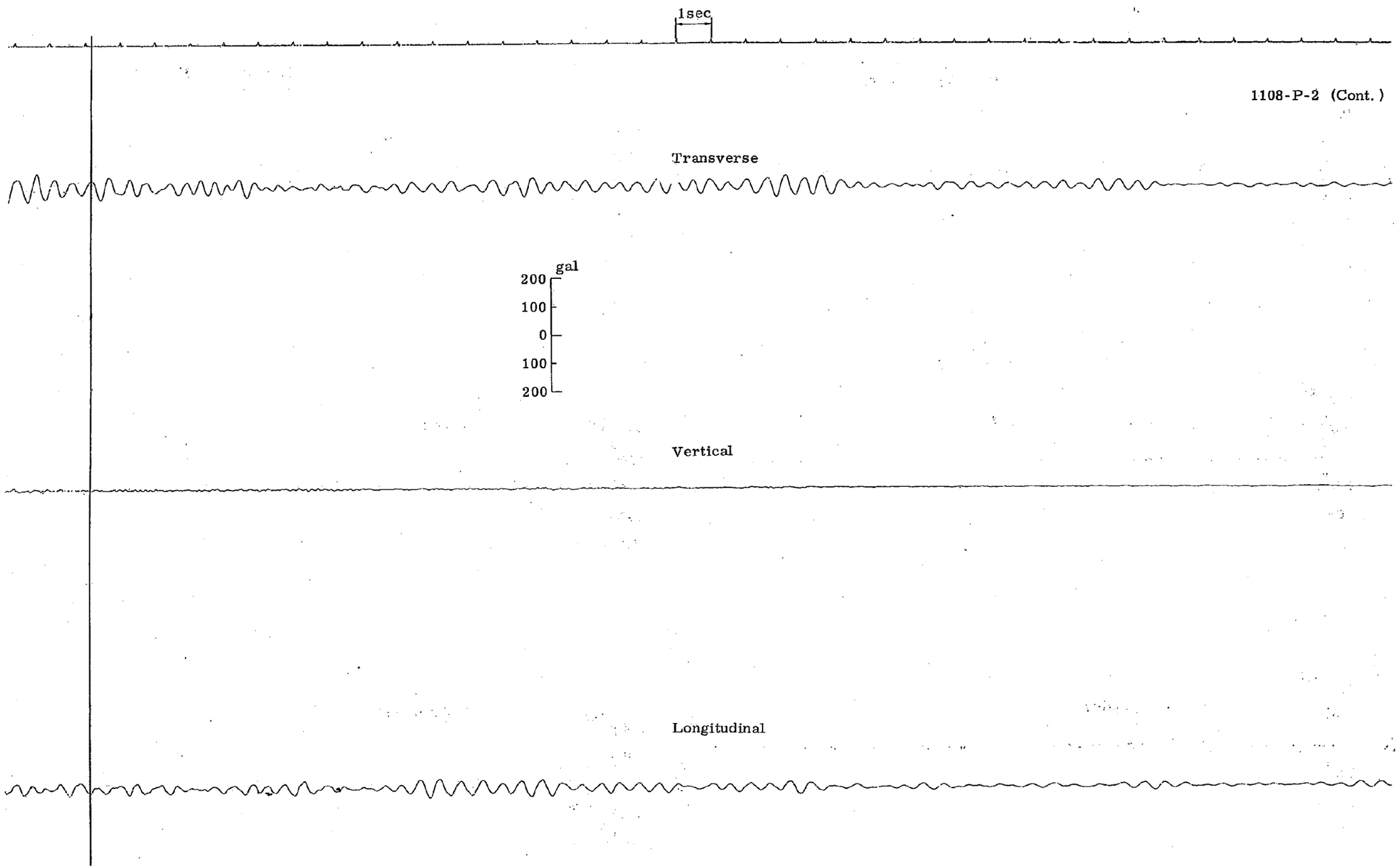

gal
200
100
0
100
200
Longitudinal
B


1sec
Ichinohashi Bridge 1108-Gr-4
1968 3.7 11:54
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal


1sec
Ichinohashi Bridge 1108-Gr-6
1968 10.8 04:22
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal


1sec
Ichinohashi Bridge 1108-Gr-5
1968 7.1 19:45
gal
200
100
0
100
200
A
Transverse
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Longitudinal


1sec
Ichinohashi Bridge 1108-P-2
1968 7.1. 19:45
A
gal
200
100
0
100
200
Transverse
Vertical
B
Longitudinal


1sec
1108-P-2 (Cont.)
Transverse
gal
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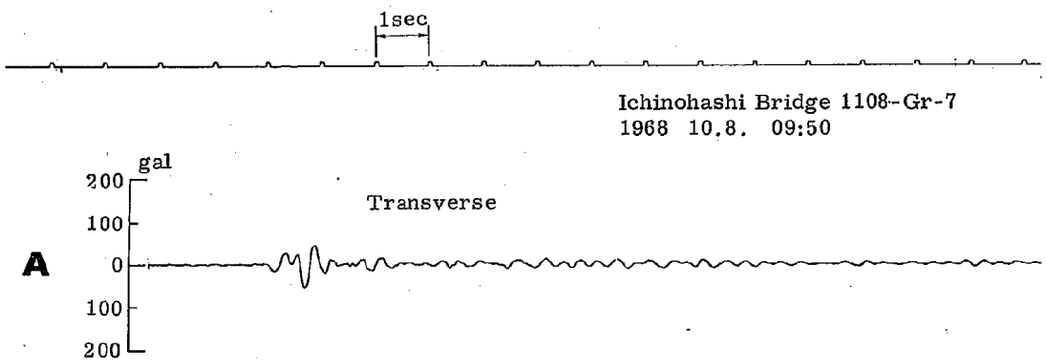
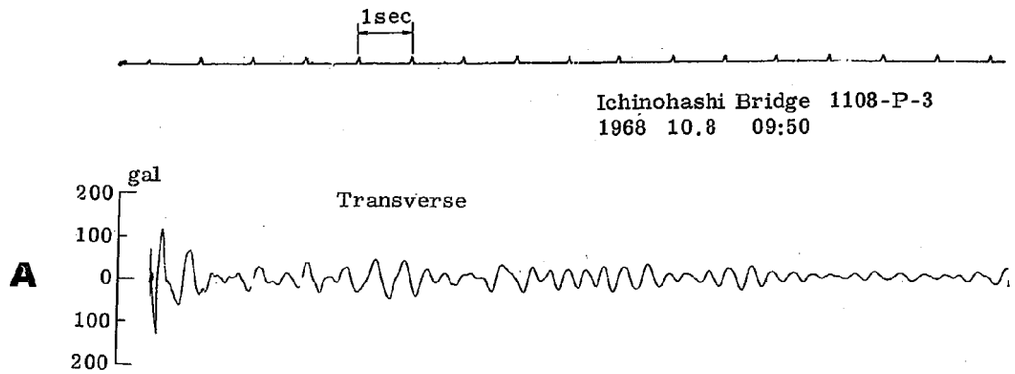
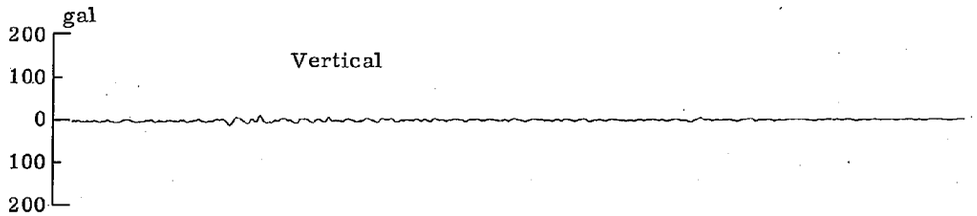
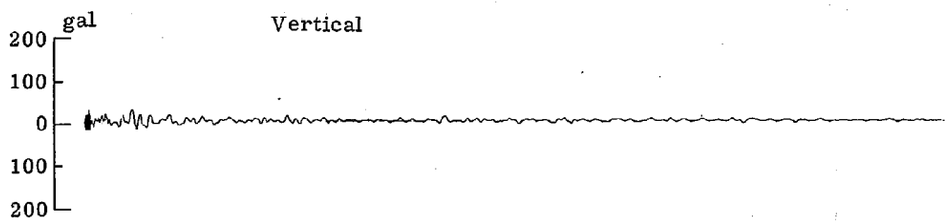
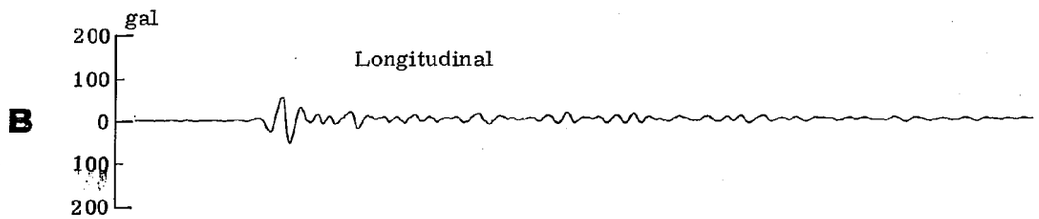
100
200
Vertical
Longitudinal

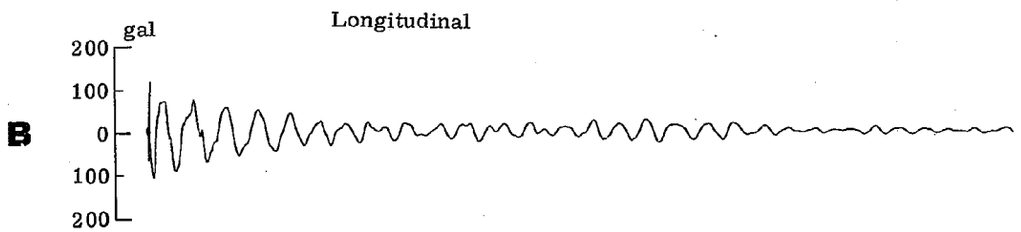

1sec
Ichinohashi Bridge 1108-Gr-7
1968 10.8. 09:50
gal
200
100
0
100
200
Transverse
A

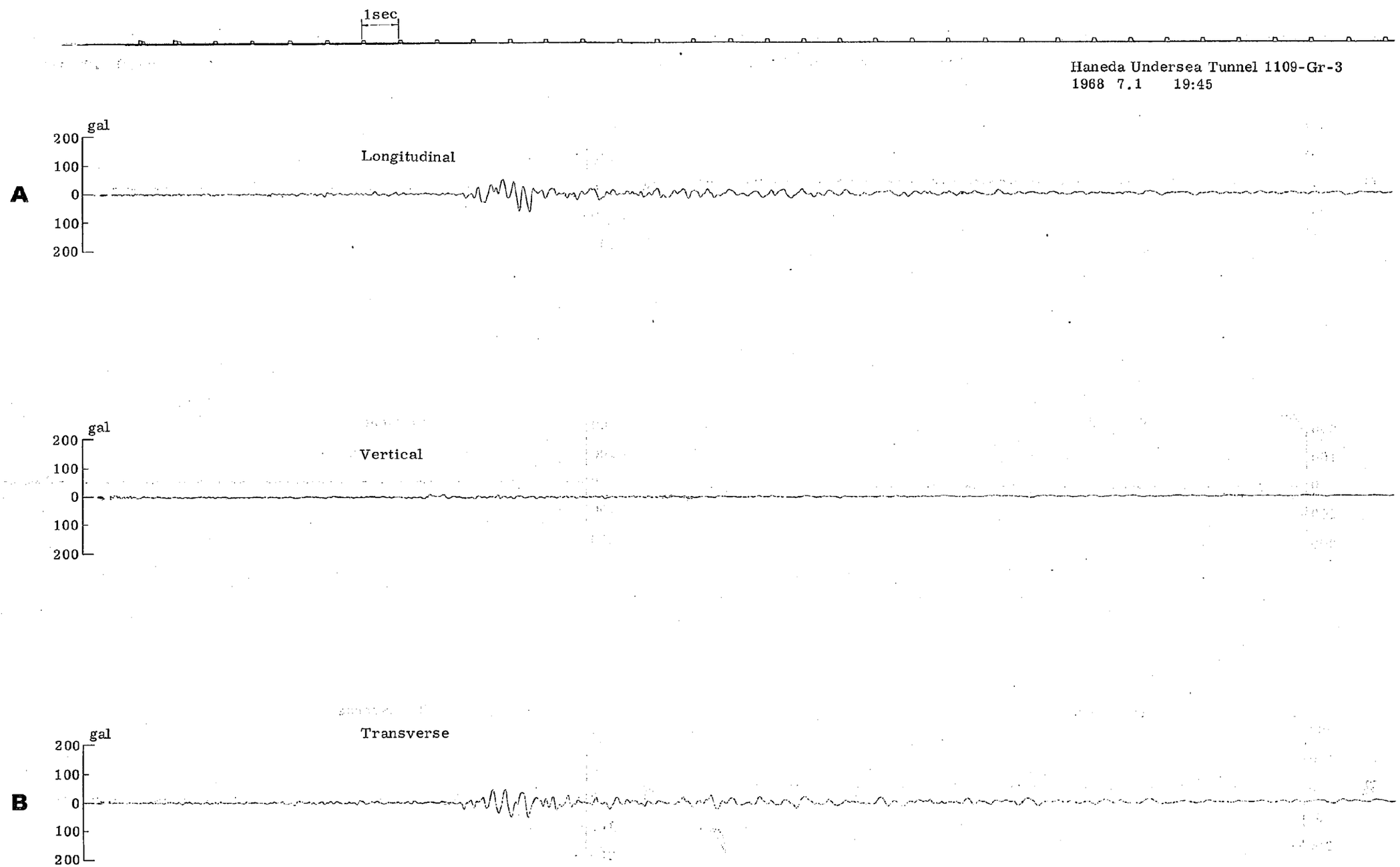

1sec
Ichinohashi Bridge 1108-P-3
1968 10.8 09:50
gal
200
100
0
100
200
Transverse
A

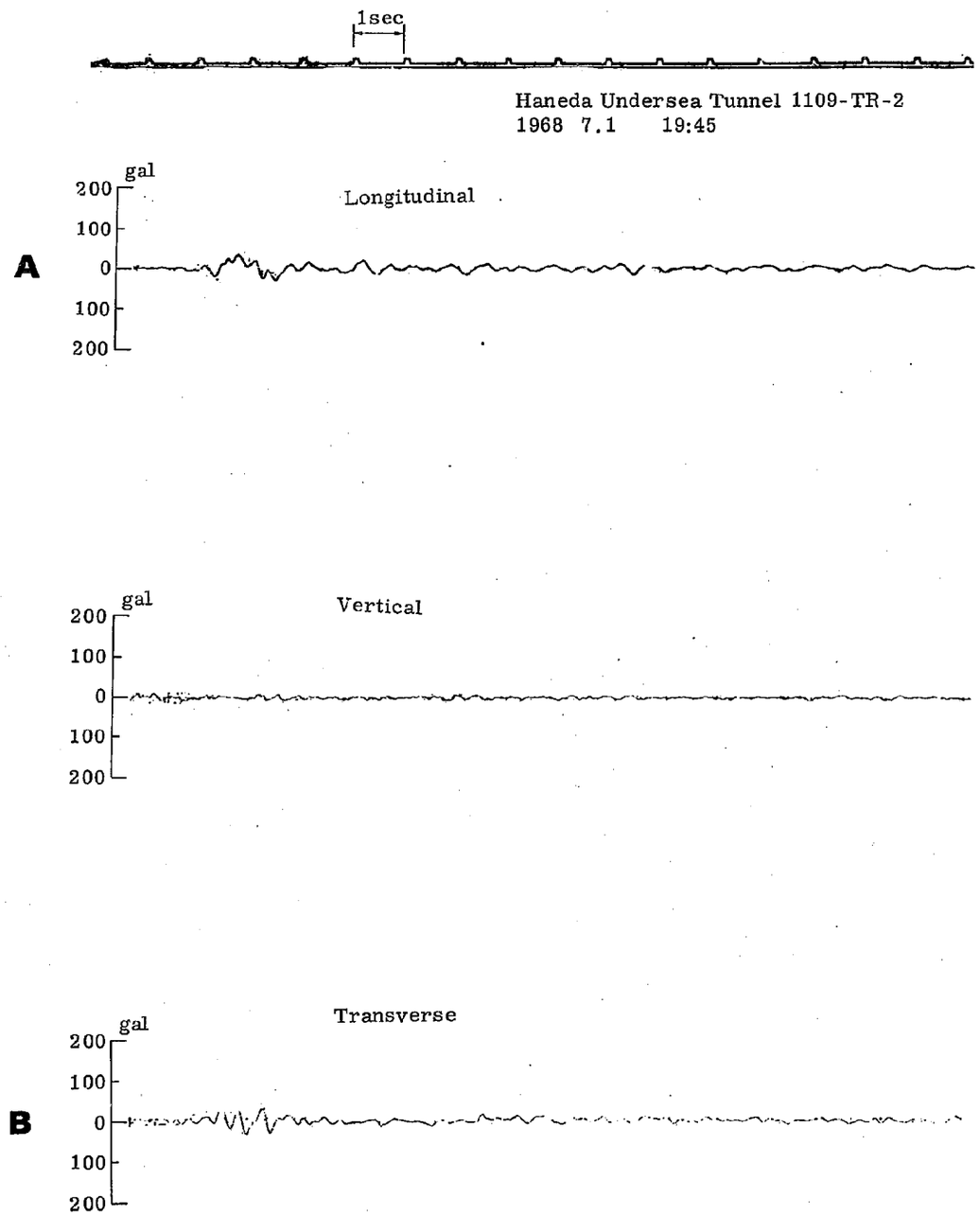

gal
200
100
0
100
200
Vertical

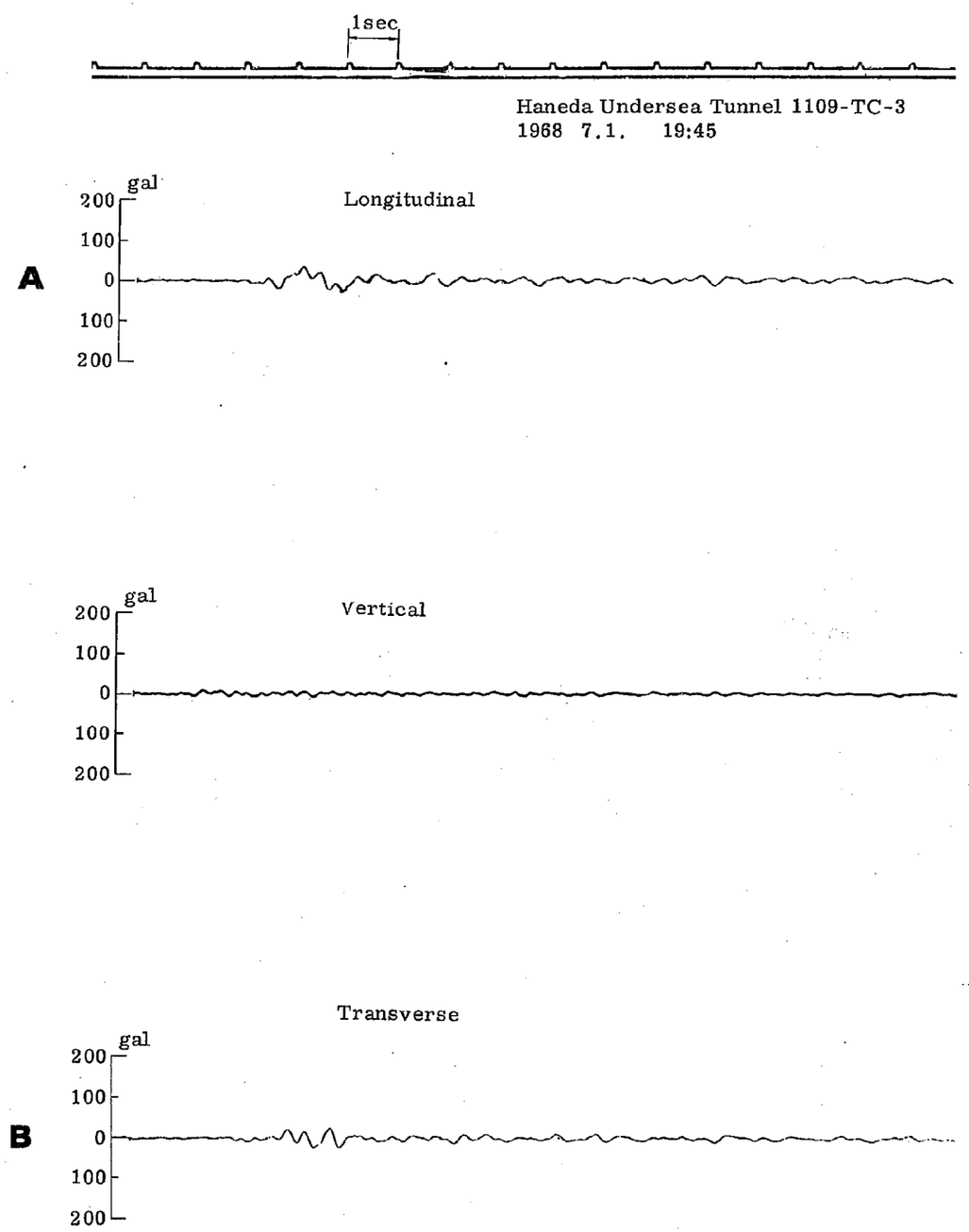

gal
200
100
0
100
200
Vertical

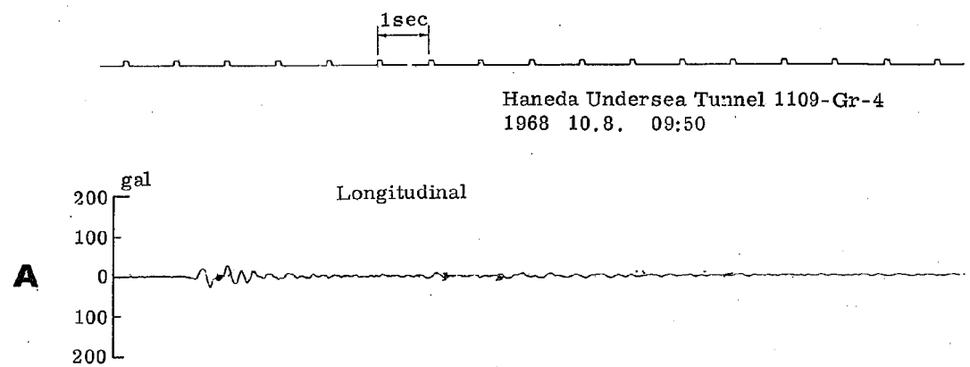

gal
200
100
0
100
200
Longitudinal
B

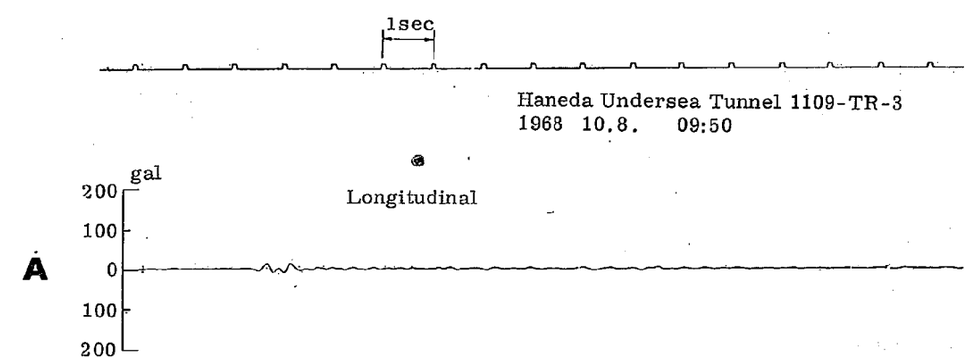

gal
200
100
0
100
200
Longitudinal
B

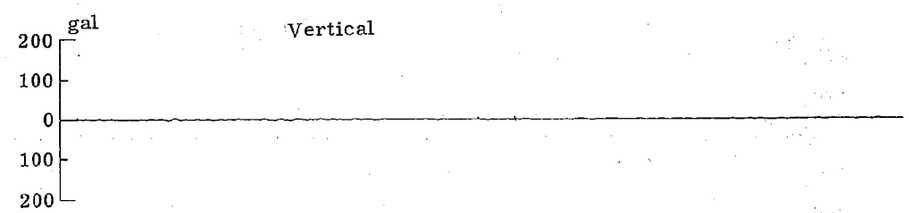

1sec
Haneda Undersea Tunnel 1109-Gr-3
1968 7.1 19:45
gal
200
100
0
100
200
Longitudinal
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
Transverse
B

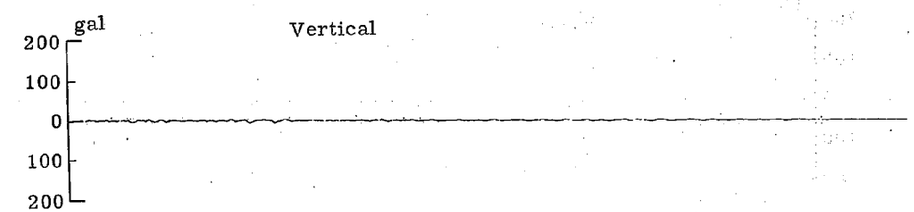

1sec
Haneda Undersea Tunnel 1109-TR-2
1968 7.1 19:45
gal
200
100
0
100
200
Longitudinal
A
Vertical
Transverse
B

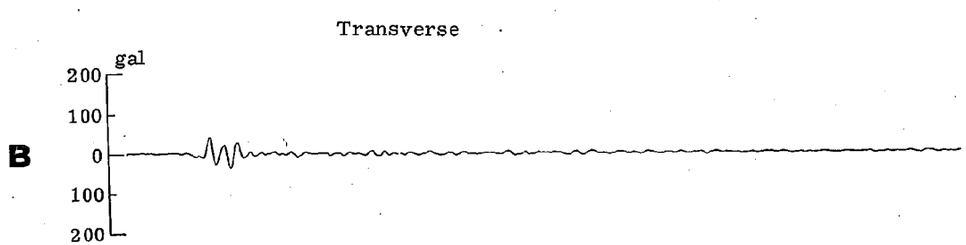

1sec
Haneda Undersea Tunnel 1109-TC-3
1968 7.1. 19:45
gal
200
100
0
100
200
Longitudinal
A
Vertical
Transverse
B

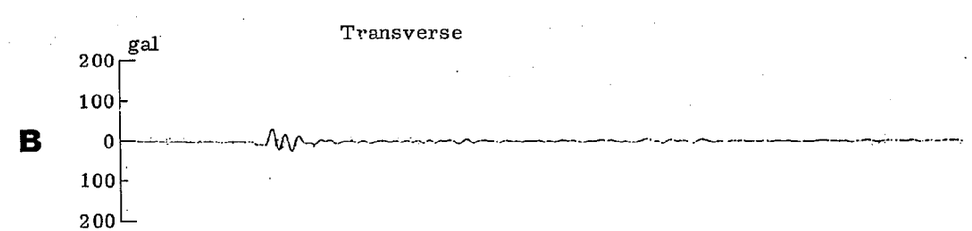

1sec
Haneda Undersea Tunnel 1109-Gr-4
1968 10.8. 09:50
gal
Longitudinal
A
200
100
0
100
200

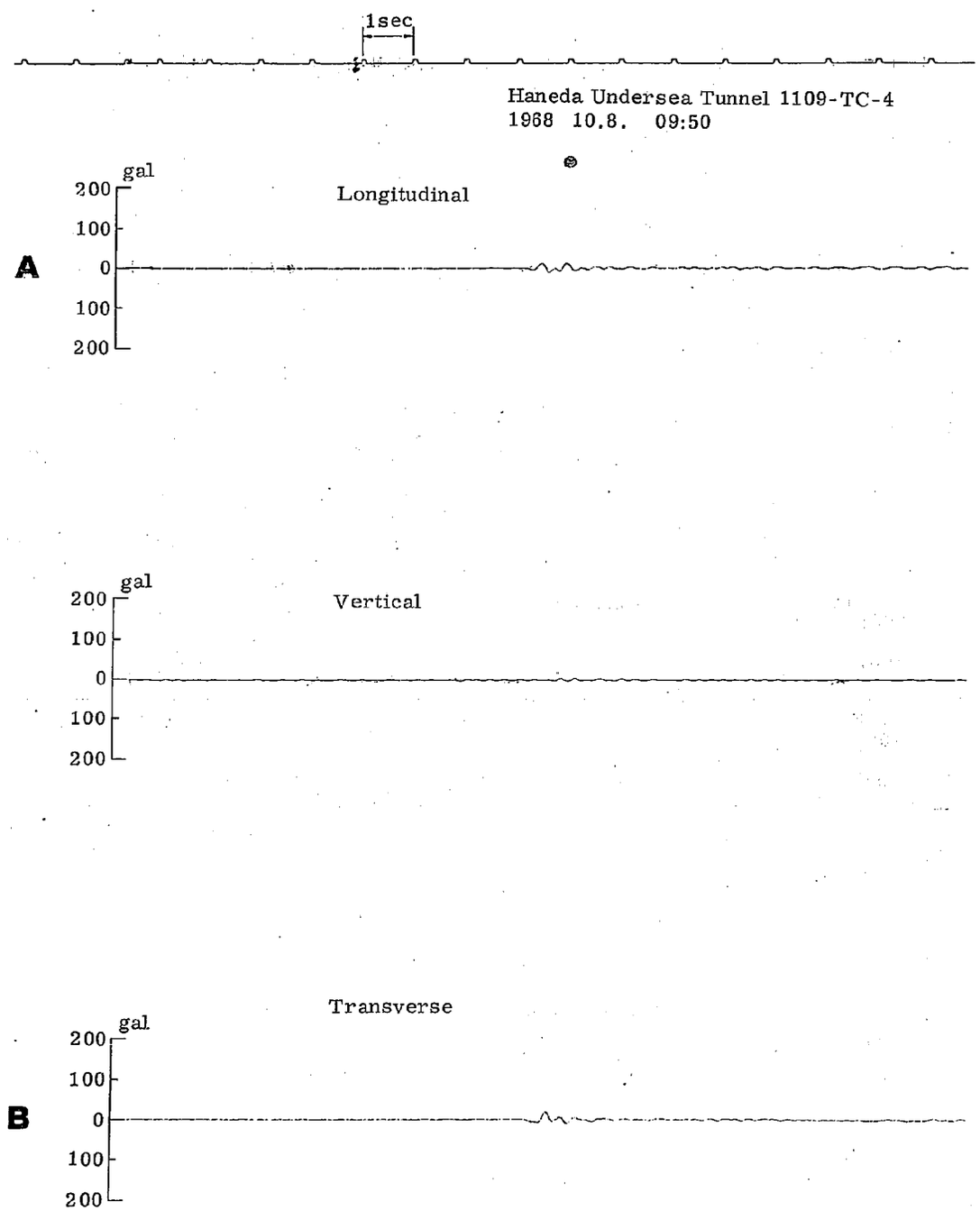

1sec
Haneda Undersea Tunnel 1109-TR-3
1968 10.8. 09:50
gal
Longitudinal
A
200
100
0
100
200

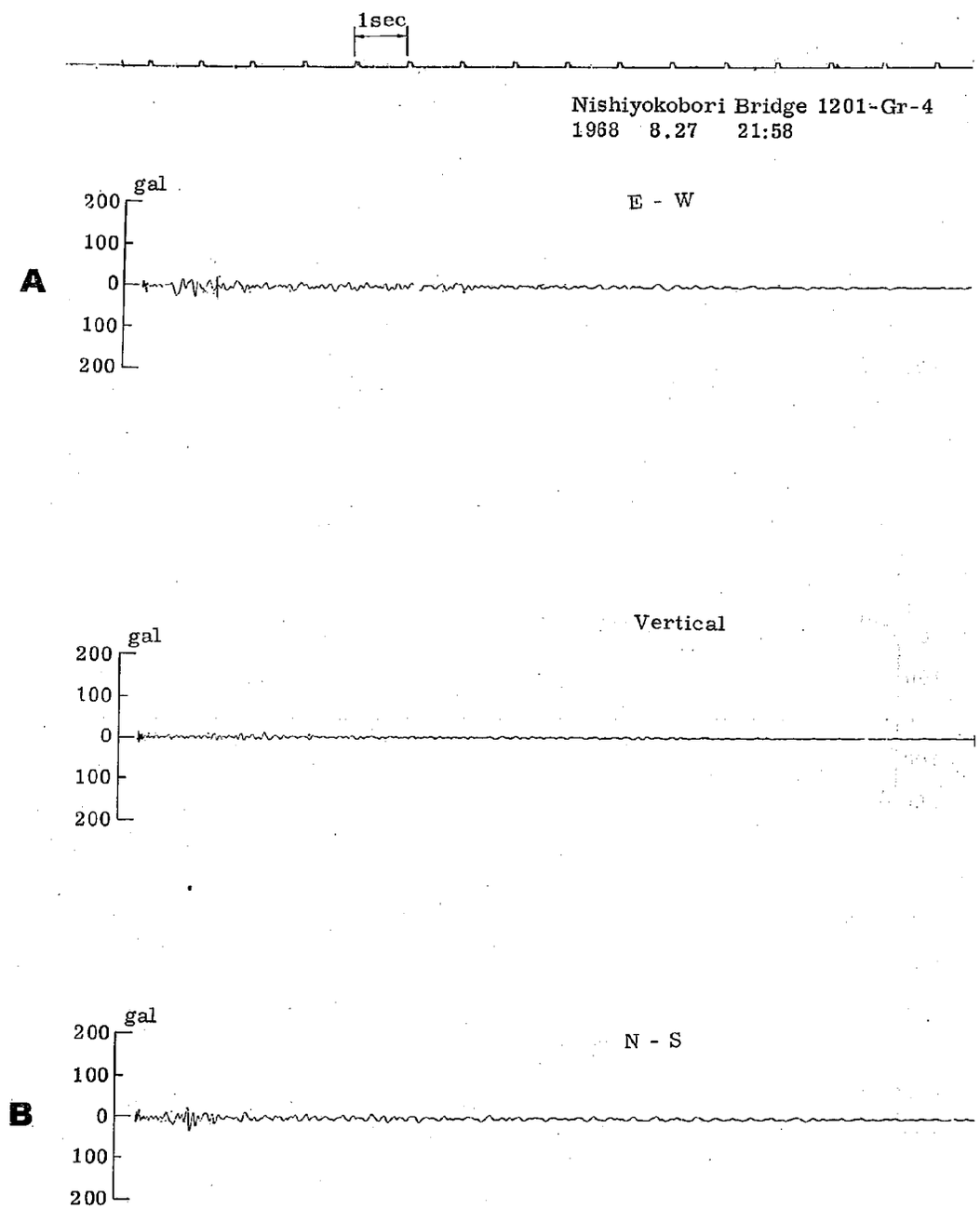

gal
Vertical
200
100
0
100
200

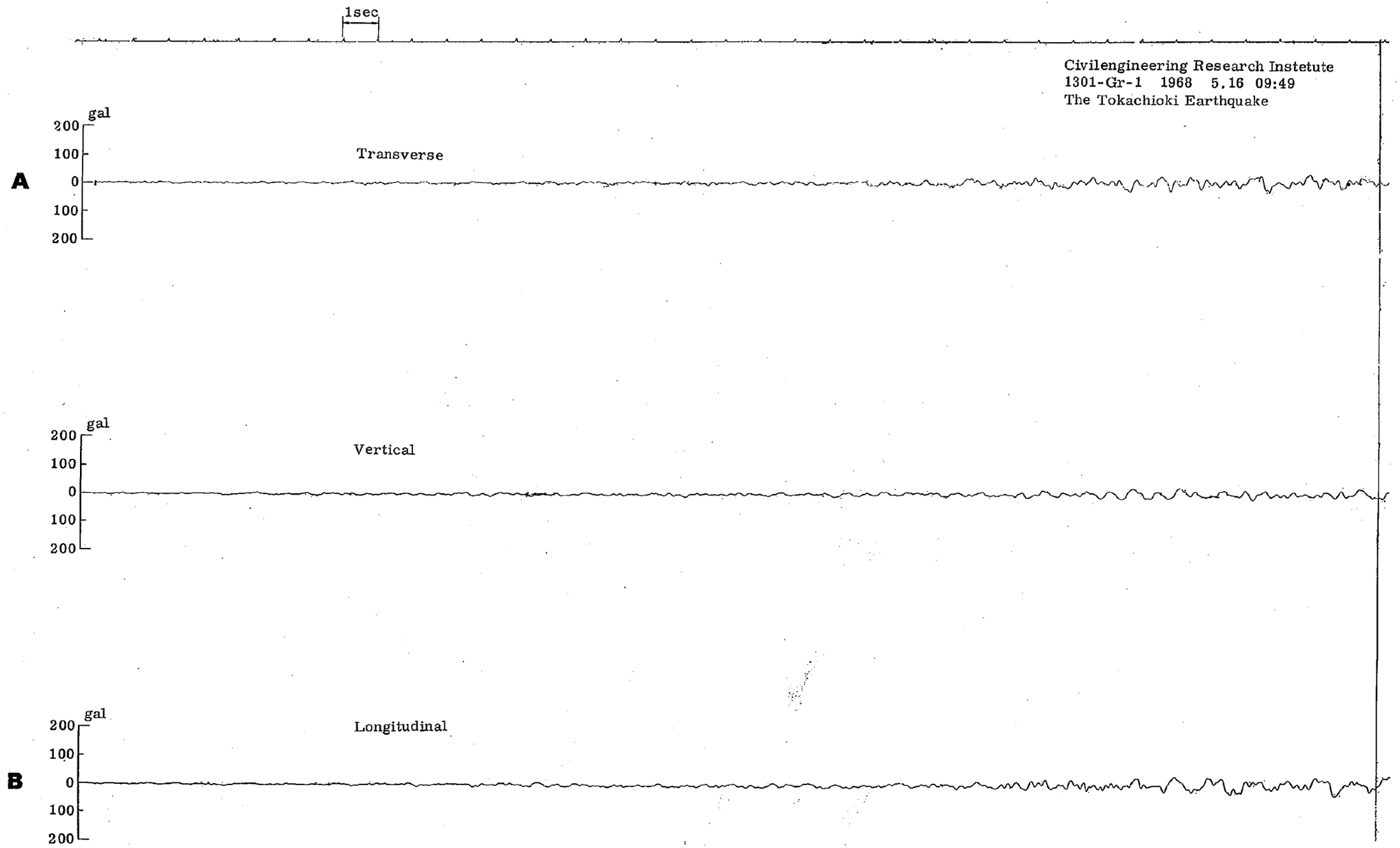

gal
Vertical
200
100
0
100
200

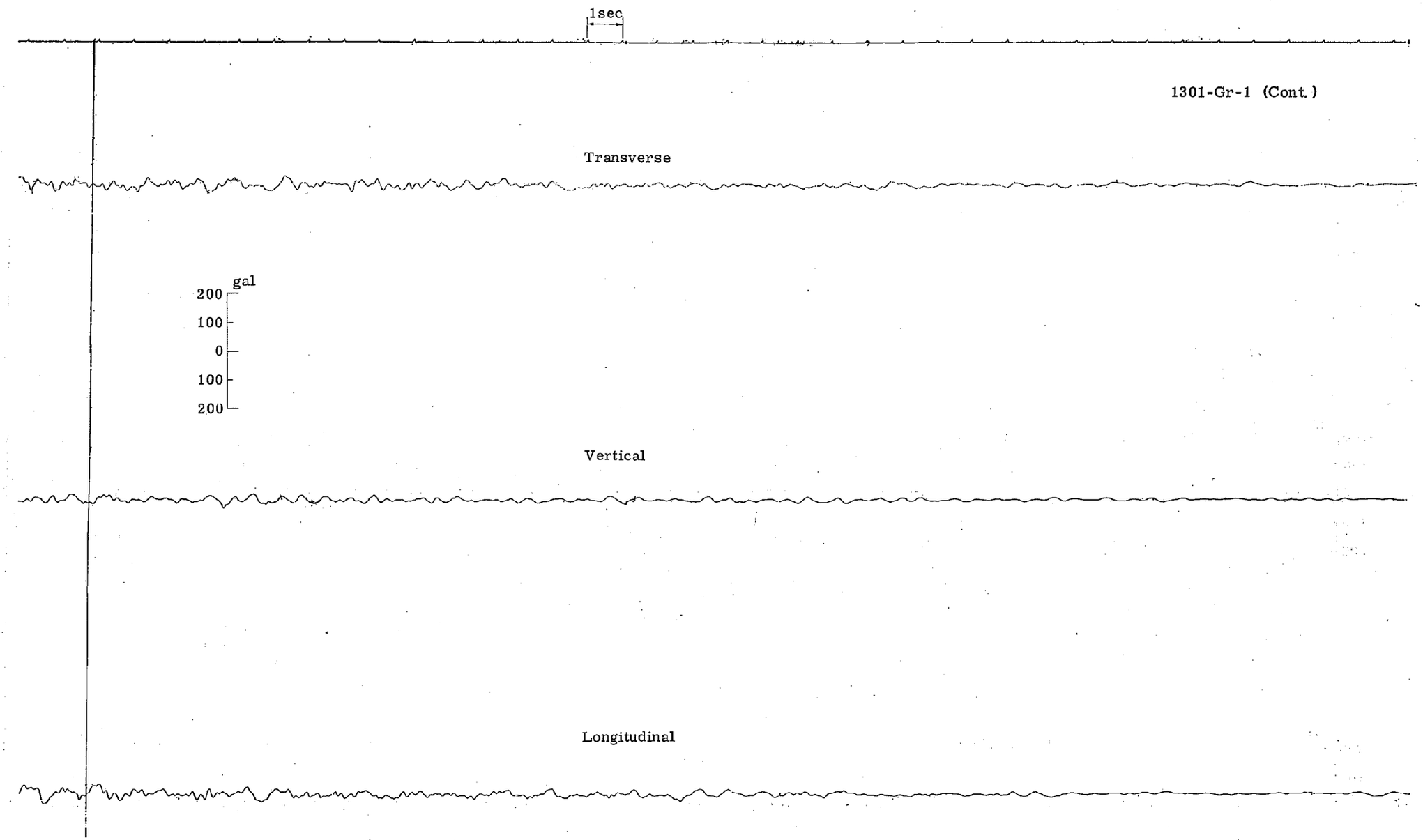

Transverse
gal
B
200
100
0
100
200

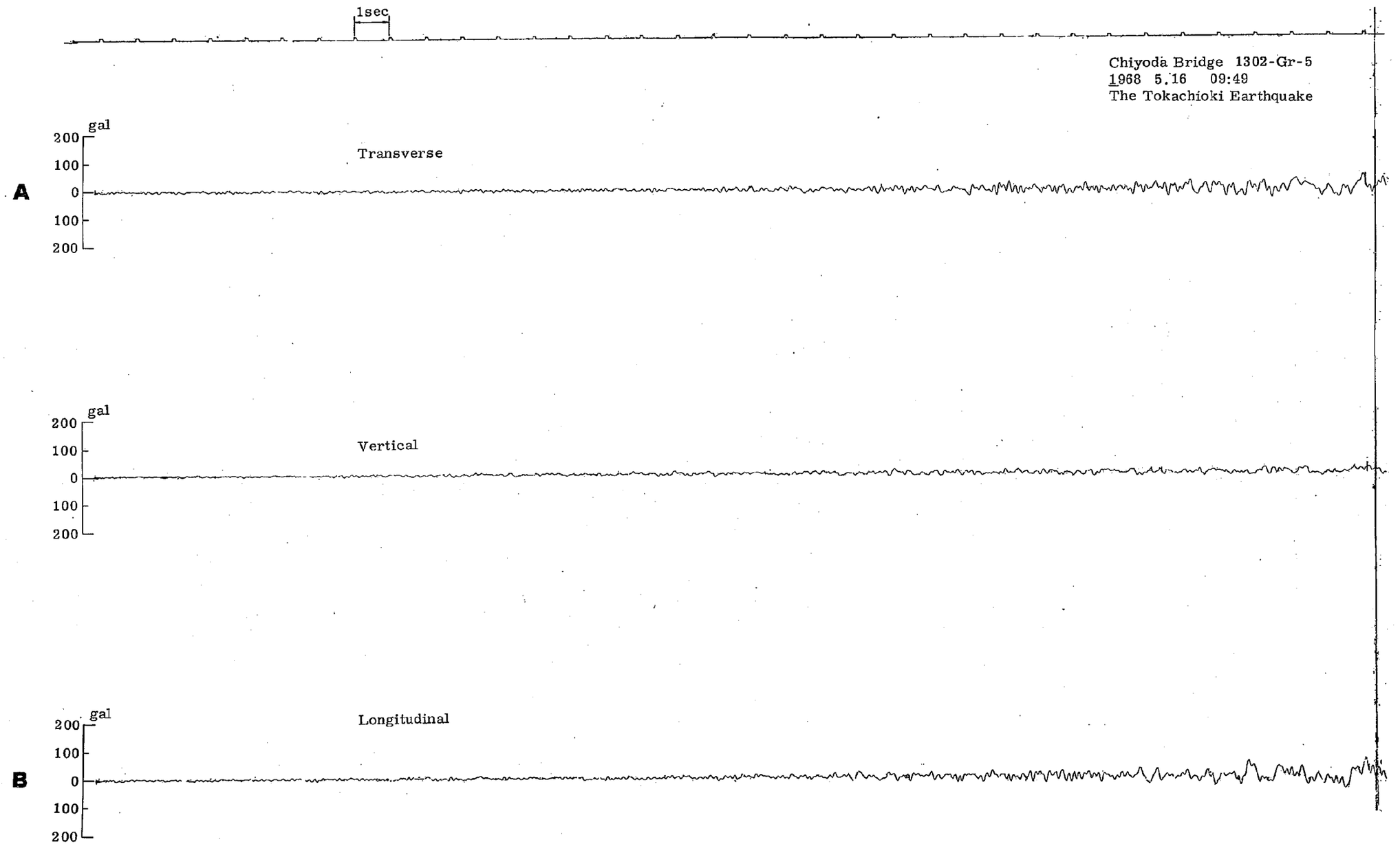

Transverse
gal
B
200
100
0
100
200

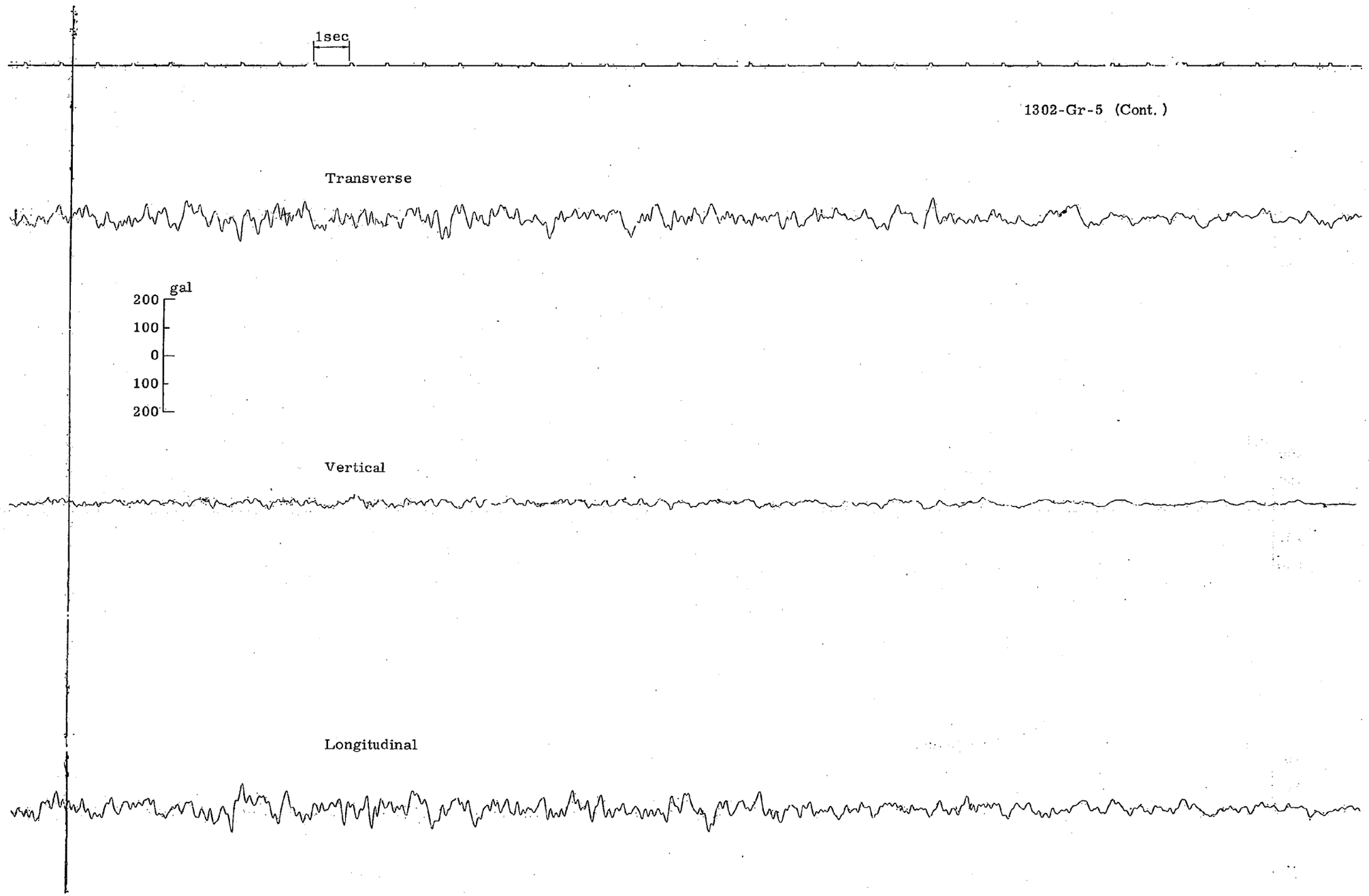

1sec
Haneda Undersea Tunnel 1109-TC-4
1968 10.8. 09:50
gal
200
100
0
100
200
Longitudinal
A
Vertical
Transverse
B

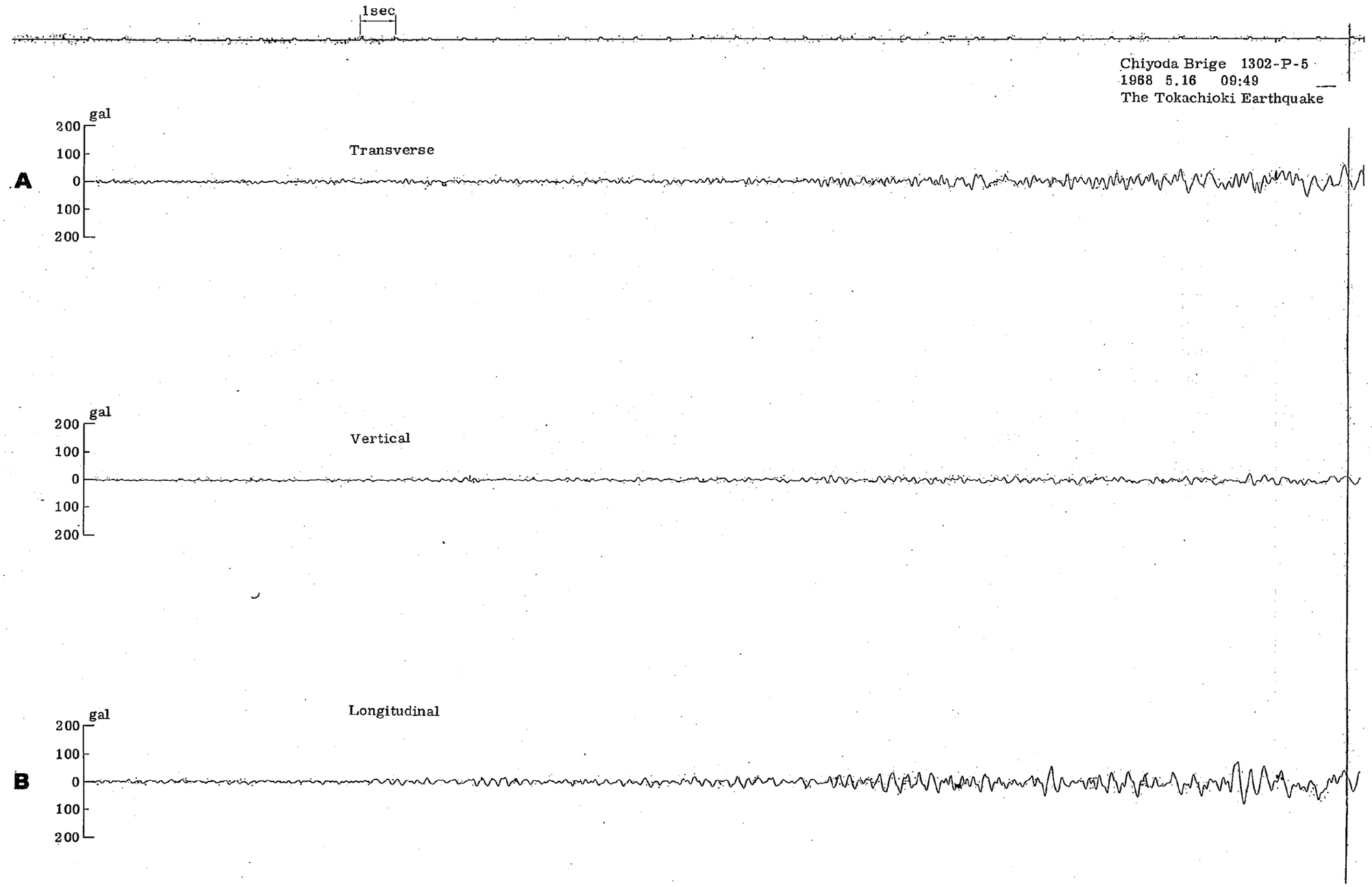

1sec
Nishiyokobori Bridge 1201-Gr-4
1968 8.27 21:58
gal
200
100
0
100
200
E - W
A
Vertical
N - S
B

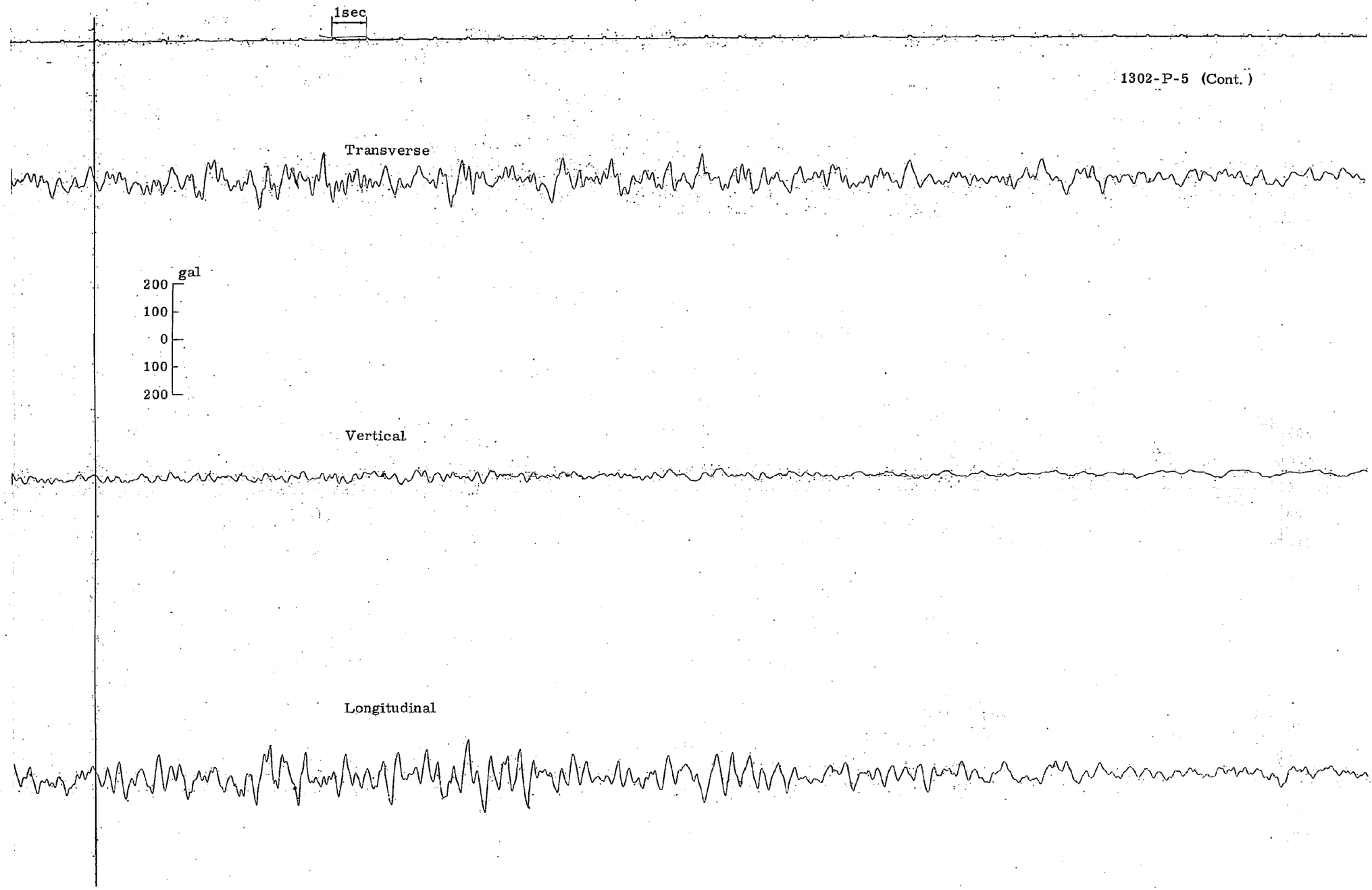

1sec
Civilengineering Research Instetute
1301-Gr-1 1968 5.16 09:49
The Tokachioki Earthquake
gal
200
100
0
100
200
Transverse
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
Longitudinal
B

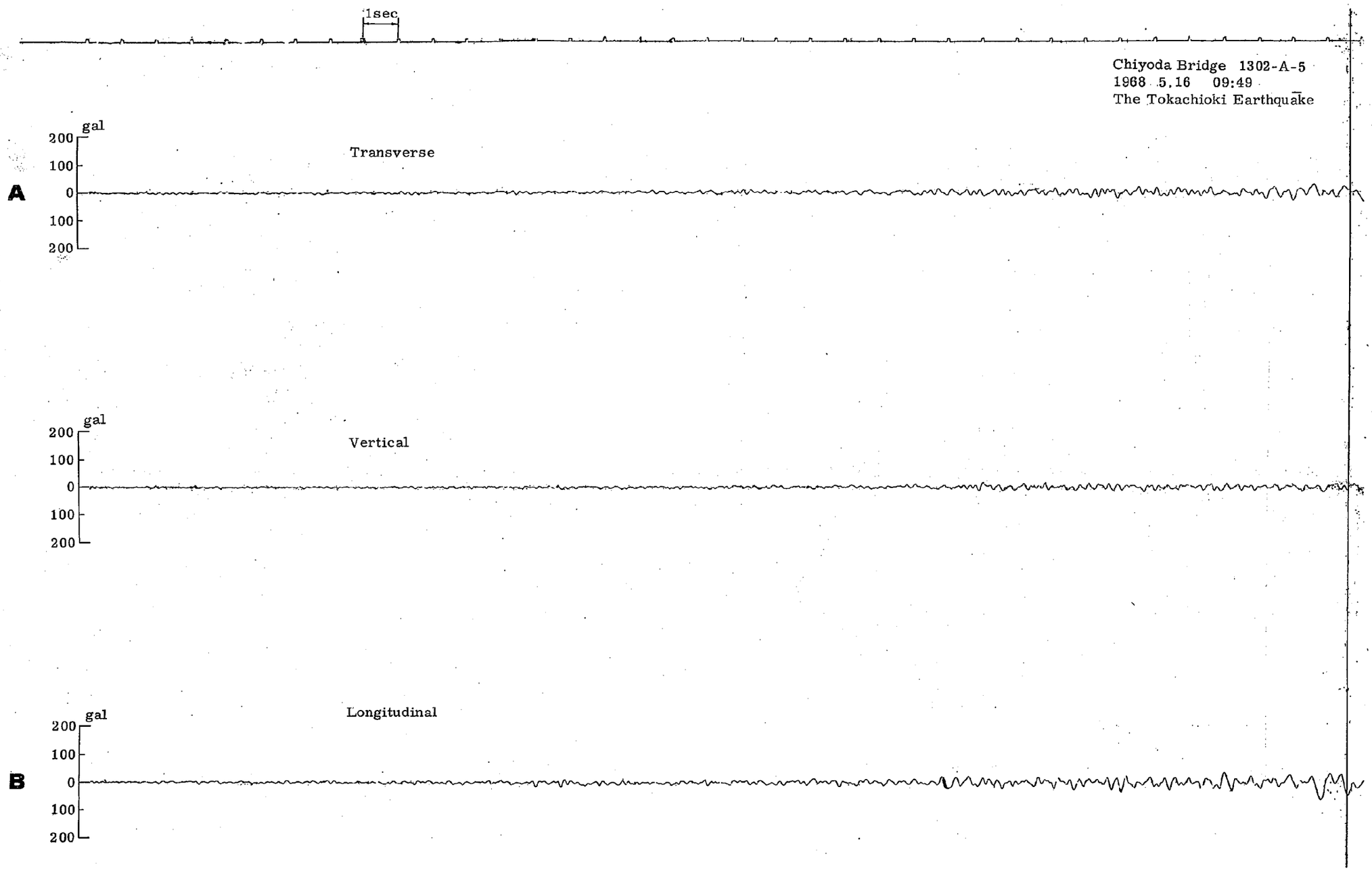

1sec
1301-Gr-1 (Cont.)
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal

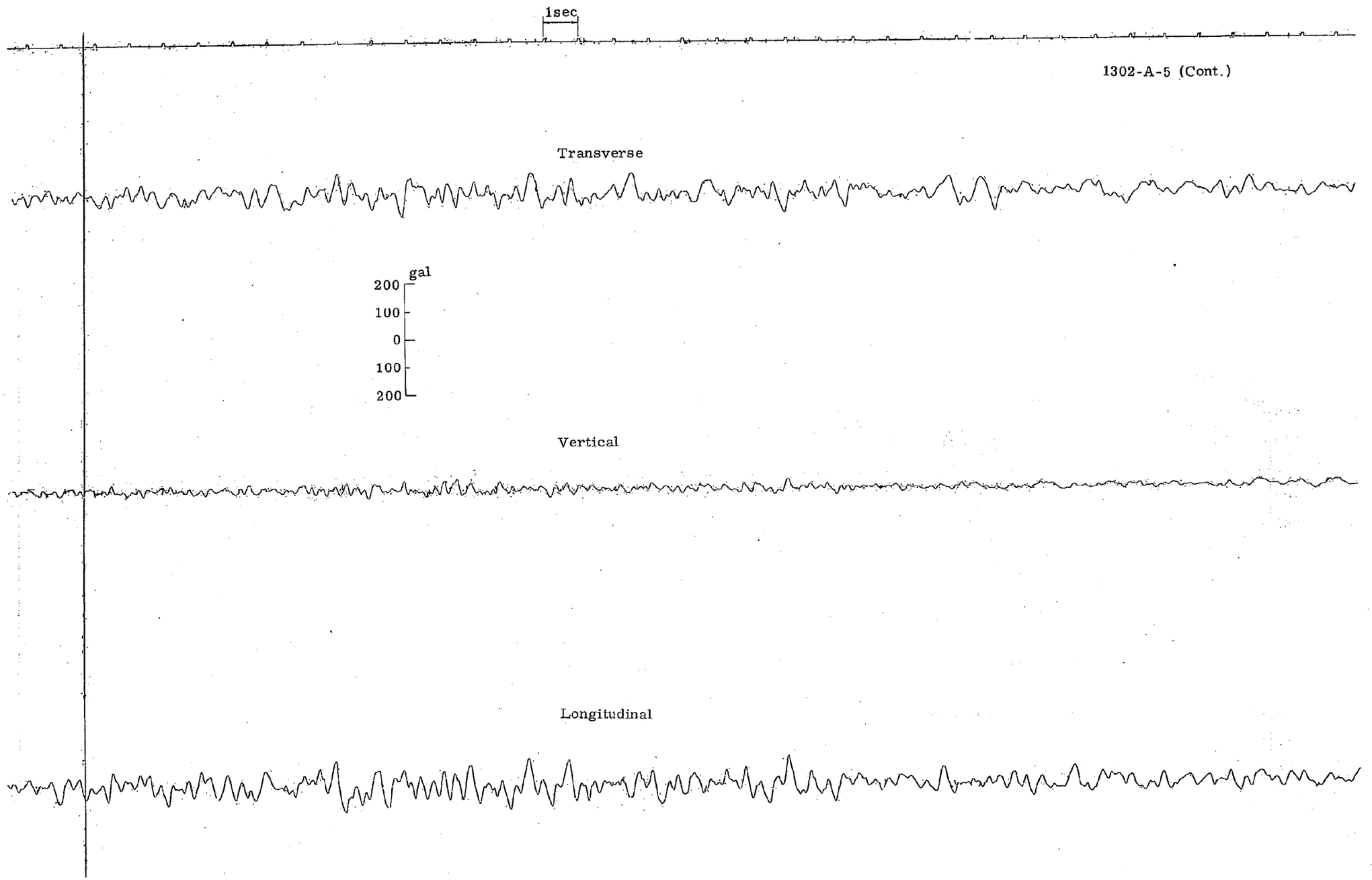

1sec
Chiyoda Bridge 1302-Gr-5
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

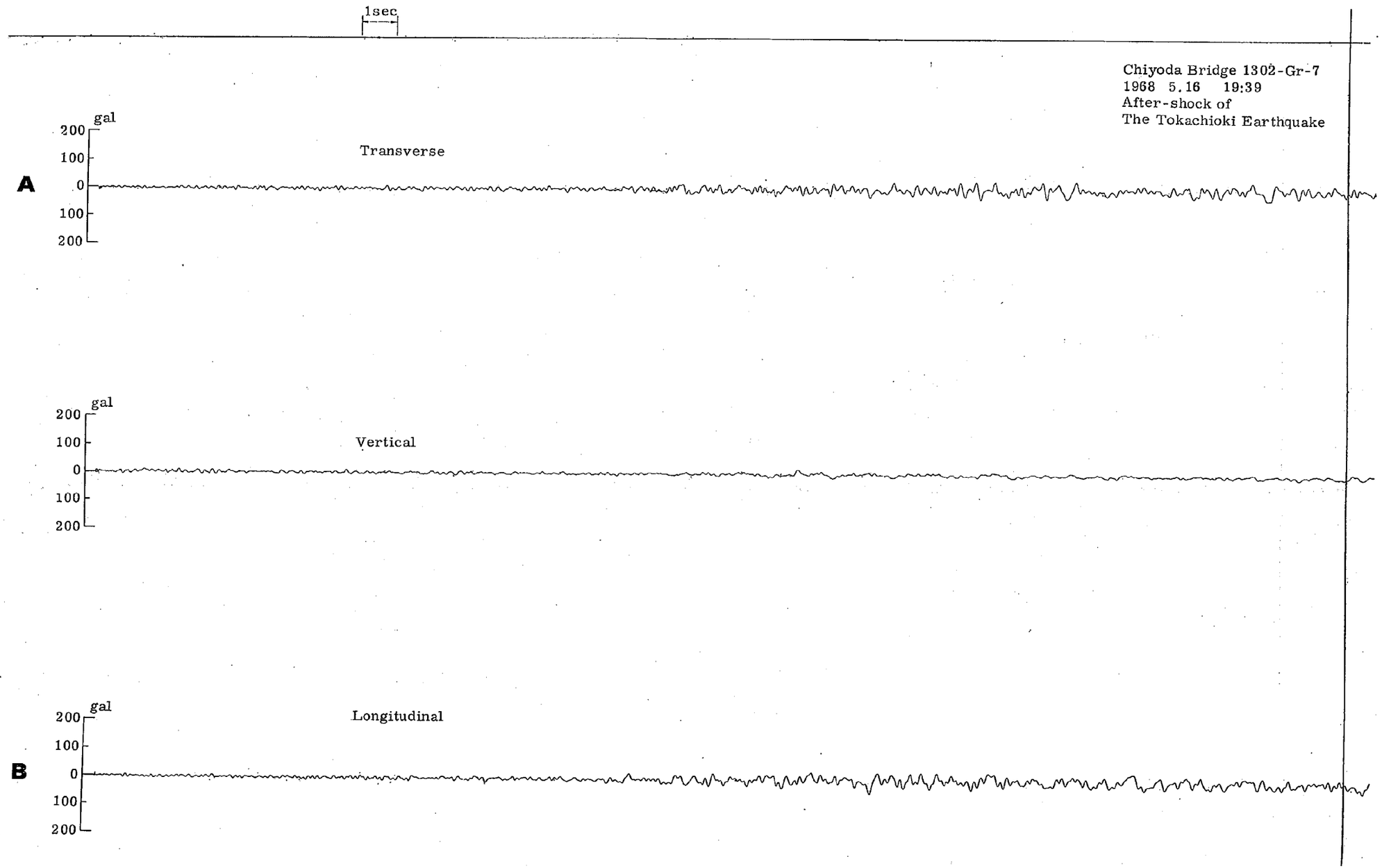

1sec
1302-Gr-5 (Cont.)
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal

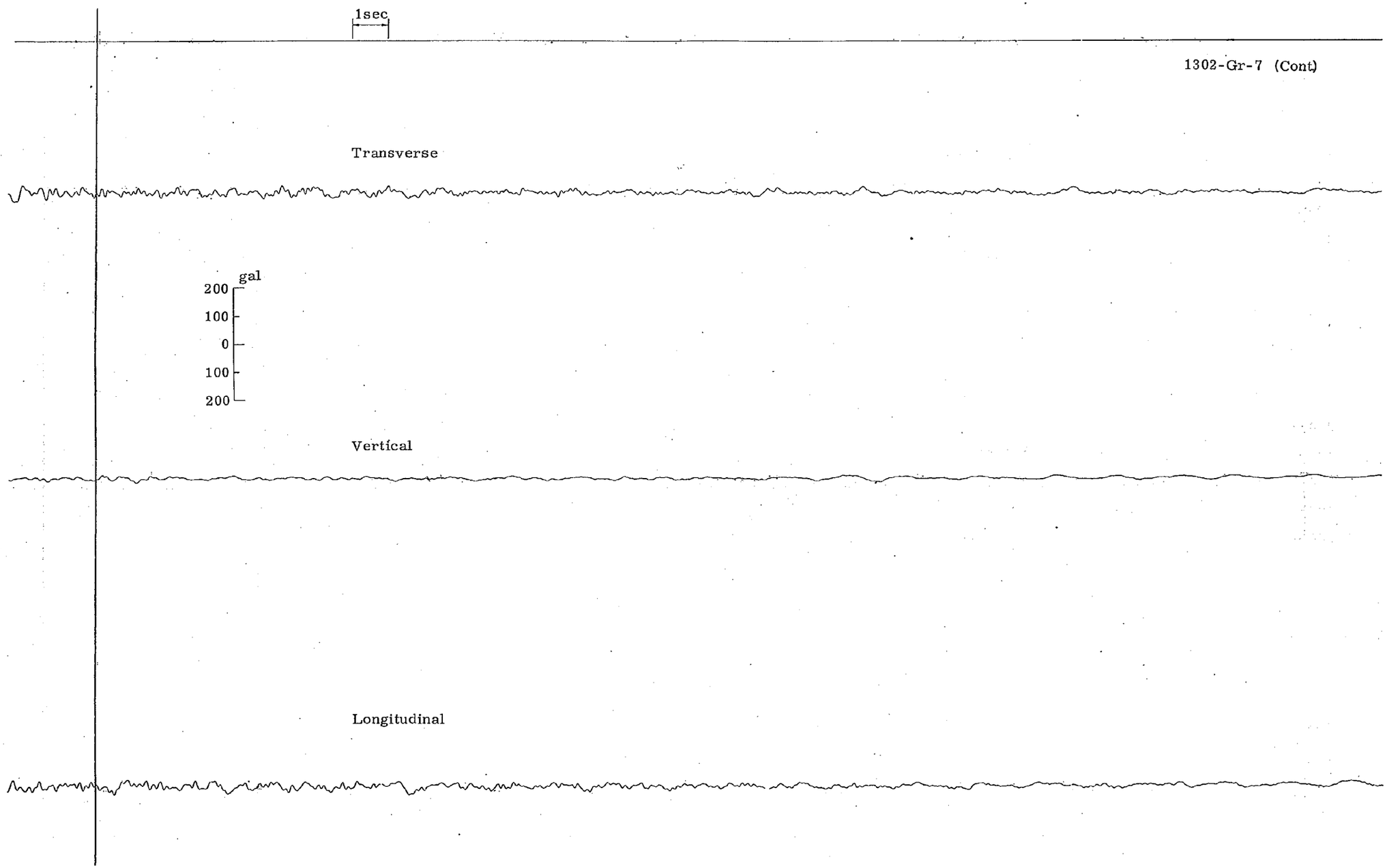

1sec
Chiyoda Brige 1302-P-5
1968 5.16 09:49
The Tokachioki Earthquake
gal
200
100
0
100
200
Transverse
A
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
Longitudinal
B

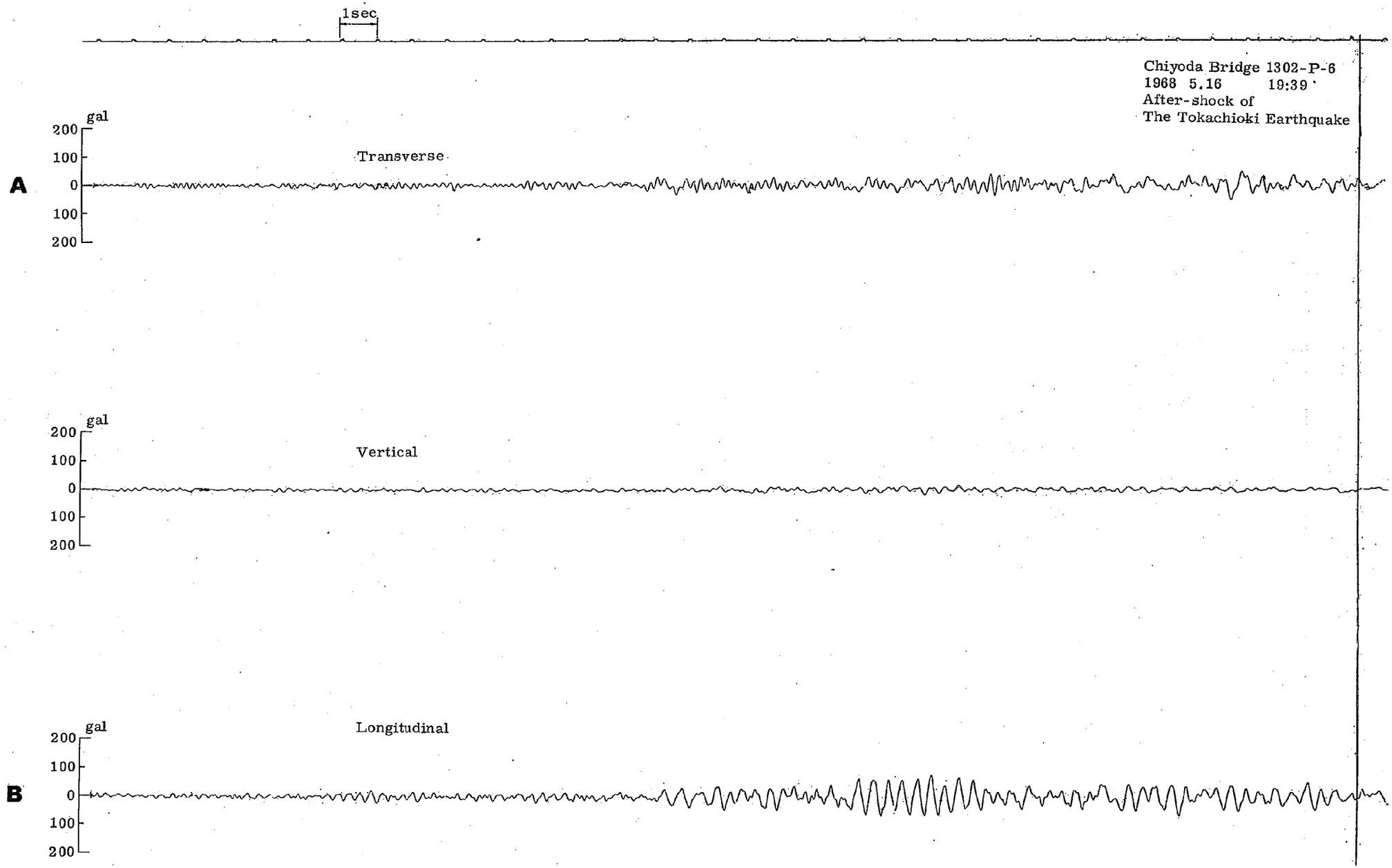

1sec
1302-P-5 (Cont.)
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal

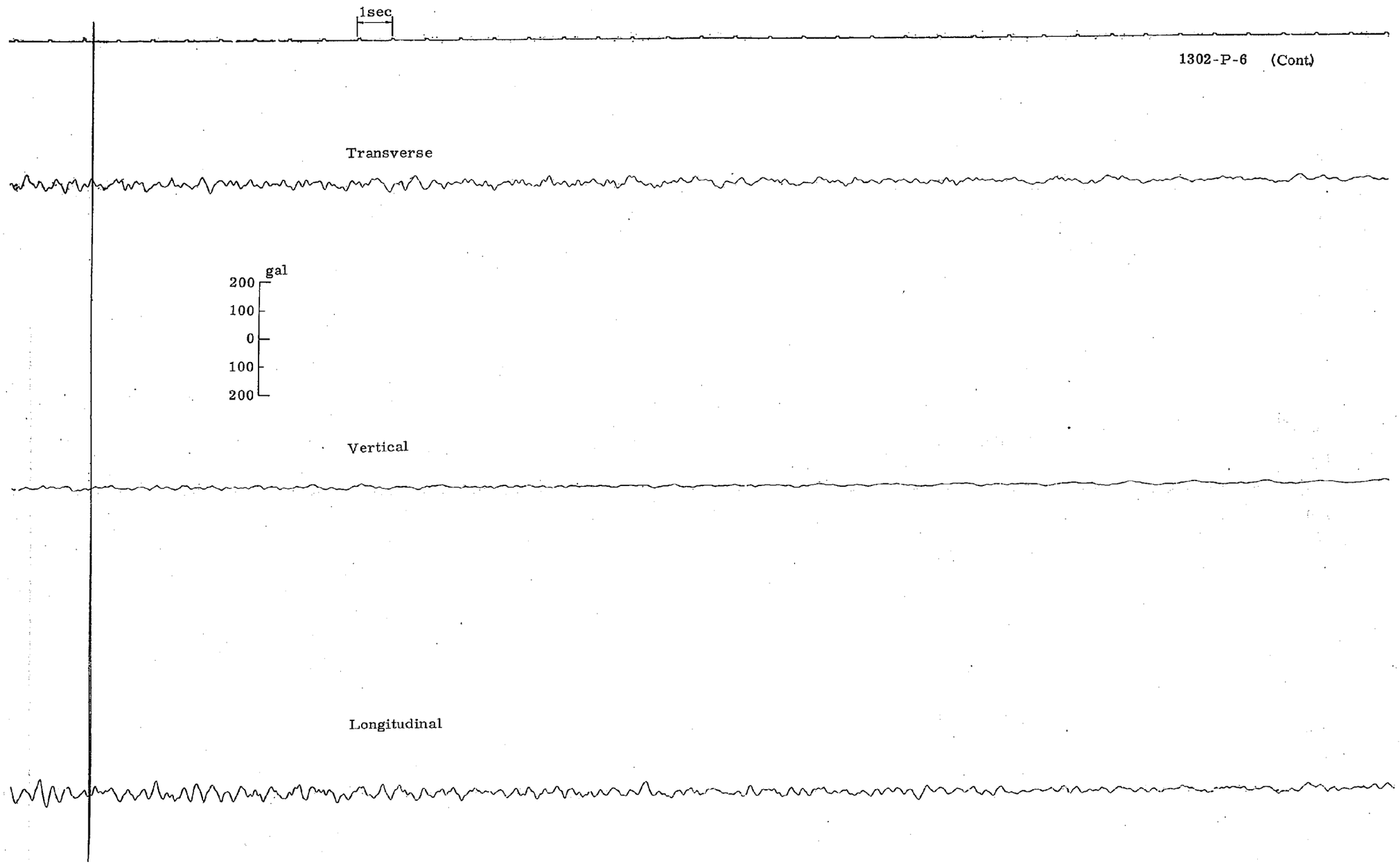

1sec
Chiyoda Bridge 1302-A-5
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

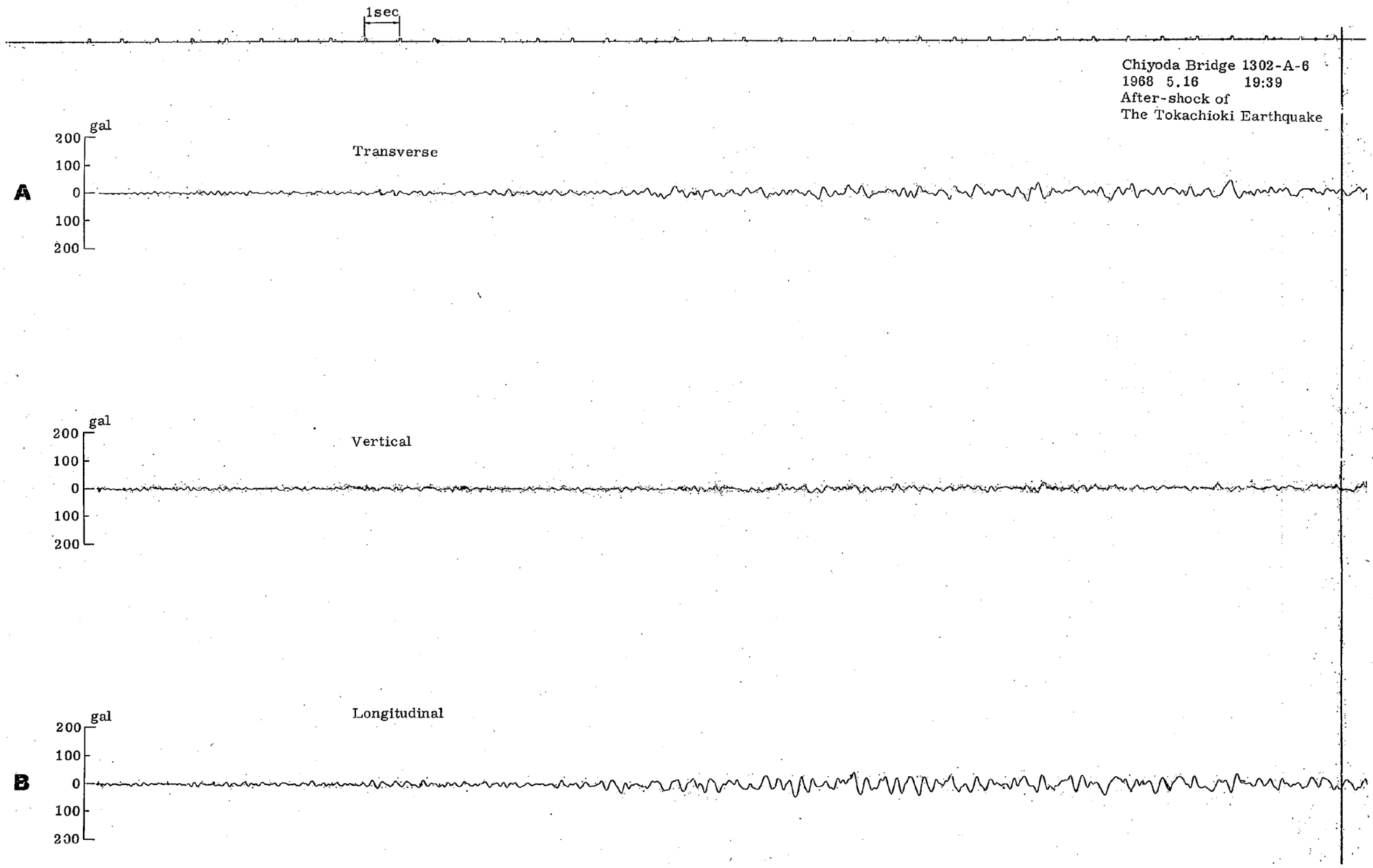

1sec
1302-A-5 (Cont.)
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal

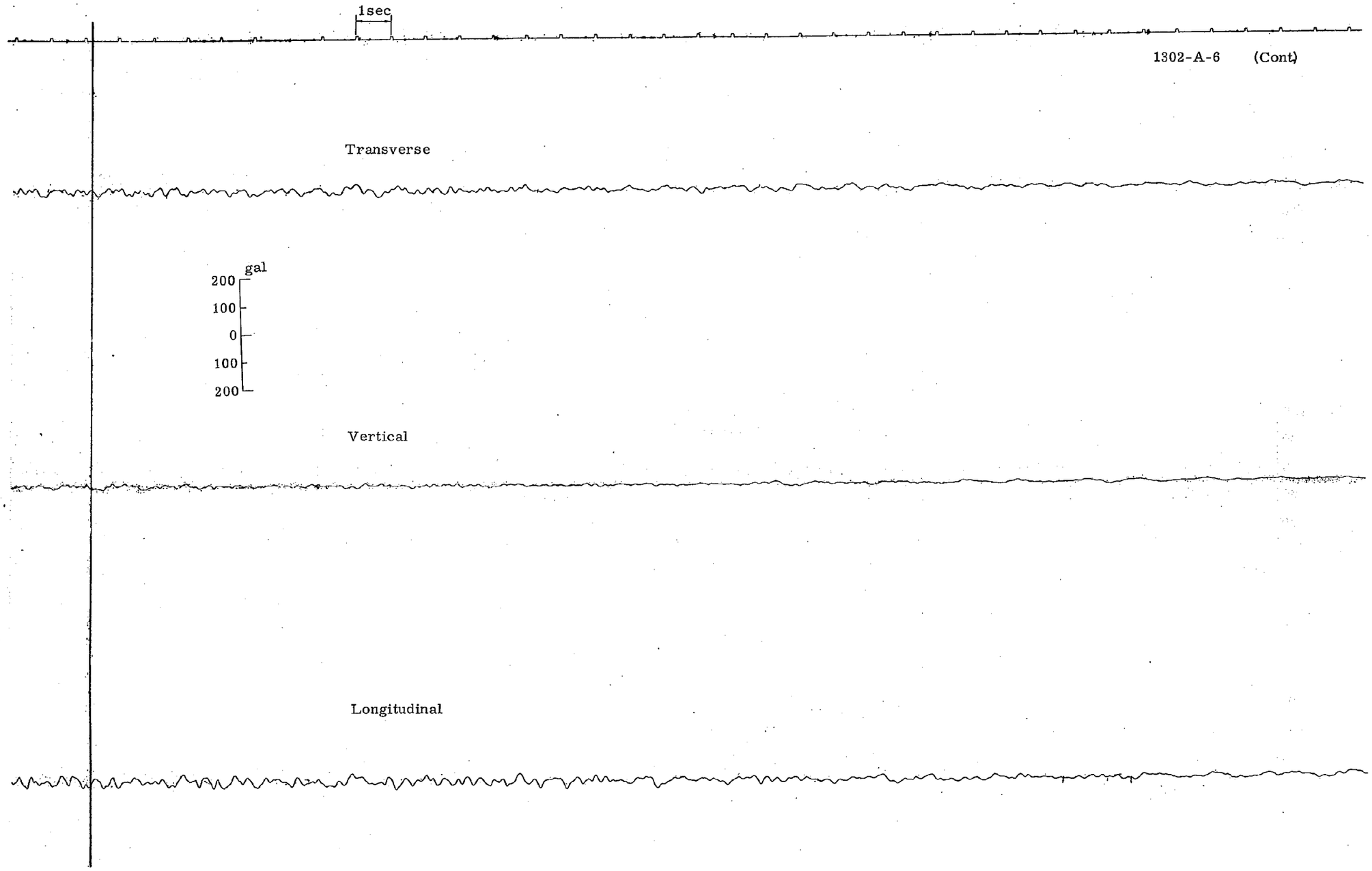

1sec
Chiyoda Bridge 1302-Gr-7
1968 5.16 19:39
After-shock of
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

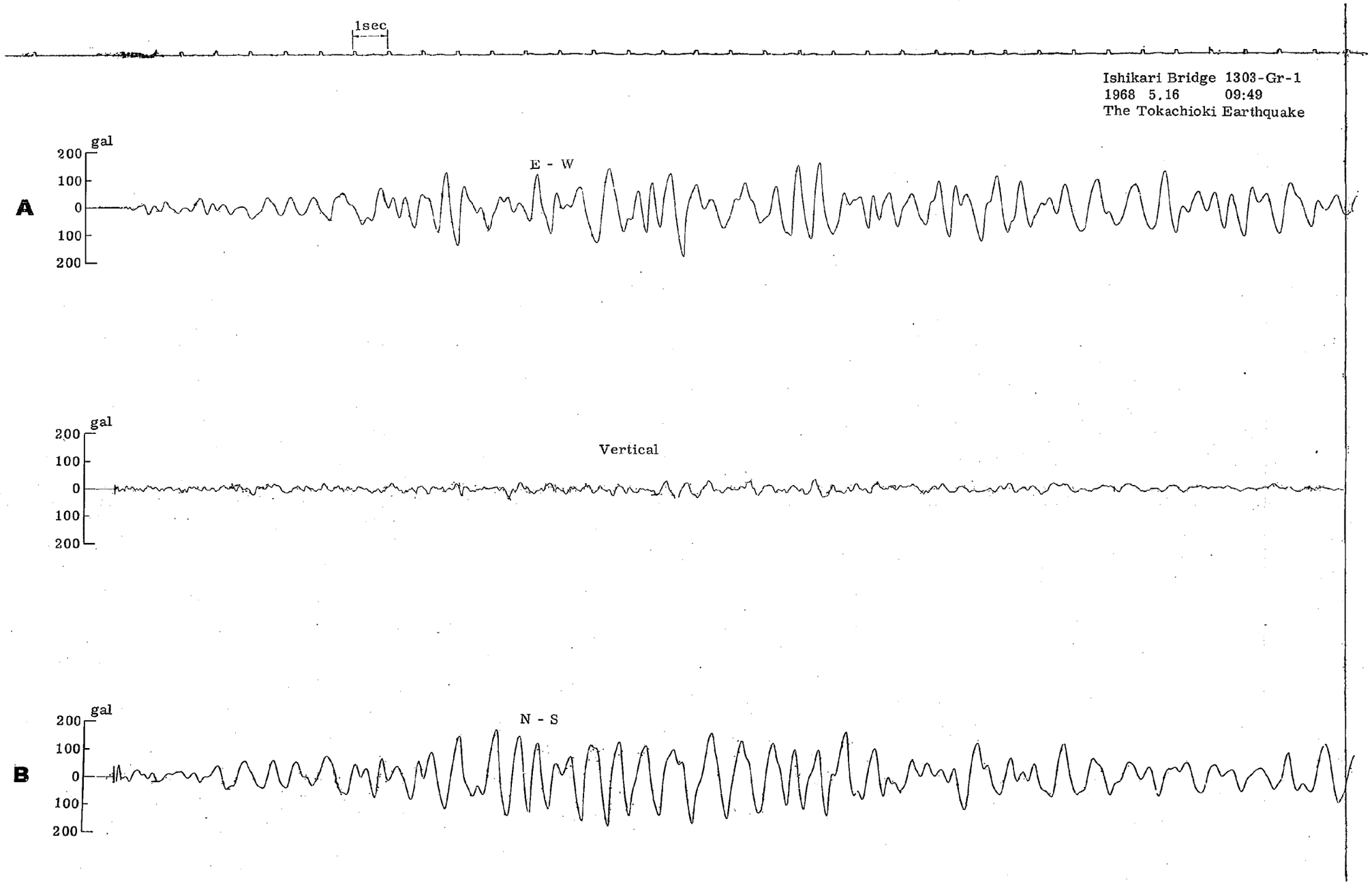

1sec
1302-Gr-7 (Cont)
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal

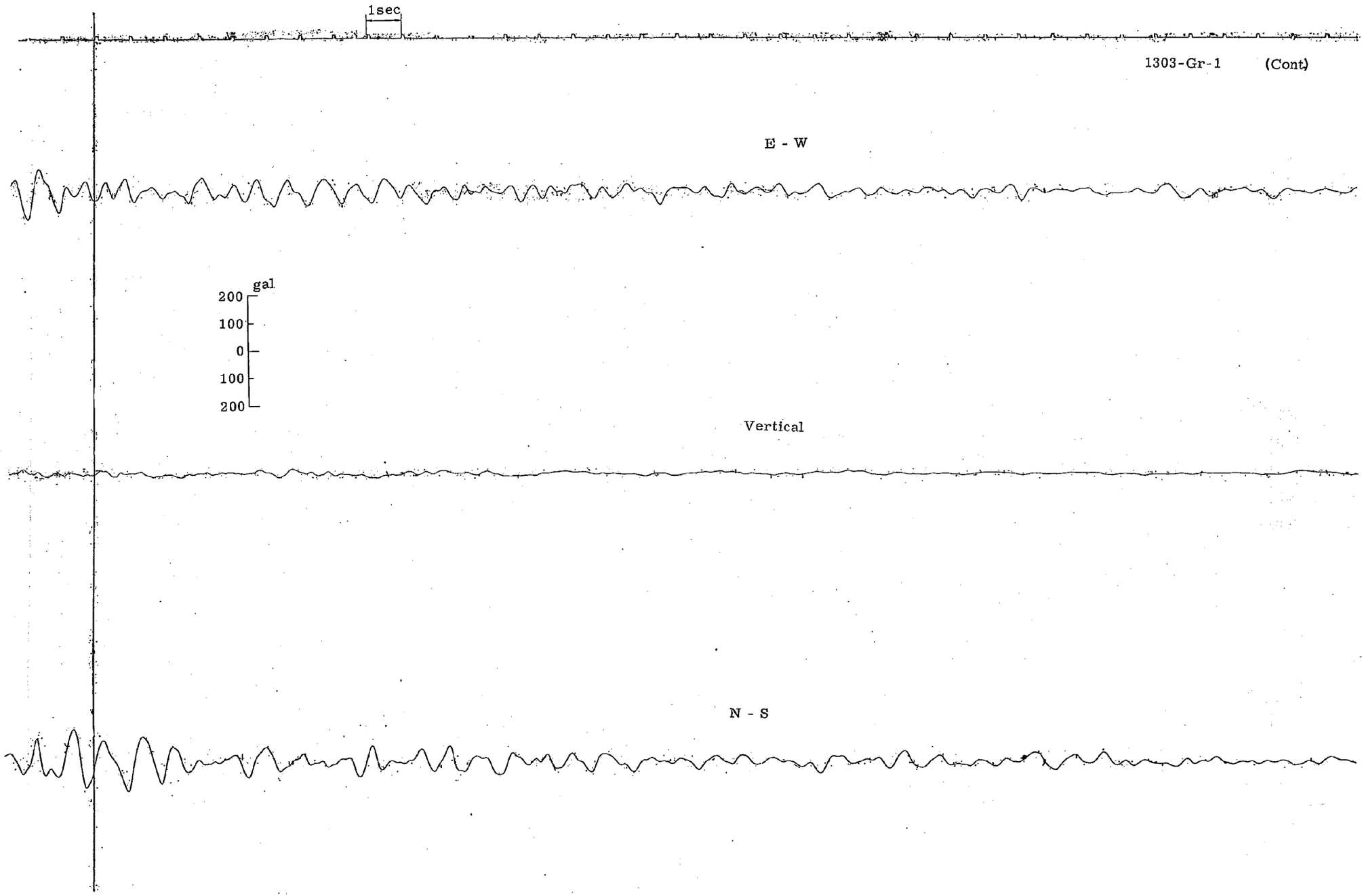

1sec
Chiyoda Bridge 1302-P-6
1968 5.16 19:39
After-shock of
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

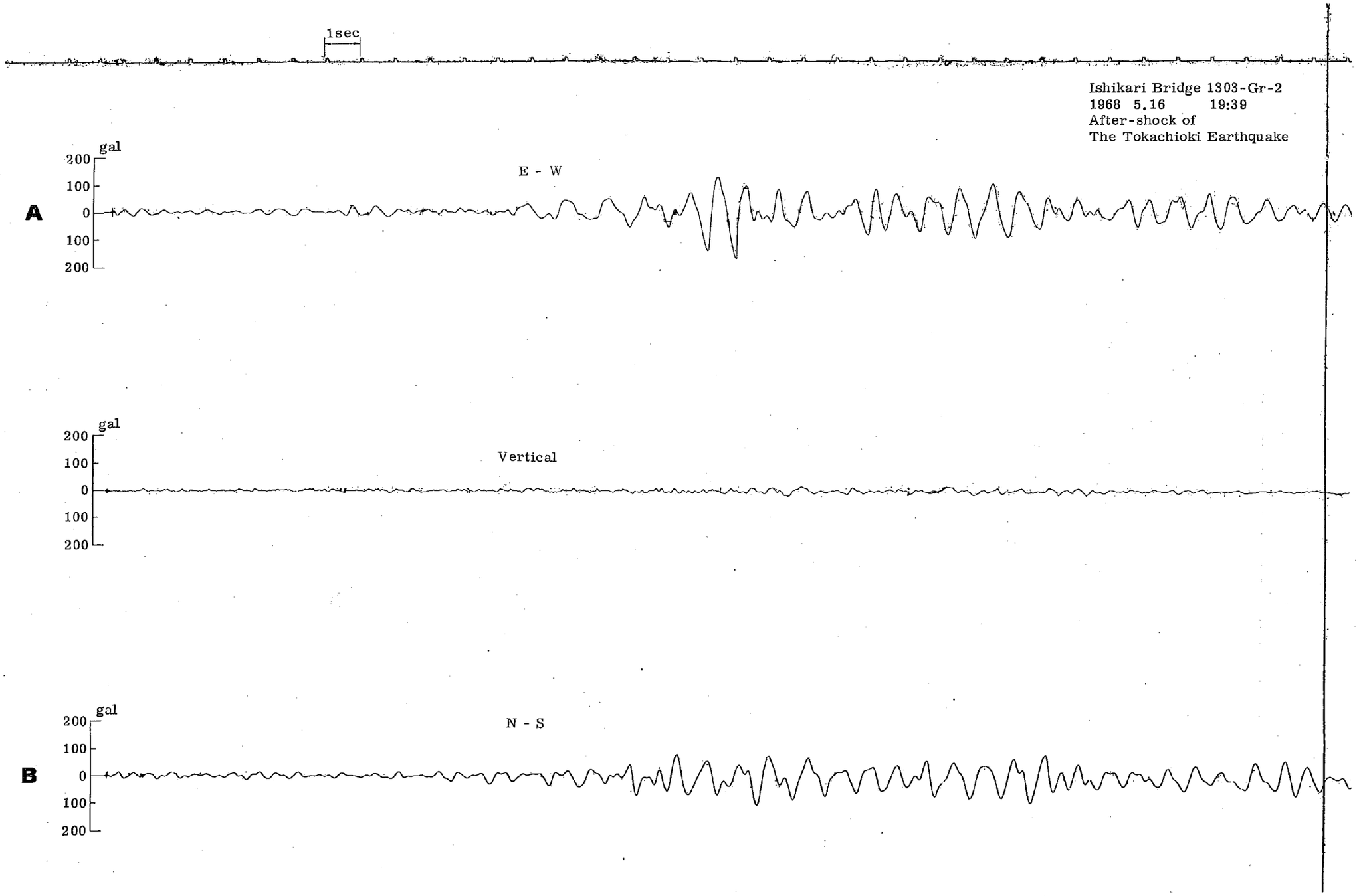

1sec
1302-P-6 (Cont)
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal

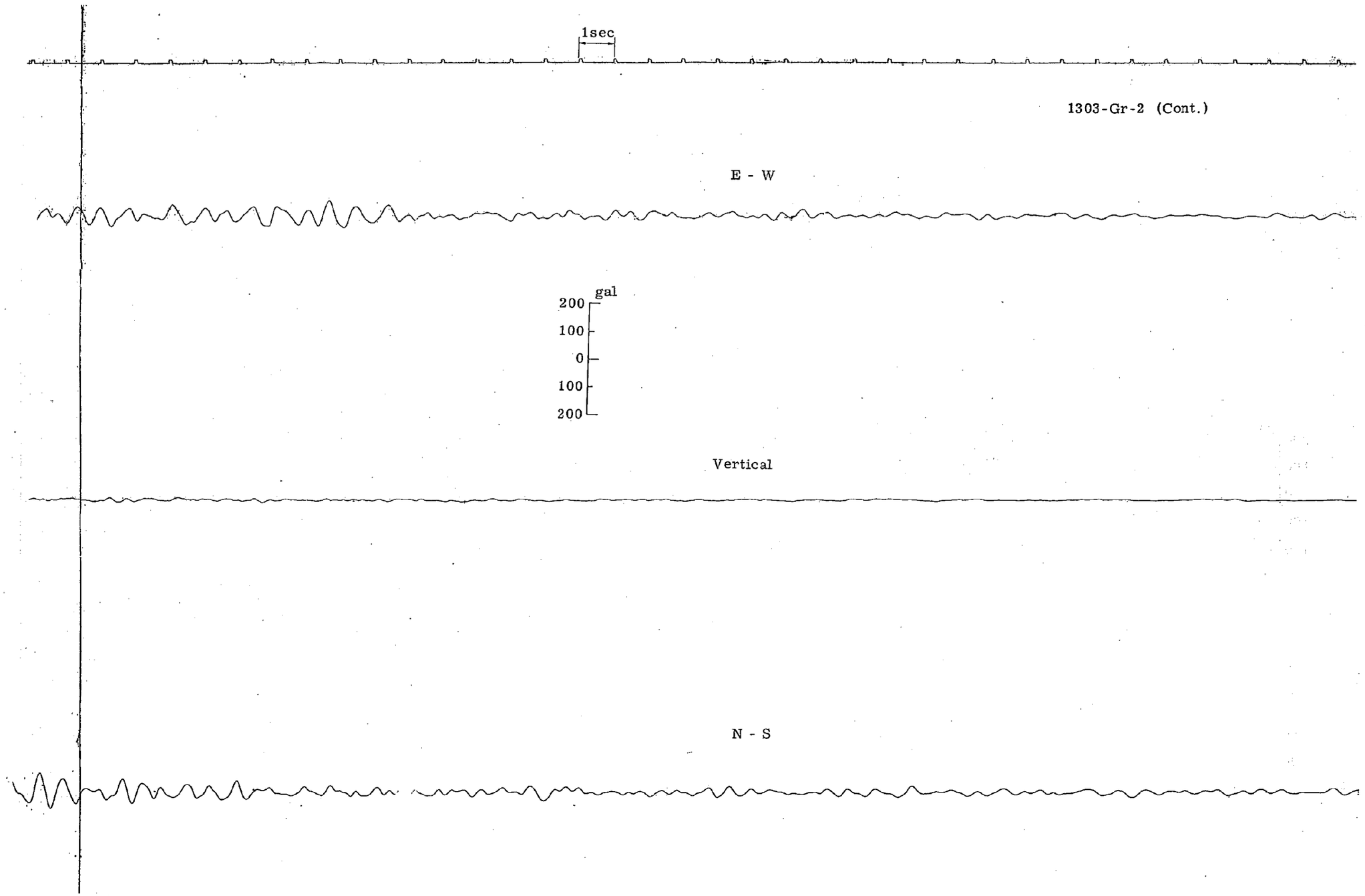

1sec
Chiyoda Bridge 1302-A-6
1968 5.16 19:39
After-shock of
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

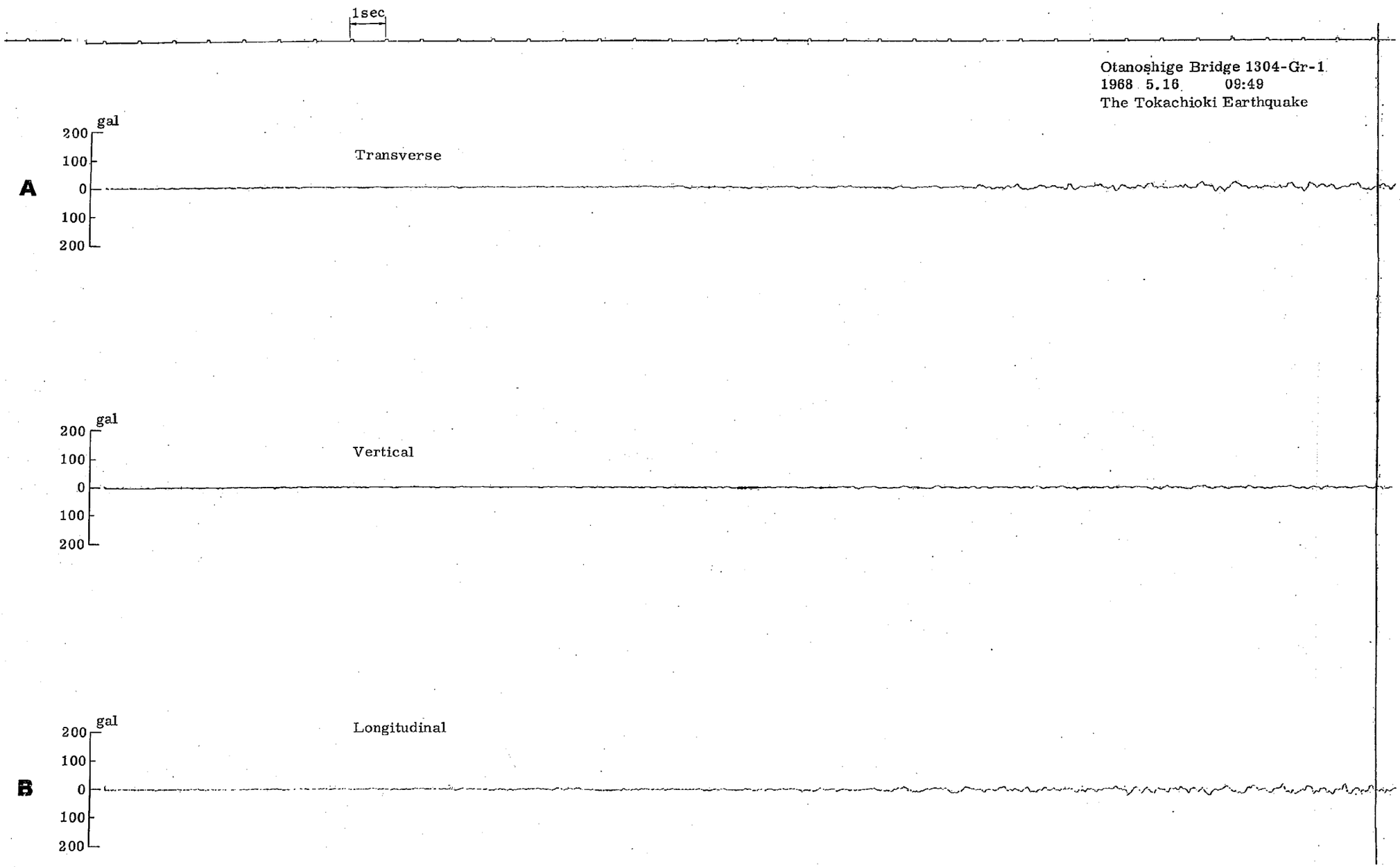

1sec
1302-A-6 (Cont)
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal

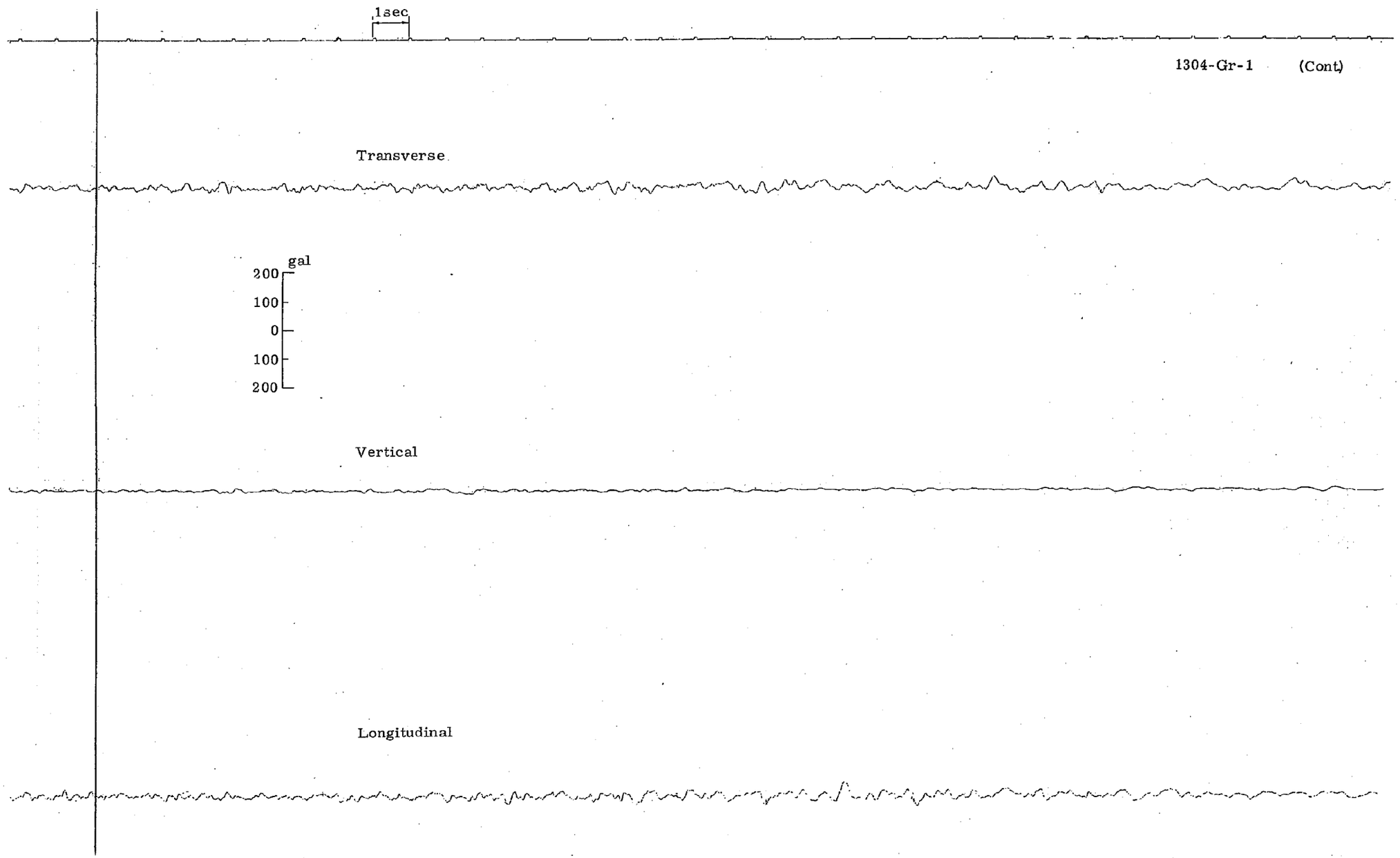

1sec
Ishikari Bridge 1303-Gr-1
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
E - W
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
N - S

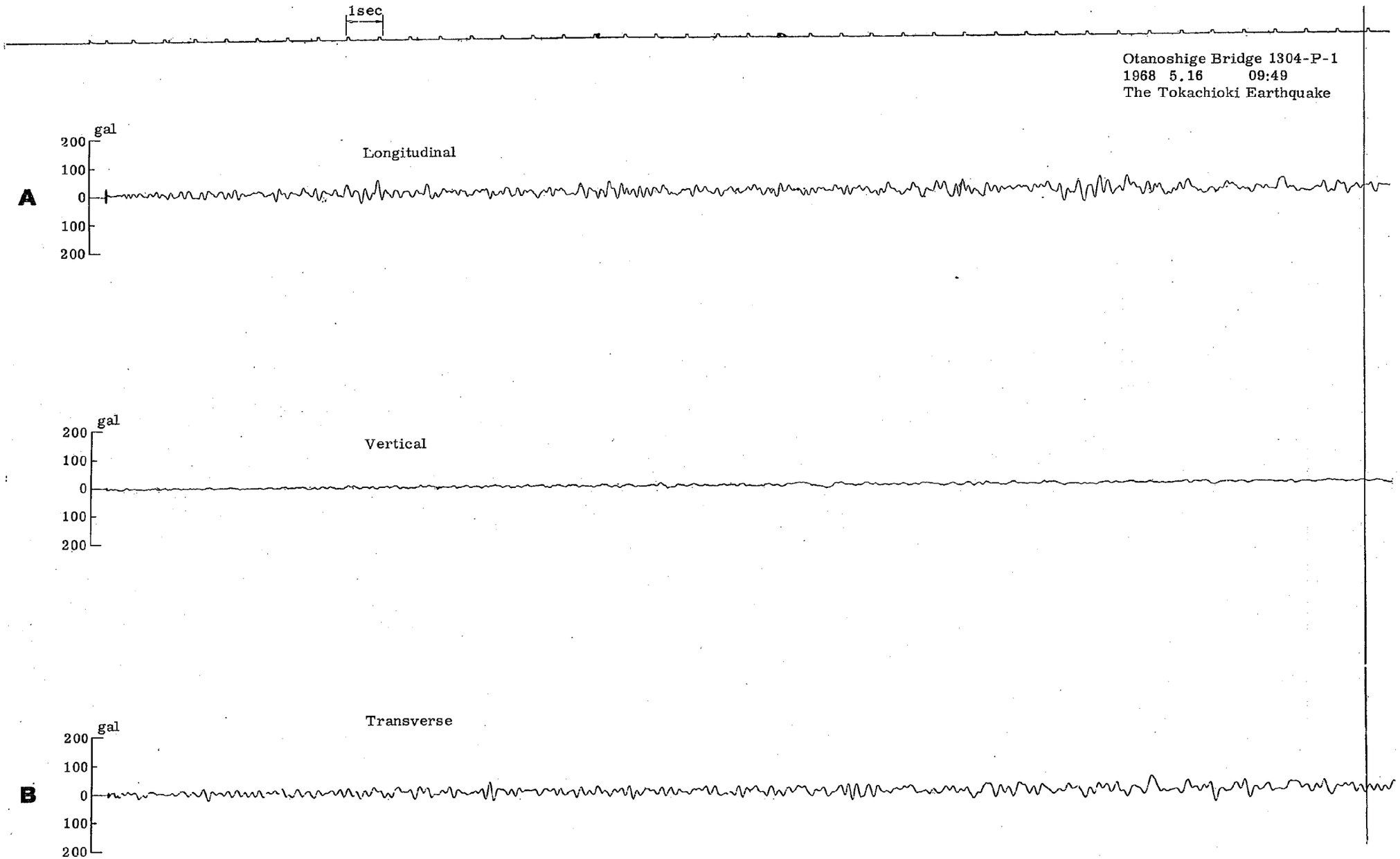

1sec
1303-Gr-1 (Cont)
E - W
gal
200
100
0
100
200
Vertical
N - S

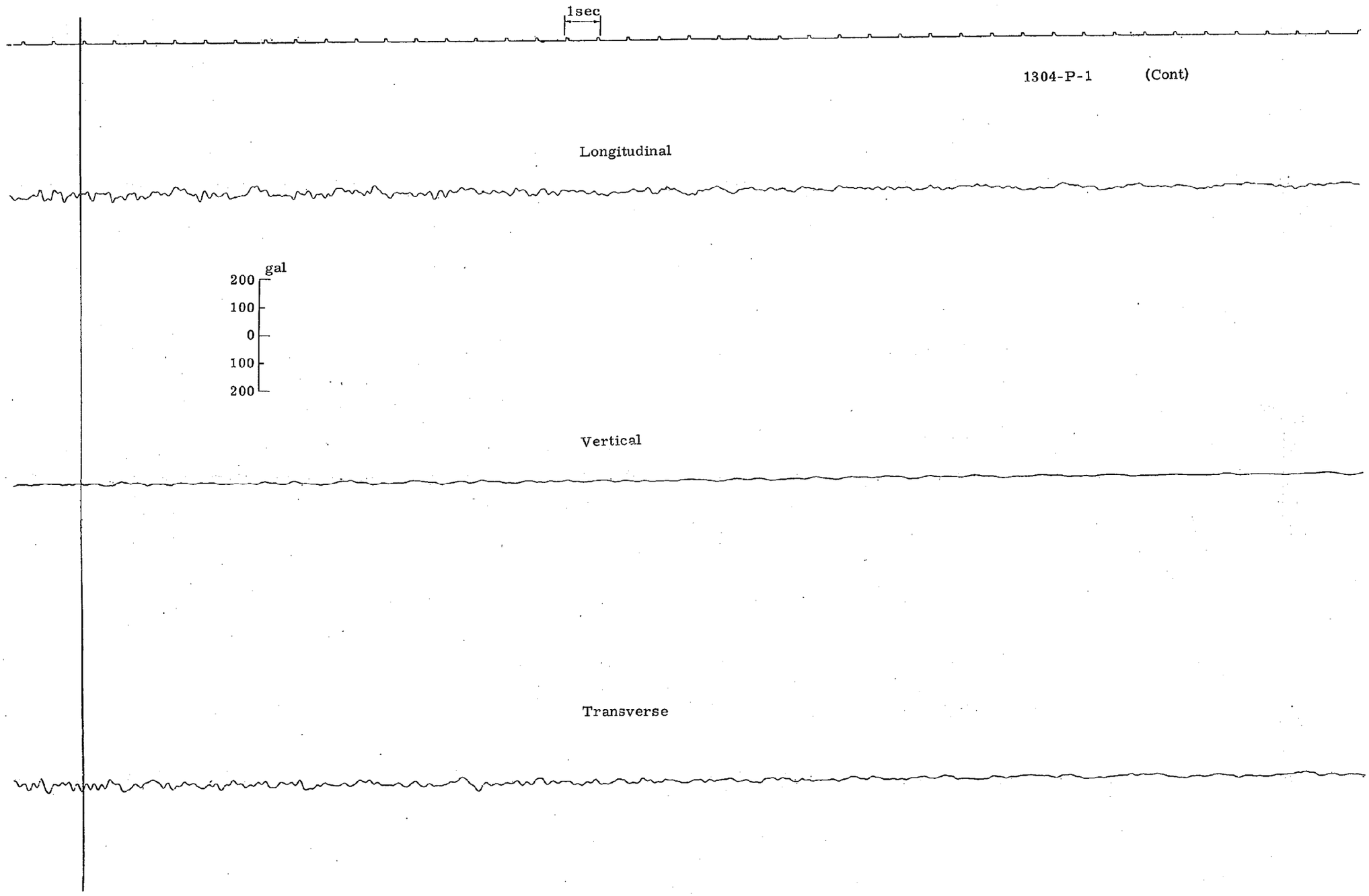

1sec
Ishikari Bridge 1303-Gr-2
1968 5.16 19:39
After-shock of
The Tokachioki Earthquake
gal
200
100
0
100
200
A
E - W
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
N - S

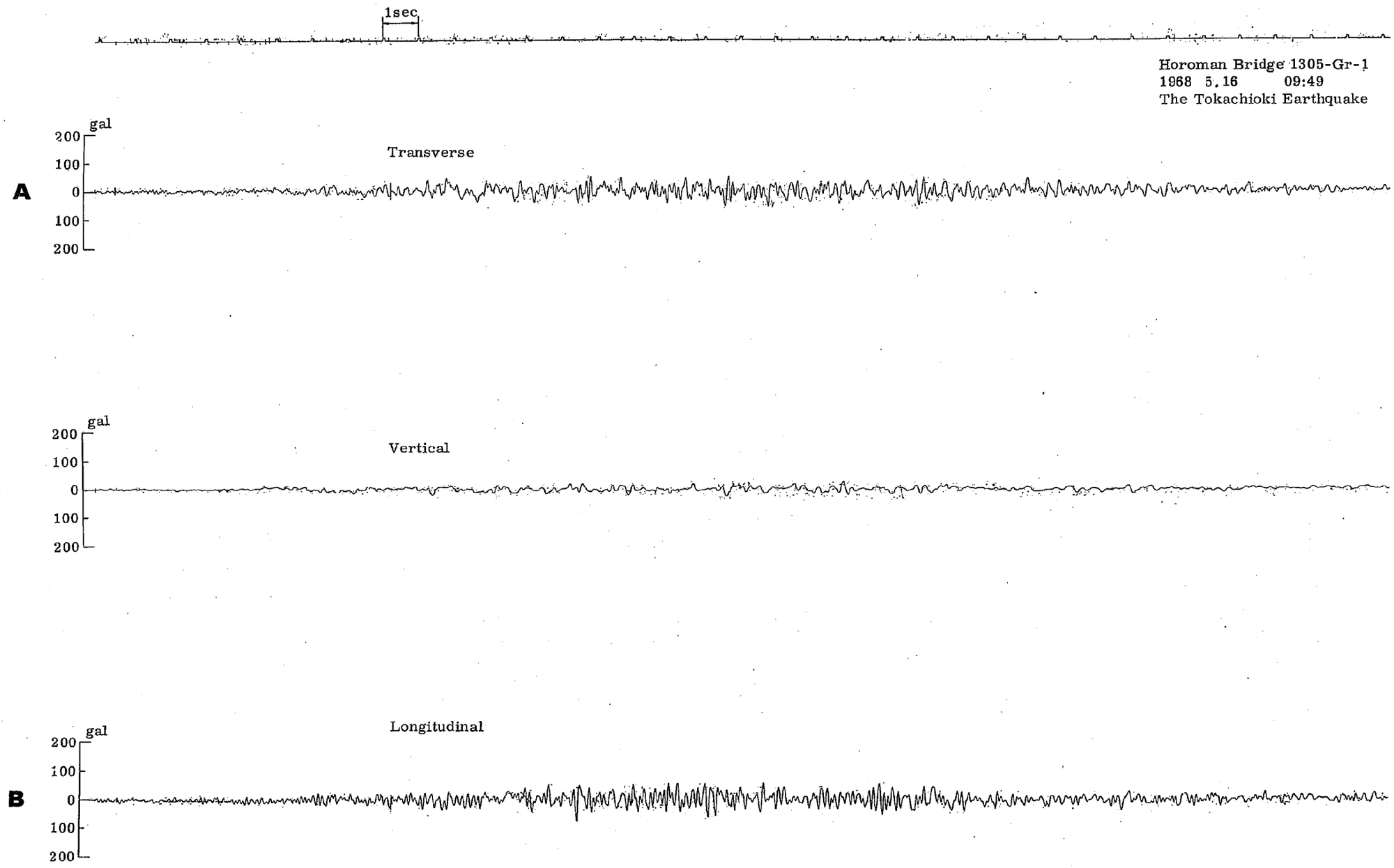

1sec
1303-Gr-2 (Cont.)
E - W
gal
200
100
0
100
200
Vertical
N - S

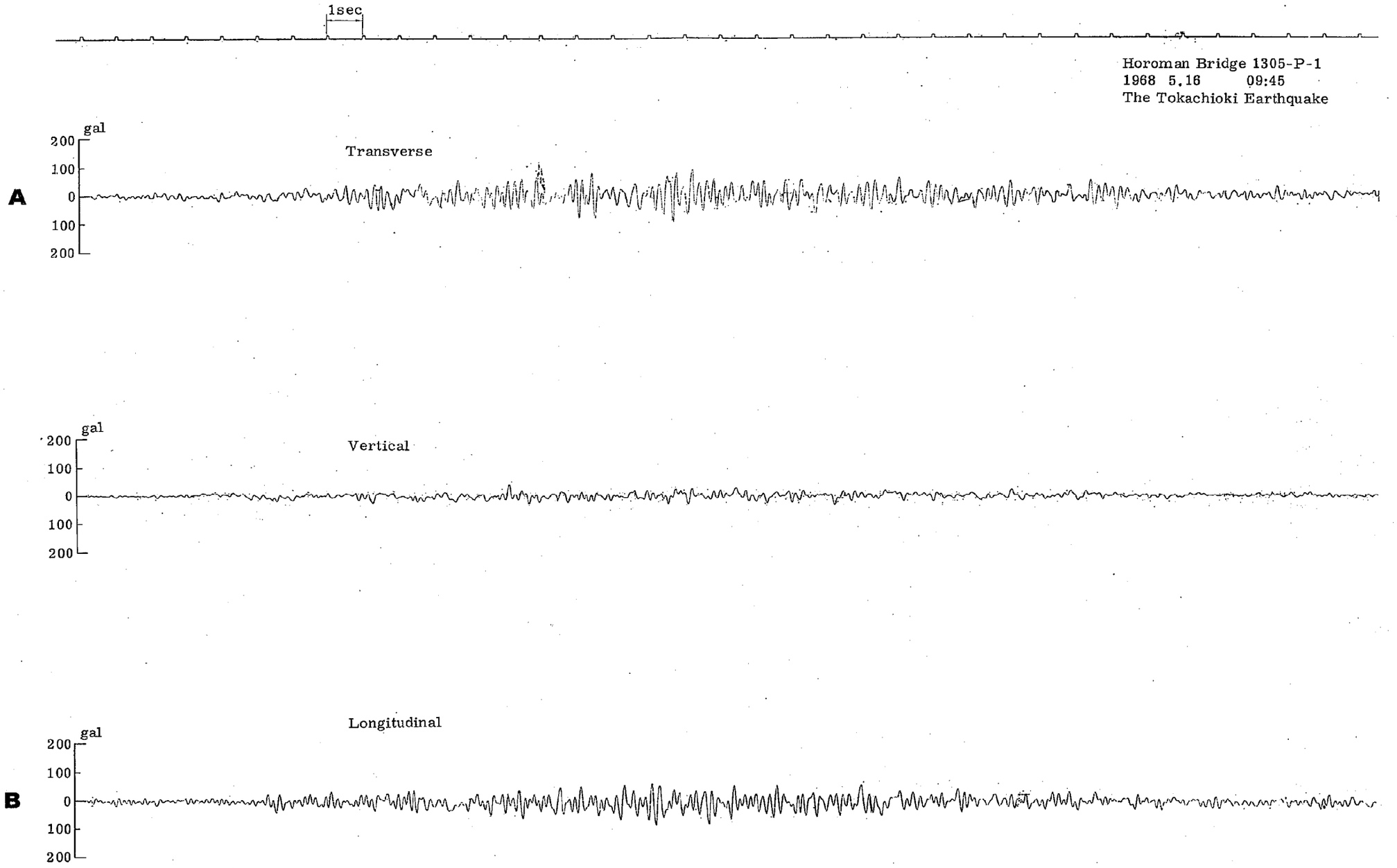

1sec
Otanoshige Bridge 1304-Gr-1
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

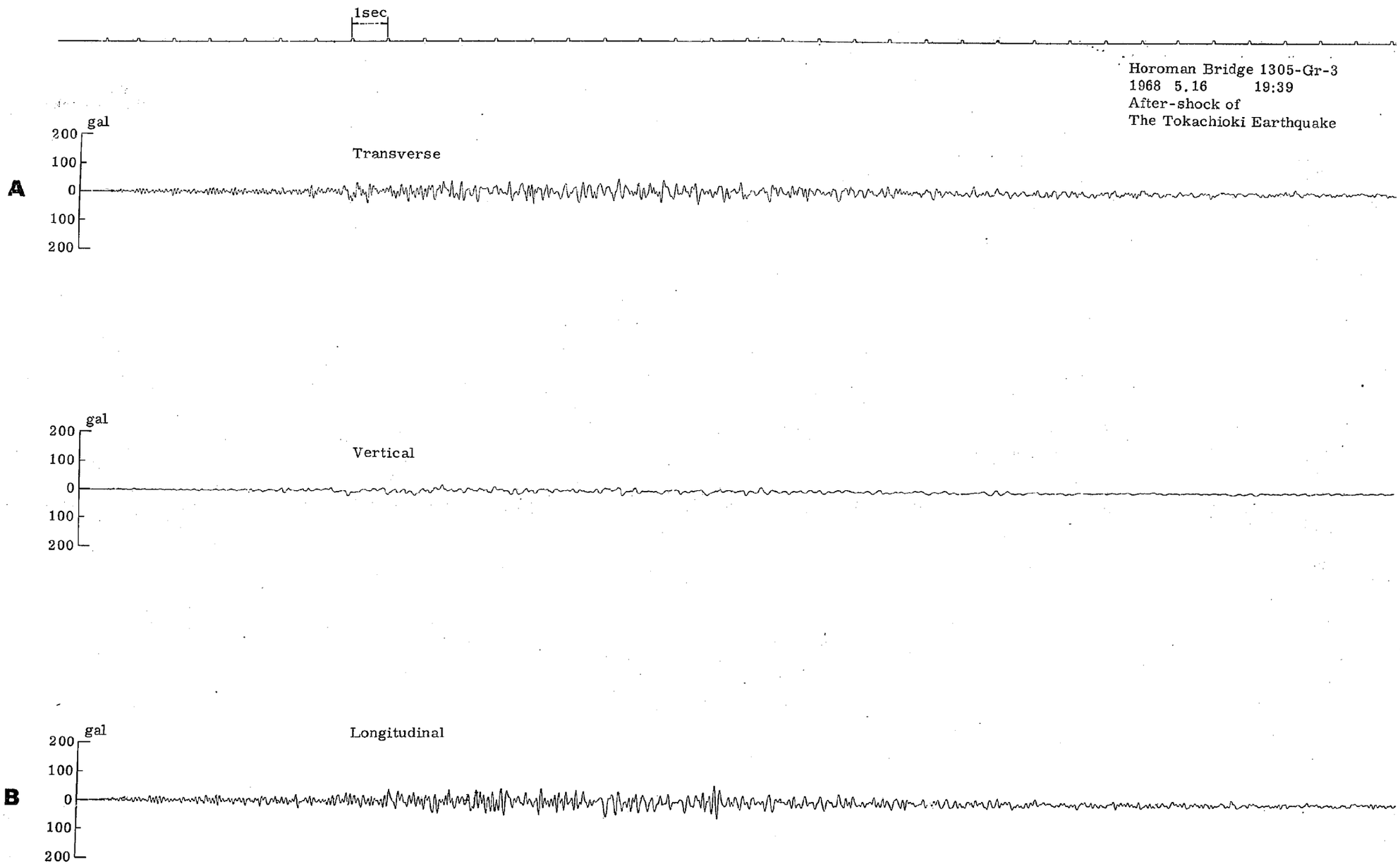

1sec
1304-Gr-1 (Cont)
Transverse
gal
200
100
0
100
200
Vertical
Longitudinal

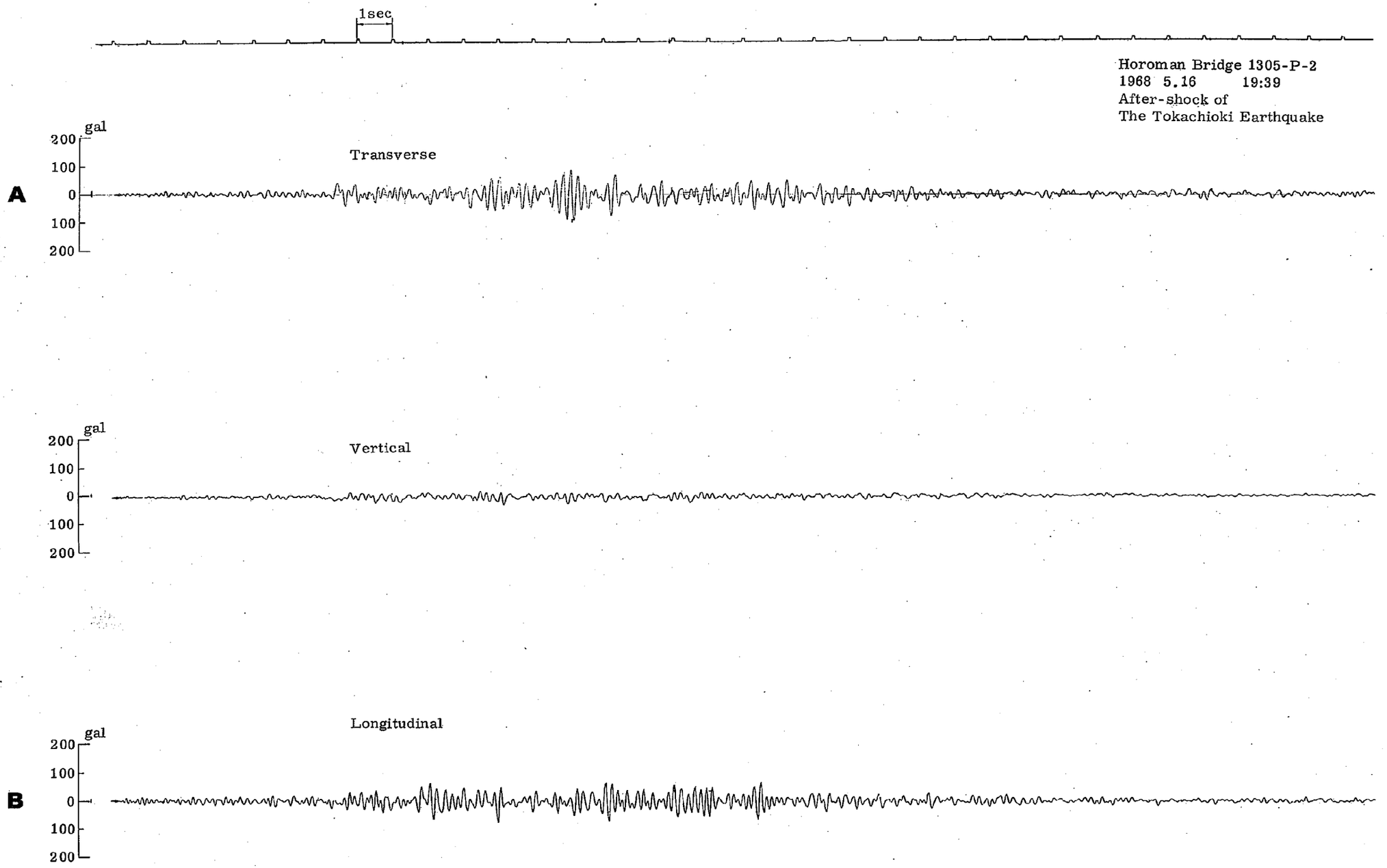

1sec
Otanoshige Bridge 1304-P-1
1968 5.16 09:49
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Longitudinal
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Transverse

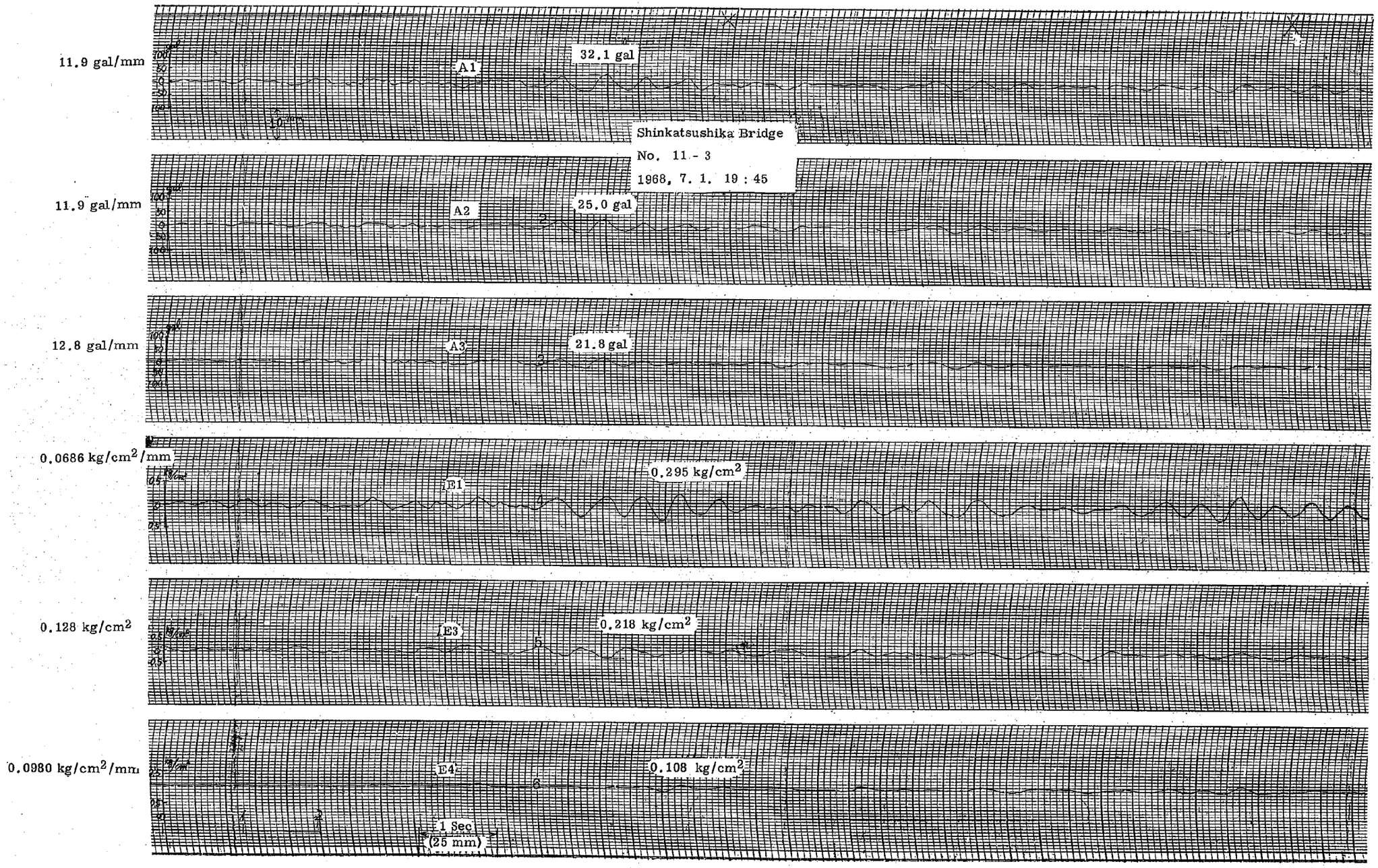

1sec
1304-P-1 (Cont)
Longitudinal
gal
200
100
0
100
200
Vertical
Transverse

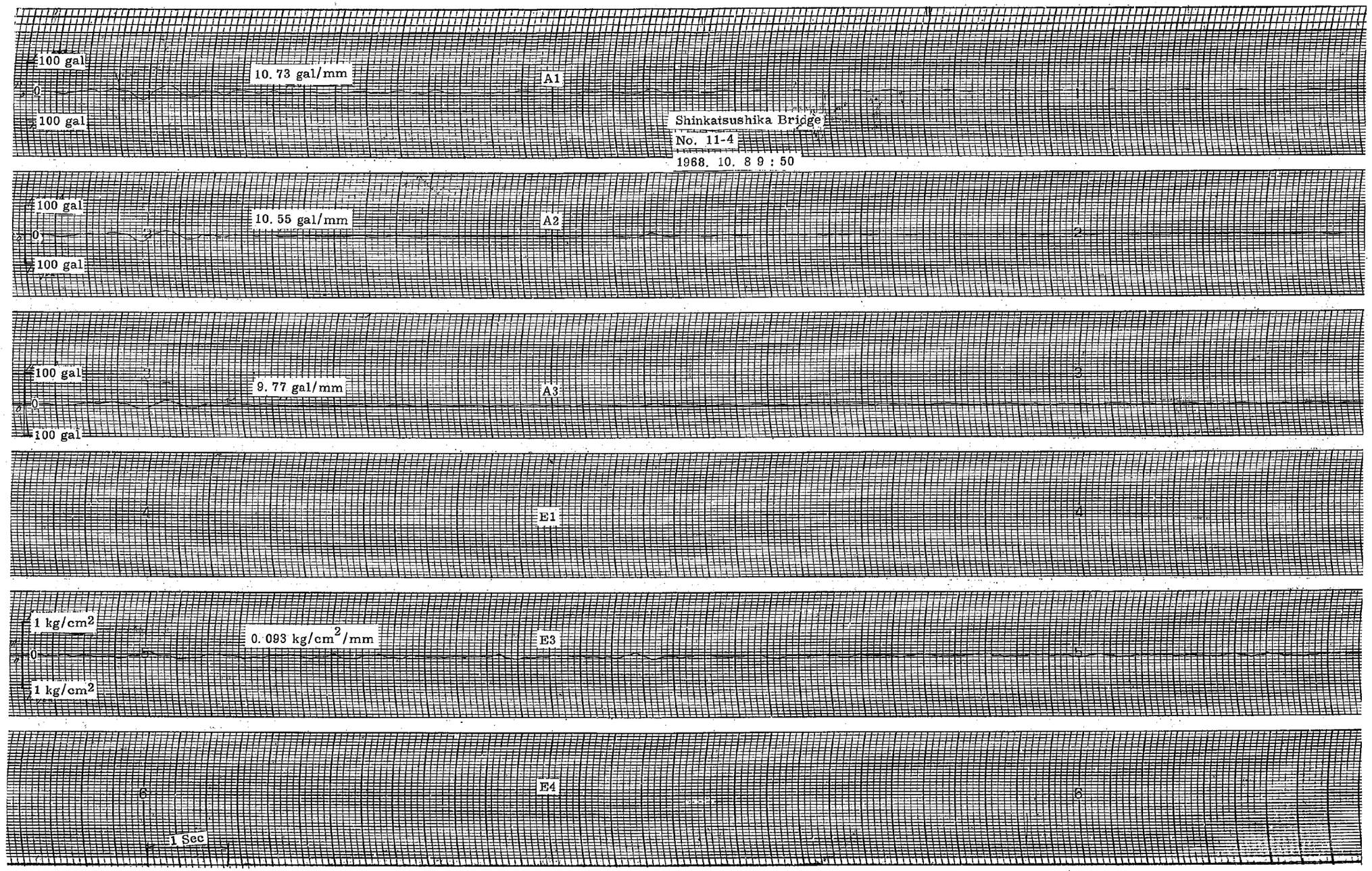

1sec
Horoman Bridge 1305-Gr-1
1968 5.16 09:49
The Tokachioki Earthquake
gal
200
100
0
100
200
A
Transverse
gal
200
100
0
100
200
Vertical
gal
200
100
0
100
200
B
Longitudinal


1sec
Horoman Bridge 1305-P-1
1968 5.16 09:45
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

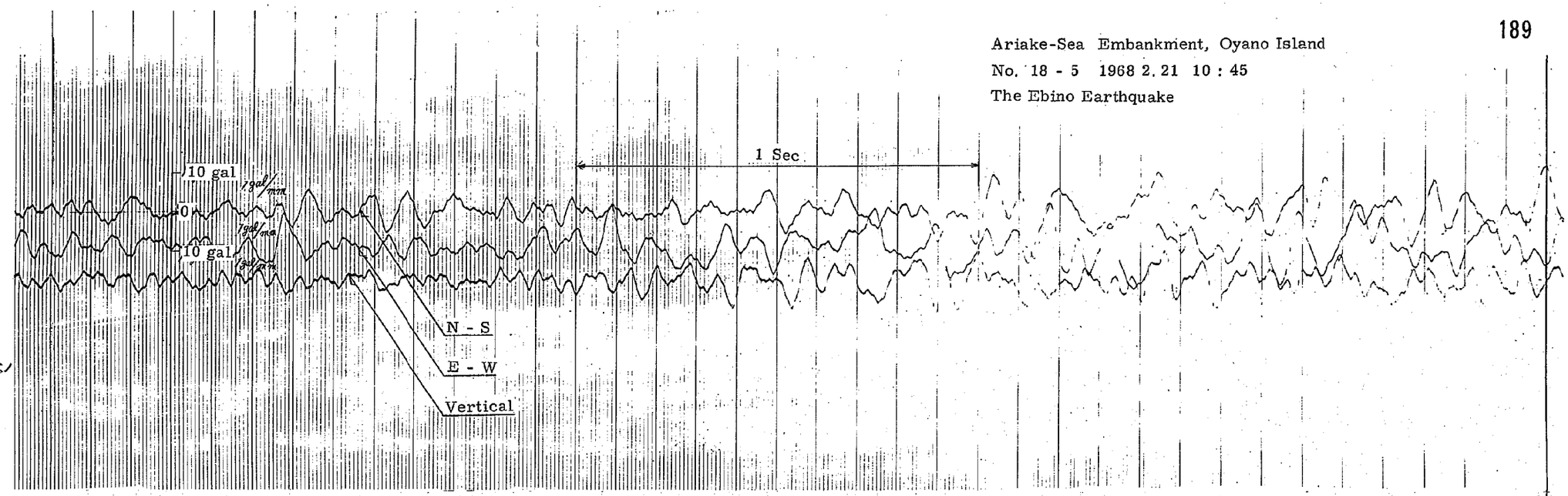

1sec
Horoman Bridge 1305-Gr-3
1968 5.16 19:39
After-shock of
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal


1sec
Horoman Bridge 1305-P-2
1968 5.16 19:39
After-shock of
The Tokachioki Earthquake
A
gal
200
100
0
100
200
Transverse
gal
200
100
0
100
200
Vertical
B
gal
200
100
0
100
200
Longitudinal

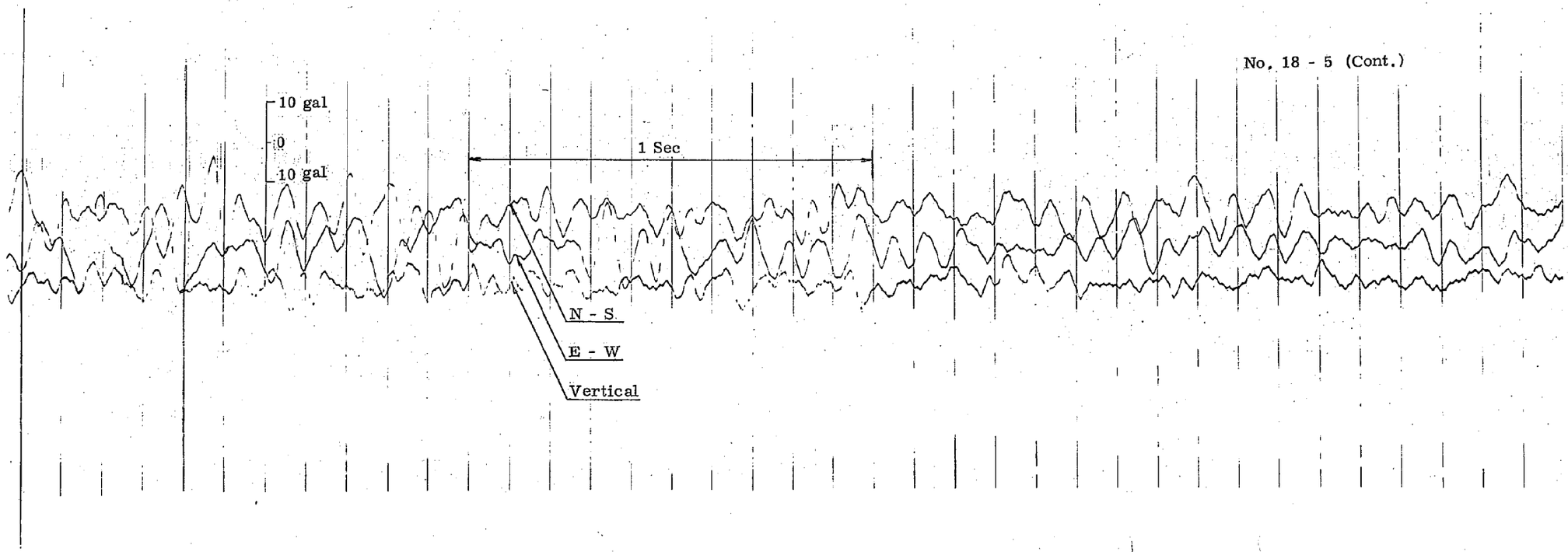

11.9 gal/mm
A1
32.1 gal
Shinkatsushika Bridge
No. 11 - 3
1968, 7. 1. 19 : 45
11.9 gal/mm
A2
25.0 gal
12.8 gal/mm
A3
21.8 gal
0.0686 kg/cm2/mm
E1
0.295 kg/cm2
0.128 kg/cm2
E3
0.218 kg/cm2
0.0980 kg/cm2/mm
E4
0.108 kg/cm2
1 Sec
(25 mm)


100 gal
0
100 gal
10.73 gal/mm
A1
Shinkaisushika Bridge
No. 11-4
1968. 10. 8 9 : 50
100 gal
0
100 gal
10.55 gal/mm
A2
2
100 gal
0
100 gal
9.77 gal/mm
A3
3
4
E1
4
1 kg/cm2
0
1 kg/cm2
0.093 kg/cm2/mm
E3
5
6
E4
6
1 Sec

Ariake-Sea Embankment, Oyano Island
No. 18 - 5 1968 2. 21 10 : 45
The Ebino Earthquake



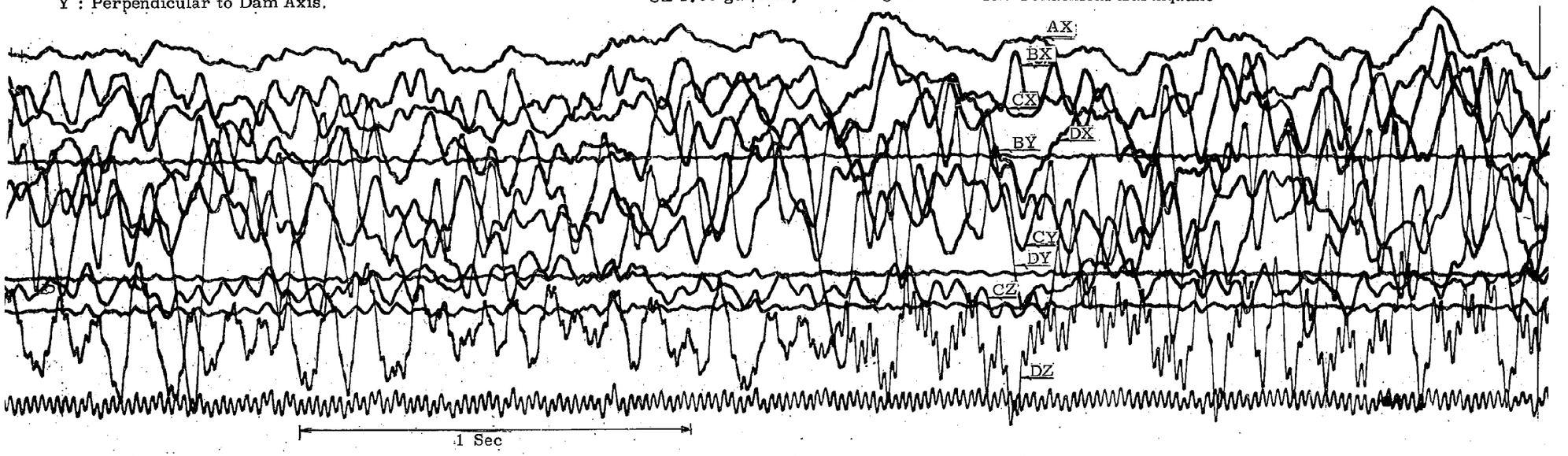
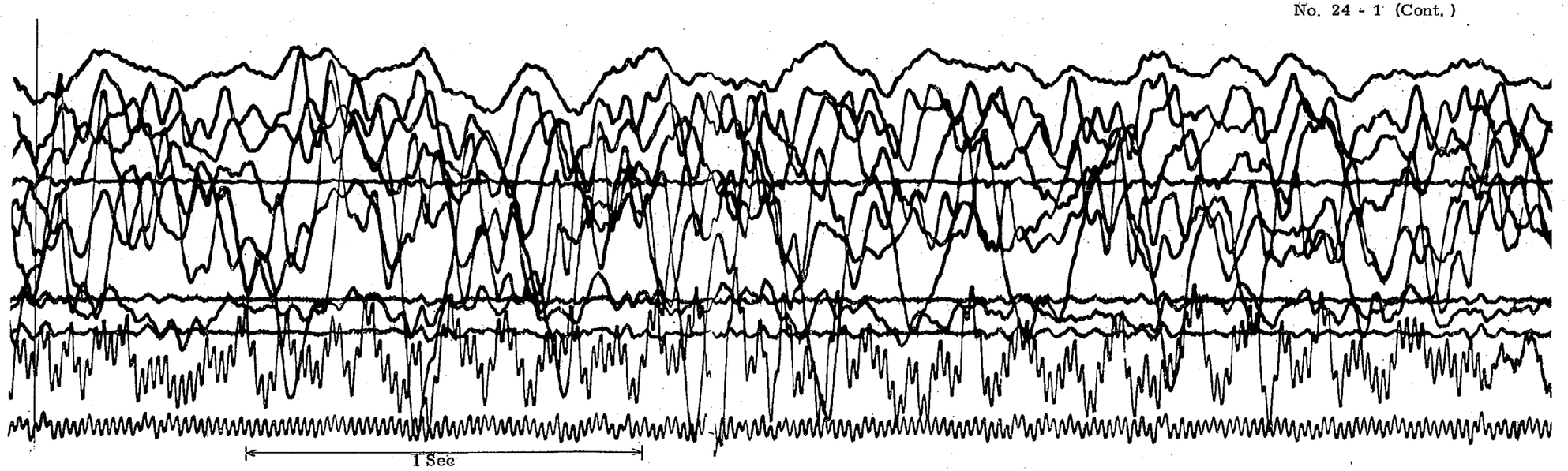
No. 18 - 5 (Cont.)



X : Dam Axis
Z : Vertical
Y : Perpendicular to Dam Axis.

AX 2.0 gal/mm, BX 2.00 gal/mm, CX 1.95 gal/mm, DX 1.97 gal/mm
BY 1.95 gal/mm, CY 1.96 gal/mm, DY 1.90 gal/mm
CZ 1.90 gal/mm, DZ 1.93 gal/mm

Shijushida Dam
No. 24-1 1968 5.16 09 : 49
The Tokachioki Earthquake



No. 24 - 1 (Cont.)