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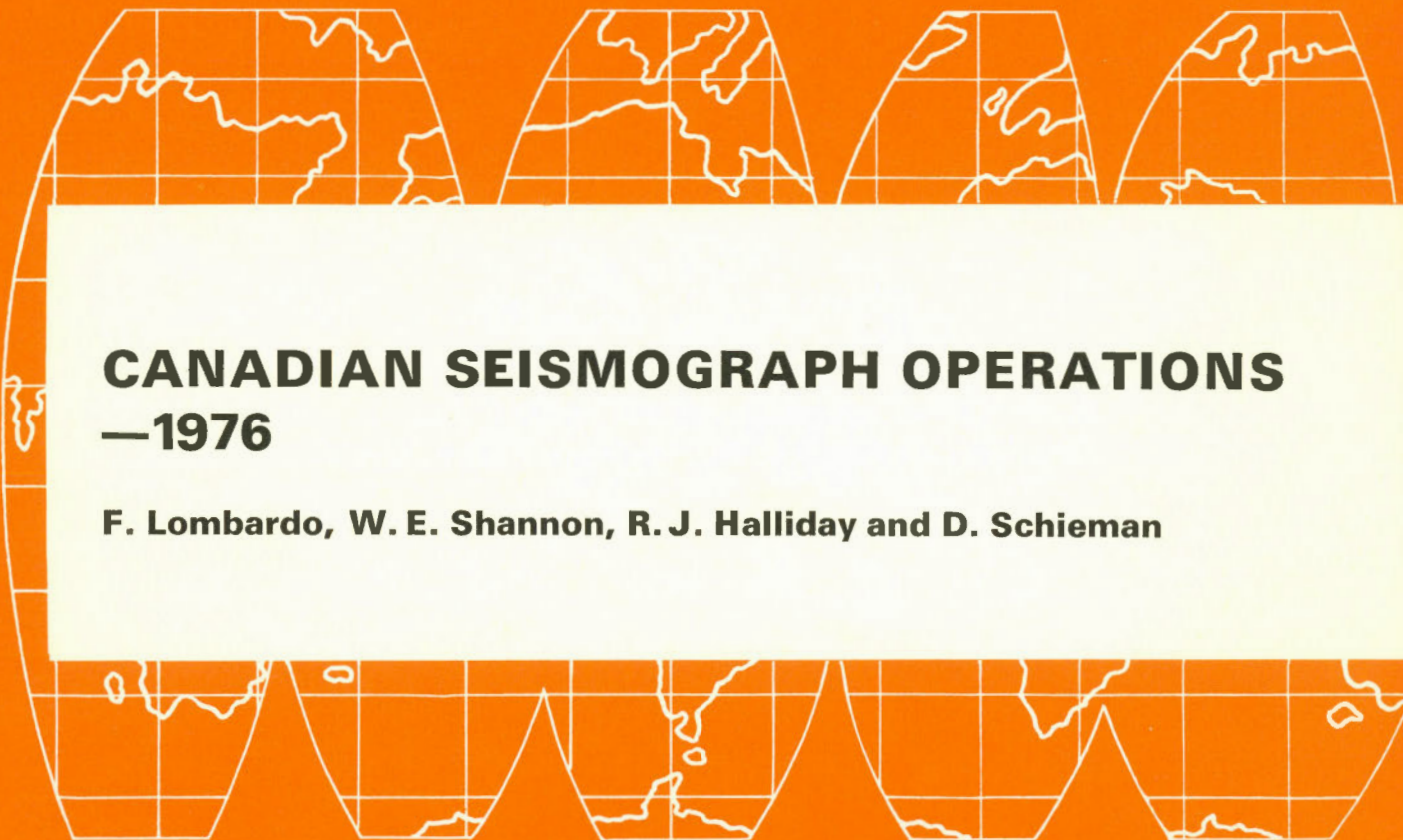
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CANADIAN SEISMOGRAPH OPERATIONS —1976

F. Lombardo, W. E. Shannon, R. J. Halliday and D. Schieman

**Seismological Series
Number 78
Ottawa, Canada 1977**

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ABSTRACT

During 1976 the Division of Seismology and Geothermal Studies of the Earth Physics Branch, Department of Energy, Mines and Resources operated or contracted the operation of 20 standard seismograph stations, 14 regional stations, 2 telemetered networks based at Ottawa and Victoria, a medium aperture array at Yellowknife, a strong-motion seismograph network on the West Coast and several special or temporary seismographs. This report gives the characteristics of the various systems and describes the format and availability of the recorded data.

RÉSUMÉ

En 1976 la Division de la séismologie et des études géothermiques de la Direction de la physique du globe, Ministère de l'Energie, des Mines et des Ressources, a exploité ou fait exploiter 20 stations séismographiques standard, 14 stations régionales, 2 réseaux de télémétrie situés à Ottawa et à Victoria, un réseau à ouverture moyenne à Yellowknife, un réseau d'accélérographes sur la côte du Pacifique ainsi que plusieurs installations séismographiques spéciales ou temporaires. Ce rapport présente les caractéristiques des divers systèmes, décrit le format des données et indique comment se les procurer.

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CANADIAN SEISMOGRAPH OPERATIONS —1976

F. Lombardo, W. E. Shannon, R. J. Halliday and D. Schieman

1. INTRODUCTION

This report is published annually as part of the Seismological Series of the Earth Physics Branch. It contains summary information on the seismograph installations operated by or for the Division of Seismology and Geothermal Studies, Earth Physics Branch, Department of Energy, Mines and Resources. This information includes a brief description of the various types of seismograph installations, the data produced, the data processing procedures and the availability of station data and records. Summary information on instrumental changes in the Network and calibration curves for the standard and regional seismograph stations are included in the later pages of the report.

2. CANADIAN SEISMOGRAPH NETWORK

2.1 General

The Canadian Seismograph Network (CSN) is composed of various types of seismograph installations which are briefly described in the following section. In 1976, these installations included 20 standard stations (minimum of six daily records), 14 regional stations (minimum of one daily record) a four-station, short period, vertical network telemetered into Ottawa, a similar four-station, short period, vertical network telemetered into Victoria, a short and long period vertical seismograph array situated in Yellowknife, a strong-motion seismograph network and several special and temporary installations.

2.2 Standard Stations

A standard station consists of three orthogonal short period seismographs and three long period seismographs, each producing a photographic record. Tables 1 and 2 list stations, codes, location and operators (see also Figure 1). The short period seismometers used in most standard stations are Willmores with a nominal period of one second. The seismometer signal, after passing through the attenuator which has

resistors arranged in a TEE pad formation, is fed into a Tinsley galvanometer having a nominal period of one-quarter second. A Sprengnether, 3-component photographic recorder is used for both short and long period seismographs. The Victoria and Montreal stations have a standard short period Benioff system. The Victoria station also operates a torsion vertical and 2 horizontal Wood Anderson seismographs.

The short period recorder drum rotation rate is set to 60 mm per minute, and the long period rate at 15 mm per minute. The three long period Columbia seismometers used in all standard stations have their free period nominally set to 15 seconds, with the exception of those at Yellowknife, which are set to 25 seconds. The same type attenuator TEE pad formation used in the short-period seismographs is also used in the long period. The long period Lehner Griffith galvanometers have a nominal period of 90 seconds.

Calibration curves for all standard stations and any instrumental changes made during the year are included in a later section of this report.

2.3 Regional Stations

Regional seismograph stations consist of a short period vertical seismograph using a Willmore MKII or Geotech S13 seismometer with a nominal one second period. Tables 1 and 2 list the station codes, location and operators (see also Figure 1). These stations are used in seismically active areas of Canada, to supplement the standard station network or for special studies. Most regional stations have electronic amplification using a Geotech or Earth Physics Branch preamplifier and a Geotech Helicorder producing a visual record. At two regional stations, Poste-de-la-Baleine and Whitehorse, short period, north-south and east-west records are also produced. Regional station calibration curves and any instrumental changes made during the year are also included in this report.

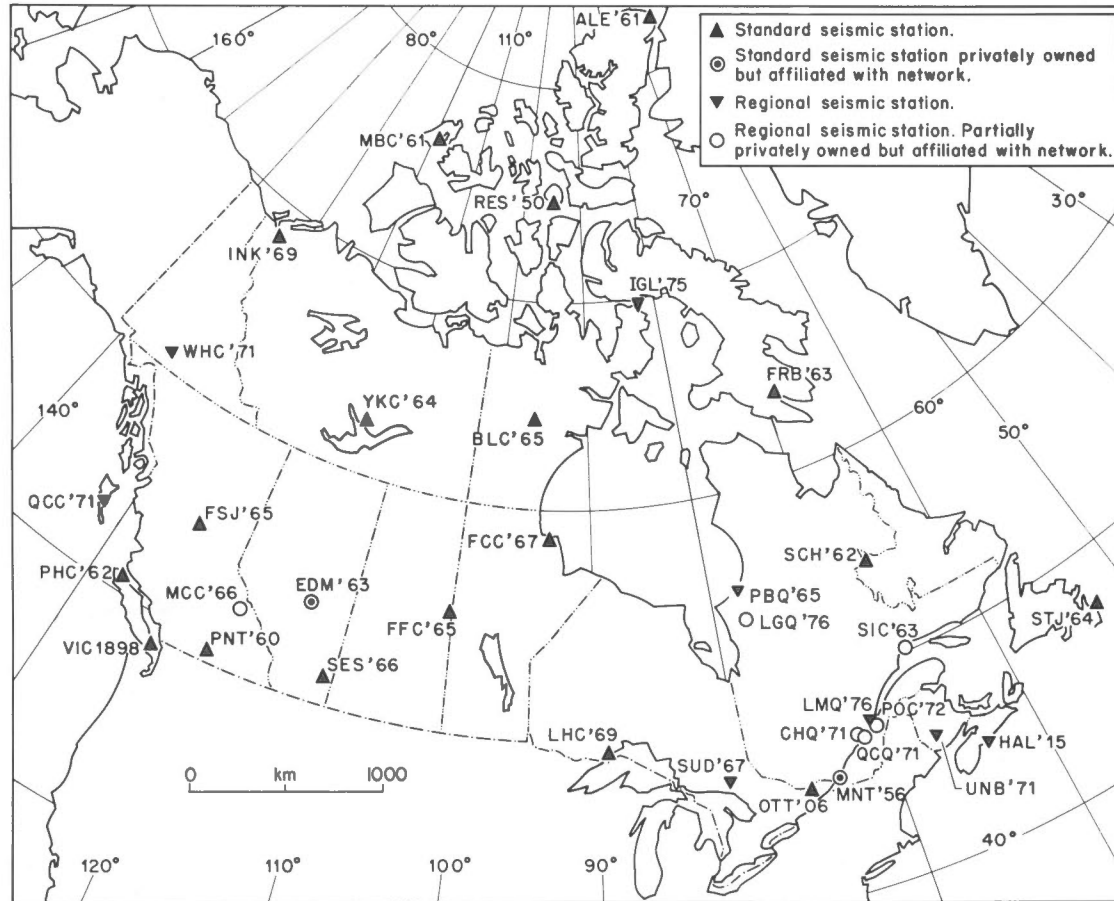


Figure 1. Canadian Standard and Regional Seismograph Stations 1976

TABLE 1
STANDARD AND REGIONAL SEISMOGRAPH STATIONS 1976

STATION CODE	STATION	LATITUDE AND LONGITUDE		ELEVATION (meters)
ALE	Alert, N.W.T.	82.48N	62.40W	65
BLC	Baker Lake, N.W.T.	64.32N	96.02W	16
*CHQ	Charlesbourg, Qué.	46.89N	71.30W	145
EDM	Edmonton, Alta.	53.22N	113.35W	730
FCC	Fort Churchill, Man.	58.76N	94.09W	39
FFC	Flin Flon, Man.	54.73N	101.98W	338
FRB	Frobisher, N.W.T.	63.75N	68.55W	18
FSJ	Fort St. James, B.C.	54.43N	124.25W	772
*HAL	Halifax, N.S.	44.63N	63.60W	56
*IGL	Igloolik, N.W.T.	69.38N	81.81W	38
INK	Inuvik, N.W.T.	68.29N	133.50W	40
*LGQ	La Grande, Qué.	53.69N	77.73W	190
LHC	Thunder Bay, Ont.	48.42N	89.27W	196
*LMQ	La Malbaie, Qué. (Charlevoix Obs.)	47.55N	70.33W	419
MBC	Mould Bay, N.W.T.	76.24N	119.36W	15
*MCC	Mica Creek, B.C.	52.05N	118.59W	594
MNT	Montréal, Qué.	45.50N	73.62W	112
OTT	Ottawa, Ont.	45.39N	75.72W	83
*PBQ	Poste-de-la-Baleine, Qué.	55.28N	77.74W	20
PHC	Port Hardy, B.C.	50.71N	127.43W	33
PNT	Penticton, B.C.	49.32N	119.62W	550
*POC	La Pocatière, Qué.	47.36N	70.04W	61
*QCC	Queen Charlotte, B.C.	53.26N	132.09W	3
*QCQ	Québec, Qué.	46.78N	71.28W	91
RES	Resolute, N.W.T.	74.69N	94.90W	15
SCH	Schefferville, Qué.	54.82N	66.78W	540
SES	Suffield, Alta.	50.40N	111.04W	770
*SIC	Sept-Iles, Qué.	50.19N	66.74W	283
STJ	St. John's Nfld.	47.57N	52.73W	62
*SUD	Sudbury, Ont.	46.47N	80.97W	267
*UNB	Fredericton, N.B.	45.95N	66.63W	56
VIC	Victoria, B.C.	48.52N	123.42W	197
*WHC	Whitehorse, Yukon Territory	60.74N	135.10W	734
YKC	Yellowknife, N.W.T.	62.48N	114.47W	198

*Regional Stations

TABLE 2

STANDARD AND REGIONAL SEISMOGRAPH STATION OPERATORS

Standard Seismograph Stations:

Alert, N.W.T. (ALE)

Owned and operated by the Earth Physics Branch. Station seismologist in 1976 was M.J. Daniels.

Baker Lake, N.W.T. (BLC)

Owned and operated by the Earth Physics Branch. Station seismologist in 1976 was O.J. Jensen.

Edmonton, Alberta (EDM)

Instrumented by the Earth Physics Branch. Owned and operated by the Department of Physics, University of Alberta, with contract support from the Earth Physics Branch.

Flin Flon, Manitoba (FFC)

Owned and operated by the Earth Physics Branch. Station seismologist in 1976 was L. Marsh.

Fort Churchill, Manitoba (FCC)

Owned by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by the Radiosonde Division, Atmospheric Environment Service, Department of Fisheries and Environment.

Fort St. James, British Columbia (FSJ)

Owned and operated by the Earth Physics Branch. Station seismologist during 1976 was T.S. Browne.

Frobisher, N.W.T. (FRB)

Owned by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by the Radiosonde Division, Atmospheric Environment Service, Department of Fisheries and Environment.

Inuvik, N.W.T. (INK)

Owned by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by the Radiosonde Division, Atmospheric Environment Service, Department of Fisheries and Environment.

Montréal, Québec (MNT)

Owned and operated by Jean-de-Brébeuf College with partial instrumental support and full contract support from the Earth Physics Branch.

Mould Bay, N.W.T. (MBC)

Owned and operated by the Earth Physics Branch. Station seismologist until March 9, 1976 was J.R. Alexander, succeeded by J.M. Savelle on August 11. (Station operated by Department of Fisheries and Environment March 10 - May 19, and by R.V. Green May 20 - August 10).

Ottawa, Ontario (OTT)

Owned and operated by the Earth Physics Branch.

Penticton, British Columbia (PNT)

Owned and operated by the Earth Physics Branch. Station seismologist during 1976 was M. Wilde.

Port Hardy, British Columbia (PHC)

Owned by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by the Radiosonde Division, Atmospheric Environment Service, Department of Fisheries and Environment.

TABLE 2 (Continued)

Resolute, N.W.T. (RES)	Owned and operated by the Earth Physics Branch. Station seismologist during 1976 was J.R. Stilborn, succeeded by J.R. Alexander on August 1.
St. John's, Newfoundland (STJ)	Owned by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by the Department of Physics, Memorial University.
Schefferville, Québec (SCH)	Owned by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by McGill University Research Station.
Suffield, Alberta (SES)	Owned by the Earth Physics Branch. Operated for the Earth Physics Branch by the Department of National Defence.
Thunder Bay, Ontario (LHC)	Owned by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by the Department of Geology, Lakehead University.
Victoria, British Columbia (VIC)	Owned and operated by the Earth Physics Branch. The seismograph observatory is part of the Victoria Geophysical Observatory, Department of Energy, Mines and Resources, 5071 West Saanich Road, R.R. #7, Victoria, B.C., V8X 3X3. This unit constitutes the West Coast office of the Earth Physics Branch.
Yellowknife, N.W.T. (YKC)	Owned and operated by the Earth Physics Branch. Station seismologists during 1976 were D. Monsees, O.I.C., L. Mahaney and J. Carter.
<i>Regional Seismograph Stations:</i>	
Charlesbourg, Québec (CHQ)	Instrumented by the Department of Geology, Laval University, and operated with contract support from the Earth Physics Branch.
Fredericton, New Brunswick (UNB)	Instrumented by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by the Physics Department, University of New Brunswick.
Halifax, Nova Scotia (HAL)	Owned by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by Dalhousie University.
Igloolik, Northwest Territories (IGL)	Instrumented by the Earth Physics Branch. Operated for the Earth Physics Branch by the Department of Indian and Northern Affairs.
La Grande, Québec (LGQ)	Owned and operated by the Bay James Corporation, La Grande, Québec, with support from the Earth Physics Branch.
La Malbaie, Québec (LMQ)	Instrumented by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by H.P. Tremblay, Les Eboulements, Québec.

TABLE 2 (Continued)

La Pocatière, Québec (POC)	Instrumented by the Department of Geology, Laval University, and operated with contract support from the Earth Physics Branch.
Mica Creek, British Columbia (MCC)	Vault owned and operated by B.C. Hydro and Power Authority, but instrumented by the Earth Physics Branch.
Poste-de-la-Baleine, Québec (PBQ)	Instrumented by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by Laval University.
Québec, Québec (QCQ)	Owned and operated by the Department of Geology, Laval University, with contract support from the Earth Physics Branch.
Queen Charlotte, British Columbia (QCC)	Instrumented by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by the B.C. Forest Service.
Sept-Iles, Québec (SIC)	Owned and operated by the Iron Ore Company of Canada, Sept-Iles, Québec, with support from the Earth Physics Branch.
Sudbury, Ontario (SUD)	Instrumented by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by the Department of Geology, Laurentian University.
Whitehorse, Yukon Territory (WHC)	Instrumented by the Earth Physics Branch. Operated under contract for the Earth Physics Branch by the Radiosonde Division, Atmospheric Environment Service, Department of Fisheries and Environment.

2.4 Eastern Canada Telemetered Network (ECTN)

On February 24, 1974, a network of short-period vertical stations linked to Ottawa by telephone lines commenced recording. Figure 2 shows, and Table 3 gives a list of the stations and their location. The broadband seismic signals are transmitted in digital mode over dedicated telephone lines to Ottawa where a PDP-11 minicomputer produces monitor records on four separate Helicorders. In 1975 an automatic triggering system and digital storing of data was

incorporated into the computer processing program. A digital magnetic tape library is maintained of all events of interest recorded on the Network.

2.5 Western Canada Telemetered Network (WCTN)

On September 1, 1975, a network of short period vertical stations, similar to the ECTN but linked to Victoria by telephone lines commenced continuous operation. Figure 3 shows and Table 4 gives a list of the stations, their location and operating dates. The computer system, data recording and storing is similar to that of the ECTN.

TABLE 3

EASTERN CANADA TELEMETERED NETWORK STATIONS

STATION	LAT.	LONG.	ELEVATION (Meters)	OPERATING DATES
Ottawa, Ont. (OTT)	45.39N	75.72W	83	Feb. 24/74 to date
Montréal, Qué. (MNT)	45.50N	73.62W	112	Feb. 24/74 to date
Maniwaki, Qué. (MIQ)	46.37N	75.97W	199	Feb. 27/74 to date
Manicouagan, Qué. (MNQ)	50.53N	68.78W	610	Nov. 27/74 to date

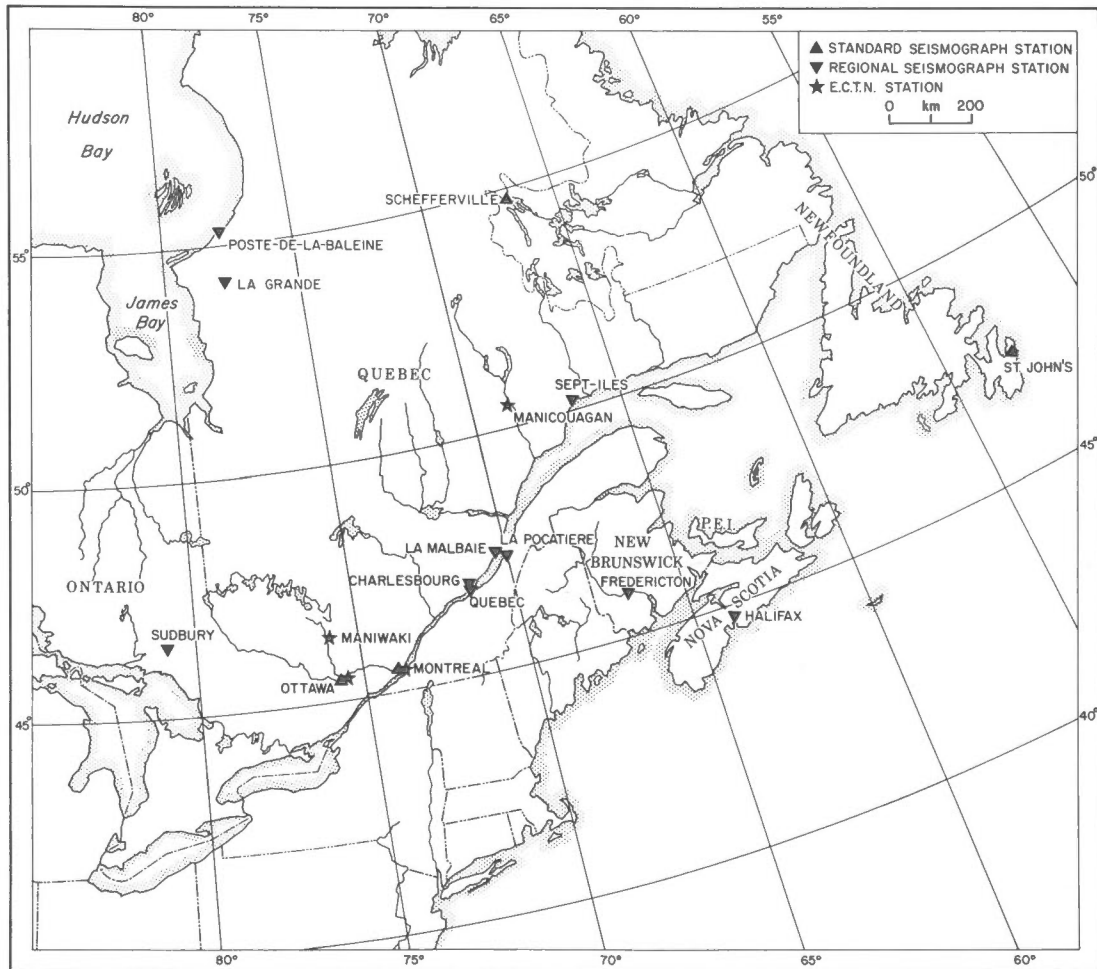


Figure 2. Eastern Canada Telemetered Network and other Stations

TABLE 4
WESTERN CANADA TELEMETERED NETWORK STATIONS

STATION	LAT.	LONG.	ELEVATION (Meters)	OPERATING DATES
Victoria, B.C. (VIC)	48.52N	123.42W	197	Sept. 1/75 to date
Port Alberni, B.C. (ALB)	49.27N	124.82W	25	Sept. 1/75 to date
Haney, B.C. (HYC)	49.26N	122.57W	150	Sept. 1/75 to date
Pender Island, B.C. (PIB)	48.82N	123.32W	40	Nov. 1/75 to date

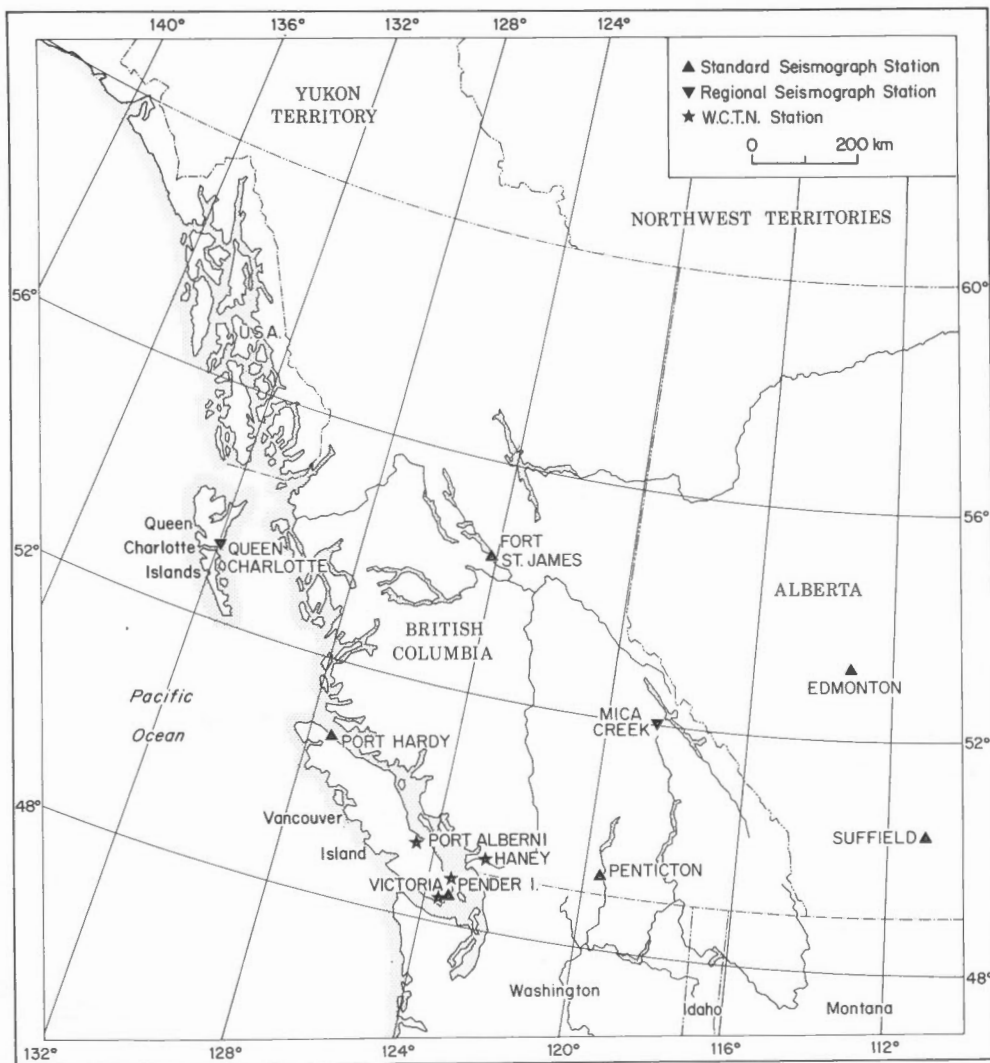


Figure 3. Western Canada Telemetered Network and other Stations

2.6 Special or Temporary Stations

To supplement the existing permanent seismograph networks of the Earth Physics Branch, special or temporary installations are commissioned at different sites for varying lengths of time. Table 5 gives the locations and operating dates for these stations plus a brief description of the type of installation.

2.7 The Yellowknife Array

The Division of Seismology and Geothermal Studies has operated and maintained a medium aperture array at Yellowknife, N.W.T. since 1962. The array configuration is shown in Figure 4. On July 8, 1976, the array site R10 was decommissioned. The short period vertical signal from the standard station YKC replaces the signal from R10. The 19 Willmore Mark II short period vertical seismometers are arranged in two orthogonal lines with a 2.5 km spacing. The long period tripartite array consists of Geotech SL210 long period vertical seismometers placed at sites G1, G2 and G3, and additional Geotech SL220 long

period horizontal seismometers at site G1. The G1 site is the vault of the standard station, YKC. Data are radio-telemetered to the Control Centre where they are processed on-line by computer and, as backup, are recorded on FM tape.

The on-line digital processing system, built around a PDP11-45 computer was installed in early 1974. The processing system, called the Canadian Seismic Array Monitor (CANSAM), remotely monitors and calibrates the various seismic sensors, digitizes the short period signals and processes the data with a detection algorithm. A hard-copy event detection bulletin is printed on a teletypewriter and punched in parallel on paper tape. A copy of the bulletin information and the raw digital data for each detected event is stored on 9-track digital tape. Additional processing of the Yellowknife array data is done off-line in Ottawa from the analogue and digital tapes.

Additional information on the Yellowknife array history, developments and current configuration can be found in reports by Manchee and Hayman (1972) and Weichert (1975).

TABLE 5

SPECIAL OR TEMPORARY STATIONS

STATION LOCATION	COORD.	ELEV. METERS	OPERATING DATES	DESCRIPTION
Alert, N.W.T.	82.48 N 62.40 W	65	Dec.11/73-Oct.13/76	Extra long-period vertical experimental Helicorder system.
Manic 3 Dam Site, Qué.	49.90 N 68.74 W	482	Sep./76 to date	6-element telemetered array recording on analogue tape
Windsor, Ont.	42.26 N 83.10 W	-122	Apr.21/76 to date	6-element array recording on analog tape in the Canadian Rock Salt Company Mine
Off West Coast of Vancouver I., B.C.	50.2 N 130.5 W	-3 km	Aug.21/76-Sep.1/76	Ocean Bottom Seisometers deployed in several locations during the operating dates given.

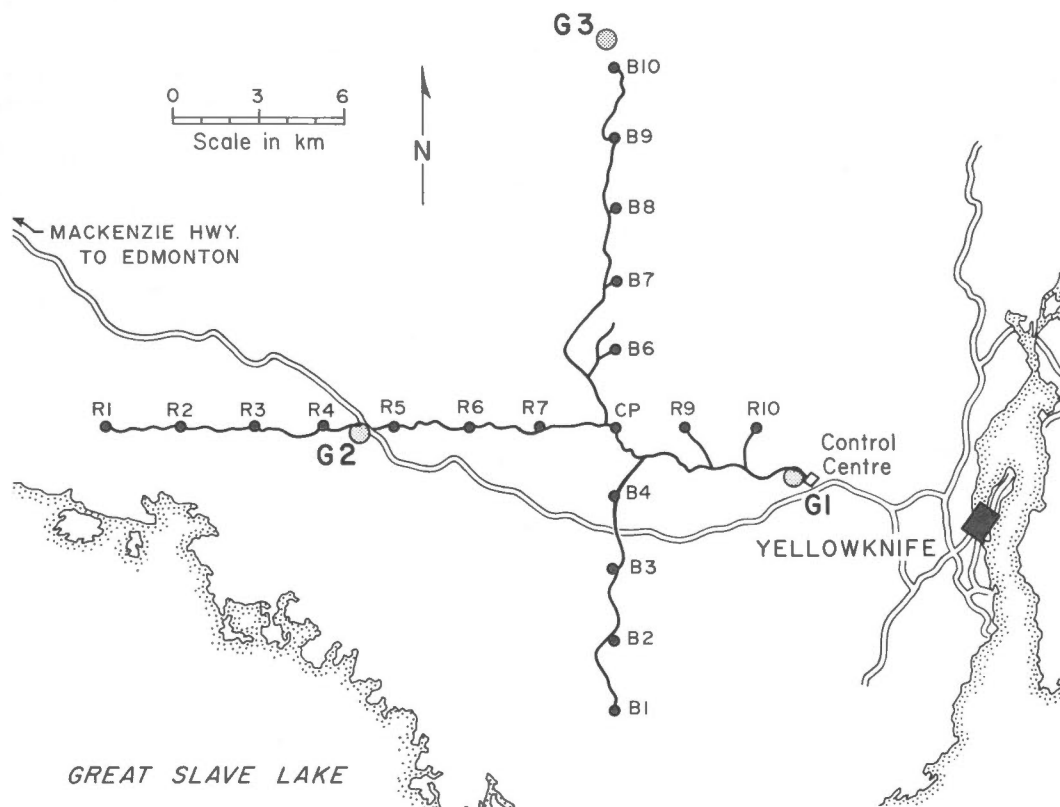


Figure 4. Yellowknife Seismograph Array

2.8 Strong-Motion Seismograph Networks

Strong-motion instruments in Canada are organized into two networks, one in western Canada maintained by the Earth Physics Branch and one in eastern Canada maintained by the National Research Council of Canada, Division of Building Research, Noise and Vibration Section. At the end of 1976 there were 48 accelerographs and 73 seismoscopes deployed in the two networks. The accelerograph sites are described in the accompanying Table 6. Most of the seismoscopes are associated with the accelerograph networks; 41 are located in Vancouver and the lower Fraser River valley, 20 in Victoria and on Vancouver Island, 2 in eastern British Columbia and 10 in the St.

Lawrence region. For a complete description of the Strong Motion program see Rogers (1976). For any additional information on the strong motion networks write to:

Victoria Geophysical Observatory,
 Division of Seismology and Geothermal
 Studies, Earth Physics Branch,
 Department of Energy, Mines &
 Resources, Victoria, B.C. V8X 3X3

or

Noise and Vibration Section,
 Division of Building Research,
 National Research Council,
 Ottawa, Ontario. K1A 0R6

TABLE 6

ACCELEROGRAPH SITES IN CANADA

<u>Table Explanation</u>	
<u>LOCATION</u>	City and site name.
<u>DATE</u>	Installation date of first instrument at site.
<u>COORDINATES (COORD)</u>	Latitude and longitude are listed to the nearest 0.01 of a degree. Where they are not known that accurately they are listed to the nearest 0.1 of a degree. For Eastern Canada, coordinates supplied in degrees and minutes have been converted to the nearest 0.01 of a degree.
<u>INSTRUMENT (INSTR)</u>	United Electro Dynamics AR-240, Teledyne-Geotech RFT-250, Kinemetrics SMA-1.
<u>SENSITIVITY (SENS)</u>	Full scale sensitivity of the instrument expressed as multiplier of the acceleration of gravity.
<u>TRIGGER</u>	Triggering level. The AR-240 and RFT-250 have horizontal displacement triggers. The SMA-1 has a vertical trigger sensitive to acceleration in the 1 to 10 Hz bandwidth. Where the acceleration level is listed as 0.01 g the instrument has not been field calibrated and is assumed to be at the factory set level.
<u>OWNER</u>	EMR Department of Energy, Mines and Resources NRC National Research Council of Canada QHEC Quebec Hydro-Electric Commission BCHPA British Columbia Hydro and Power Authority AECL Atomic Energy of Canada Limited COTC Canadian Overseas Telecommunications Corp. ALCAN Aluminum Company of Canada
<u>BUILDING</u>	A brief description of the structure housing the instrument.
<u>FOUNDATION</u>	The material underlying the structure housing the instrument.
<u>*</u>	Sites having changes in the tabulated material during the current year.

Accelerograph Sites in Eastern Canada

<u>LOCATION</u>	<u>DATE</u>	<u>COORD†</u>	<u>INSTR</u>	<u>SENS</u>	<u>TRIGGER</u>	<u>OWNER</u>	<u>BUILDING</u>	<u>FOUNDATION</u>
St. Féréol Seismograph Station	1/66	47.12 70.83	AR-240	1 g	0.5 mm	NRC	In underground seismic vault. Instrument on concrete pier.	bedrock
Ottawa N.R.C. Building	3/66	45.45 75.61	SMA-1	½ g	0.01 g	NRC	One storey steel frame, masonry walls. Instrument on concrete basement floor slab.	bedrock
Montréal CIL Building	8/66	45.50 73.58	AR-240	1 g	0.5 mm	NRC	32 storey steel frame, curtain wall, four basement storeys. Instrument on bottom basement floor slab.	bedrock
Chalk River Reactor Building	4/67	46.05 77.38	AR-240	1 g	0.5 mm	AECL	Steel frame poured concrete reactor building. Instrument on concrete basement floor slab.	bedrock
Québec Laval University	6/67	46.78 71.28	AR-240	1 g	0.5 mm	NRC	Three storey reinforced concrete. Instrument on concrete pier on basement floor slab.	bedrock
La Malbaie Post Office	9/67	47.68 70.15	AR-240	1 g	0.5 mm	NRC	One storey steel frame masonry walls. Instrument on concrete pier on basement floor slab.	bedrock
St.-Pascal Post Office	10/69	47.52 69.80	AR-240	1 g	0.5 mm	NRC	One storey reinforced concrete and masonry. Instrument on concrete basement floor slab.	bedrock
Mont Laurier Mercier Dam	8/72	46.67 75.98	SMA-1	½ g	0.01 g	NRC	Small shack. Instrument on concrete slab.	bedrock
Montréal Brébeuf College	12/73	45.50 73.62	SMA-1	½ g	0.01 g	NRC	Four storey steel frame curtain wall, poured concrete. Instru- ment in seismic vault in basement.	bedrock
Baie Comeau Manicouagan 5 Dam	6/74	50.67 68.73	SMA-1 (6 units)	½ g	0.01 g	QHEC	Several locations in reinforced concrete dam of multiarch construc- tion. Instruments vary from bedrock to 600 ft level in dam.	bedrock
Baie Comeau Manicouagan 3 Dam	9/74	47.77 68.62	SMA-1 (2 units)	½ g	0.01 g	QHEC	One in small hut on concrete slab. One in instrument room in rock tunnel. Instrument on concrete pier.	bedrock

†Coordinates supplied in degrees and minutes have been converted to the nearest 0.01 of a degree.

Accelerograph Sites in Western Canada

<u>LOCATION</u>	<u>DATE</u>	<u>COORD†</u>	<u>INSTR</u>	<u>SENS</u>	<u>TRIGGER</u>	<u>OWNER</u>	<u>BUILDING</u>	<u>FOUNDATION</u>
Cowichan Lake Satellite Station	3/73	48.8 124.2	SMA-1	1 g	0.010 g	COTC	One storey structure next to earth station antenna. Instrument on concrete floor slab.	bedrock
Gold River Public Safety Building	8/73	49.78 126.04	SMA-1	1 g	0.010 g	EMR	One storey reinforced concrete block. Instrument on concrete floor slab.	bedrock
Victoria Geophysical Observatory	5/74	48.52 123.42	SMA-1	$\frac{1}{2}$ g	0.008 g	EMR	Three storey, part wood frame and part masonry. Instrument in seismic vault on main floor level.	bedrock
Vancouver Bloedel Conservatory	5/74	49.24 123.11	AR-240	1 g	0.5 mm	EMR	Triodetic dome structure 50 feet high and 140 feet in diameter. Instrument on concrete foundation.	bedrock
Richmond Brighthouse Library	5/74	49.16 123.14	AR-240	1 g	0.5 mm	EMR	One storey reinforced masonry. Instrument on concrete basement floor slab.	alluvium
Prince Rupert Airport Terminal Bldg.	5/74	54.29 130.44	SMA-1	1 g	0.011 g	EMR	One storey heavy wood portal frames and purlins with masonry walls. Instrument on concrete floor slab.	bedrock
Port Alberni Maquinna Elementary S.	11/74	49.23 124.79	SMA-1	1 g	0.009 g	EMR	One storey wood frame. Instrument on concrete basement floor slab.	bedrock
Kemano Switching Station	1/75	53.56 127.93	SMA-1	1 g	0.009 g	ALCAN	One storey masonry construction. Instrument on concrete floor slab.	gravel
*Haney U.B.C. Research Forest	6/75	49.27 122.57	SMA-1	1 g	0.010 g	EMR	Instrument in small vault on bedrock outcrop.	bedrock
Richmond Highway Patrol Building	11/75	49.12 123.08	RFT-250	1 g	0.5 mm	EMR	One storey wood frame construction. Instrument on concrete basement floor.	alluvium
Sandspit Airport Terminal Bldg.	11/75	49.12 131.81	SMA-1	1 g	0.012 g	EMR	One storey wood frame. Instrument on concrete slab at ground level.	sandy gravel

†Coordinates supplied in degrees and minutes have been converted to the nearest 0.01 of a degree.

Accelerograph Sites in Western Canada (con'd)

<u>LOCATION</u>	<u>DATE</u>	<u>COORD†</u>	<u>INSTR</u>	<u>SENS</u>	<u>TRIGGER</u>	<u>OWNER</u>	<u>BUILDING</u>	<u>FOUNDATION</u>
Duncan Cowichan Hospital	10/67	48.79 123.72	SMA-1	1 g	0.010 g	EMR	Varying from one to six storeys, reinforced concrete. Instrument on pier on concrete footing at basement level.	sand
North Vancouver Cleveland Dam	1/68	49.36 123.11	AR-240	1 g	0.5 mm	EMR	Concrete gravity dam 300 feet high. Instrument at end of gallery on concrete floor directly above bedrock.	bedrock
Delta Roberts Bank Seaport	11/69	49.02 123.16	RFT-250	1 g	0.5 mm	EMR	In small hut. Instrument on concrete slab.	silt fill
Langley Municipal Hall	3/71	49.10 122.62	RFT-250	1 g	0.5 mm	EMR	One storey wood frame. Instrument on reinforced concrete basement floor slab.	clay
Matsqui Municipal Hall	3/71	49.05 122.32	RFT-250	1 g	0.5 mm	EMR	Two storey reinforced concrete. Instrument on concrete floor slab.	sand and gravel
Fort McPherson R.C.M.P. Residence	6/71	67.5 134.9	SMA-1	$\frac{1}{2}$ g	0.009 g	EMR	One storey wood frame. Instrument on concrete basement floor slab.	permafrost
Mica Creek Mica Creek Dam	5/72	52.0 118.5	SMA-1 (3 units)	1 g	0.019 g	BCHPA	Three locations in 800 foot high earth fill dam.	bedrock
Vancouver Manitoba Works Yard	12/72	49.21 123.11	RFT-250	1 g	0.5 mm	EMR	Two storey steel frame, masonry walls. Instrument on concrete floor slab over pile foundation.	alluvium
Delta Annacis Island	12/72	49.18 122.93	RFT-250	1 g	0.5 mm	EMR	One storey. Instrument on concrete floor slab.	alluvium
Victoria Law Courts Building	1/63	48.42 123.36	SMA-1	1 g	0.009 g	EMR	Five storey reinforced concrete. Instrument on concrete basement floor slab.	bedrock
Vancouver B.C. Hydro Building	7/63	49.28 123.12	AR-240	1 g	0.5 mm	EMR	Twenty-two storey reinforced concrete. Instrument on concrete floor in lower basement.	bedrock

†Coordinates supplied in degrees and minutes have been converted to the nearest 0.01 of a degree.

Accelerograph Sites in Western Canada (concl.)

<u>LOCATION</u>	<u>DATE</u>	<u>COORD †</u>	<u>INSTR</u>	<u>SENS</u>	<u>TRIGGER</u>	<u>OWNER</u>	<u>BUILDING</u>	<u>FOUNDATION</u>
Victoria University of Victoria	9/64	48.46 123.31	SMA-1	1 g	0.008 g	EMR	Three storey reinforced concrete. Part of foundation is reinforced concrete footings and part is 'Franki' piles. Instrument on concrete pier on basement floor slab.	clay
Port Alberni Pulp and Paper Mill	7/65	49.24 124.81	SMA-1	1 g	0.008 g	EMR	Two storey reinforced concrete. Instrument on concrete floor over a stiff cellular substructure built on wood piles.	sand and gravel
Campbell River Ladore Dam	7/65	50.01 125.39	SMA-1	1 g	0.009 g	EMR	Concrete gravity dam 140 feet high. Instrument on concrete floor near base of dam.	bedrock
Vancouver University of B.C.	8/65	49.26 123.25	AR-240	1 g	0.5 mm	EMR	Two storey building. Instrument on concrete floor slab.	sand and gravel
Comox St. Joseph's Hospital	8/67	49.67 124.94	SMA-1	1 g	0.009 g	EMR	Four storey reinforced concrete. Instrument on concrete pier at ground level.	glacial till
Richmond Massey Tunnel	9/67	49.12 123.08	AR-240	1 g	0.5 mm	EMR	Reinforced concrete tunnel in partial trench dredged in river bottom. Instrument on concrete floor about 50 feet below ground surface.	sand and silt
Pender Island Seismograph Station	11/76	48.82 123.32	SMA-1	1 g	0.009	EMR	One storey wood frame construction. Instrument on concrete floor slab.	bedrock

†Coordinates supplied in degrees and minutes have been converted to the nearest 0.01 of a degree

3. CANADIAN SEISMOLOGICAL DATA

3.1 *Rapid Telex Data*

All Canadian standard seismograph stations send telegraphic reports of P-phase arrivals to Ottawa five days a week. Additional information, such as teleseismic P-phase periods and amplitudes, P first motions and pP phase arrivals are also telegraphed when clearly recorded. The P-phase arrival time for all local earthquakes of magnitude equal to or greater than three are included in the telegraphed messages along with S-phase periods and amplitudes.

The U.S. Geological Survey, National Earthquake Information Service (NEIS) continues to make immediate use of the Canadian P-phase data in their fast hypocentre determinations. The telegraphed data from Canadian standard stations are made available with limited checking, within 48 hours to NEIS. Most Canadian P-wave data arrives at the NEIS data centre within ten days of the occurrence of each event. The P-wave data sent to NEIS are stored temporarily in the Departmental computer in Ottawa. These data are then accessed by NEIS using a teletype terminal and telephone lines. This procedure greatly decreases the delay in P-wave data reaching the NEIS data centre. Copies of the telegraphed P-arrival data are airmailed to Britain, Sweden and the U.S.S.R. for use of seismological institutions in those countries. NEIS relays Canadian data to the International Seismological Centre, Edinburgh, for inclusion in the ISC definitive calculations.

3.2 *Microfilm*

Thirty-five millimeter negative microfilm rolls of Canadian seismograms are stored in Ottawa. Copies of Canadian seismograms microfilm from January 1, 1962, to the present have been deposited with the World Data Center A for Seismology, Environmental Data Service, NOAA, Boulder, Colorado, 80302, U.S.A. Microfilm of records prior to 1962 is available to cooperating institutions on request to the Head, Canadian Seismograph Network, Division of Seismology and Geothermal Studies, Earth Physics Branch, Department of Energy, Mines and Resources, Ottawa, Canada, K1A 0Y3.

3.3 *Original Seismograms*

Original seismograms are normally available only to qualified Canadian research scientists, since microfilm is available at

Boulder, Colorado, to all others. On special request to the Director, Division of Seismology and Geothermal Studies, Earth Physics Branch, Department of Energy, Mines and Resources, Ottawa, Canada, K1A 0Y3, original Canadian seismograms may be loaned to qualified foreign requestors. This loan, in general, can be made only after the seismograms have been photographed; this avoids undue delay in getting complete microfilm from the Canadian Seismograph Network deposited in the World Data Center for use of all scientists.

Original Canadian seismograms dating back to and including 1965 are stored in Ottawa. Most seismograms previous to this date are on permanent loan to Lamont-Doherty Geological Observatory, Palisades, N.Y., U.S.A., 10964.

3.4 *Special Data*

Data and records from seismograph installations other than the standard and regional networks are available on special request to the Head, Canadian Seismograph Network, Division of Seismology and Geothermal Studies, Earth Physics Branch, Department of Energy, Mines and Resources, Ottawa, Canada, K1A 0Y3. These data include the SP and LP FM magnetic tapes from the Yellowknife arrays, the detection log and digital data of seismic signals produced by the real-time operating system, CANSAM, data from the tape of all events recorded on the long period digital tape system which was deployed in British Columbia until October 28, 1975, and seismograms produced by the telemetered networks and other special or temporary stations. A small charge is made for accessing and copying digital data.

3.5 *Canadian Earthquakes*

All significant earthquakes occurring in or near Canada are located by the Seismicity, Seismic Hazards and Applications section of the Division of Seismology and Geothermal Studies. A bimonthly catalogue of Canadian Earthquakes is produced approximately six months in arrears and distributed to interested institutions. An annual catalogue of Canadian earthquakes is produced for each calendar year. A composite digital tape file, the Canadian Earthquake Data File, is also maintained and updated each year. Commencing with 1974 data, all Canadian earthquake determinations, with their associated data, have also been submitted to the ISC for inclusion in its Bulletin.

4. STATION PROCEDURES

Seismograms from all stations are mailed weekly to Ottawa. On a weekly basis standard stations submit phase report sheets listing the arrival times of all P phases of teleseisms and also local earthquakes equal or greater than magnitude three. Local earthquake monthly summary sheets, seismogram log sheets and instrument log sheets are submitted from standard stations monthly. Regional stations submit only monthly seismogram log sheets. Quality control on station seismograms, data and log sheets is performed by Network staff in Ottawa prior to having the seismograms microfilmed.

The daily telegraphed messages from standard stations include all teleseisms with good P-wave onsets. If the maximum P-wave amplitude is in the first five seconds and exceeds four millimeters (peak-to-peak), the period and maximum zero-to-peak ground amplitude in millimicrons is included. Selected high gain stations telegraph periods and maximum ground amplitudes within the first minute of the P-wave train for all teleseisms. This procedure was introduced to improve m_b values for smaller events. For local earthquakes equal to or greater than magnitude three, P arrival times, maximum S-wave amplitudes and periods are telegraphed. Only the P arrival times from these messages are relayed to other seismological institutions.

5. STANDARD AND REGIONAL SEISMOGRAPH STATION INSTRUMENTATION

5.1 Instrument Changes During 1976

Starting in 1971, a rectangular (box-car) pulse was applied twice daily to the long-period seismographs. The pulse, consisting of a known value of current for a specified time (nominally 0.1 microampere for 7 seconds), is applied automatically by the chronometer and time control unit at 0000 hours and 1200 hours U.T., and produces the output pulse, an example of which is shown in Figure 5. By the simple procedure of superimposing a standard pulse on the recorded daily pulse, any significant change in the seismograph response characteristics can be detected. For a more complete description of the pulse calibration, see the report by Wickens et al. (1974).

The only standard station which does not have the pulse calibration circuitry is VIC.

Instrumental changes of calibrations were performed at the following stations during 1976. For any changes that resulted in more than one calibration curve being applicable during the year, the appropriate additional curves are included here.

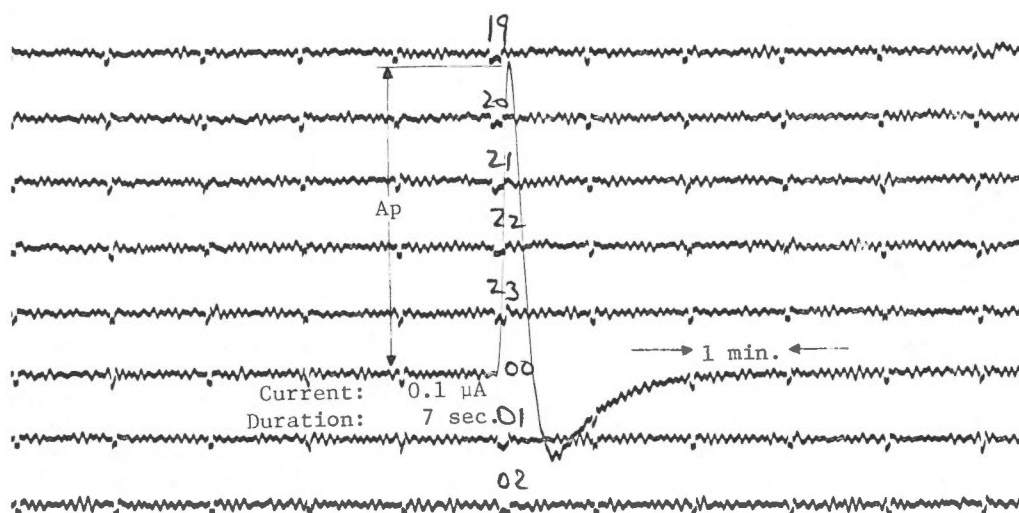


Figure 5. Pulse Calibration Example

Charlesbourg (CHQ). On May 14, 1976, the station was visited to replace the Geotech AR-311 amplifier with a modified EPB Pen Drive Amplifier in an unsuccessful attempt to eliminate local R.F. interference. The main problem was caused by pick up in the AS-330 preamplifier which was returned to Ottawa and mounted in a special metal box using feed-through filters which effectively eliminated the interference. On May 28, 1976, the system was returned to the station, installed, tested for interference and calibrated. The calibration was within 10% of the October, 1972, calibration and hence no new curve was drawn.

On October 5, 1976, the station was calibrated and routine maintenance performed. The resultant calibration curve was calculated in Ottawa.

LaMalbaie - Charlevoix Observatory (LMQ). The Charlevoix Observatory is located about 20 km southwest of LaMalbaie and 130 km northeast of Quebec City. The Observatory is instrumented by the Earth Physics Branch for the recording of variations in strain and tilt, tidal gravity and resistivity. The Observatory has also been used as one of the sites for local seismicity studies in the surrounding area. On November 3, 1976, a permanent short period vertical regional modular seismograph was installed and calibrated. The seismograph is operating with a one second period seismometer and a 0.5 to 20 Hz bandpass.

Edmonton (EDM). On April 21, 1976, the gain on the short period seismographs was increased by a factor of 1.2 from the November 28, 1974, calibrated levels. On May 27, 1976, the gain was increased again to improve the short period response. Calibration curves for these "Final" levels were calculated in Ottawa.

Fort St. James (FSJ). On April 20, 1976, the long period east galvanometer was found to have an open circuit. On May 6, 1976, a new galvanometer was installed and calibrated and a response curve calculated in Ottawa.

Frobisher (FRB). From October 19 to 24, 1976, the station was closed for calibration and maintenance. "As found and left" calibration curves were drawn for the long period east and short period seismographs which were in excellent agreement with the November 1972 calibrated levels. The long period vertical and north seismometer periods were both about one half second shorter than the 1972 values. The long period vertical galvanometer period was about 13 seconds

longer than the 1972 value. At the time of the 1972 calibration the lower section of the long period vertical galvanometer suspension was probably doubled over and subsequently straightened itself out. "As found" calibrations were performed before the seismometer periods were reset to 15 seconds and the "Final" calibrations performed.

La Grande (LGQ). On August 4, 1976, the regional station which is located near the La Grande 2 dam site, was activated and calibrated. The short period vertical seismometer has a one second period and the preamplifier (EPB 100) has a 0.5 - 20 Hz band-pass. The station is operated by the Bay James Corporation to monitor the background seismicity and any seismicity which may be induced due to the filling of the dam reservoirs.

La Pocatière (POC). On September 25, 1976, the galvanometer/pen assembly on the Helicorder stopped translating. The unit was sent to Ottawa for repair and on October 5, 1976, was reinstalled and the seismograph calibrated.

Sept Iles (SIC). The October 31, 1975 calibration curve which appeared in last year's publication was a theoretical curve assuming a 0.5 - 7.0 Hz. bandpass. The October 31, 1975 calibration data has been re-evaluated and a new curve drawn which indicates filter corner frequencies of 0.5 and 8.0 Hz.

5.2 Calibration Curves

Calibration curves for all standard and regional stations, listed alphabetically by station code, are given on the following pages. The curves for the photographic seismographs were obtained by application of the Willmore bridge method on site (Willmore, 1959). Regional station calibration curves are computed in Ottawa from the known seismograph instrument parameters. A smooth line response curve with no plotted points signifies a calculated rather than a calibrated response. Magnification and acceleration sensitivity of any instrument is determined from the curves by multiplying the velocity sensitivity by $2\pi/T$ and $T/2\pi$, respectively. The calibration sheets give the periods of the seismometers and galvanometers, and include other information such as the station coordinates, altitude, foundation material and date of calibration.

6. PERSONNEL

During 1976, Mr. R.J. Halliday was in charge of the Canadian Seismograph Network and was assisted in quality control and Network management by Mr. W.E. Shannon and Mr. D.R.J. Schieman. Mr. F. Lombardo continued as the Chief Technician of the Network for station maintenance, calibration and installation, assisted by Mr. P.A. Burns. Mr. R.B. Hayman was in charge of the Seismological Instrumentation Laboratory in Ottawa supporting and servicing the Network. Dr. F. Kollar gave particular attention to the Network instrumental problems and their solution.

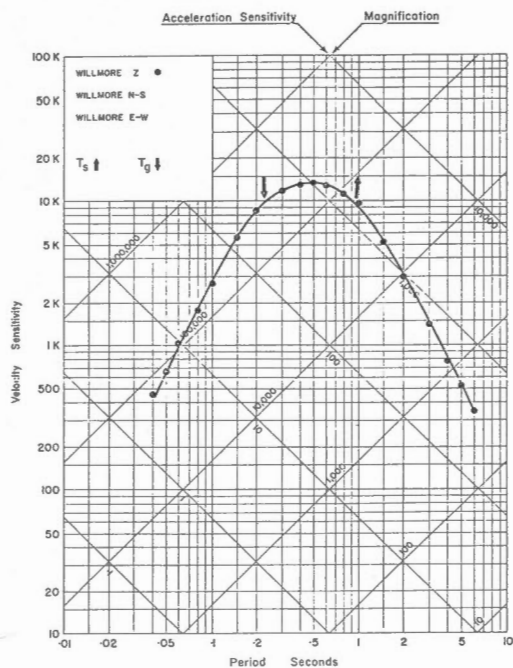
REFERENCES

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- Rogers, G.C. A Survey of the Canadian Strong Motion Seismograph Network. *Can. Geotech. J.*, 13, 1, 78-85, 1976.
- Weichert, D.H. The role of medium aperture arrays: The Yellowknife system. In: *Exploitation of Seismograph Networks*, NATO Advanced Study Institute Series E, No. 11, 1975.
- Wickens, A.J., H.S. Hasegawa and M.N. Bone. Pulse calibration and its application to the daily calibration of the Canadian standard seismograph network long-period seismometers. *Can. J. Earth Sci.*, 11, 691-697, 1974.
- Willmore, P.L. The application of the Maxwell impedance bridge to the calibration of electromagnetic seismographs. *Bull. Seis. Soc. Am.*, 49, 99-114, 1959.

STATION: ALERT, N.W.T. (AS FOUND AND LEFT) (ALE)

$\phi = 82^{\circ}29' N$ $\lambda = 62^{\circ}24' W$ Altitude 65M

Foundation: Permanently frozen glacial debris overlying Palaeozoic limestone



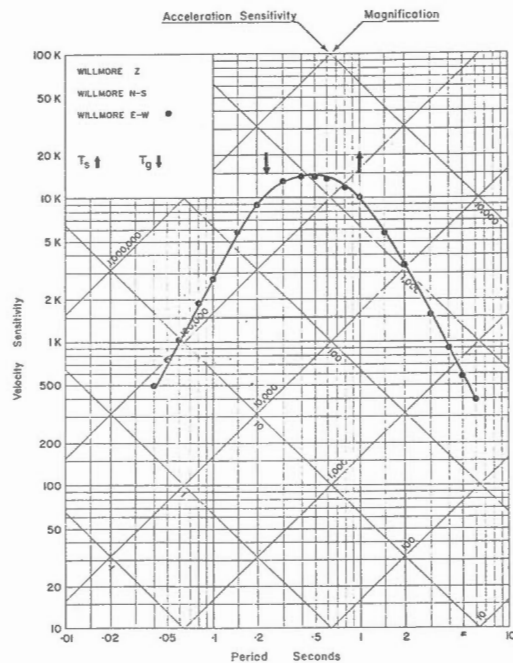
Dates of Calibration:

WILLMORE Z • April 11, 1972
WILLMORE N-S

STATION:ALERT, N.W.T.(AS FOUND AND LEFT) (ALE)

$\phi = 82^{\circ}29' N$ $\lambda = 62^{\circ}24' W$ Altitude 65M

Foundation: Permanently frozen glacial debris overlying Palaeozoic limestone.



Dates of Calibration:

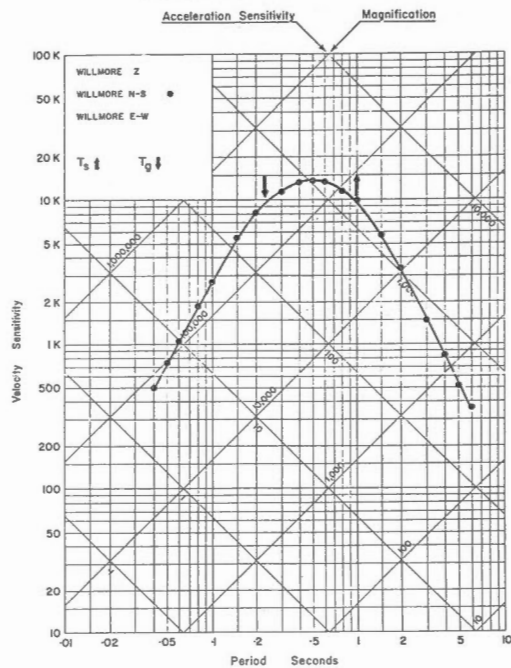
WILLMORE Z
WILLMORE N-S
WILLMORE E-W • April 11, 1972

STATION: ALERT, N.W.T. (ALE)

(As found and left)

$\phi = 82^{\circ}29' N$ $\lambda = 62^{\circ}24' W$ Altitude 65M

Foundation: Permanently frozen glacial debris overlying Palaeozoic limestone.



Dates of Calibration:

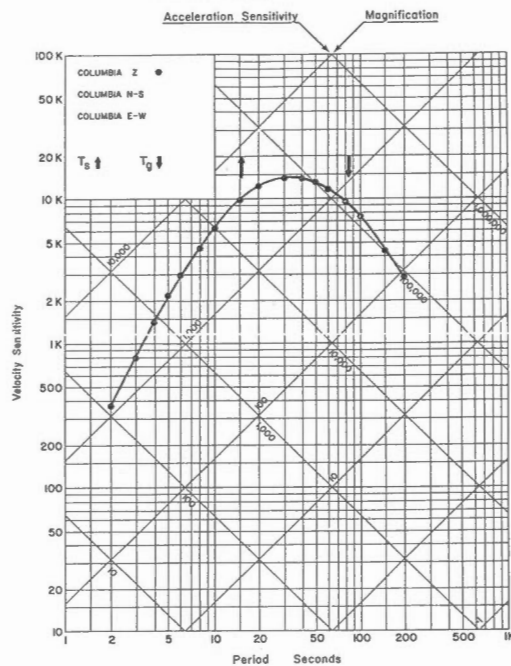
WILLMORE Z
WILLMORE N-S • April 11, 1972
WILLMORE E-W

STATION: ALERT, N.W.T. (ALE)

(Final)

$\phi = 82^{\circ}29' N$ $\lambda = 62^{\circ}24' W$ Altitude 65M

Foundation: Permanently frozen glacial debris overlying Palaeozoic limestone.



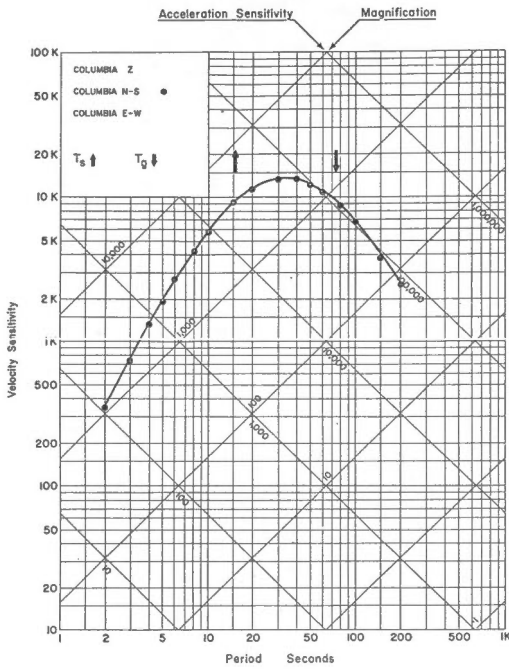
Dates of Calibration:

COLUMBIA Z • April 11, 1972
COLUMBIA N-S
COLUMBIA E-W

STATION: ALERT, N.W.T. (ALE)
(Final)

$\phi = 82^{\circ}29' N$ $\lambda = 62^{\circ}24' W$ Altitude 65M

Foundation: Permanently frozen glacial debris overlying Palaeozoic limestone.



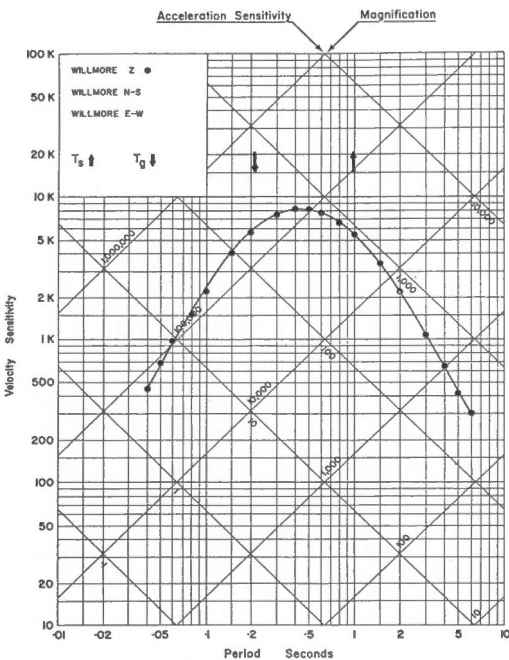
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • April 9, 1972
COLUMBIA E-W

STATION: BAKER LAKE, N.W.T. (As found and left) (BLC)

$\phi = 64^{\circ}19' N$ $\lambda = 96^{\circ}01' W$ Altitude 16M

Foundation: Granite Gneiss



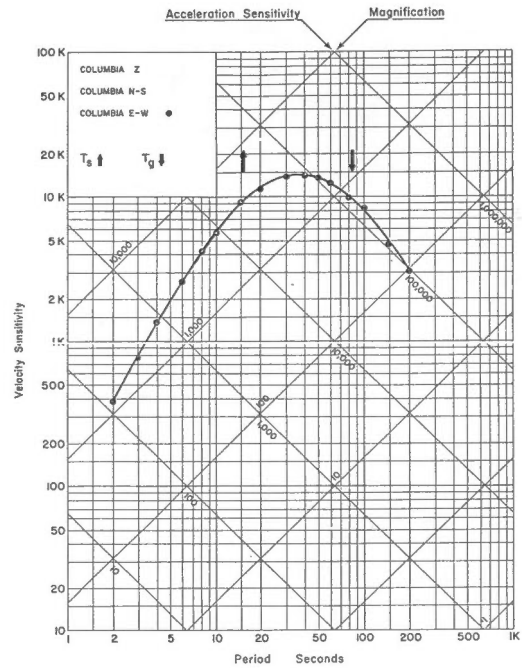
Dates of Calibration:

WILLMORE Z • Oct. 23, 1975
WILLMORE N-S
WILLMORE E-W

STATION: ALERT, N.W.T. (ALE)
(Final)

$\phi = 82^{\circ}29' N$ $\lambda = 62^{\circ}24' W$ Altitude 65M

Foundation: Permanently frozen glacial debris overlying Palaeozoic limestone.



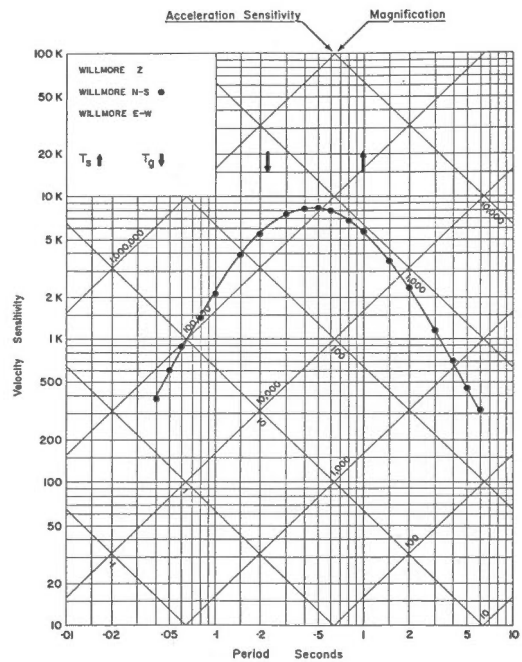
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • April 8, 1972

STATION: BAKER LAKE, N.W.T. (As found and left) (BLC)

$\phi = 64^{\circ}19' N$ $\lambda = 96^{\circ}01' W$ Altitude 16M

Foundation: Granite Gneiss



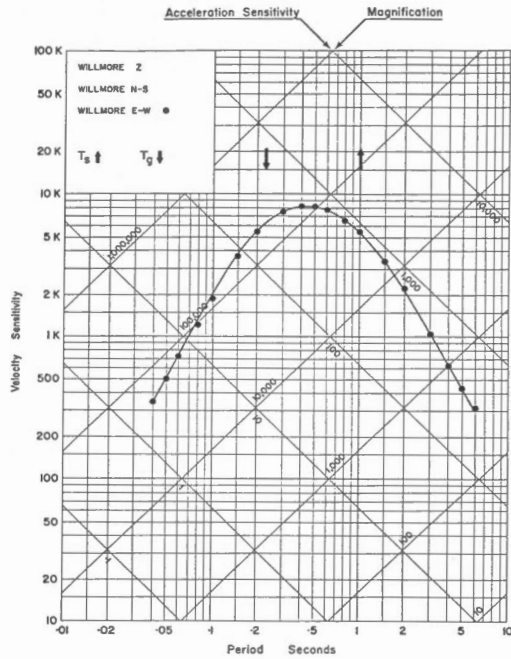
Dates of Calibration:

WILLMORE Z
WILLMORE N-S • Oct. 23, 1975
WILLMORE E-W

STATION: BAKER LAKE, N.W.T. (As found and left) (BLC)

$\phi = 64^{\circ}19'N$ $\lambda = 96^{\circ}01'W$ Altitude 16M

Foundation: Granite Gneiss



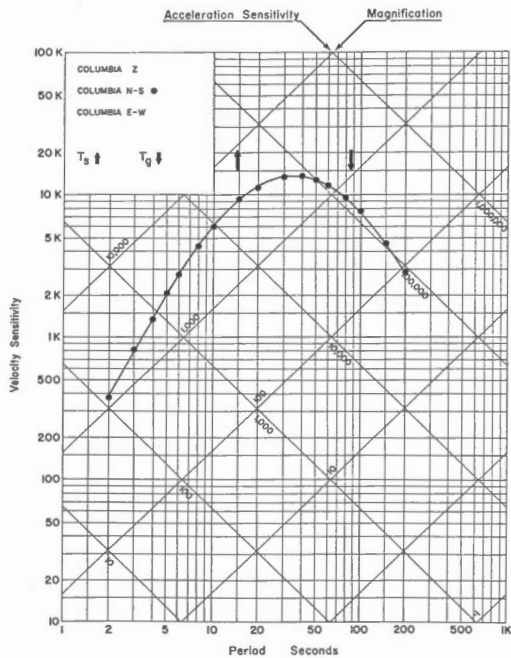
Dates of Calibration:

WILLMORE Z
WILLMORE N-S
WILLMORE E-W • October 23, 1975

STATION: BAKER LAKE, N.W.T. (As found and left) (BLC)

$\phi = 64^{\circ}19'N$ $\lambda = 96^{\circ}01'W$ Altitude 16M

Foundation: Granite Gneiss



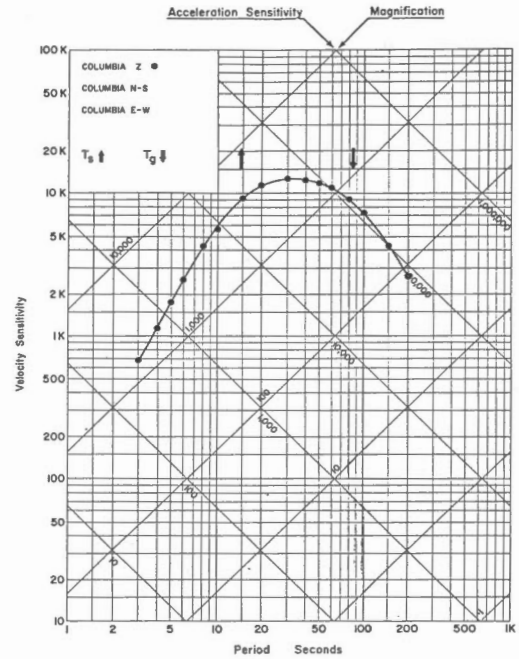
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • 23 Oct. 1975
COLUMBIA E-W

STATION: BAKER LAKE, N.W.T. (As found and left) (BLC)

$\phi = 64^{\circ}19'N$ $\lambda = 96^{\circ}01'W$ Altitude 16M

Foundation: Granite Gneiss



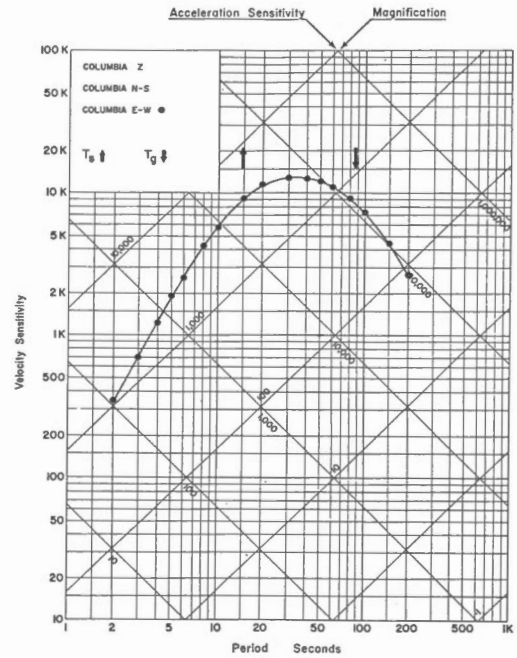
Dates of Calibration:

COLUMBIA Z • 23 Oct. 1975
COLUMBIA N-S
COLUMBIA E-W

STATION: BAKER LAKE, N.W.T. (As found and left) (BLC)

$\phi = 64^{\circ}19'N$ $\lambda = 96^{\circ}01'W$ Altitude 16M

Foundation: Granite Gneiss



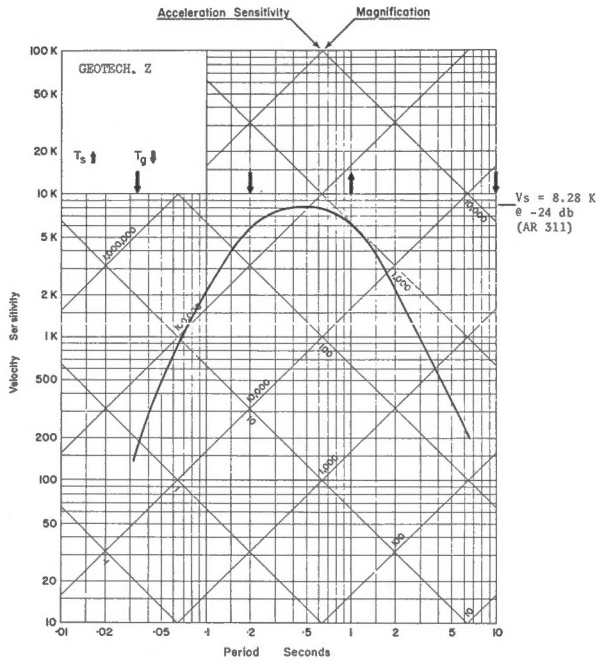
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • 23 Oct. 1975

STATION: CHARLESBOURG, QUE. (CHQ)

$\phi = 46^{\circ}53'23''N$ $\lambda = 71^{\circ}18'00''W$ Altitude 145 M

Foundation: Precambrian Gneiss



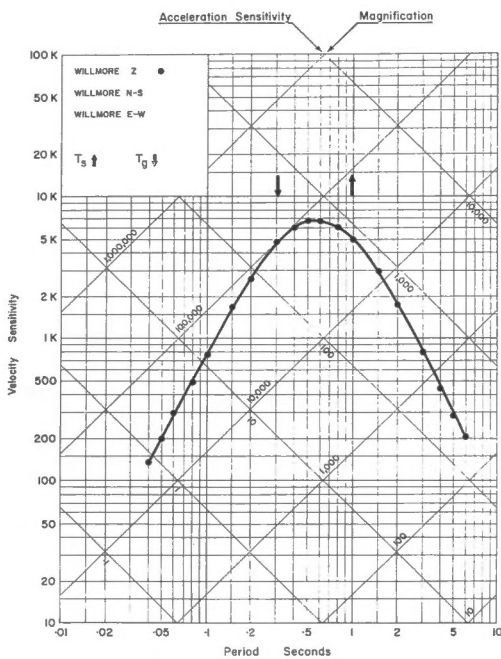
Dates of Calibration: October 1972

SEISMOMETER: Geotech. S13 $G_1 = 2.62$ V.S./C.M.
 PREAMPLIFIER: AS330 operated at 30-30 db (SEP.-ATT.)
 Filter Bandpass 0.1 - 5 Hz
 AMPLIFIER: AR 311 - 1 CM./Volt @ 24 db
 HELICORDER: RV 301 - 0-30 Hz

STATION: EDMONTON, ALTA. (EDM)
 (Final)

$\phi = 53^{\circ}13.3'N$ $\lambda = 113^{\circ}21'W$ Altitude 730M

Foundation: Unconsolidated Shales, Edmonton Formation



Dates of Calibration:

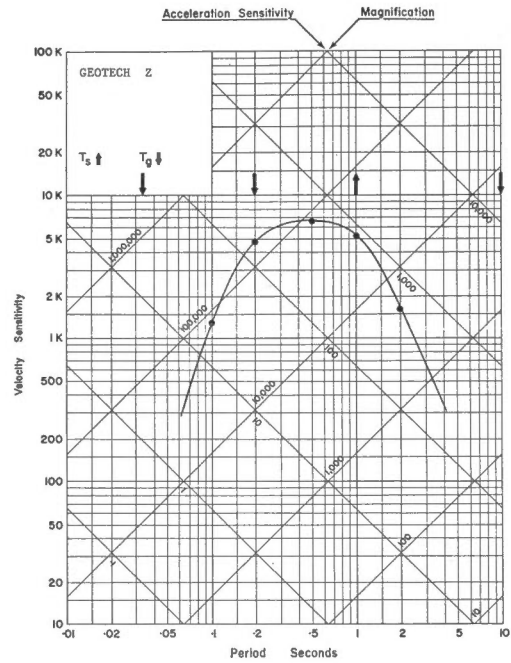
WILLMORE Z • November 28, 1974
 WILLMORE N-S
 WILLMORE E-W

STATION: CHARLESBOURG, QUE. (CHQ)

(CHQ)

$\phi = 46^{\circ}53'23''N$ $\lambda = 71^{\circ}18'00''W$ Altitude 145 m

Foundation: Precambrian Gneiss



DATE OF CALIBRATION: OCT. 5, 1976

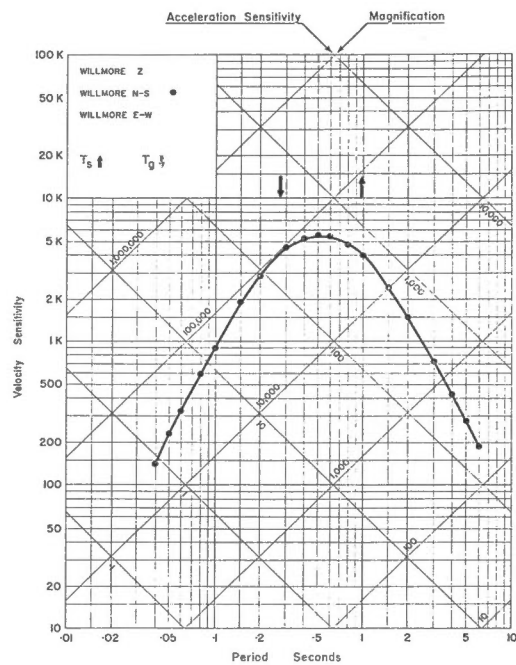
SEISMOMETER: Geotech S-13
 PREAMPLIFIER: Geotech AS330
 PEN DRIVE AMP: E.P.B.R. 110
 HELICORDER: Geotech RY301

Corner frequencies indicated by T_g arrows.

STATION: EDMONTON, ALTA. (EDM)
 (Final)

$\phi = 53^{\circ}13.3'N$ $\lambda = 113^{\circ}21'W$ Altitude 730M

Foundation: Unconsolidated Shales, Edmonton Formation



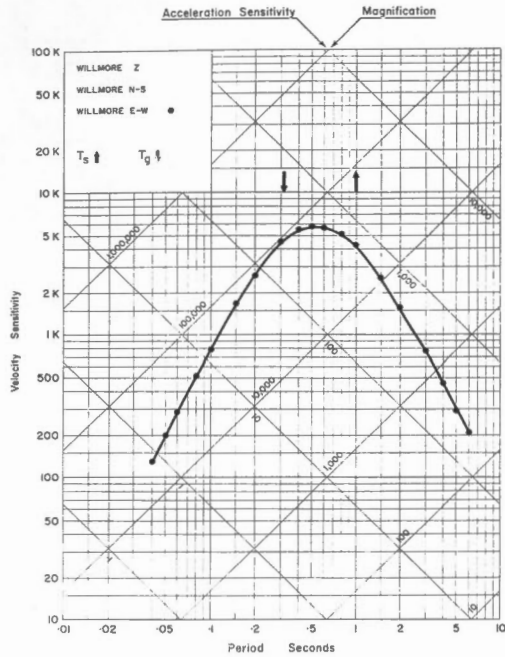
Dates of Calibration:

WILLMORE Z
 WILLMORE N-S • November 28, 1974
 WILLMORE E-W

STATION: EDMONTON, ALTA. (EDM)
(Final)

$\phi = 53^{\circ}13.3'N$ $\lambda = 113^{\circ}21'W$ Altitude 730M

Foundation: Unconsolidated Shales, Edmonton Formation

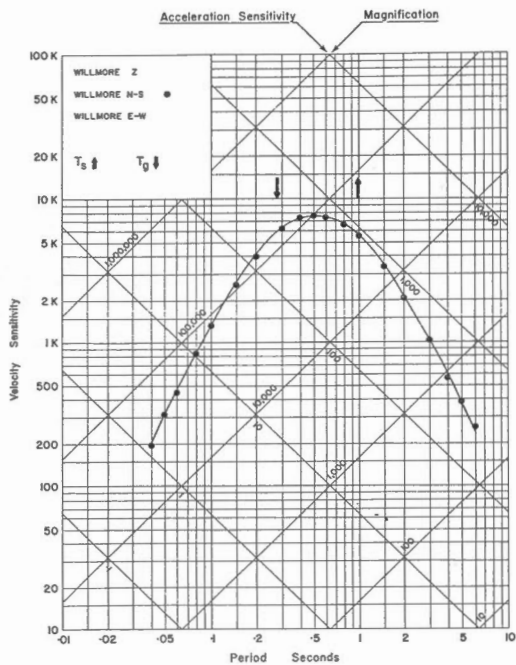


Dates of Calibration:
WILLMORE Z
WILLMORE N-S
WILLMORE E-W • November 28, 1974

STATION: EDMONTON, ALTA. (EDM)
(Final)

$\phi = 53^{\circ}13.3'N$ $\lambda = 113^{\circ}21'W$ Altitude 730 m

Foundation: Unconsolidated Shales, Edmonton Formation

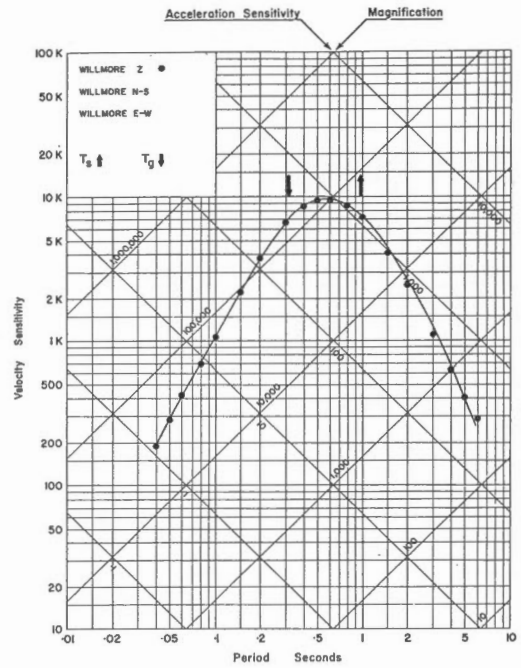


Dates of Calibration:
WILLMORE Z
WILLMORE N-S • May 27, 1976
WILLMORE E-W

STATION: EDMONTON, ALTA. (EDM)
(Final)

$\phi = 53^{\circ}13.3'N$ $\lambda = 113^{\circ}21'W$ Altitude 730 m

Foundation: Unconsolidated Shales, Edmonton Formation

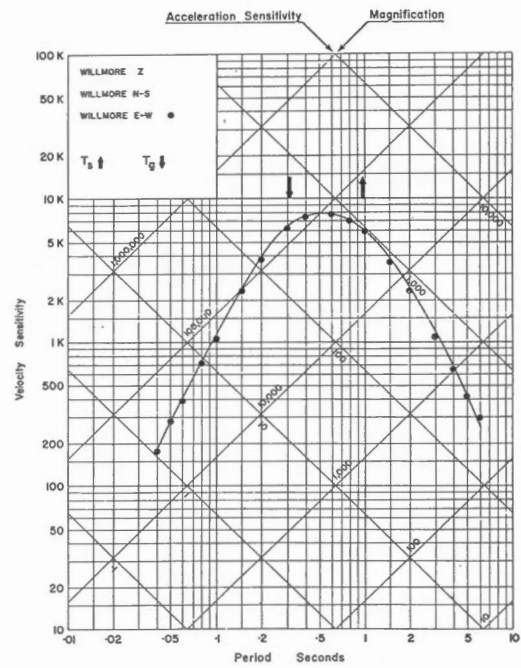


Dates of Calibration:
WILLMORE Z • May 27, 1976
WILLMORE N-S
WILLMORE E-W

STATION: EDMONTON, ALTA. (EDM)
(Final)

$\phi = 53^{\circ}13.3'N$ $\lambda = 113^{\circ}21'W$ Altitude 730 m

Foundation: Unconsolidated Shales, Edmonton Formation

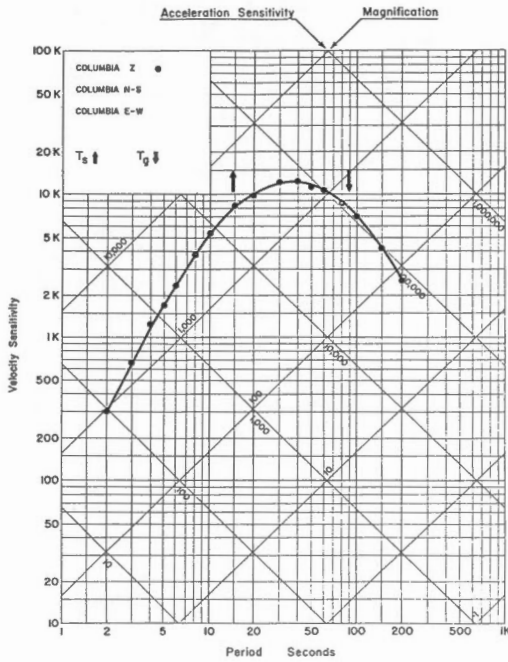


Dates of Calibration:
WILLMORE Z
WILLMORE N-S
WILLMORE E-W • May 27, 1976

STATION: EDMONTON, ALTA. (EDM)
(Final)

$\phi = 53^{\circ}13.3'N$ $\lambda = 113^{\circ}21'W$ Altitude 730M

Foundation: Unconsolidated Shales, Edmonton Formation



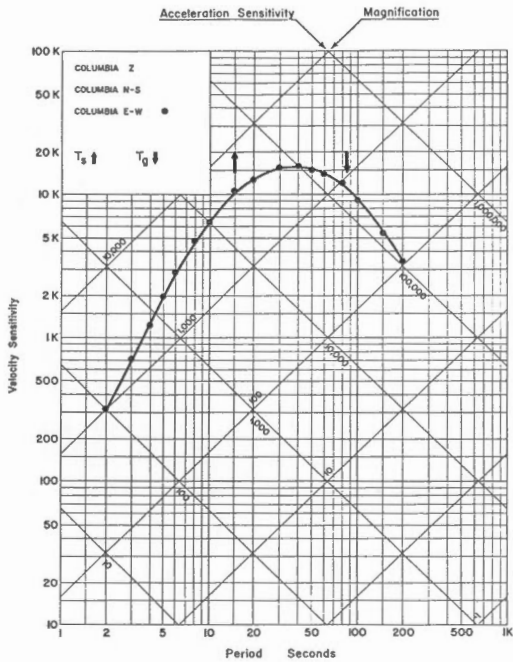
Dates of Calibration:

COLUMBIA Z • November 27, 1974
COLUMBIA N-S
COLUMBIA E-W

STATION: EDMONTON, ALTA. (EDM)
(As Found)

$\phi = 53^{\circ}13.3'N$ $\lambda = 113^{\circ}21'W$ Altitude 730M

Foundation: Unconsolidated Shales, Edmonton Formation



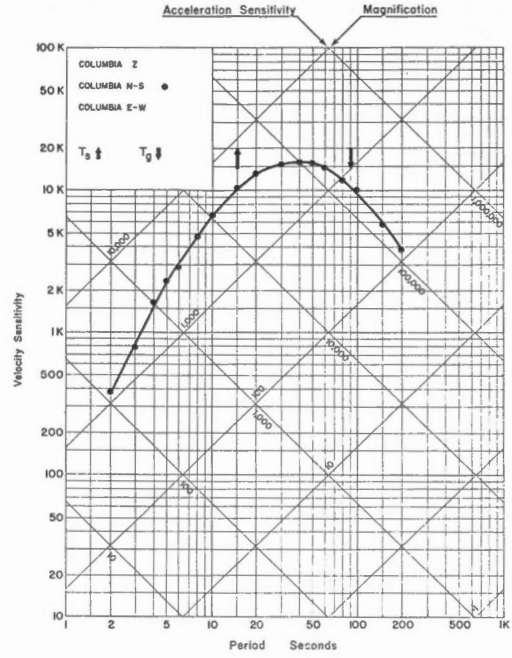
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • November 28, 1974

STATION: EDMONTON, ALTA. (EDM)
(As found)

$\phi = 53^{\circ}13.3'N$ $\lambda = 113^{\circ}21'W$ Altitude 730M

Foundation: Unconsolidated Shales, Edmonton Formation



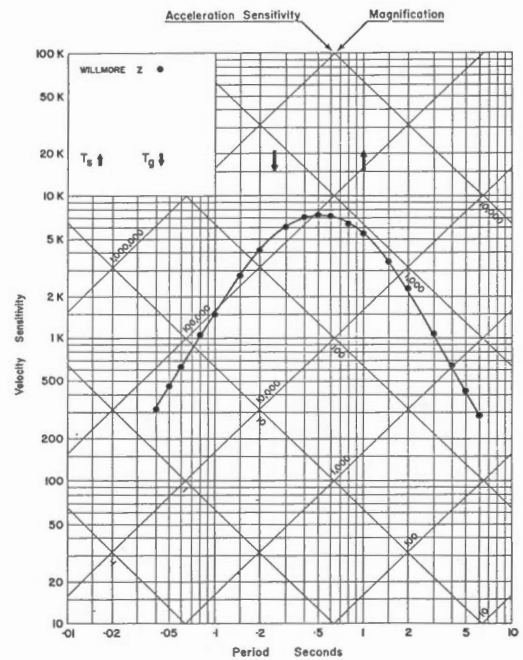
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • November 27, 1974
COLUMBIA E-W

STATION: FORT CHURCHILL, MAN. (As found and left) (FCC)

$\phi = 58^{\circ}45.7'N$ $\lambda = 94^{\circ}05.2'W$ Altitude 39 M

Foundation: Precambrian sediments and volcanic rocks



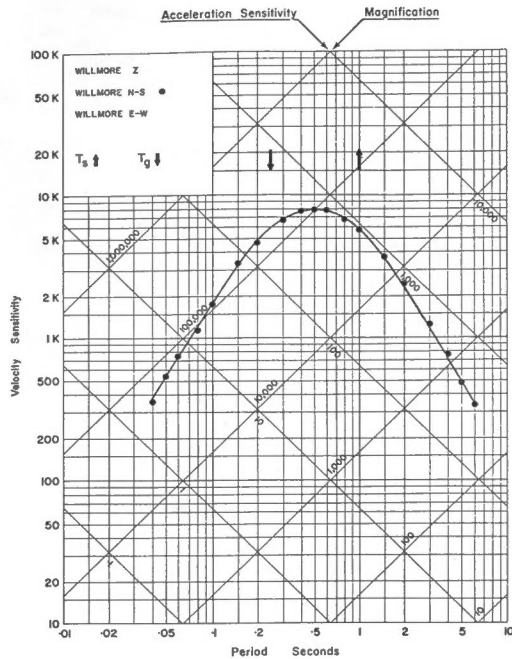
Dates of Calibration:

WILLMORE Z • Oct. 21, 1975

STATION: FORT CHURCHILL, MAN. (As found and left) (PCC)

$\phi = 58^{\circ}45.7'N$ $\lambda = 94^{\circ}05.2'W$ Altitude 39 M

Foundation: Precambrian sediments and volcanic rocks



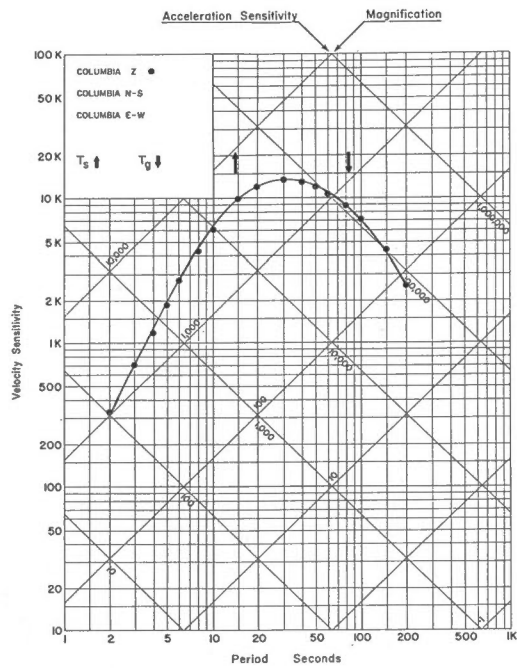
Dates of Calibration:

WILLMORE Z
WILLMORE N-S • Oct. 21, 1975
WILLMORE E-W

STATION: FORT CHURCHILL, MAN. (Final) (PCC)

$\phi = 58^{\circ}45.7'N$ $\lambda = 94^{\circ}05.2'W$ Altitude 39 M

Foundation: Precambrian sediments and volcanic rocks



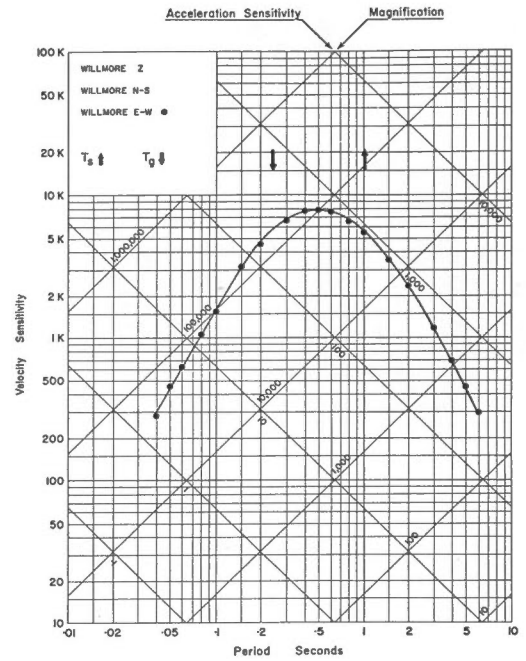
Dates of Calibration:

COLUMBIA Z • Oct. 26, 1975
COLUMBIA N-S
COLUMBIA E-W

STATION: FORT CHURCHILL, MAN. (As found and left) (PCC)

$\phi = 58^{\circ}45.7'N$ $\lambda = 94^{\circ}05.2'W$ Altitude 39 M

Foundation: Precambrian sediments and volcanic rocks



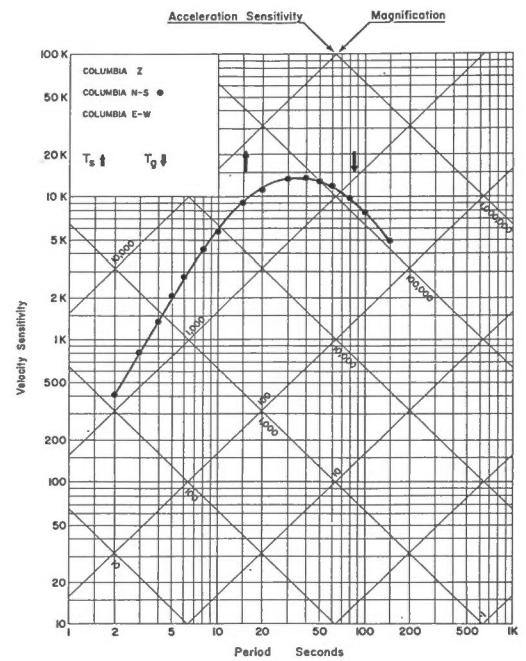
Dates of Calibration:

WILLMORE Z
WILLMORE N-S
WILLMORE E-W • Oct. 21, 1975

STATION: FORT CHURCHILL, MAN. (As found and left) (PCC)

$\phi = 58^{\circ}45.7'N$ $\lambda = 94^{\circ}05.2'W$ Altitude 39 M

Foundation: Precambrian sediments and volcanic rocks



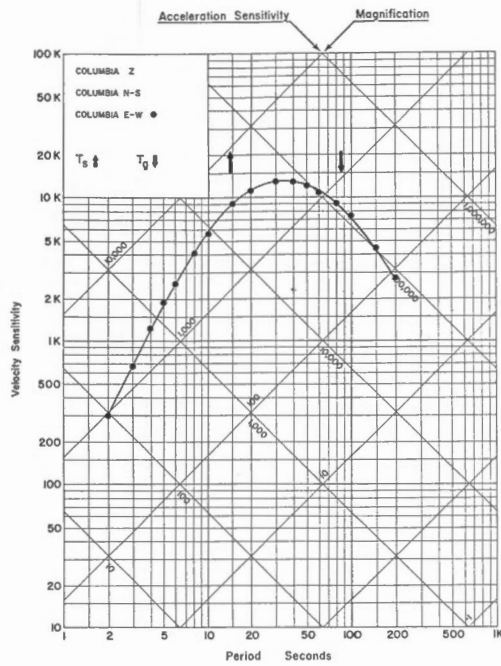
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • Oct. 25, 1975
COLUMBIA E-W

STATION: FORT CHURCHILL, MAN. (Final) (FFC)

$\phi = 58^{\circ}45.7'N$ $\lambda = 94^{\circ}05.2'W$ Altitude 39 M

Foundation: Precambrian sediments and volcanic rocks



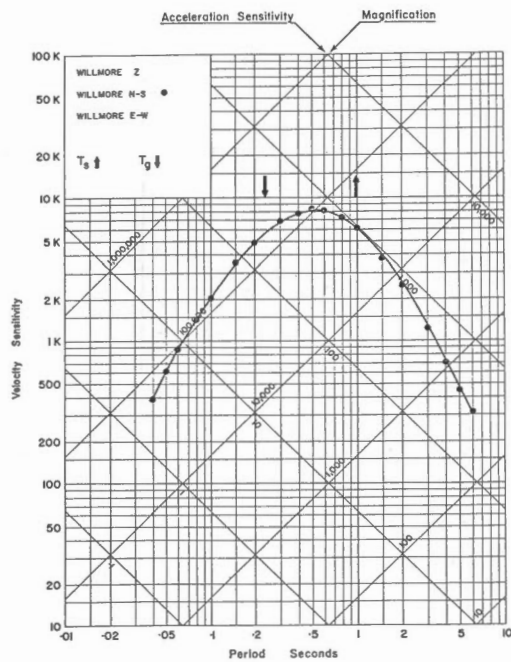
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • Oct. 26, 1975

STATION: FLIN FLON, MAN. (As Found & Left) (FFC)

$\phi = 54^{\circ}43.5'N$ $\lambda = 101^{\circ}58.7'W$ Altitude 338 M

Foundation: Granite Gneiss



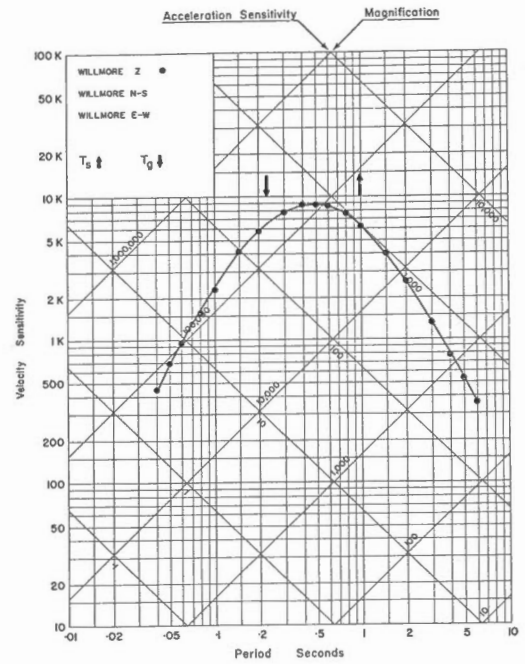
Dates of Calibration: June 20, 1975

WILLMORE Z
WILLMORE N-S •
WILLMORE E-W

STATION: FLIN FLON, MAN. (FFC)
(As Found & Left)

$\phi = 54^{\circ}43.5'N$ $\lambda = 101^{\circ}58.7'W$ Altitude 338 M

Foundation: Granite Gneiss



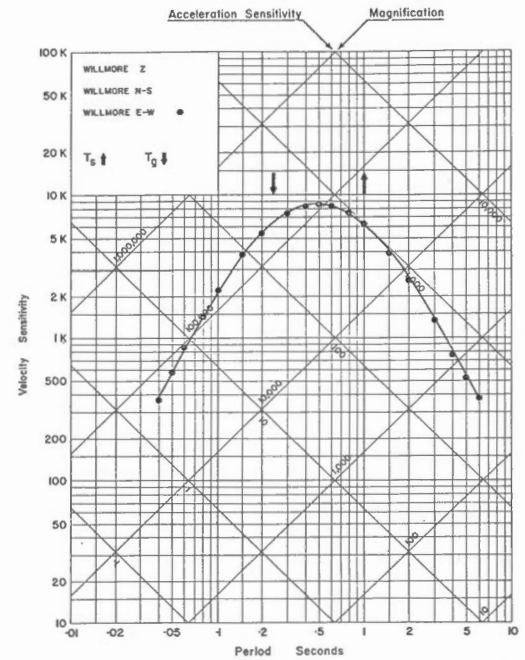
Dates of Calibration: June 20, 1975

WILLMORE Z •
WILLMORE N-S
WILLMORE E-W

STATION: FLIN FLON, MAN. (FFC)
(As Found & Left)

$\phi = 54^{\circ}43.5'N$ $\lambda = 101^{\circ}58.7'W$ Altitude 338 M

Foundation: Granite Gneiss



Dates of Calibration: June 20, 1975

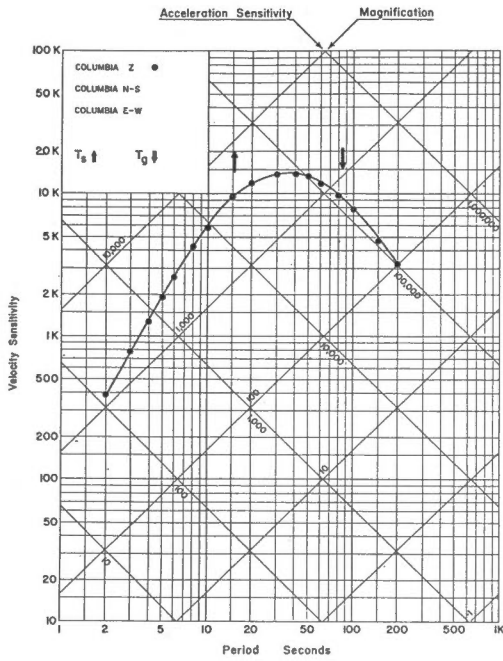
WILLMORE Z
WILLMORE N-S
WILLMORE E-W •

STATION: FLIN FLON, MAN. (FFC)

(As Found & Left)

$\phi = 54^{\circ}43.5'N$ $\lambda = 101^{\circ}58.7'W$ Altitude 338 M

Foundation: Granite Gneiss



Dates of Calibration: June 20, 1975

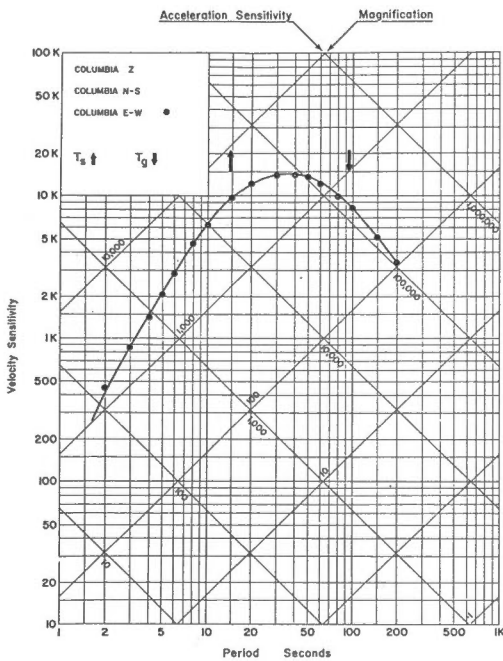
COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W

STATION: FLIN FLON, MAN. (FFC)

(As Found & Left)

$\phi = 54^{\circ}43.5'N$ $\lambda = 101^{\circ}58.7'W$ Altitude 338 M

Foundation: Granite Gneiss



Dates of Calibration: June 19, 1975

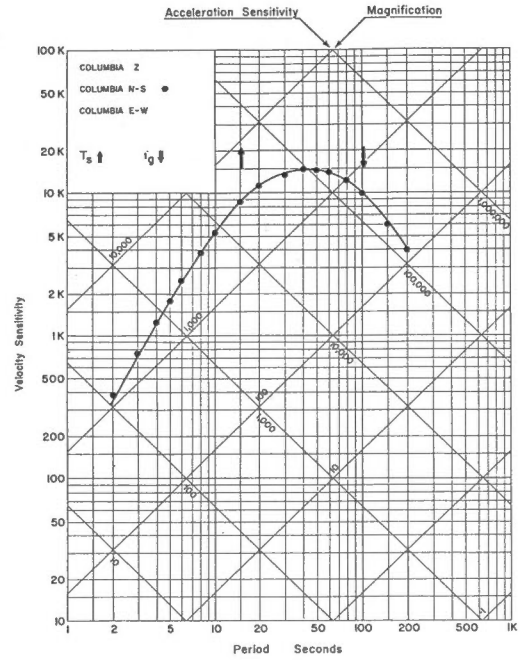
COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W

STATION: FLIN FLON, MAN. (FFC)

(As Found & Left)

$\phi = 54^{\circ}43.5'N$ $\lambda = 101^{\circ}58.7'W$ Altitude 338 M

Foundation: Granite Gneiss



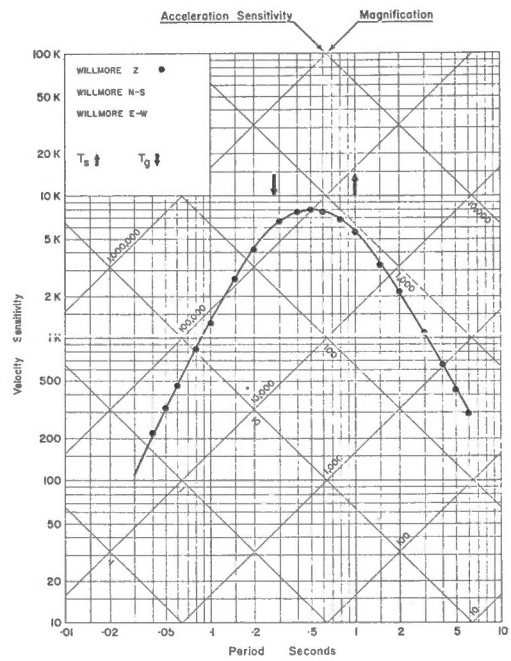
Dates of Calibration: June 18, 1975

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W

STATION: FROBISHER, N.W.T. (FRB) (FINAL)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 M

Foundation: Precambrian metamorphic rock.



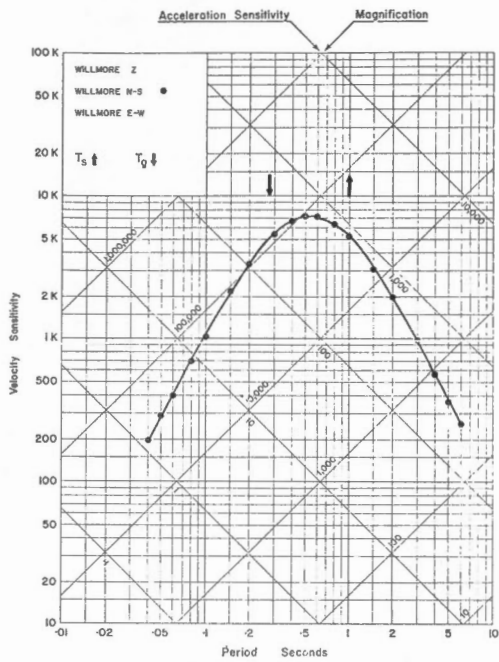
Dates of Calibration:

WILLMORE Z • Nov. 28, 1972
WILLMORE N-S
WILLMORE E-W

STATION: FROBISHER, N.W.T. (FRB) (FINAL)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 M

Foundation: Precambrian metamorphic rock



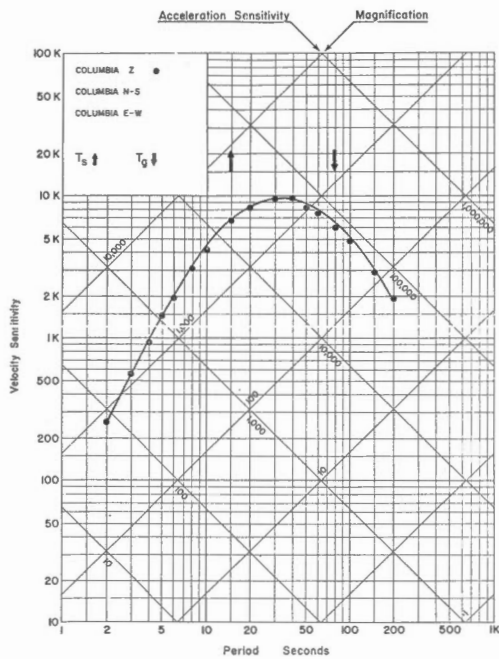
Dates of Calibration:

WILLMORE Z
WILLMORE N-S • Nov. 28, 1972
WILLMORE E-W

STATION: FROBISHER, N.W.T. (FRB) (FINAL)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 M

Foundation: Precambrian metamorphic rock



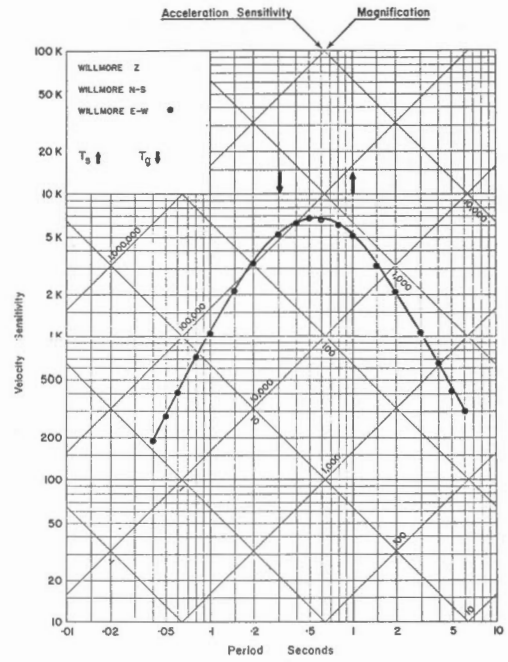
Dates of Calibration:

COLUMBIA Z • Nov. 29, 1972
COLUMBIA N-S
COLUMBIA E-W

STATION: FROBISHER, N.W.T. (FRB) (FINAL)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 M

Foundation: Precambrian metamorphic rock



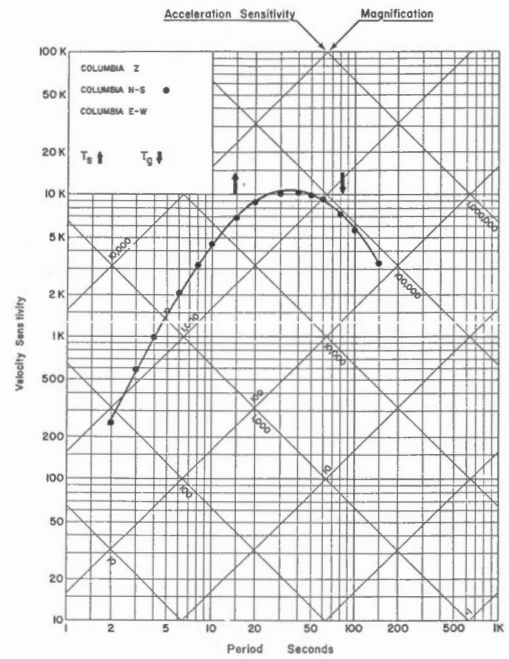
Dates of Calibration:

WILLMORE Z
WILLMORE N-S • Nov. 28, 1972
WILLMORE E-W

STATION: FROBISHER, N.W.T. (FRB) (FINAL)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 M

Foundation: Precambrian metamorphic rock



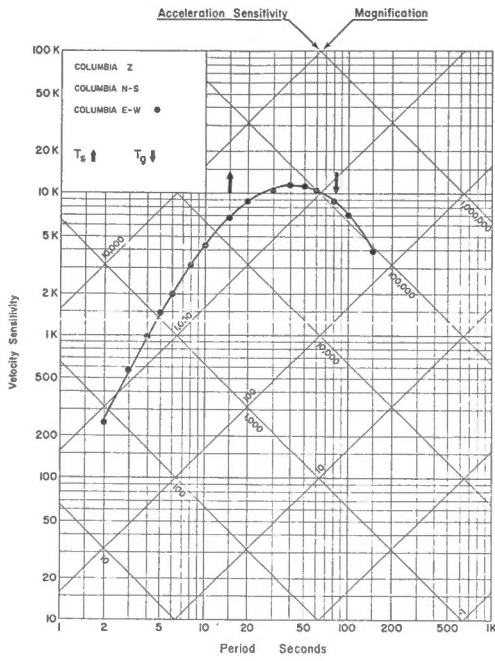
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • Nov. 29, 1972
COLUMBIA E-W

STATION: FROBISHER, N.W.T. (FRB) (FINAL)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 M

Foundation: Precambrian metamorphic rock



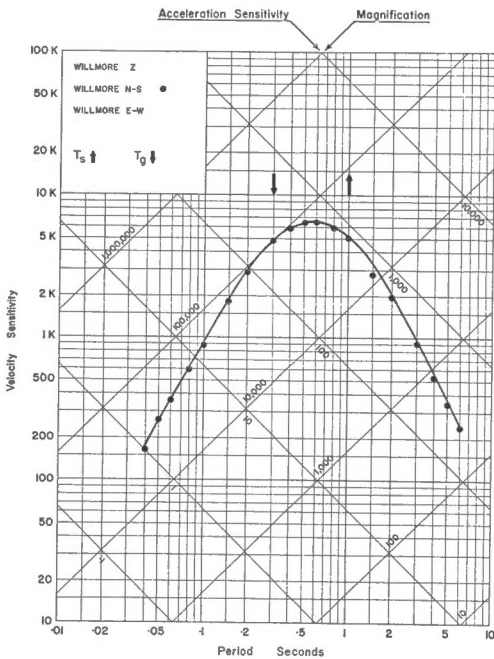
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • Nov. 30, 1972

STATION: FROBISHER, N.W.T. (FRB)
(As found & left)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 m

Foundation: Precambrian metamorphic rock



Dates of Calibration:

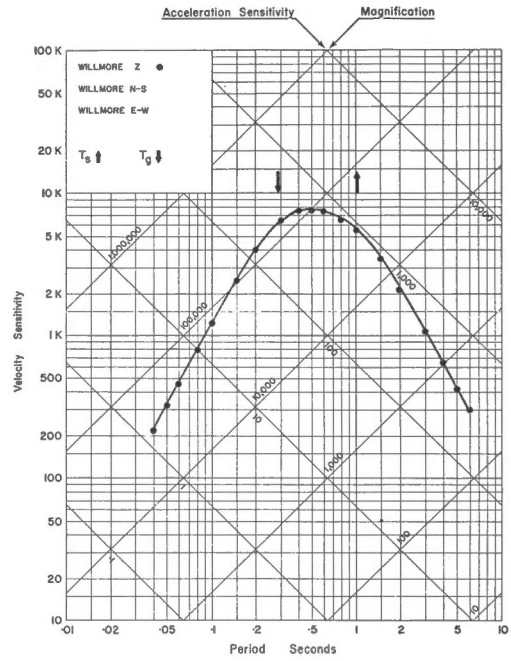
WILLMORE Z
WILLMORE N-S • Oct. 20, 1976
WILLMORE E-W

STATION: FROBISHER, N.W.T. (FRB)

(As found & left)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 m

Foundation: Precambrian metamorphic rock



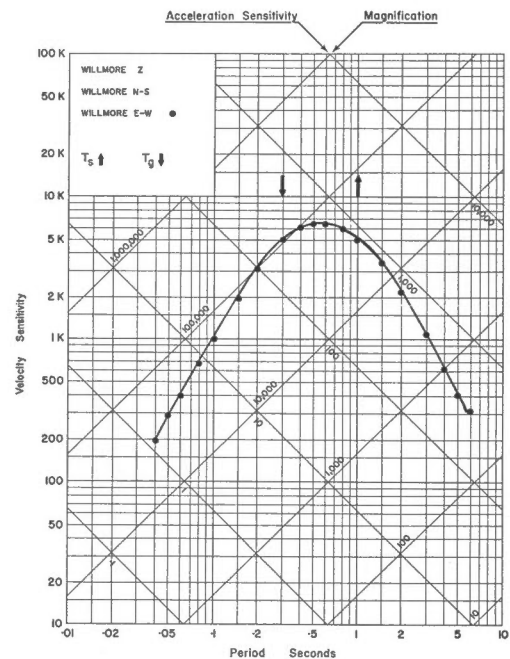
Dates of Calibration:

WILLMORE Z • Oct. 20, 1976
WILLMORE N-S
WILLMORE E-W

STATION: FROBISHER, N.W.T. (FRB)
(As found & left)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 m

Foundation: Precambrian metamorphic rock



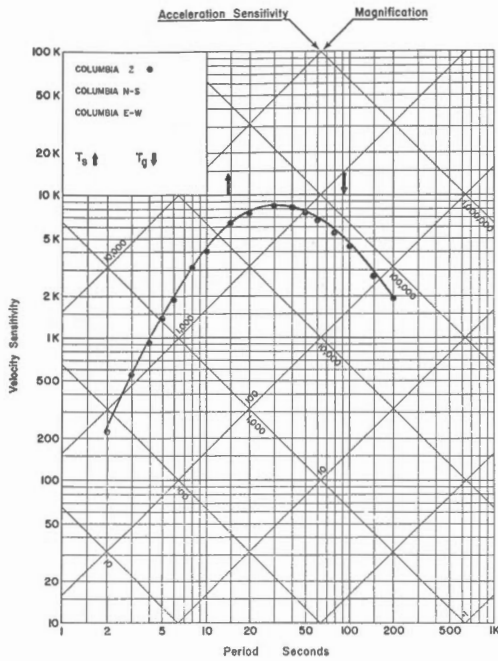
Dates of Calibration:

WILLMORE Z
WILLMORE N-S
WILLMORE E-W • Oct. 20, 1976

STATION: FROBISHER, N.W.T. (FRB)
(As found)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 m

Foundation: Precambrian metamorphic rock



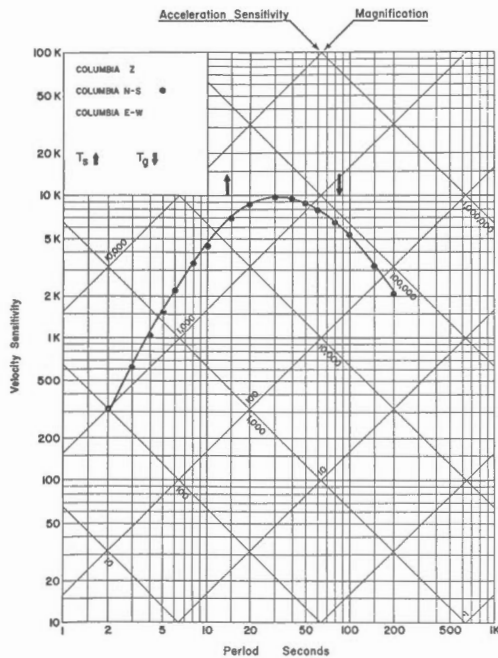
Dates of Calibration:

COLUMBIA Z • Oct. 21, 1976
COLUMBIA N-S
COLUMBIA E-W

STATION: FROBISHER, N.W.T. (FRB)
(As found)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 m

Foundation: Precambrian metamorphic rock



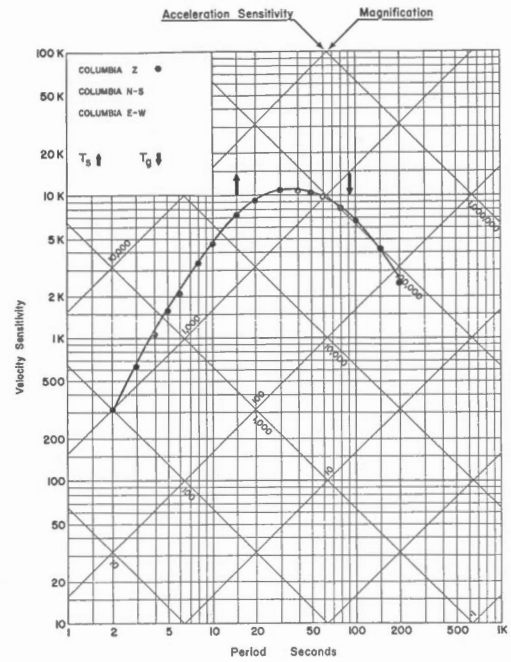
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • Oct. 21, 1976
COLUMBIA E-W

STATION: FROBISHER, N.W.T. (FRB)
(Final)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 m

Foundation: Precambrian metamorphic rock



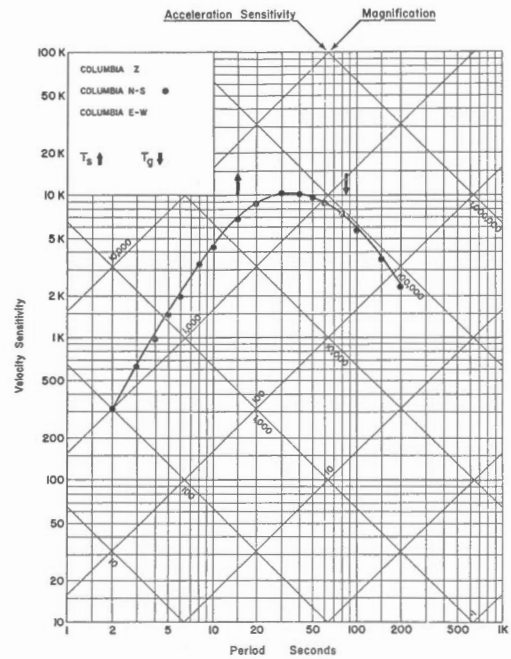
Dates of Calibration:

COLUMBIA Z • Oct. 23, 1976
COLUMBIA N-S
COLUMBIA E-W

STATION: FROBISHER, N.W.T. (FRB)
(Final)

$\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 m

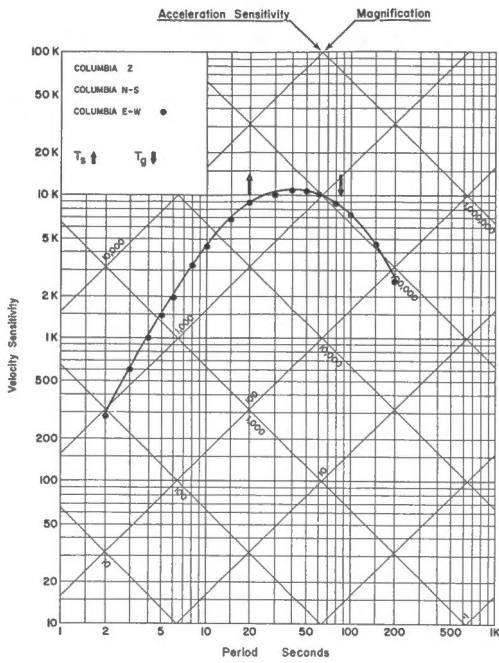
Foundation: Precambrian metamorphic rock



Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • Oct. 23, 1976
COLUMBIA E-W

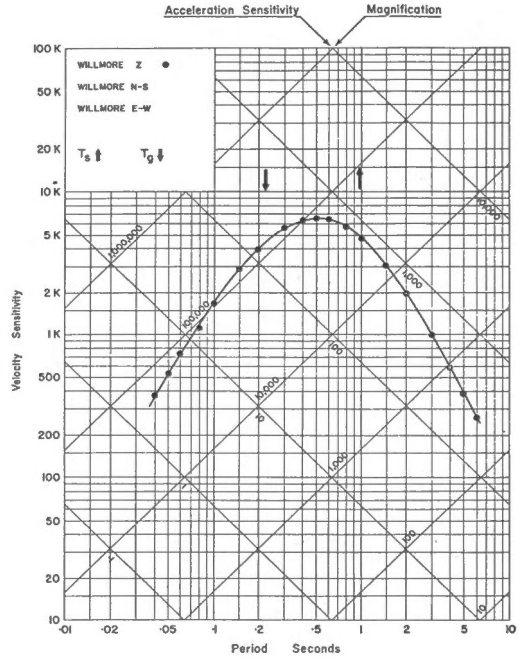
STATION: FROBISHER, N.W.T. (FRB)
 (As found & left)
 $\phi = 63^{\circ}44.8'N$ $\lambda = 68^{\circ}32.8'W$ Altitude 18 m
 Foundation: Precambrian metamorphic rock



Dates of Calibration:
 COLUMBIA Z
 COLUMBIA N-S
 COLUMBIA E-W • Oct. 22, 1976

STATION: FORT ST. JAMES, B.C. (FSJ)
 (Final)
 $\phi = 54^{\circ}26'N$ $\lambda = 124^{\circ}15'W$ Altitude 772 M
 Foundation: Palaeozoic Sediments

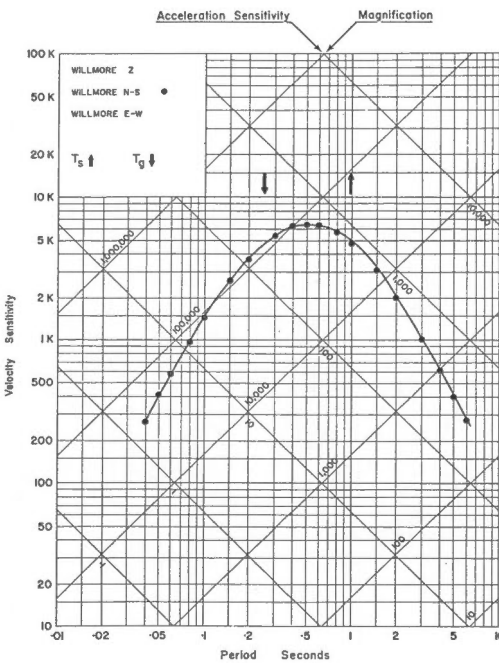
STATION: FORT ST. JAMES, B.C. (FSJ)
 (Final)
 $\phi = 54^{\circ}26'N$ $\lambda = 124^{\circ}15'W$ Altitude 772 M
 Foundation: Palaeozoic Sediments



Dates of Calibration: May 8, 1975

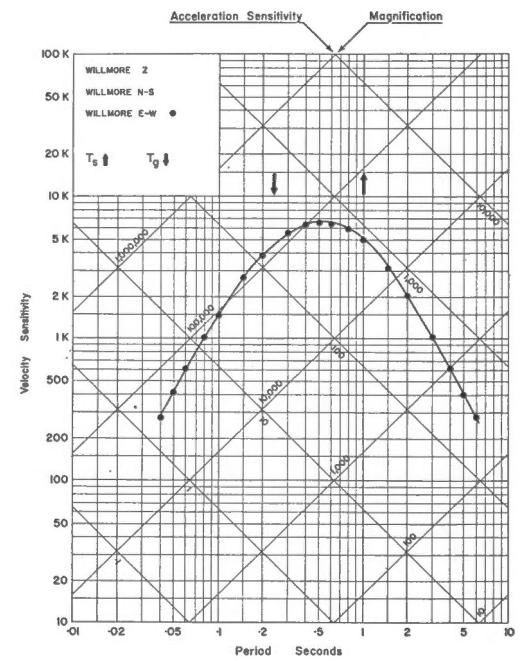
WILLMORE Z •
 WILLMORE N-S
 WILLMORE E-W

STATION: FORT ST. JAMES, B.C. (FSJ)
 (Final)
 $\phi = 54^{\circ}26'N$ $\lambda = 124^{\circ}15'W$ Altitude 772 M
 Foundation: Palaeozoic Sediments



Dates of Calibration: May 8, 1975

WILLMORE Z
 WILLMORE N-S •
 WILLMORE E-W



Dates of Calibration: May 8, 1975

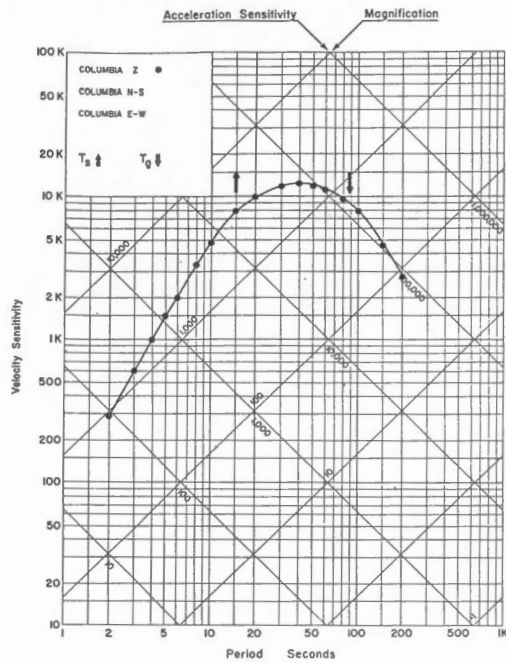
WILLMORE Z
 WILLMORE N-S
 WILLMORE E-W •

STATION: FORT ST. JAMES, B.C. (FSJ)

(As Found & Left)

$\phi = 54^{\circ}26'N$ $\lambda = 124^{\circ}15'W$ Altitude 772 M

Foundation: Palaeozoic Sediments



Dates of Calibration: May 8, 1975

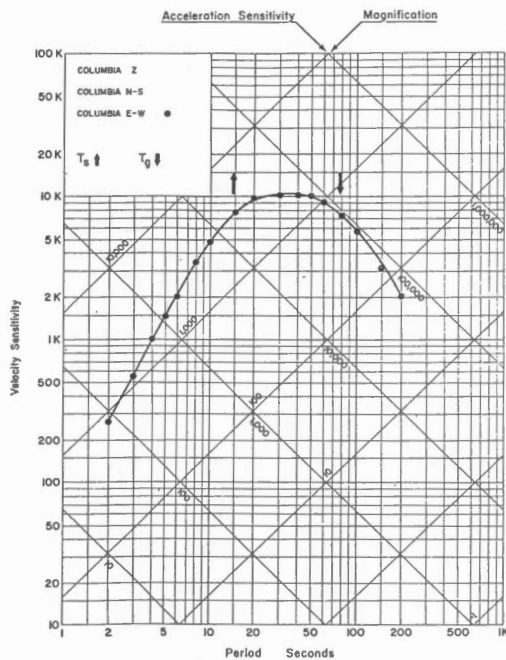
COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W

STATION: FORT ST. JAMES, B.C. (FSJ)

(As Found & Left)

$\phi = 54^{\circ}26'N$ $\lambda = 124^{\circ}15'W$ Altitude 772 M

Foundation: Palaeozoic Sediments



Dates of Calibration: May 8, 1975

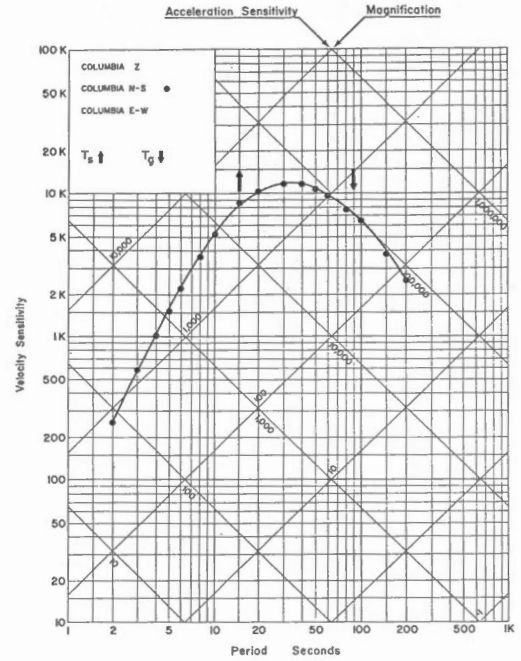
COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W

STATION: FORT ST. JAMES, B.C. (FSJ)

(As Found & Left)

$\phi = 54^{\circ}26'N$ $\lambda = 124^{\circ}15'W$ Altitude 772 M

Foundation: Palaeozoic Sediments



Dates of Calibration: May 8, 1975

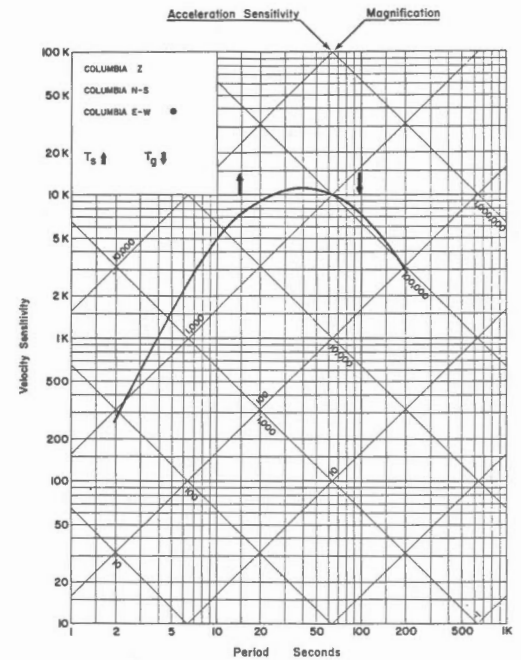
COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W

STATION: FORT ST. JAMES, B.C. (FSJ)

(As Found & Left)

$\phi = 54^{\circ}26'N$ $\lambda = 124^{\circ}15'W$ Altitude 772 M

Foundation: Palaeozoic Sediments



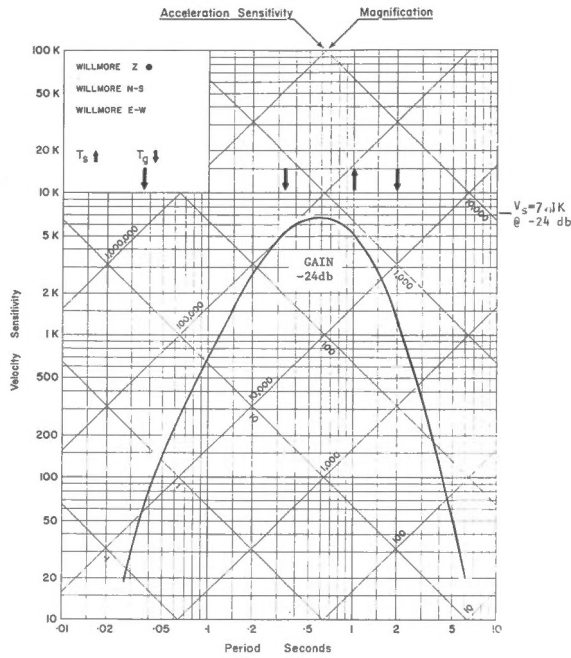
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • May 6, 1976

STATION: HALIFAX, N.S. (HAL)

$\phi = 44^{\circ}38'N$ $\lambda = 63^{\circ}36'W$ Altitude 56M

Foundation: Carbonaceous Slate



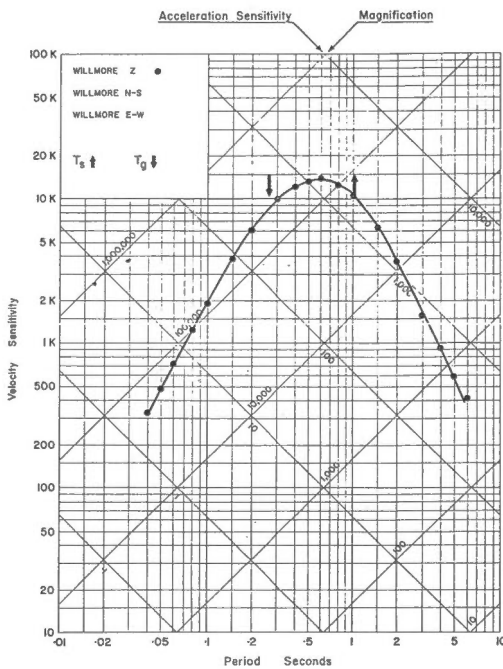
Dates of Calibration: March 9, 1973

SEISMOMETER: Willmore MKII $G_L = 1.96$ v.s/cm
PREAMPLIFIER: Teledyne EA310 operated @ 30 db sep.
Filter Band Pass 0.5-3 Hz
HELICORDER: Model RV301 0-30 Hz
Corner frequencies indicated by "Tg" arrows.

STATION: INUVIK, N.W.T. (INK)

$\phi = 68^{\circ}17.5'N$ $\lambda = 133^{\circ}30'W$ Altitude 40 M (approx.)

Foundation: Palaeozoic, Sediments Cambrian Limestone



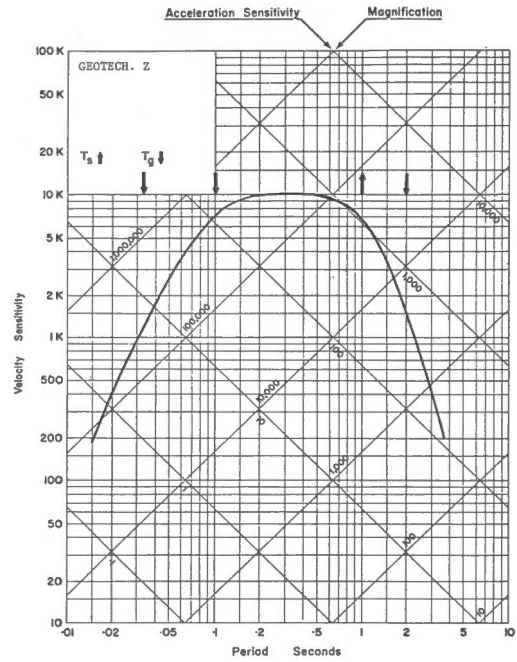
Dates of Calibration:

WILLMORE Z • June 2, 1972
WILLMORE N-S
WILLMORE E-W

STATION: IGLLOOLIK, N.W.T. (IGL)

$\phi = 69^{\circ}22.6'N$ $\lambda = 81^{\circ}48.4'W$ Altitude 38 M

Foundation: Palaeozoic, Ordovician Limestone



DATE OF CALIBRATION: Sept. 3, 1975

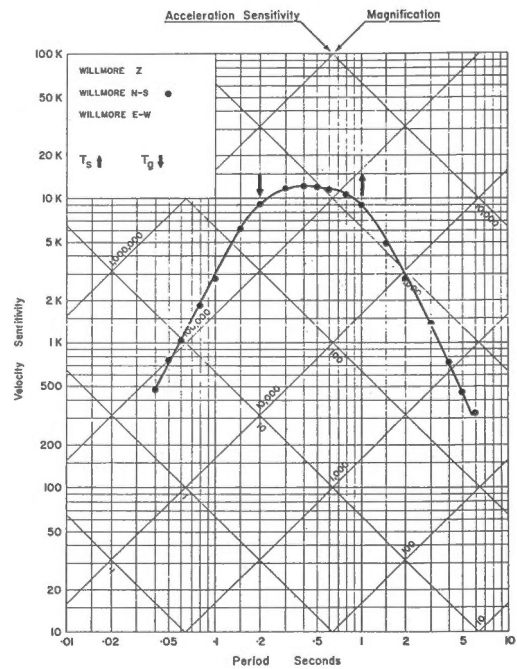
SEISMOMETER: Geotech S-13
PREAMPLIFIER: E.P.100
PEN DRIVE AMP: E.P.110
HELICORDER: Geotech RV301

Corner frequencies indicated by Tg arrows.

STATION: INUVIK, N.W.T. (INK)

$\phi = 68^{\circ}17.5'N$ $\lambda = 133^{\circ}30'W$ Altitude 40 M (approx.)

Foundation: Palaeozoic, Sediments Cambrian Limestone



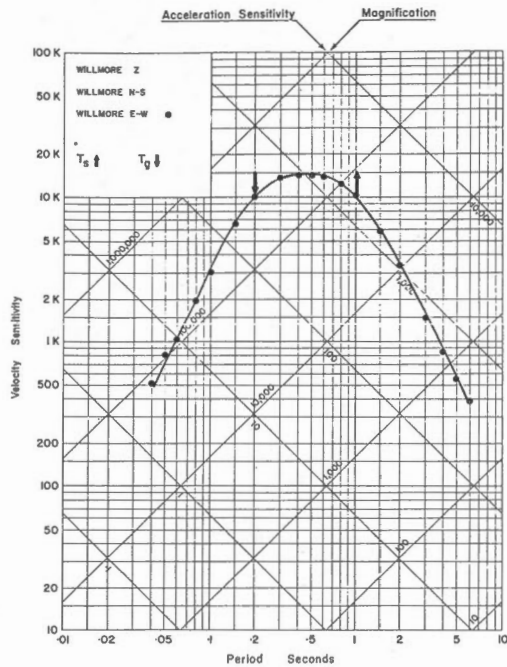
Dates of Calibration:

WILLMORE Z
WILLMORE N-S • June 1, 1972
WILLMORE E-W

STATION: INUVIK, N.W.T. (INK)

$\phi = 68^{\circ}17.5'N$ $\lambda = 133^{\circ}30'W$ Altitude 40 M (approx.)

Foundation: Palaeozoic, Sediments Cambrian Limestone



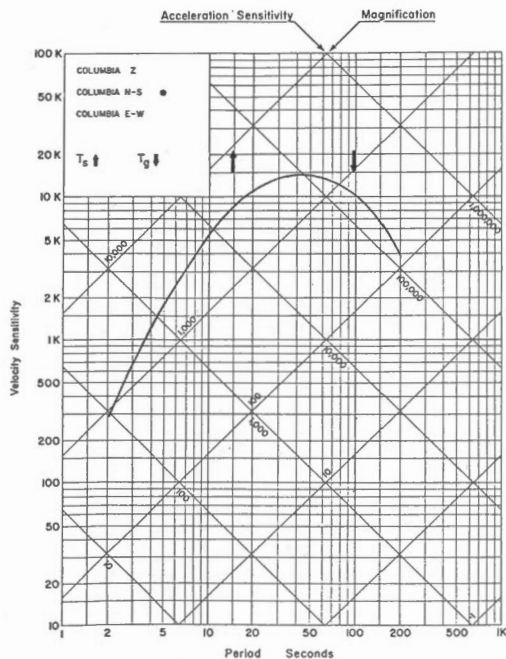
Dates of Calibration:

WILLMORE Z
WILLMORE N-S
WILLMORE E-W • May 31, 1972

STATION: INUVIK, N.W.T. (INK)

$\phi = 68^{\circ}17.5'N$ $\lambda = 133^{\circ}30'W$ Altitude 40 M (approx.)

Foundation: Palaeozoic, Sediments Cambrian Limestone



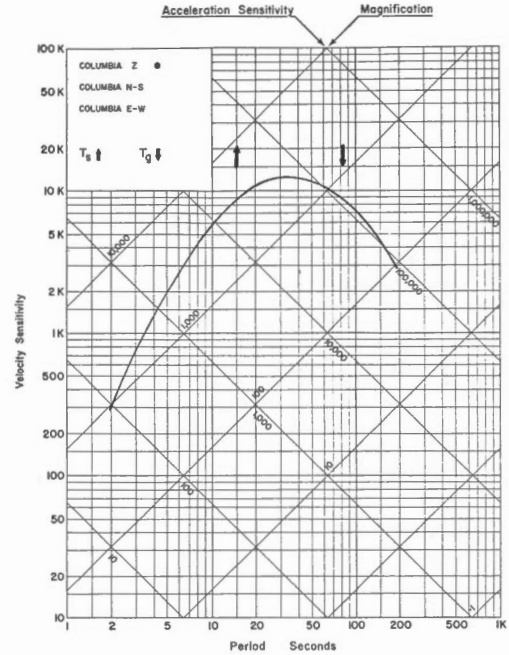
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • June 20, 1974
COLUMBIA E-W (estimated in Ottawa)

STATION: INUVIK, N.W.T. (INK)

$\phi = 68^{\circ}17.5'N$ $\lambda = 133^{\circ}30'W$ Altitude 40 M (approx.)

Foundation: Palaeozoic, Sediments Cambrian Limestone



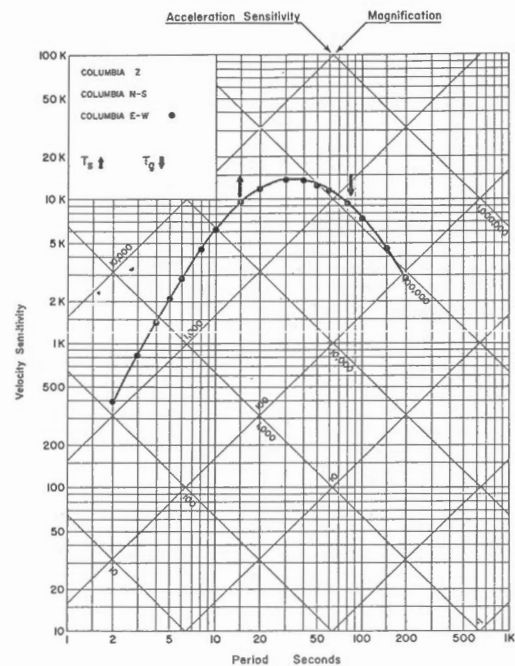
Dates of Calibration:

COLUMBIA Z • Aug. 26, 1974
COLUMBIA N-S (estimated in Ottawa)
COLUMBIA E-W

STATION: INUVIK, N.W.T. (INK)

$\phi = 68^{\circ}17.5'N$ $\lambda = 133^{\circ}30'W$ Altitude 40 M (approx.)

Foundation: Palaeozoic, Sediments Cambrian Limestone



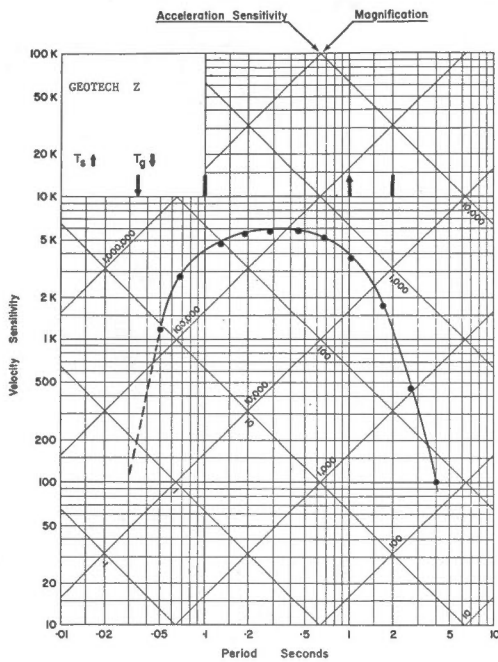
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • May 31, 1972

STATION: LA GRANDE, QUE. (LGQ)

$\phi = 53^{\circ}41.5'N$ $\lambda = 77^{\circ}43.5'W$ Altitude 190 m

Foundation: Palaeozoic, Ordovician Limestone



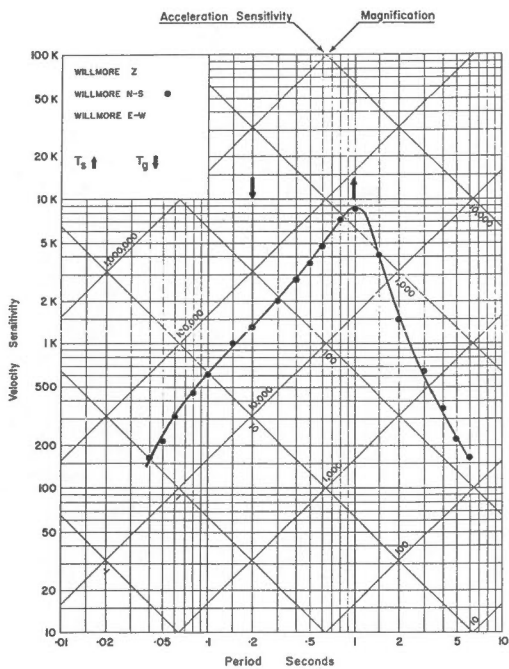
DATE OF CALIBRATION: Aug. 4, 1976

SEISMOMETER: Geotech S-13
 PREAMPLIFIER: E.P. BR.100
 PEN DRIVE AMP: E.P. BR.110
 HELICORDER: Geotech. RV301
 Filter corner frequencies indicated by vertical bars

STATION: THUNDER BAY, ONT. (FINAL) (LHC)

$\phi = 48^{\circ}25'N$ $\lambda = 89^{\circ}16'W$ Altitude 196 M

Foundation: Precambrian, upper gunflint, iron formation



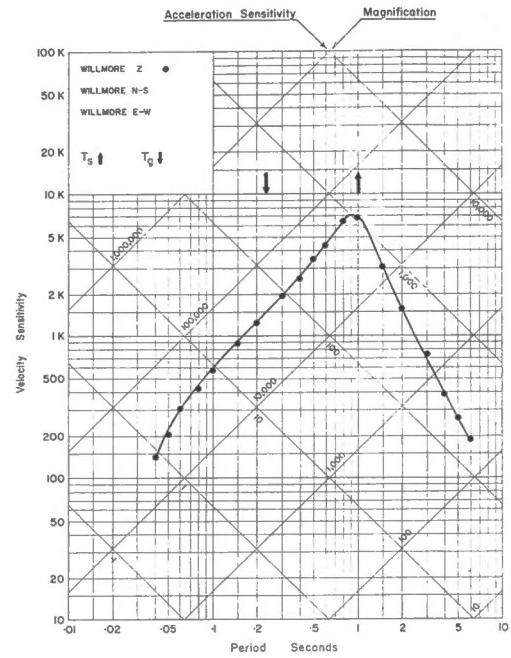
Dates of Calibration:

WILLMORE Z
 WILLMORE N-S • Sept. 20, 1972
 WILLMORE E-W

STATION: THUNDER BAY, ONT. (FINAL) (LHC)

$\phi = 48^{\circ}25'N$ $\lambda = 89^{\circ}16'W$ Altitude 196 M

Foundation: Precambrian, upper gunflint, iron formation



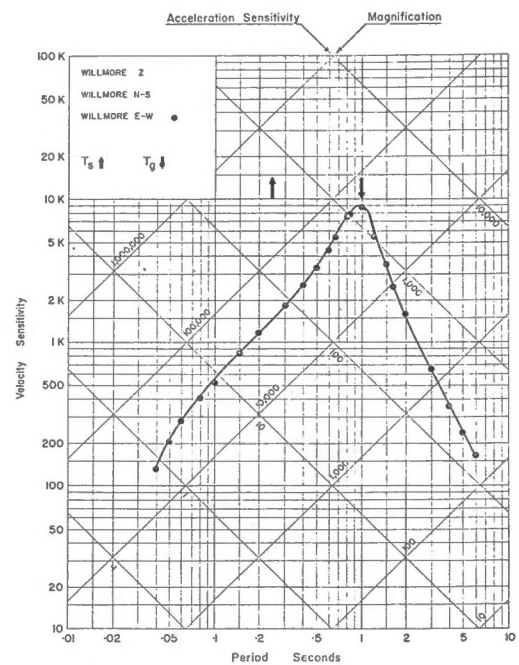
Dates of Calibration:

WILLMORE Z • Sept. 19, 1972
 WILLMORE N-S
 WILLMORE E-W

STATION: THUNDER BAY, ONT. (Final) (LHC)

$\phi = 48^{\circ}25'N$ $\lambda = 89^{\circ}16'W$ Altitude 196M

Foundation: Precambrian, upper gunflint, iron formation



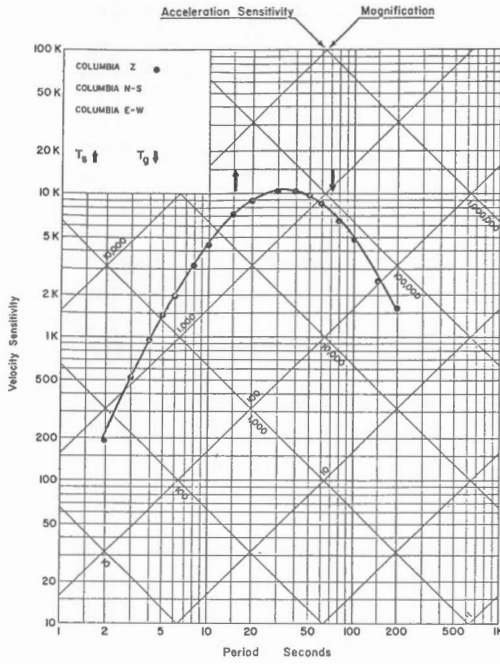
Dates of Calibration:

WILLMORE Z
 WILLMORE N-S
 WILLMORE E-W • March 27, 1973

STATION: THUNDER BAY, ONT. (As found and left) (LHC)

$\phi = 48^{\circ}25'N$ $\lambda = 89^{\circ}16'W$ Altitude 196M

Foundation: Precambrian, upper gunflint, iron formation



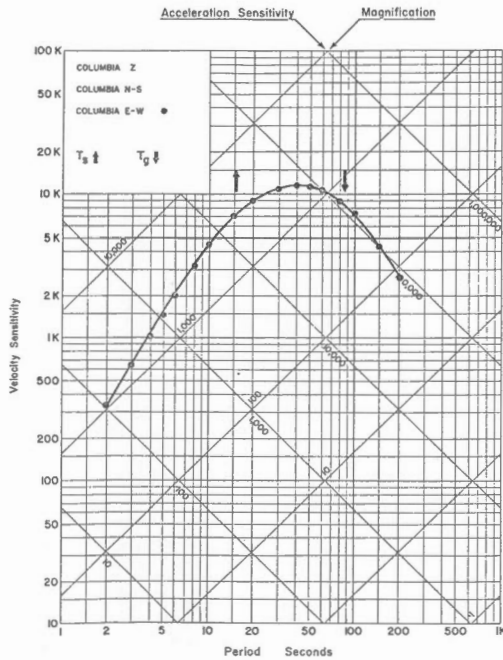
Dates of Calibration:

COLUMBIA Z • March 27, 1973
 COLUMBIA N-S
 COLUMBIA E-W

STATION: THUNDER BAY, ONT. (As found and left) (LHC)

$\phi = 48^{\circ}25'N$ $\lambda = 89^{\circ}16'W$ Altitude 196M

Foundation: Precambrian, upper gunflint, iron formation



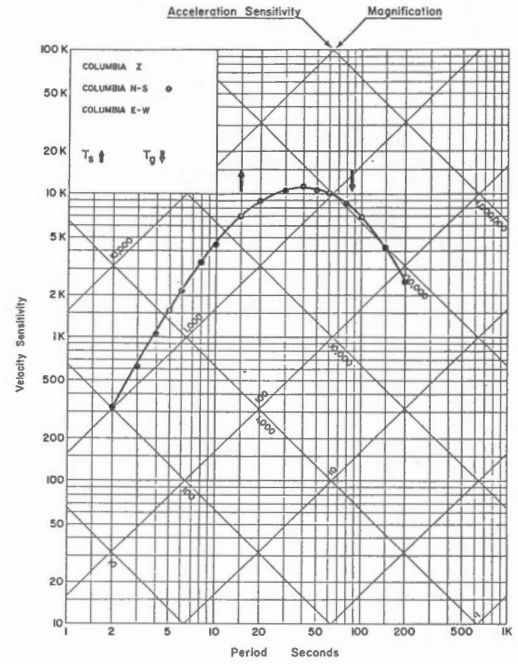
Dates of Calibration:

COLUMBIA Z
 COLUMBIA N-S
 COLUMBIA E-W • March 28, 1973

STATION: THUNDER BAY, ONT. (As found and left) (LHC)

$\phi = 48^{\circ}25'N$ $\lambda = 89^{\circ}16'W$ Altitude 196M

Foundation: Precambrian, upper gunflint, iron formation



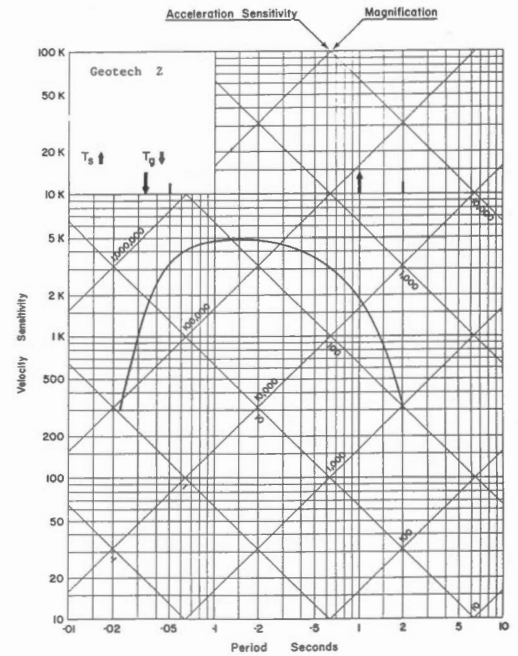
Dates of Calibration:

COLUMBIA Z
 COLUMBIA N-S • March 28, 1973
 COLUMBIA E-W

STATION: LA MALBAIE, QUE. (CHARLEVOIX OBSERVATORY) (LMQ)

$\phi = 47^{\circ}32'54''N$ $\lambda = 70^{\circ}19'36''W$ Altitude 419 m

Foundation: Precambrian, Anorthosite



DATE OF CALIBRATION: Nov. 3, 1976

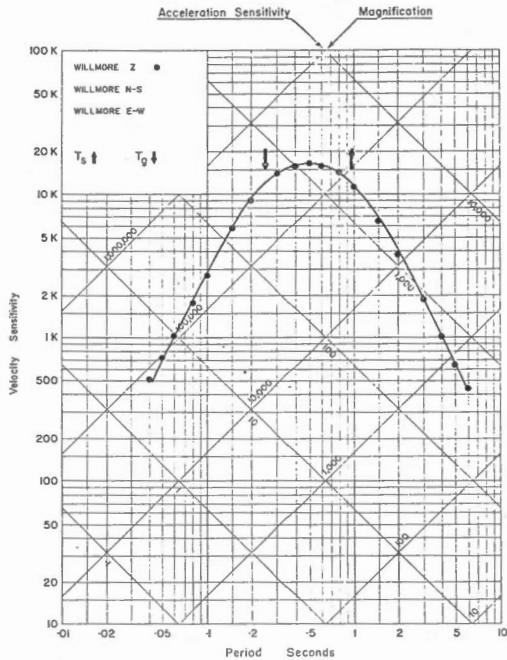
SEISMOMETER: Geotech S-13
 PREAMPLIFIER: E.P. Branch P.A. 100
 PEN DRIVE AMP: E. P. Br. P.D. 110
 HELICORDER: Geotech RV 301

NOTE: Filter corner frequencies indicated by vertical bars.

STATION: MOULD BAY, N.W.T. (MBC)
 (As found & left)

$\phi = 76^{\circ}14.5'N$ $\lambda = 119^{\circ}21.6'W$ Altitude 15 m

Foundation: Regolith and solifluxion deposits overlying Devonian sandstone (permafrost)



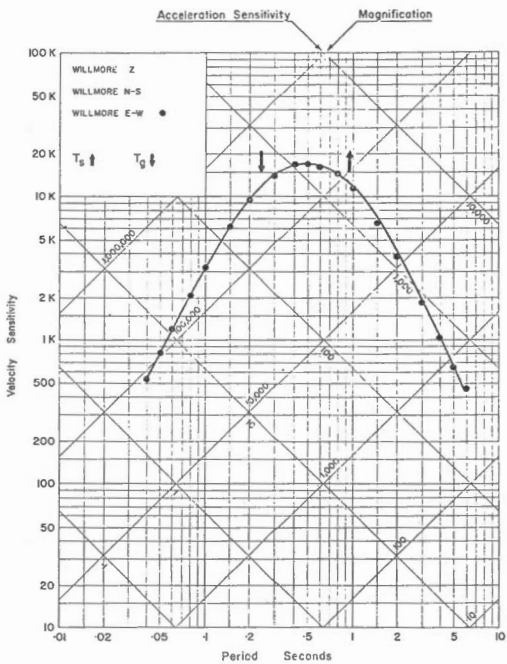
Dates of Calibration:

WILLMORE Z • May 5, 1973
 WILLMORE N-S
 WILLMORE E-W

STATION: MOULD BAY, N.W.T. (MBC)
 (As found & left)

$\phi = 76^{\circ}14.5'N$ $\lambda = 119^{\circ}21.6'W$ Altitude 15 m

Foundation: Regolith and solifluxion deposits overlying Devonian sandstone (permafrost)



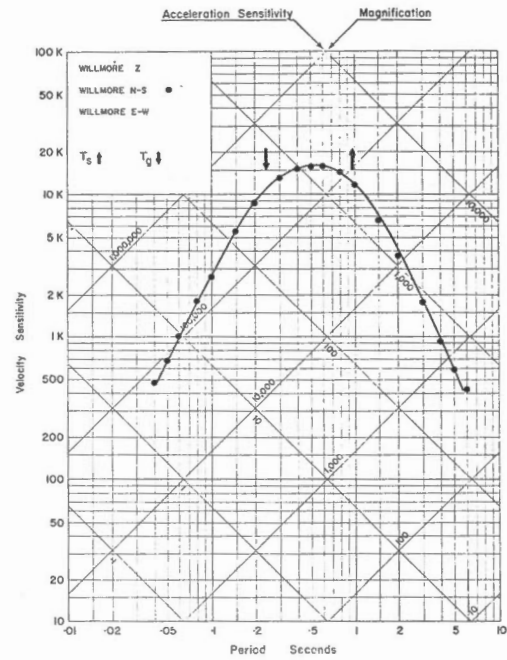
Dates of Calibration:

WILLMORE Z
 WILLMORE N-S
 WILLMORE E-W • May 6, 1973

STATION: MOULD BAY, N.W.T. (MBC)
 (As found & left)

$\phi = 76^{\circ}14.5'N$ $\lambda = 119^{\circ}21.6'W$ Altitude 15 m

Foundation: Regolith and solifluxion deposits overlying Devonian sandstone (permafrost)



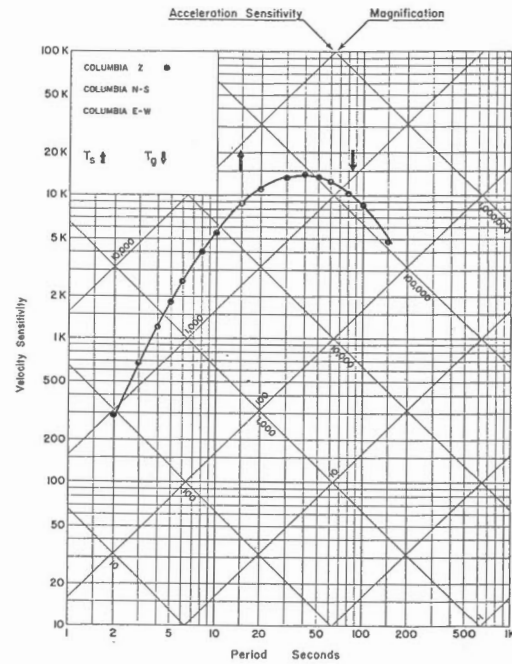
Dates of Calibration:

WILLMORE Z
 WILLMORE N-S • May 5, 1973
 WILLMORE E-W

STATION: MOULD BAY, N.W.T. (MBC)
 (As found & left)

$\phi = 76^{\circ}14.5'N$ $\lambda = 119^{\circ}21.6'W$ Altitude 15 m

Foundation: Regolith and solifluxion deposits overlying Devonian sandstone (permafrost)



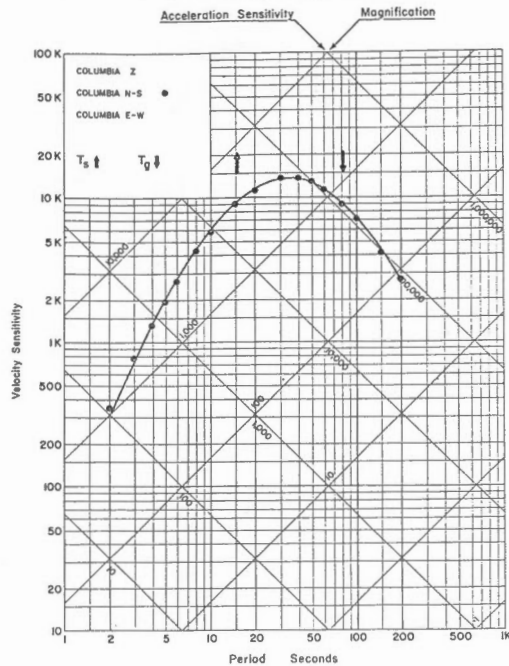
Dates of Calibration:

COLUMBIA Z • May 5, 1973
 COLUMBIA N-S
 COLUMBIA E-W

STATION: MOULD BAY, N.W.T. (MBC)
(As found & left)

$\phi = 76^{\circ}14.5'N$ $\lambda = 119^{\circ}21.6'W$ Altitude 15 m

Foundation: Regolith and solifluxion deposits overlying Devonian sandstone (permafrost)



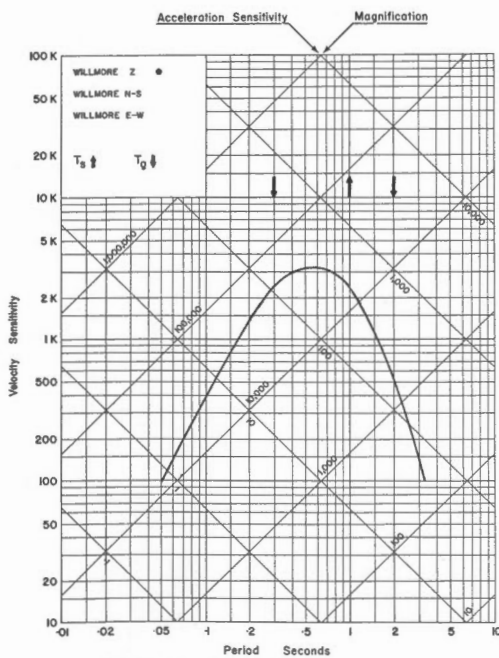
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • May 5, 1973
COLUMBIA E-W

STATION: HICA CREEK, B.C. (HCC)

$\phi = 52^{\circ}03'06''N$ $\lambda = 118^{\circ}35'07''W$ Altitude 594 M

Foundation: Granite Gneiss



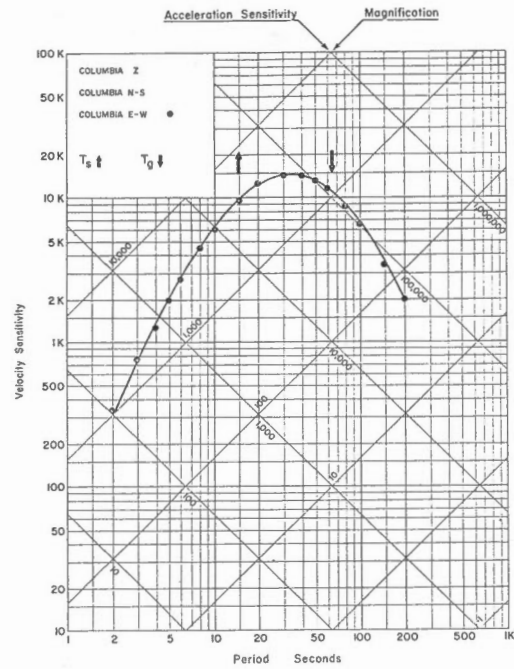
Date of Calibration: May 13, 1975

SEISMOMETER: Willmore MK11
PREAMPLIFIER: Teledyne EA310
HELICORDER: Geotech. RV301
Corner frequencies indicated by "Tg" arrows.

STATION: MOULD BAY, N.W.T. (MBC)
(As found & left)

$\phi = 76^{\circ}14.5'N$ $\lambda = 119^{\circ}21.6'W$ Altitude 15 m

Foundation: Regolith and solifluxion deposits overlying Devonian sandstone (permafrost)



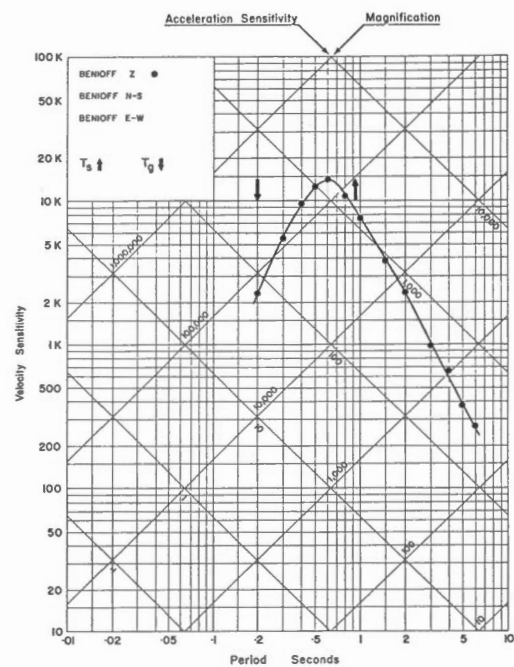
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • May 5, 1973

STATION: MONTREAL, QUE. (MNT) As Found, and final.

$\phi = 45^{\circ}30'09''N$ $\lambda = 73^{\circ}37'23''W$ Altitude 112 M

Foundation: Ordovician limestone (Trenton)



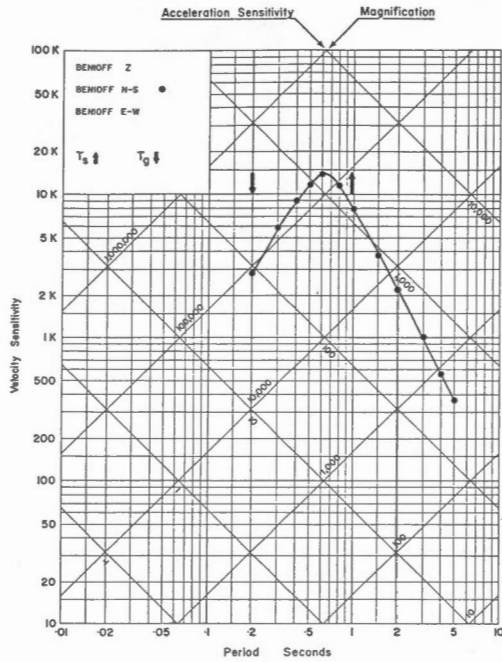
Dates of Calibration:

BENOFF Z • Feb. 13, 1974
BENOFF N-S
BENOFF E-W

STATION: MONTREAL, QUE. (MNT) As found and final.

$\phi = 45^{\circ}30'09''N$ $\lambda = 73^{\circ}37'23''W$ Altitude 112 M

Foundation: Ordovician Limestone (Trenton)



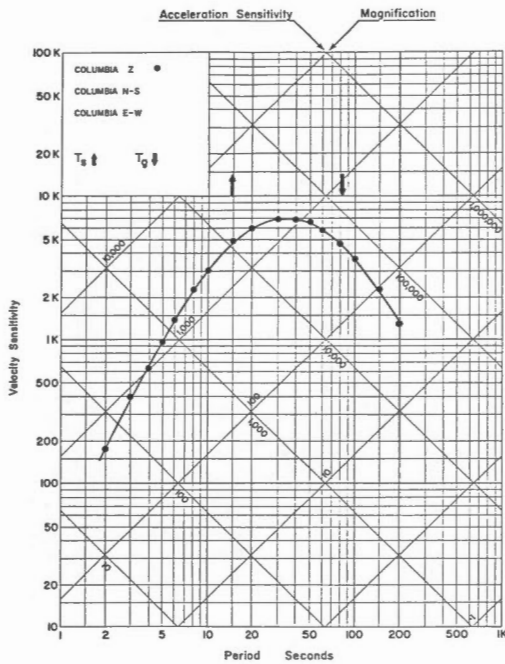
Dates of Calibration:

BEHOFF Z
BEHOFF N-S • Feb. 13, 1974
BEHOFF E-W

STATION: MONTREAL, QUE. (MNT) Final.

$\phi = 45^{\circ}30'09''N$ $\lambda = 73^{\circ}37'23''W$ Altitude 112 M

Foundation: Ordovician Limestone (Trenton)



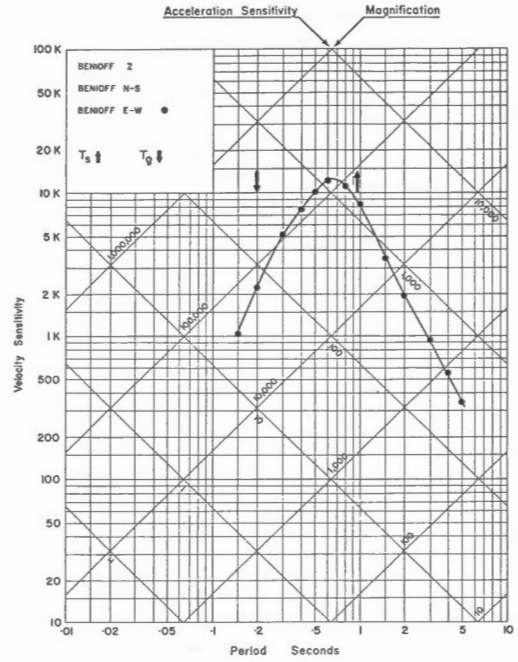
Dates of Calibration:

COLUMBIA Z • Feb. 14, 1974
COLUMBIA N-S
COLUMBIA E-W

STATION: MONTREAL, QUE. (MNT) As found and final.

$\phi = 45^{\circ}30'09''N$ $\lambda = 73^{\circ}37'23''W$ Altitude 112 M

Foundation: Ordovician Limestone (Trenton)



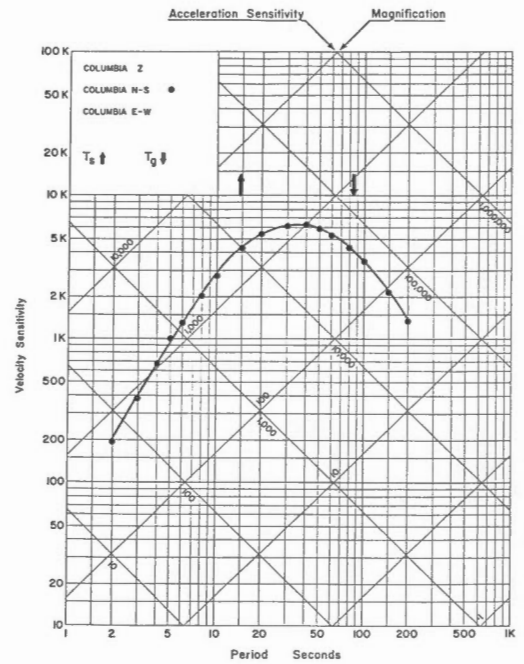
Dates of Calibration:

BEHOFF Z
BEHOFF N-S
BEHOFF E-W • Feb. 13, 1974

STATION: MONTREAL, QUE. (MNT) Final.

$\phi = 45^{\circ}30'09''N$ $\lambda = 73^{\circ}37'23''W$ Altitude 112 M

Foundation: Ordovician Limestone (Trenton)



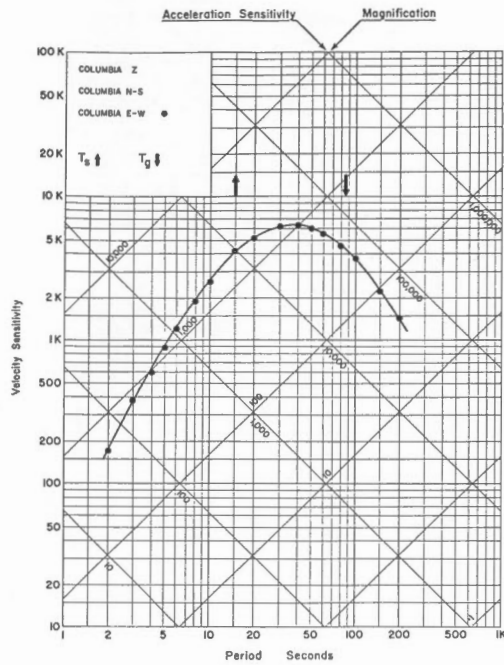
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • Feb. 14, 1974
COLUMBIA E-W

STATION: MONTREAL, QUE. (MNT) Final.

$\phi = 45^{\circ}30'09''N$ $\lambda = 73^{\circ}37'23''W$ Altitude 112 M

Foundation: Ordovician Limestone (Trenton)



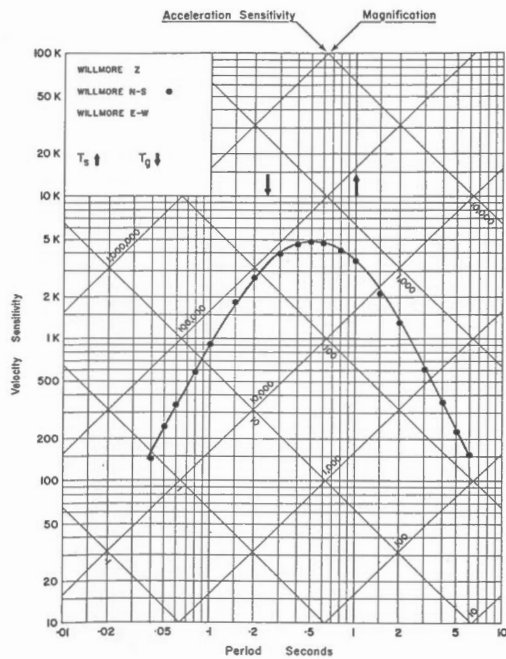
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • Feb. 14, 1974

STATION: OTTAWA, ONT. (OTT)

$\phi = 45^{\circ}23'38''N$ $\lambda = 75^{\circ}42'57''W$ Altitude 83 M

Foundation: Boulder clay on limestone



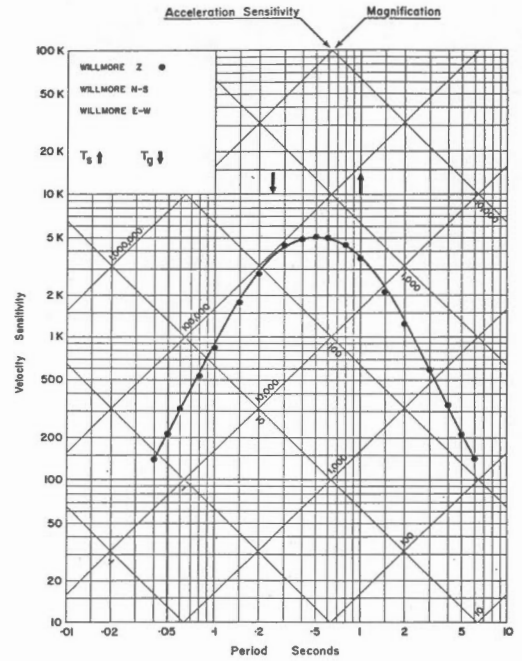
Dates of Calibration:

WILLMORE Z
WILLMORE N-S • 19 Sept. 1975
WILLMORE E-W

STATION: OTTAWA, ONT. (OTT)

$\phi = 45^{\circ}23'38''N$ $\lambda = 75^{\circ}42'57''W$ Altitude 83 M

Foundation: Boulder clay on limestone



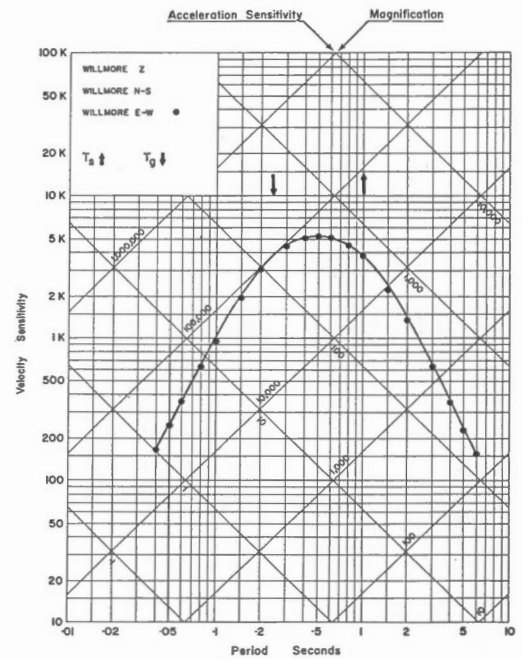
Dates of Calibration:

WILLMORE Z • 19 Sept. 1975
WILLMORE N-S
WILLMORE E-W

STATION: OTTAWA, ONT. (OTT)

$\phi = 45^{\circ}23'38''N$ $\lambda = 75^{\circ}42'57''W$ Altitude 83 M

Foundation: Boulder clay on limestone



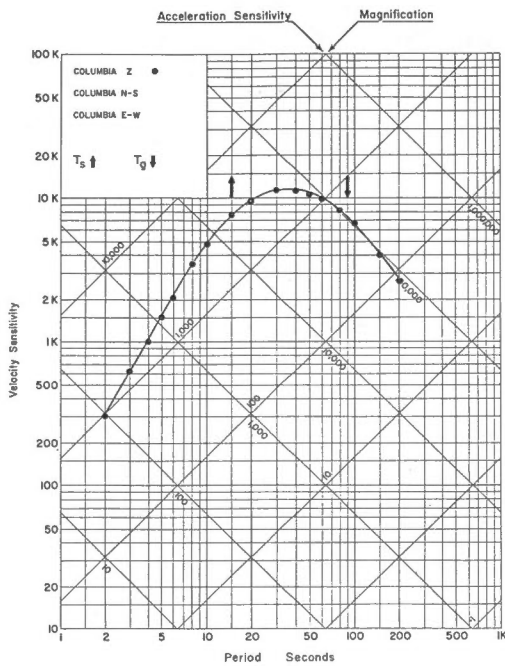
Dates of Calibration:

WILLMORE Z
WILLMORE N-S
WILLMORE E-W • 19 Sept. 1975

STATION: OTTAWA, ONT. (OTT)
(Final)

$\phi = 45^{\circ}23'38''N$ $\lambda = 75^{\circ}42'57''W$ Altitude 83 M

Foundation: Boulder Clay on Limestone



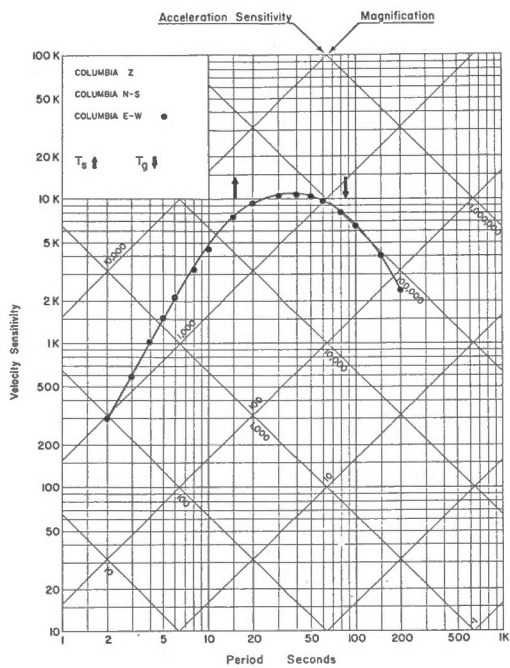
Dates of Calibration:

COLUMBIA Z • February 13, 1973
COLUMBIA N-S
COLUMBIA E-W

STATION: OTTAWA, ONT. (OTT)
(As Found & Left)

$\phi = 45^{\circ}23'38''N$ $\lambda = 75^{\circ}42'57''W$ Altitude 83 M

Foundation: Boulder Clay on Limestone



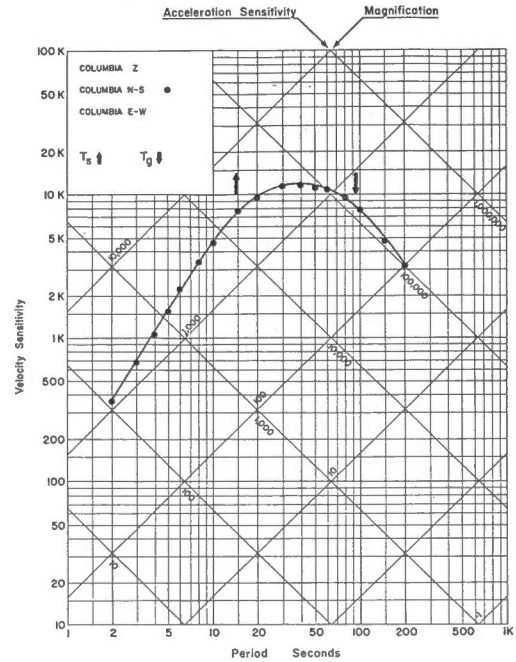
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • February 14, 1973

STATION: OTTAWA, ONT. (OTT)
(As Found & Left)

$\phi = 45^{\circ}23'38''N$ $\lambda = 75^{\circ}42'57''W$ Altitude 83 M

Foundation: Boulder Clay on Limestone



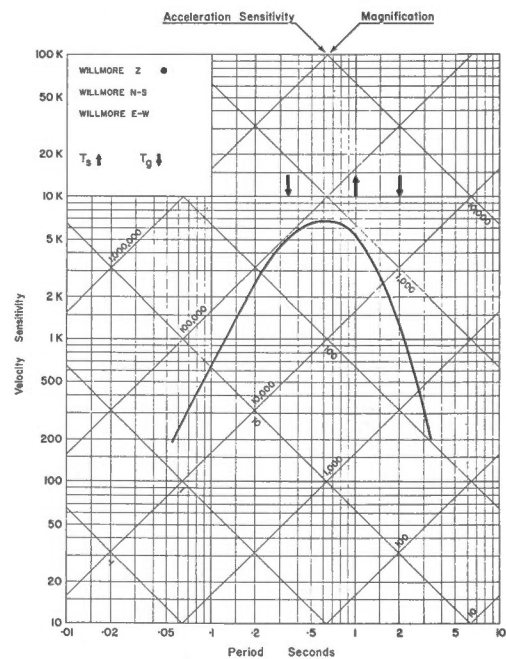
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • February 13, 1973
COLUMBIA E-W

STATION: POSTE DE LA BALEINE, QUE. (PBQ)

$\phi = 55^{\circ}16.6'N$ $\lambda = 77^{\circ}44.6'W$ Altitude 20 M

Foundation: Granite Gneiss



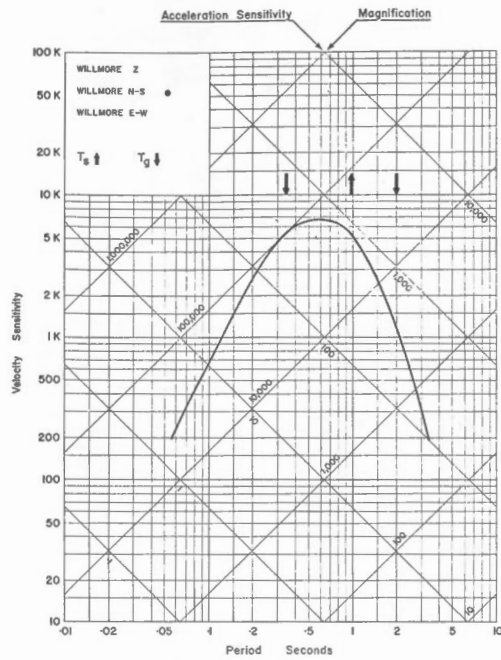
DATE OF CALIBRATION: Feb. 14, 1975

SEISMOMETER: Willmore MKII T_s 1.0 D_s 0.63
 $G_L = 1.13$ v.s./cm @ $R_L = 545$ ohms
AMPLIFIER: Teledyne EA310 - Gain 7.06K @ 24 dB
HELICORDER: RV301 - 1 cm/V
Corner frequencies indicated by "T_s" arrows.

STATION: POSTE DE LA BALEINE, QUE. (PBQ)

$\phi = 55^{\circ}16.6'N$ $\lambda = 77^{\circ}44.6'W$ Altitude 20 M

Foundation: Granite Gneiss



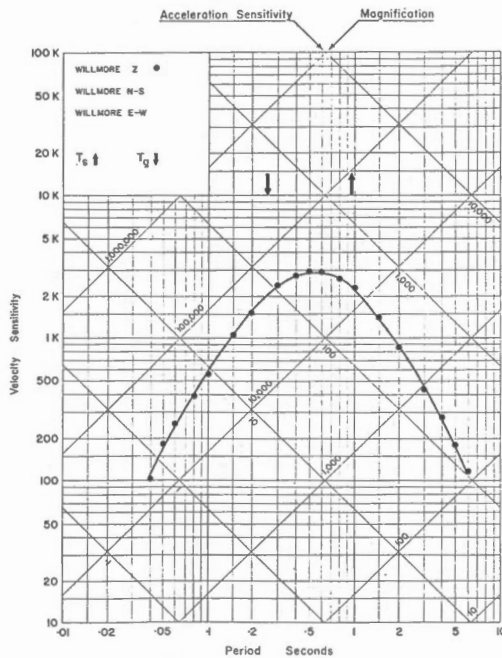
DATE OF CALIBRATION: Feb. 14, 1975

SEISMO METER: Willmore MKII T_A 0.96 D_s 0.65
 $G_L = 1.17$ v.s./cm @ $R_L = 545$ ohms
 AMPLIFIER: Teledyne EA310 - Gain 7.3K @ 24 dB
 HELICORDER: RV301 - 1 cm/V
 Corner frequencies indicated by " T_g " arrows.

STATION: PORT HARDY, B.C. (PHC)
 (As found and left)

$\phi = 50^{\circ}42.4'N$ $\lambda = 127^{\circ}25.9'W$ Altitude 33 M

Foundation: Mesozoic, Triassic sedimentary and volcanic rock



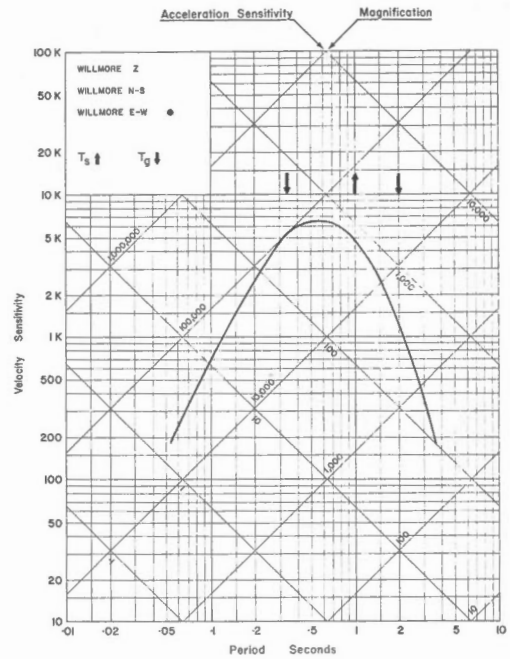
Dates of Calibration:

WILLMORE Z • June 27, 1974
 WILLMORE N-S
 WILLMORE E-W

STATION: POSTE DE LA BALEINE, QUE. (PBQ)

$\phi = 55^{\circ}16.6'N$ $\lambda = 77^{\circ}44.6'W$ Altitude 20 M

Foundation: Granite Gneiss



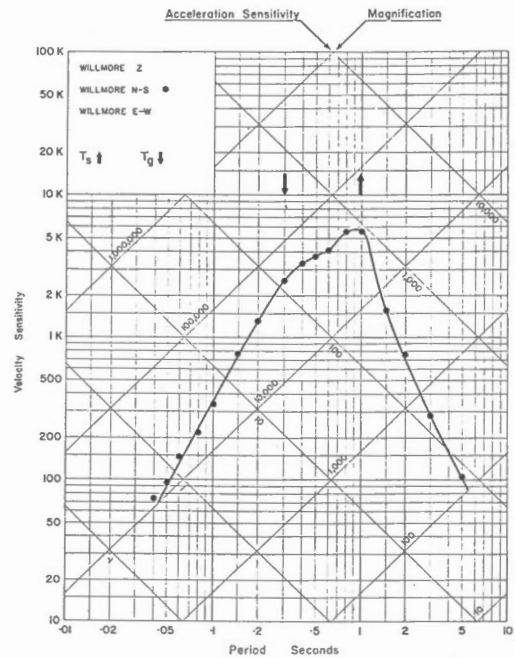
DATE OF CALIBRATION: Feb. 14, 1975

SEISMO METER: Willmore MKII T_s 1.0 D_s 0.77
 $G_L = 1.23$ v.s./cm @ $R_L = 545$ ohms
 AMPLIFIER: Teledyne EA310 - Gain 7.7K @ 24 dB
 HELICORDER: RV301 - 1 cm/V
 Corner frequencies indicated by " T_g " arrows.

STATION: PORT HARDY, B.C. (PHC)
 (As found and left)

$\phi = 50^{\circ}42.4'N$ $\lambda = 127^{\circ}25.9'W$ Altitude 33 M

Foundation: Mesozoic, Triassic sedimentary and volcanic rock.

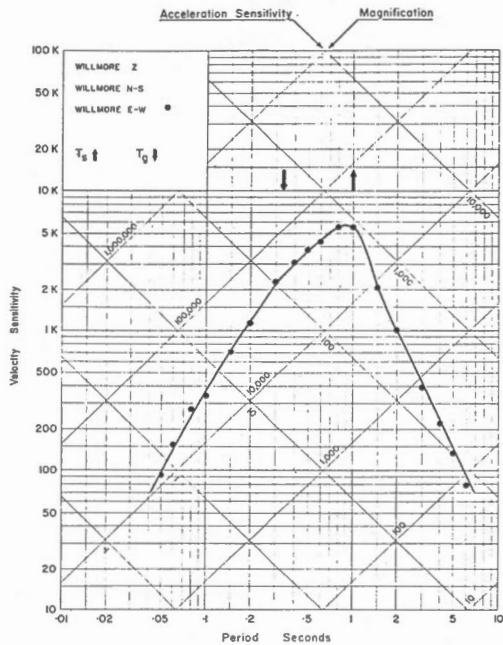


Dates of Calibration:

WILLMORE Z
 WILLMORE N-S • June 27, 1974
 WILLMORE E-W

STATION: PORT HARDY, B.C. (PHC)
 (As found and left)
 $\phi = 50^{\circ}42.4'N$ $\lambda = 127^{\circ}25.9'W$ Altitude 33 M

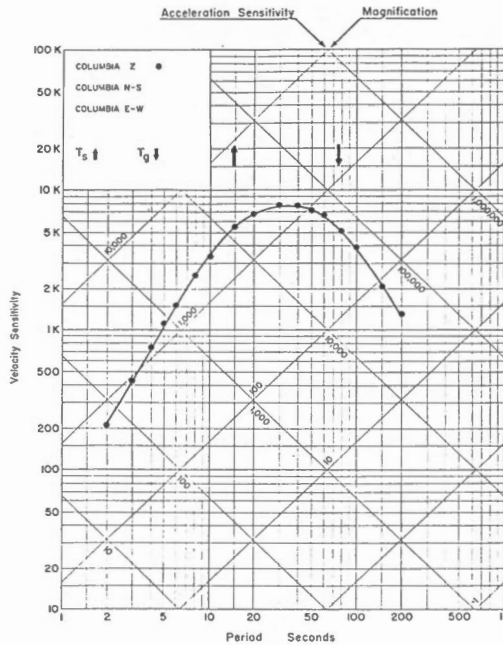
Foundation: Mesozoic, Triassic sedimentary and volcanic rocks



Dates of Calibration:
 WILLMORE Z
 WILLMORE N-S
 WILLMORE E-W • June 27, 1974

STATION: PORT HARDY, B.C. (PHC)
 (As found and left)
 $\phi = 50^{\circ}42.4'N$ $\lambda = 127^{\circ}25.9'W$ Altitude 33 M

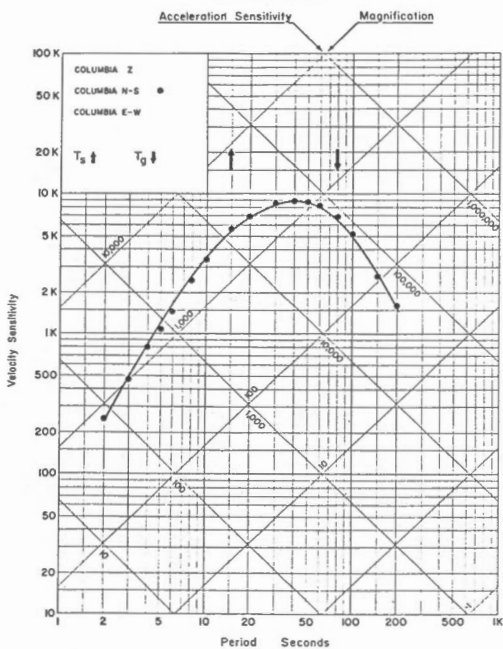
Foundation: Mesozoic, Triassic sedimentary and volcanic rocks



Dates of Calibration:
 COLUMBIA Z • June 24, 1974
 COLUMBIA N-S
 COLUMBIA E-W

STATION: PORT HARDY, B.C. (PHC)
 (As found and left)
 $\phi = 50^{\circ}42.4'N$ $\lambda = 127^{\circ}25.9'W$ Altitude 33 M

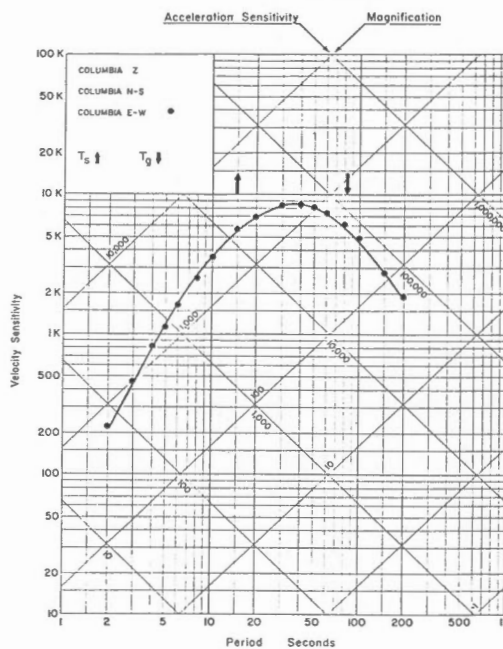
Foundation: Mesozoic, Triassic sedimentary and volcanic rocks



Dates of Calibration:
 COLUMBIA Z
 COLUMBIA N-S • June 25, 1974
 COLUMBIA E-W

STATION: PORT HARDY, B.C. (PHC)
 (As found and left)
 $\phi = 50^{\circ}42.4'N$ $\lambda = 127^{\circ}25.9'W$ Altitude 33 M

Foundation: Mesozoic, Triassic sedimentary and volcanic rocks

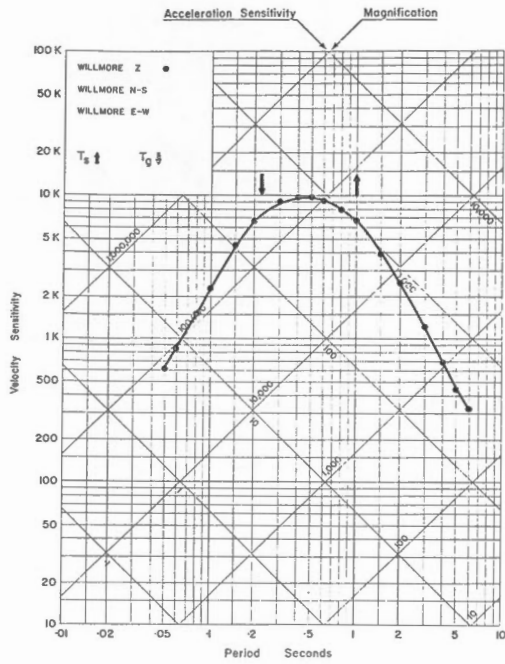


Dates of Calibration:
 COLUMBIA Z
 COLUMBIA N-S
 COLUMBIA E-W • June 26, 1974

STATION: PENTICTON, B.C. (PNT)

(Final)
 $\phi = 49^{\circ}19'N$ $\lambda = 119^{\circ}37'W$ Altitude 550 m

Foundation: Tertiary shale



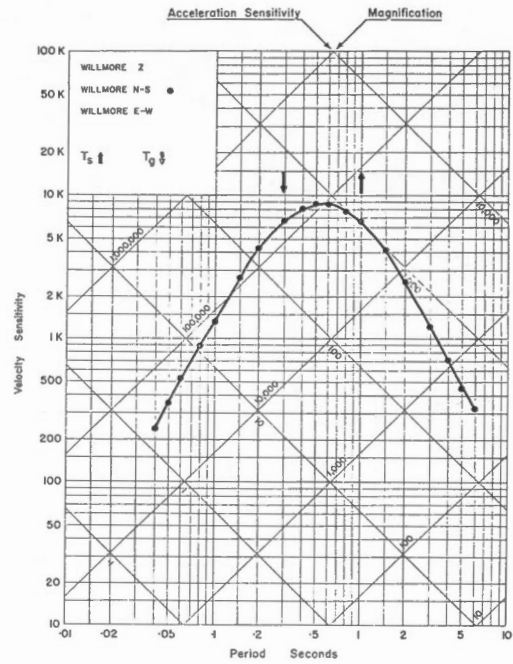
Dates of Calibration:

WILLMORE Z • December 2, 1974
 WILLMORE N-S
 WILLMORE E-W

STATION: PENTICTON, B.C. (PNT)

(Final)
 $\phi = 49^{\circ}19'N$ $\lambda = 119^{\circ}37'W$ Altitude 550 m

Foundation: Tertiary shale



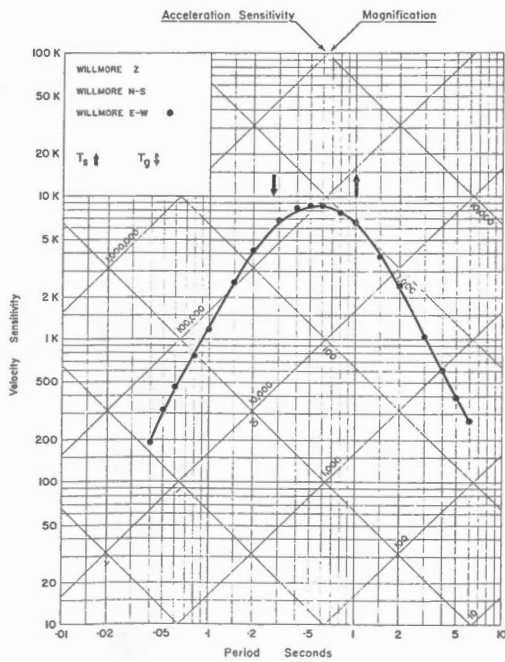
Dates of Calibration:

WILLMORE Z
 WILLMORE N-S • December 2, 1974
 WILLMORE E-W

STATION: PENTICTON, B.C. (PNT)

(Final)
 $\phi = 49^{\circ}19'N$ $\lambda = 119^{\circ}37'W$ Altitude 550 m

Foundation: Tertiary Shale



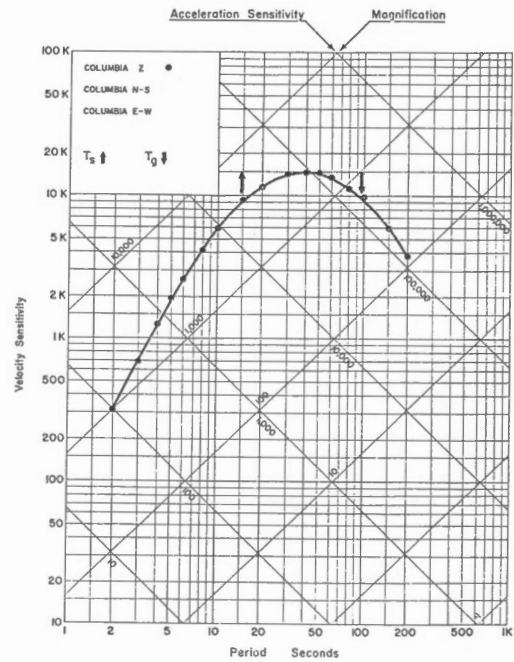
Dates of Calibration:

WILLMORE Z
 WILLMORE N-S
 WILLMORE E-W • December 2, 1974

STATION: PENTICTON, B.C. (PNT)

(As found and left)
 $\phi = 49^{\circ}19'N$ $\lambda = 119^{\circ}37'W$ Altitude 550 m

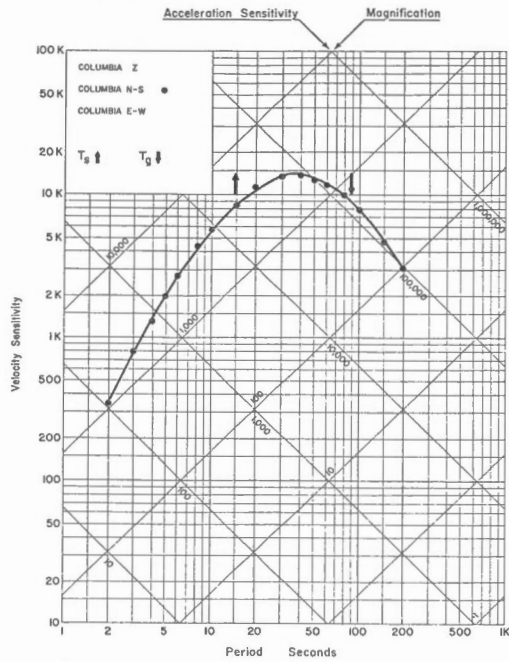
Foundation: Tertiary shale



Dates of Calibration:

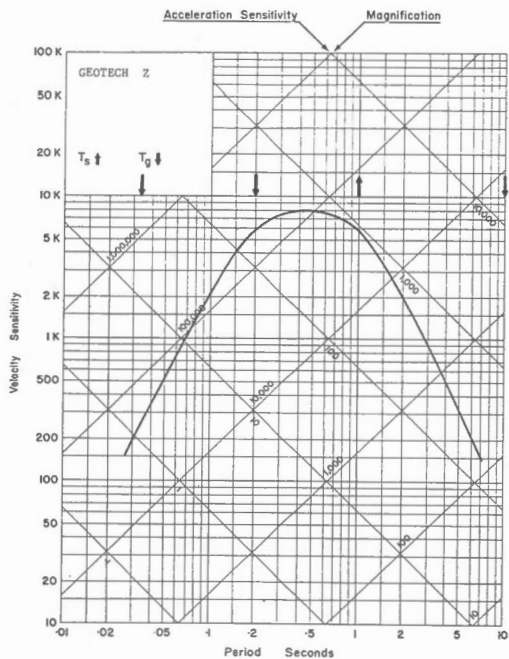
COLUMBIA Z • December 3, 1974
 COLUMBIA N-S
 COLUMBIA E-W

STATION: PENTICTON, B.C. (PNT)
 (As found and left)
 $\phi = 49^{\circ}19'N$ $\lambda = 119^{\circ}37'W$ Altitude 550 m
 Foundation: Tertiary shale



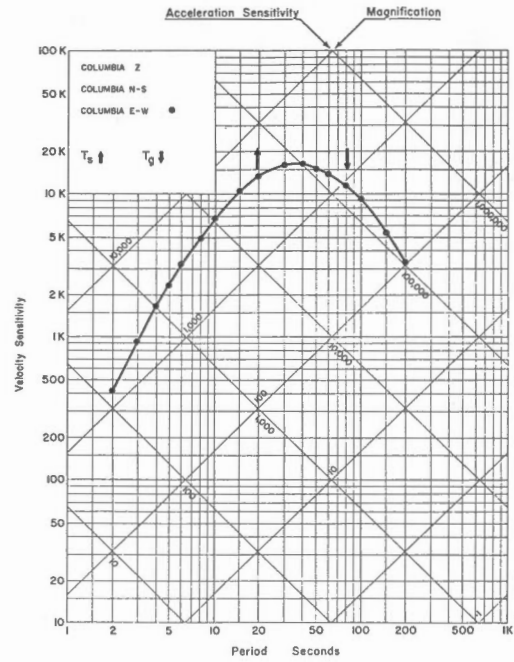
Dates of Calibration:
 COLUMBIA Z
 COLUMBIA N-S ● December 4, 1974
 COLUMBIA E-W

STATION: LA POCATIERE, QUE. (POC)
 $\phi = 47^{\circ}21'52''N$ $\lambda = 70^{\circ}02'27''W$ Altitude 61 m
 Foundation: Quartzite



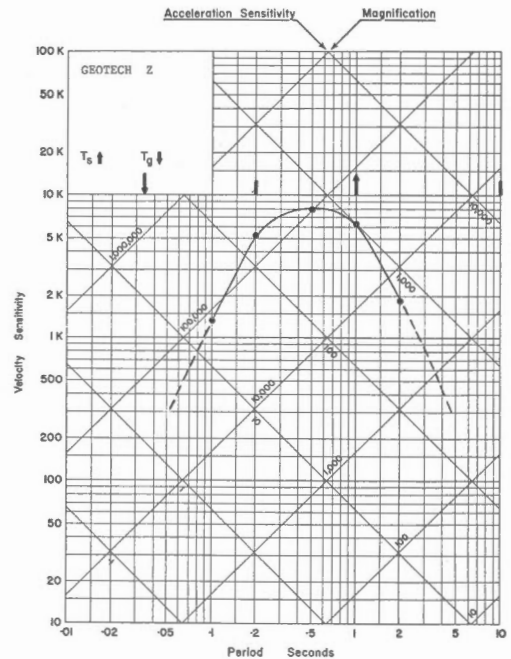
DATE OF CALIBRATION: Sept. 10, 1975
 SEISMOMETER: GEOTECH S13
 PREAMPLIFIER: AS330
 AMPLIFIER: AR311
 HELICORDER: RV301
 Corner frequencies indicated by T_g arrows.

STATION: PENTICTON, B.C. (PNT)
 (As found and left)
 $\phi = 49^{\circ}19'N$ $\lambda = 119^{\circ}37'W$ Altitude 550 m
 Foundation: Tertiary shale



Dates of Calibration:
 COLUMBIA Z
 COLUMBIA N-S
 COLUMBIA E-W ● December 4, 1974

STATION: LA POCATIERE, QUE. (POC)
 $\phi = 47^{\circ}21'52''N$ $\lambda = 70^{\circ}02'27''W$ Altitude 61 m
 Foundation: Quartzite

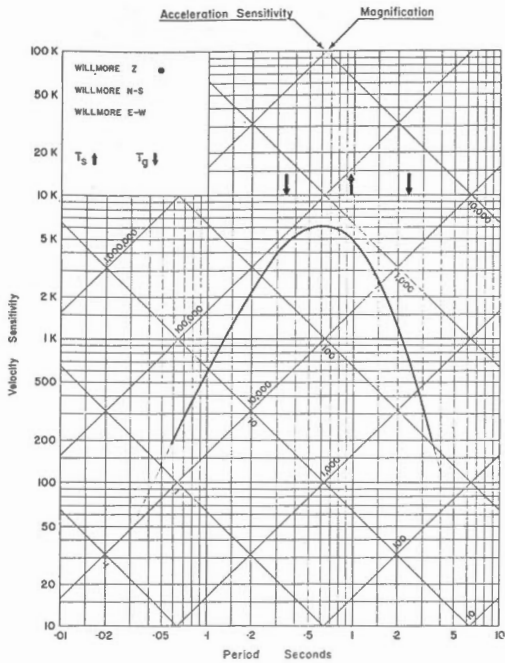


DATE OF CALIBRATION: Oct. 5, 1976
 SEISMOMETER: GEOTECH S13
 PREAMPLIFIER: AS330
 AMPLIFIER: AR311
 HELICORDER: RV301
 Filter Corner frequencies indicated by vertical bars |

STATION: QUEEN CHARLOTTE, B.C. (QCC)

$\phi = 53^{\circ}15.3'N$ $\lambda = 132^{\circ}05.3'W$ Altitude 3 M

Foundation: Sedimentary Rocks

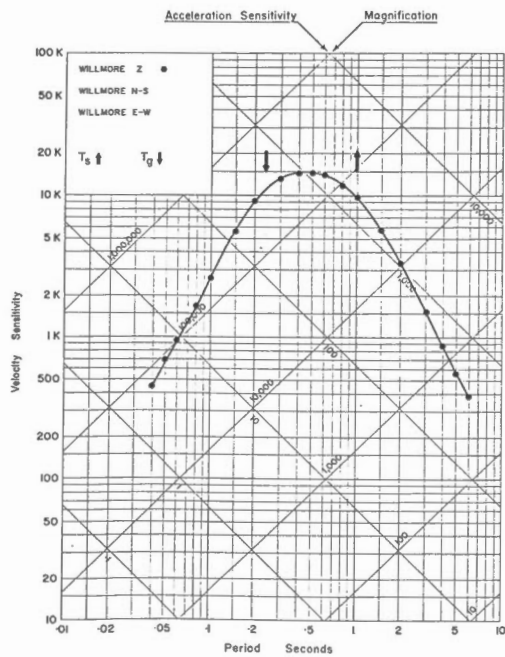


DATE OF CALIBRATION: Mar. 5, 1975
 SEISMOMETER: Willmore MK11 $T_s = 0.97$ $D_s = 0.59$
 $G_L = 1.08$ v.s./cm @ $R_L = 545$ ohms
 AMPLIFIER: Teledyne EA310 - Gain 6.1K @ -24 db
 HELICORDER: RV301 - 1 cm/V.
 Corner frequencies indicated by "T_g" arrows.

STATION: RESOLUTE, N.W.T. (final) (RES)

$\phi = 74^{\circ}41.2'N$ $\lambda = 94^{\circ}54.0'W$ Altitude 15 M

Foundation: Early Palaeozoic limestone

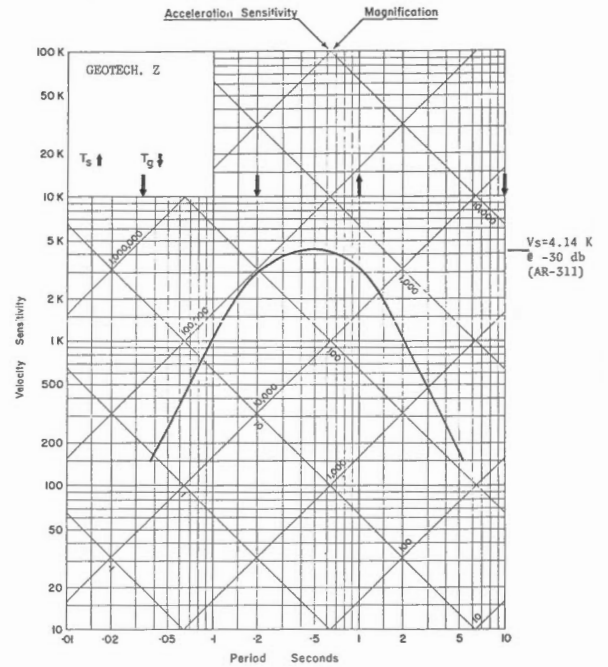


Dates of Calibration:
 WILLMORE Z • July 18, 1974
 WILLMORE N-S
 WILLMORE E-W

STATION: QUEBEC, QUE. (QCQ)

$\phi = 46^{\circ}46'44''N$ $\lambda = 71^{\circ}16'33''W$ Altitude 91 M

Foundation: Schist

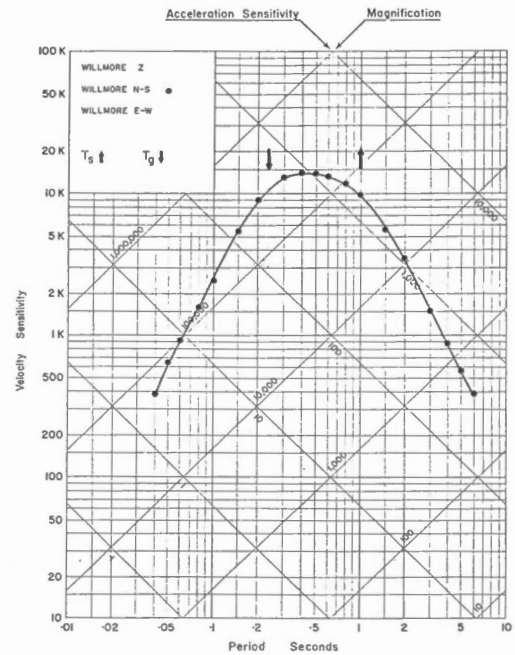


Dates of Calibration: October 1972
 SEISMOMETER: Geotech. S13 $G_L = 2.62$ V.S./C.M.
 PREAMPLIFIER: AS330 operated at 30-30 db (SEP.-ATT.)
 Filter Bandpass 0.1 - 5 Hz
 AMPLIFIER: AR 311 - 1 C.M./Volt @ 24 db
 HELICORDER: RV 301 - 0-30 Hz

STATION: RESOLUTE, N.W.T. (final) (RES)

$\phi = 74^{\circ}41.2'N$ $\lambda = 94^{\circ}54.0'W$ Altitude 15 M

Foundation: Early Palaeozoic limestone

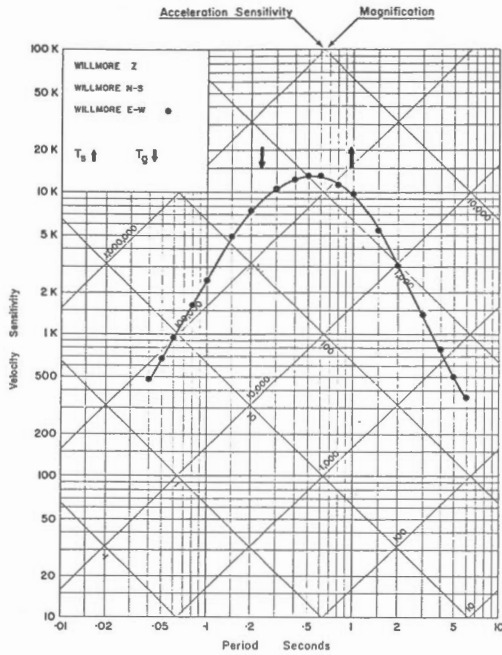


Dates of Calibration:
 WILLMORE Z
 WILLMORE N-S • July 19, 1974
 WILLMORE E-W

STATION: RESOLUTE, N.W.T. (RES)
(final)

$\phi = 74^{\circ}41.2'N$ $\lambda = 94^{\circ}54.0'W$ Altitude 15 M

Foundation: Early Palaeozoic limestone



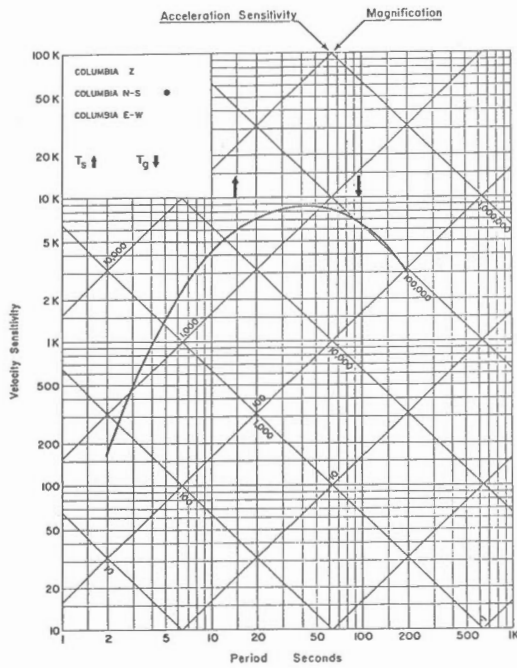
Dates of Calibration:

WILLMORE Z
WILLMORE N-S
WILLMORE E-W • July 19, 1974

STATION: RESOLUTE, N.W.T. (RES)

$\phi = 74^{\circ}41.2'N$ $\lambda = 94^{\circ}54.0'W$ Altitude 15 M

Foundation: Early Palaeozoic limestone



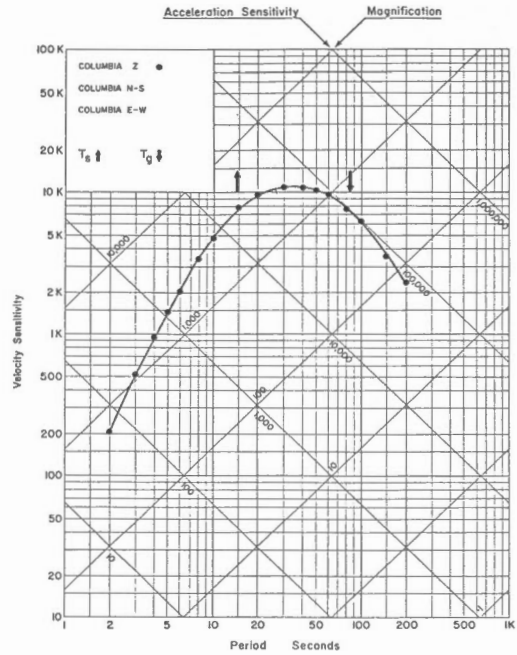
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • May 5, 1975
COLUMBIA E-W

STATION: RESOLUTE, N.W.T. (RES)

$\phi = 74^{\circ}41.2'N$ $\lambda = 94^{\circ}54.0'W$ Altitude 15 M

Foundation: Early Palaeozoic limestone



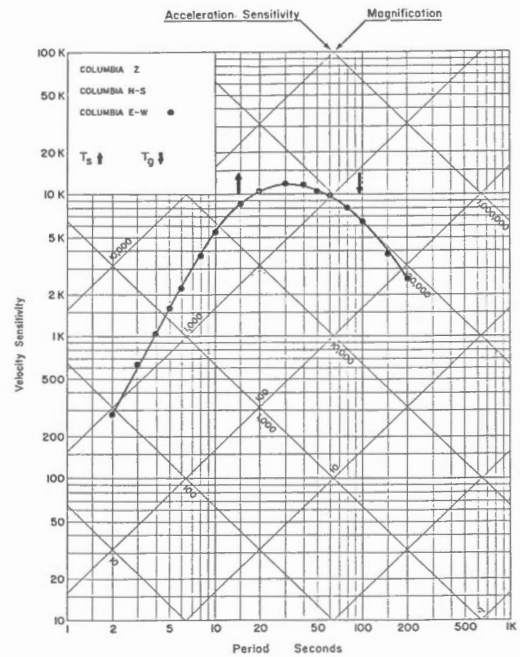
Dates of Calibration:

COLUMBIA Z • July 17, 1974
COLUMBIA N-S
COLUMBIA E-W

STATION: RESOLUTE, N.W.T. (RES)

$\phi = 74^{\circ}41.2'N$ $\lambda = 94^{\circ}54.0'W$ Altitude 15 M

Foundation: Early Palaeozoic limestone



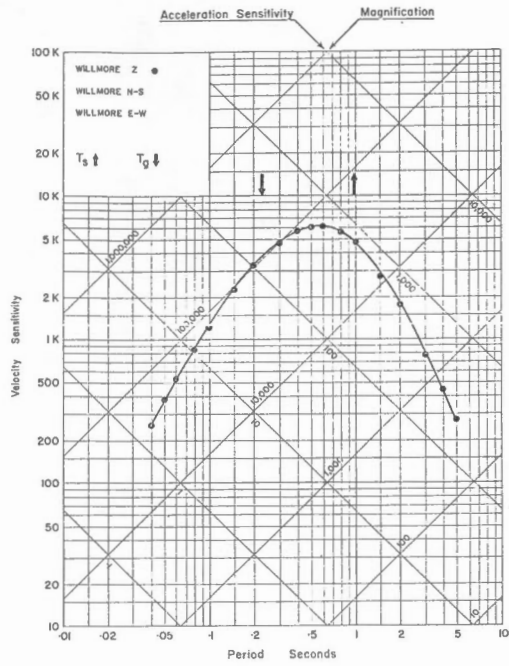
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • July 17, 1974

STATION: SCHEFFERVILLE, QUE. (AS FOUND AND LEFT) (SCH)

$\phi = 54^{\circ}49'N$ $\lambda = 66^{\circ}47'W$ Altitude 540 M

Foundation: Competent Precambrian state-shale



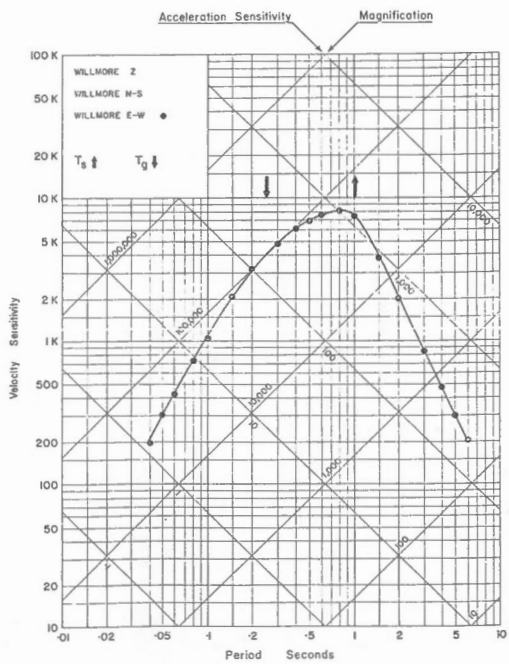
Dates of Calibration:

WILLMORE Z • 22 Feb. 1973
 WILLMORE N-S
 WILLMORE E-W

STATION: SCHEFFERVILLE, QUE. (AS FOUND AND LEFT) (SCH)

$\phi = 54^{\circ}49'N$ $\lambda = 66^{\circ}47'W$ Altitude 540 M

Foundation: Competent Precambrian state-shale



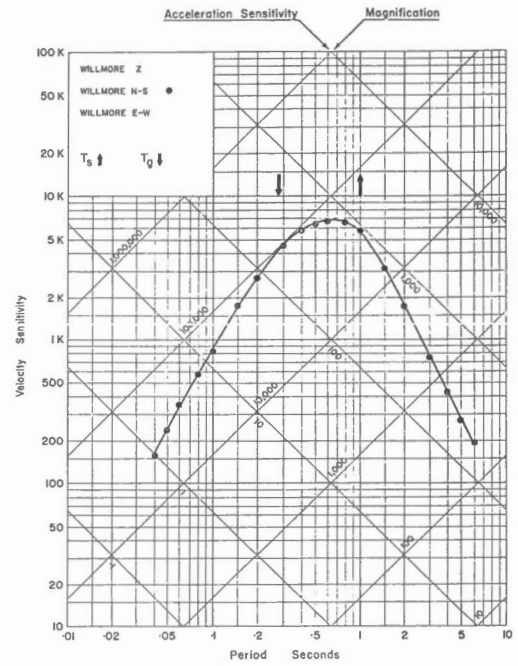
Dates of Calibration:

WILLMORE Z
 WILLMORE N-S
 WILLMORE E-W • 22 Feb. 1973

STATION: SCHEFFERVILLE, QUE. (AS FOUND AND LEFT) (SCH)

$\phi = 54^{\circ}49'N$ $\lambda = 66^{\circ}47'W$ Altitude 540 M

Foundation: Competent Precambrian slate-shale



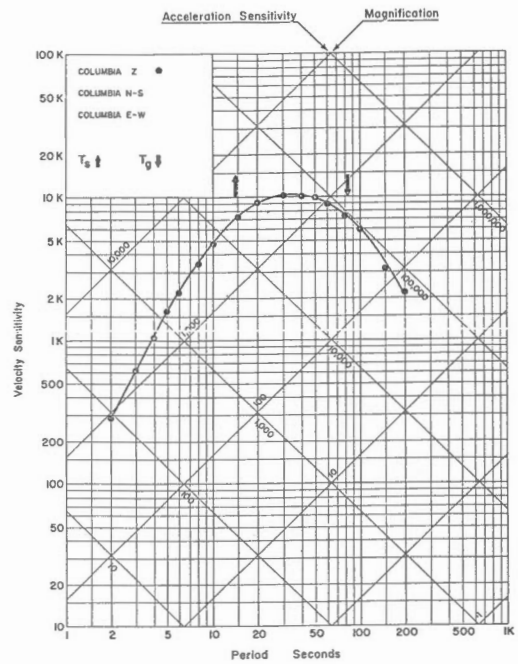
Dates of Calibration:

WILLMORE Z
 WILLMORE N-S • 22 Feb. 1973
 WILLMORE E-W

STATION: SCHEFFERVILLE, QUE. (AS FOUND AND LEFT) (SCH)

$\phi = 54^{\circ}49'N$ $\lambda = 66^{\circ}47'W$ Altitude 540 M

Foundation: Competent Precambrian slate-shale



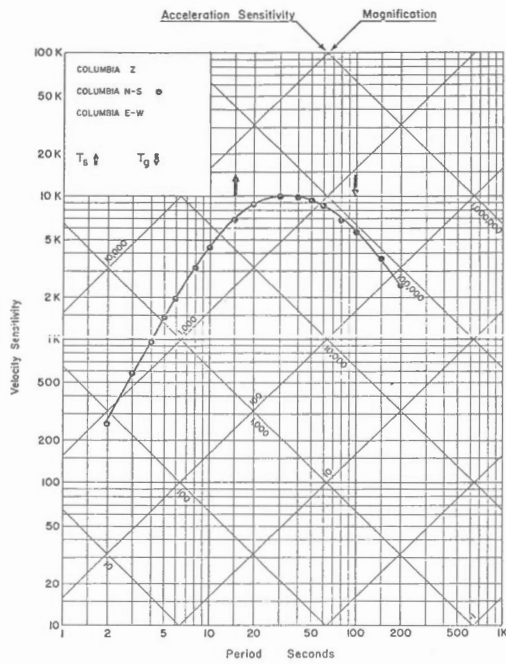
Dates of Calibration:

COLUMBIA Z • 21 Feb. 1973
 COLUMBIA N-S
 COLUMBIA E-W

STATION: SCHEFFERVILLE, OUE. (AS FOUND AND LEFT) (SCH)

$\phi = 54^{\circ}49'N$ $\lambda = 66^{\circ}47'W$ Altitude 540 M

Foundation: Competent Precambrian slate-shale



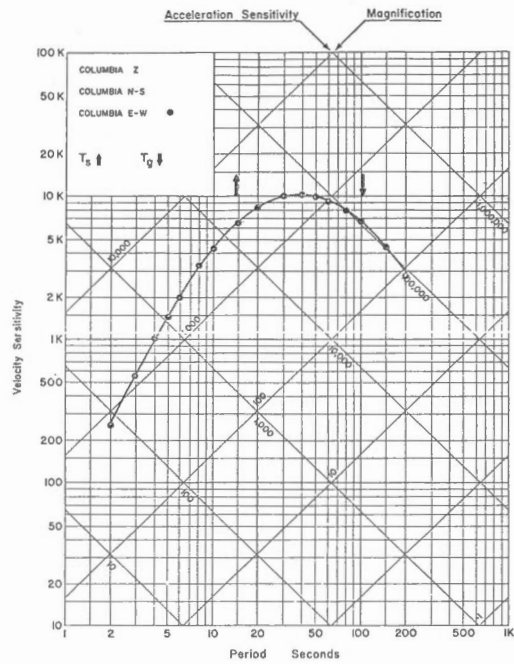
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • 22 Feb. 1973
COLUMBIA E-W

STATION: SCHEFFERVILLE, OUE. (AS FOUND AND LEFT) (SCH)

$\phi = 54^{\circ}49'N$ $\lambda = 66^{\circ}47'W$ Altitude 540 M

Foundation: Competent Precambrian slate-shale



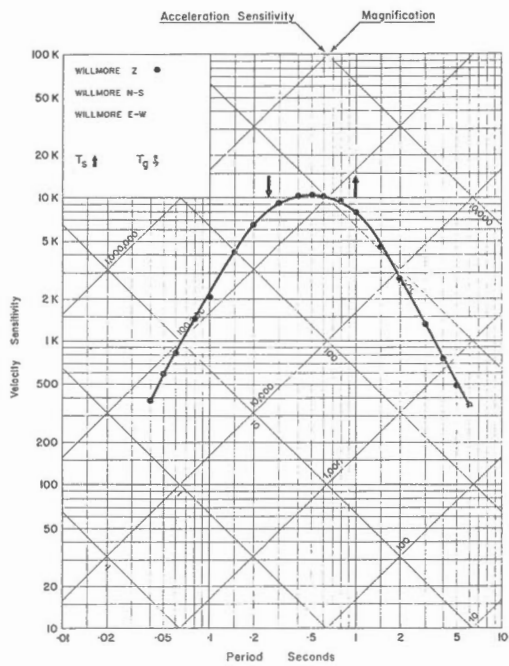
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • 22 Feb. 1973

STATION: SUFFIELD, ALTA. (Final) (SES)

$\phi = 50^{\circ}23'45''N$ $\lambda = 111^{\circ}02'30''W$ Altitude 770M

Foundation: Grey Competent Sandstone



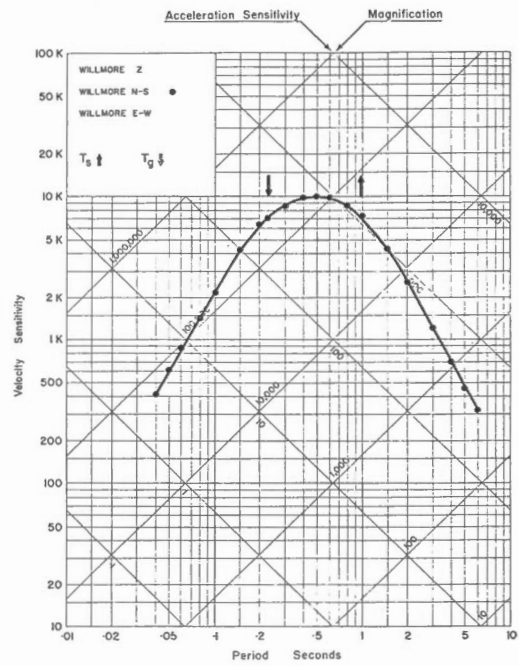
Dates of Calibration:

WILLMORE Z • December 7, 1974
WILLMORE N-S
WILLMORE E-W

STATION: SUFFIELD, ALTA. (final) (SES)

$\phi = 50^{\circ}23'45''N$ $\lambda = 111^{\circ}02'30''W$ Altitude 770M

Foundation: Grey Competent Sandstone



Dates of Calibration:

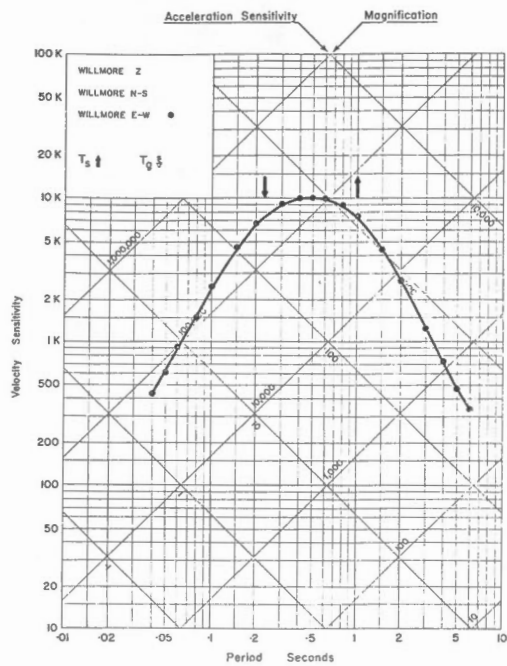
WILLMORE Z
WILLMORE N-S • December 7, 1974
WILLMORE E-W

STATION: SUFFIELD, ALTA. (SES)

(Final)

$\phi = 50^{\circ}23'45''N$ $\lambda = 111^{\circ}02'30''W$ Altitude 770M

Foundation: Grey Competent Sandstone



Dates of Calibration:

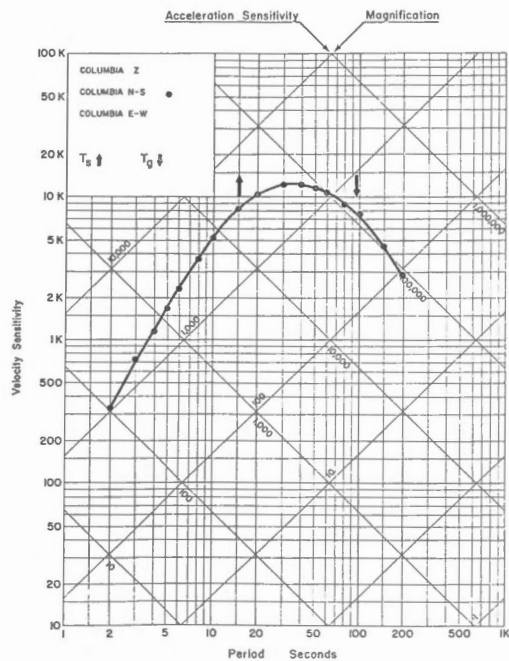
WILLMORE Z
WILLMORE N-S
WILLMORE E-W • December 7, 1974

STATION: SUFFIELD, ALTA. (SES)

(as found and left)

$\phi = 50^{\circ}23'45''N$ $\lambda = 111^{\circ}02'30''W$ Altitude 770M

Foundation: Grey Competent Sandstone



Dates of Calibration:

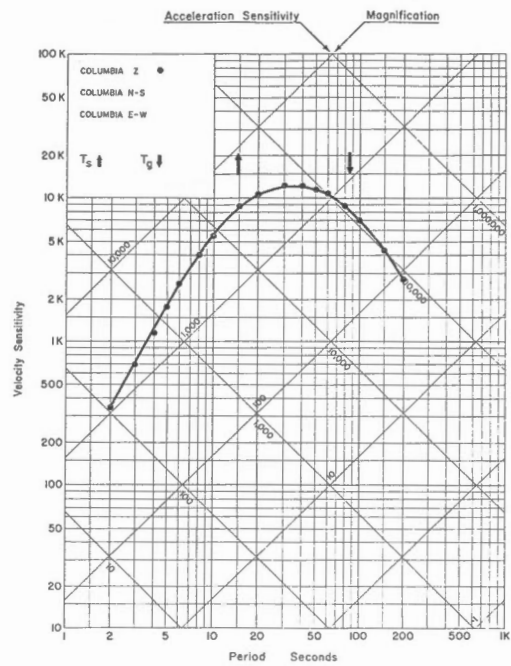
COLUMBIA Z
COLUMBIA N-S • December 8, 1974
COLUMBIA E-W

STATION: SUFFIELD, ALTA. (SES)

(As found and left)

$\phi = 50^{\circ}23'45''N$ $\lambda = 111^{\circ}02'30''W$ Altitude 770M

Foundation: Grey Competent Sandstone



Dates of Calibration:

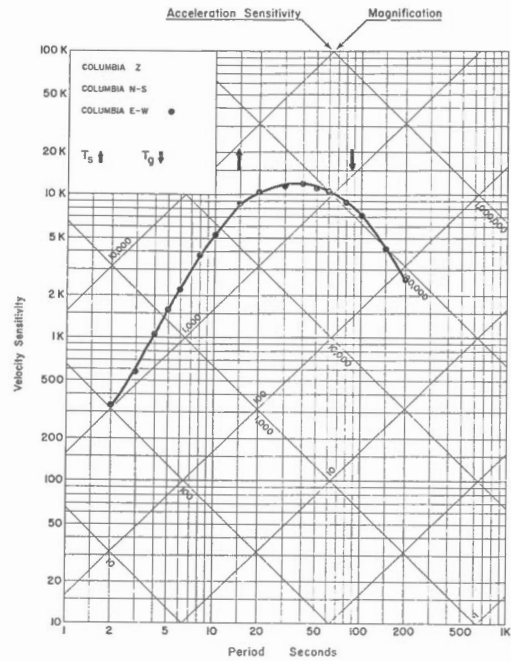
COLUMBIA Z • December 7, 1974
COLUMBIA N-S
COLUMBIA E-W

STATION: SUFFIELD, ALTA. (SES)

(As found and left)

$\phi = 50^{\circ}23'45''N$ $\lambda = 111^{\circ}02'30''W$ Altitude 770M

Foundation: Grey Competent Sandstone



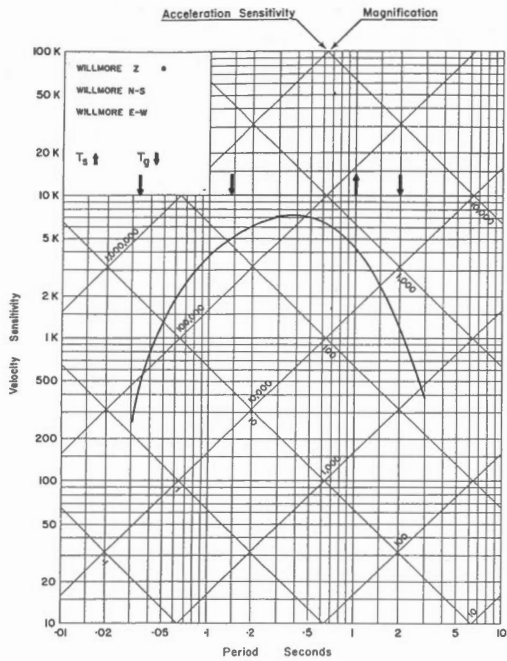
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • December 9, 1974

STATION: SEPT-ILES, QUE. (SIC)

$\phi = 50^{\circ}11'20''$ N $\lambda = 66^{\circ}44'25''$ W Altitude 283 m

Foundation:



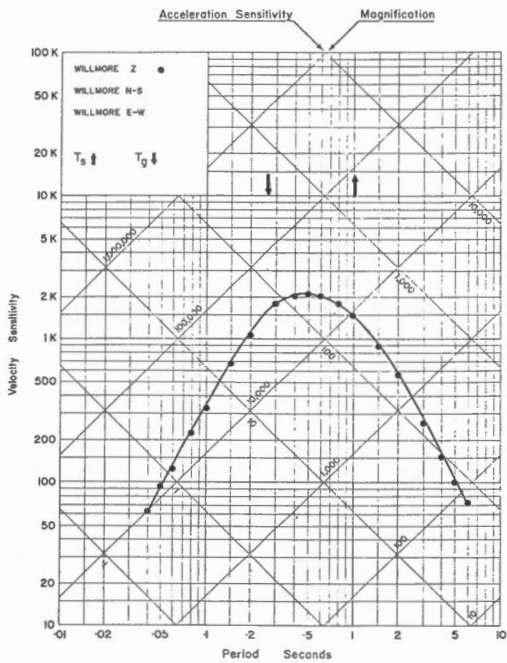
Dates of Calibration:

WILLMORE Z • Oct. 31, 1975
 WILLMORE N-S
 WILLMORE E-W
 Corner frequencies indicated by "Tg" arrows.

STATION: ST. JOHN'S, NFLD. (STJ)

$\phi = 47^{\circ}34.3'N$ $\lambda = 52^{\circ}44.0'W$ Altitude 62 m

Foundation: Precambrian: Siliceous Mudstone



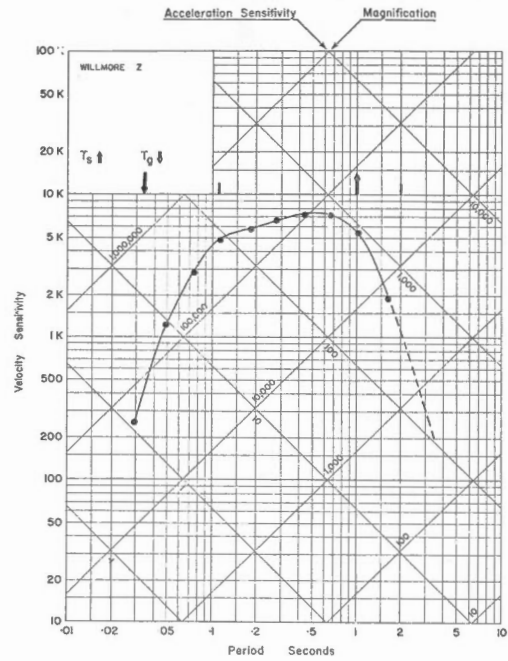
Dates of Calibration:

WILLMORE Z • Aug. 14, 1973
 WILLMORE N-S
 WILLMORE E-W

STATION: SEPT-ILES, QUE. (SIC)

$\phi = 50^{\circ}11'20''$ N $\lambda = 66^{\circ}44'25''$ W Altitude 283 m

Foundation:



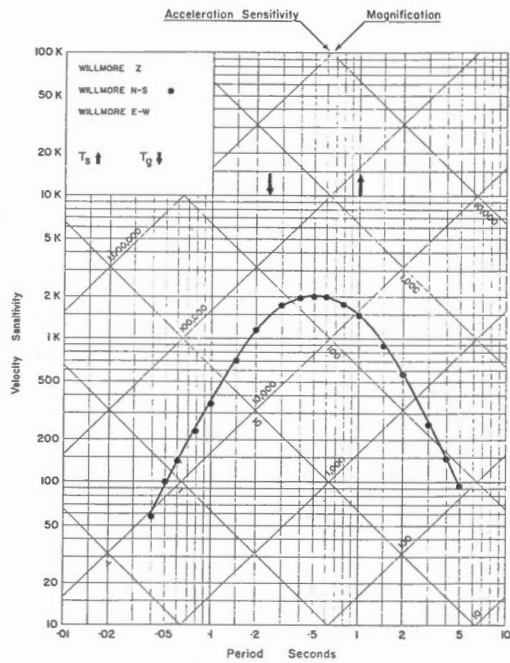
DATE OF CALIBRATION: OCT. 31, 1975

SEISMOMETER: Willmore M. 2
 PREAMPLIFIER: Teladyn AS420
 PEN DRIVE AMP.: E.P.Br. 111
 HELICORDER: Geotech RV301
 NOTE: Filter corner frequencies indicated by vertical bars.

STATION: ST. JOHN'S, NFLD. (STJ)

$\phi = 47^{\circ}34.3'N$ $\lambda = 52^{\circ}44.0'W$ Altitude 62 m

Foundation: Precambrian: Siliceous Mudstone



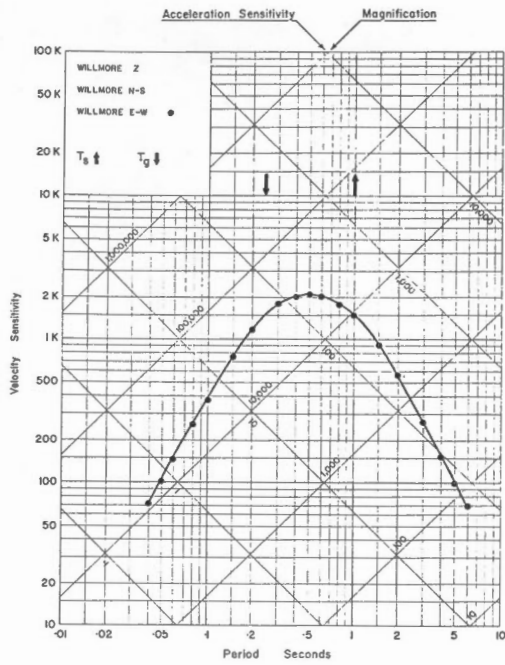
Dates of Calibration:

WILLMORE Z
 WILLMORE N-S • Aug. 14, 1973
 WILLMORE E-W

STATION: ST. JOHN'S, NFLD. (STJ)

$\phi = 47^{\circ}34.3'N$ $\lambda = 52^{\circ}44.0'W$ Altitude 62 m

Foundation: Precambrian: Siliceous Mudstone



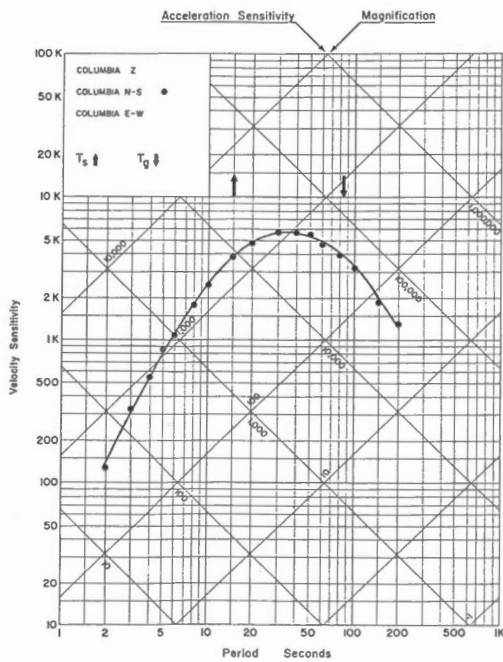
Dates of Calibration:

WILLMORE Z
WILLMORE N-S
WILLMORE E-W • Aug. 15, 1973

STATION: ST. JOHN'S, NFLD. (STJ)

$\phi = 47^{\circ}34.3'N$ $\lambda = 52^{\circ}44.0'W$ Altitude 62 m

Foundation: Precambrian: Siliceous Mudstone



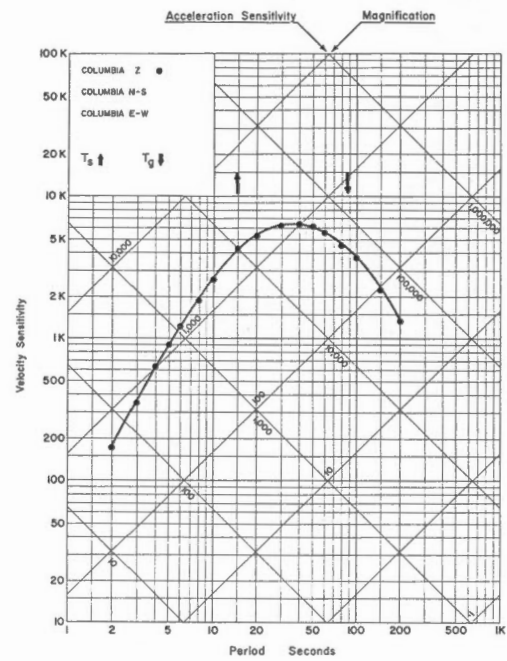
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • Aug. 17, 1973
COLUMBIA E-W

STATION: ST. JOHN'S, NFLD. (STJ)

$\phi = 47^{\circ}34.3'N$ $\lambda = 52^{\circ}44.0'W$ Altitude 62 m

Foundation: Precambrian: Siliceous Mudstone



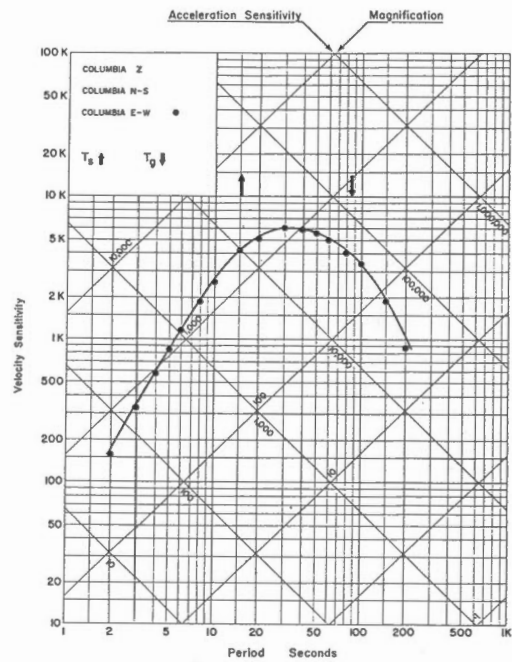
Dates of Calibration:

COLUMBIA Z • Aug. 17, 1973
COLUMBIA N-S
COLUMBIA E-W

STATION: ST. JOHN'S, NFLD. (STJ)

$\phi = 47^{\circ}34.3'N$ $\lambda = 52^{\circ}44.0'W$ Altitude 62 m

Foundation: Precambrian: Siliceous Mudstone



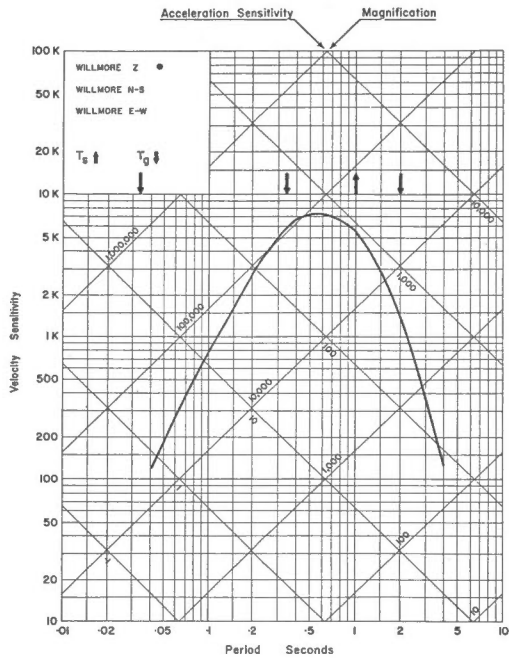
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S
COLUMBIA E-W • Aug. 18, 1973

STATION: SUDBURY, ONT. (SUD)

$\phi = 46^{\circ}28'N$ $\lambda = 80^{\circ}58'W$ Altitude 267 M

Foundation: Proterozoic, Huronian, Wanapitae Quartzite

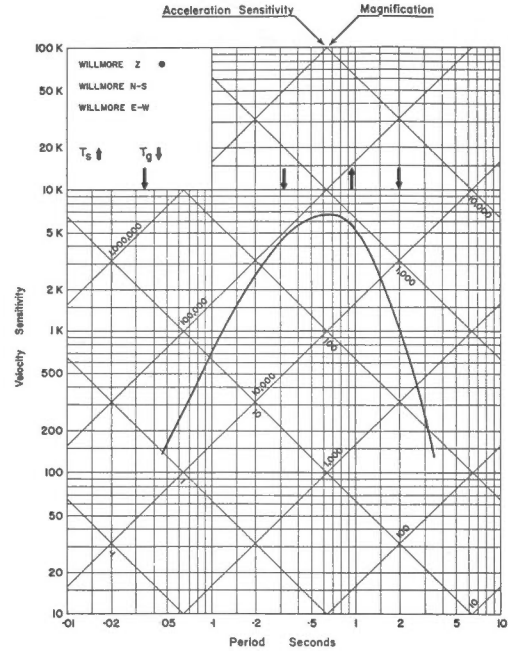


DATE OF CALIBRATION: May 28, 1975
 SEISMOMETER: WILLMORE MK11
 PREAMPLIFIER: TELEDYNE AS310
 HELICORDER: GEOTECH RV301
 Corner frequencies indicated by T_g arrows.

STATION: FREDERICTON, N.B. (UNB)

$\phi = 45^{\circ}57'N$ $\lambda = 66^{\circ}38'W$ Altitude 56 M

Foundation: Cenozoic, early post-glacial rock

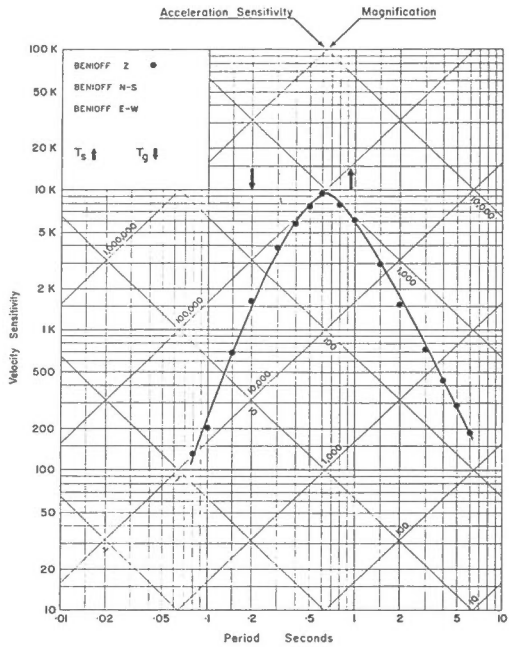


DATE OF CALIBRATION: May 8, 1975
 SEISMOMETER: WILLMORE MK11
 PREAMPLIFIER: TELEDYNE EA310
 HELICORDER: GEOTECH RV301
 Corner frequencies indicated by T_g arrows.

STATION: VICTORIA, B.C. (VIC)

$\phi = 48^{\circ}31'10''N$ $\lambda = 123^{\circ}24'55''W$ Altitude 197 M

Foundation: Quartz Diorite

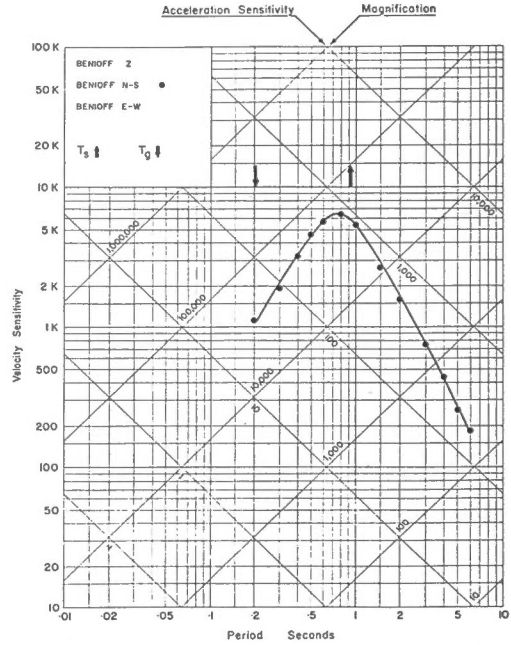


Dates of Calibration:
 BENHOFF Z • June 22, 1974
 BENHOFF N-S
 BENHOFF E-W

STATION: VICTORIA, B.C. (VIC)

$\phi = 48^{\circ}31'10''N$ $\lambda = 123^{\circ}24'55''W$ Altitude 197 M

Foundation: Quarz Diorite

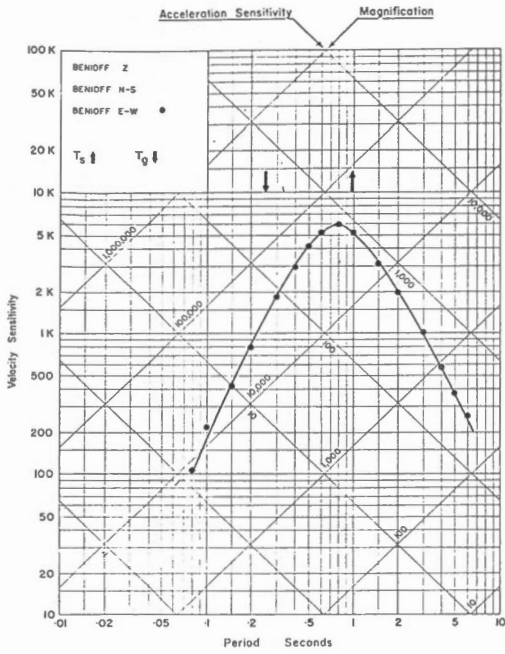


Dates of Calibration:
 BENHOFF Z
 BENHOFF N-S • June 22, 1974
 BENHOFF E-W

STATION: VICTORIA, B.C. (VIC)

$\phi = 48^{\circ}31'10''N$ $\lambda = 123^{\circ}24'55''W$ Altitude 197M

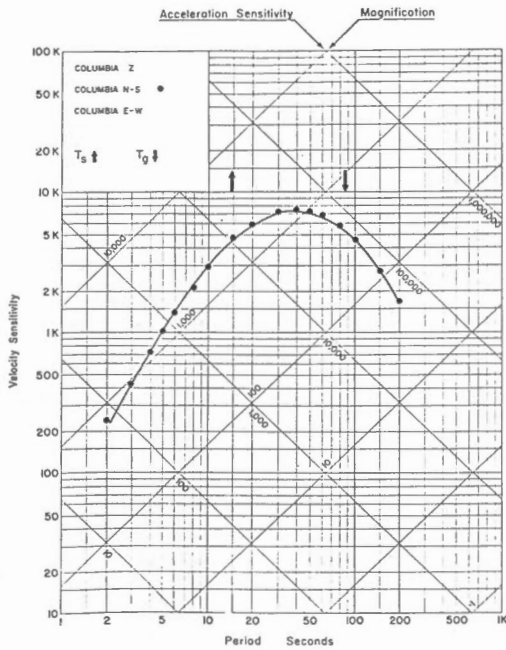
Foundation: Quartz Diorite



STATION: VICTORIA, B.C. (VIC)

$\phi = 48^{\circ}31'10''N$ $\lambda = 123^{\circ}24'55''W$ Altitude 197 M

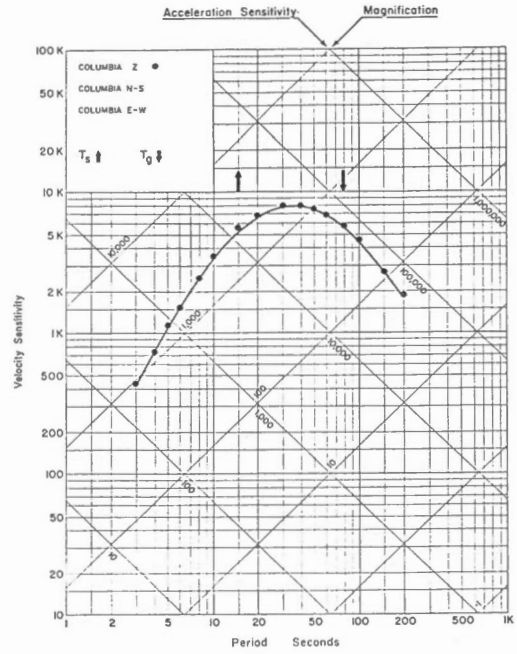
Foundation: Quartz Diorite



STATION: VICTORIA, B.C. (VIC)

$\phi = 48^{\circ}31'10''N$ $\lambda = 123^{\circ}24'55''W$ Altitude 197M

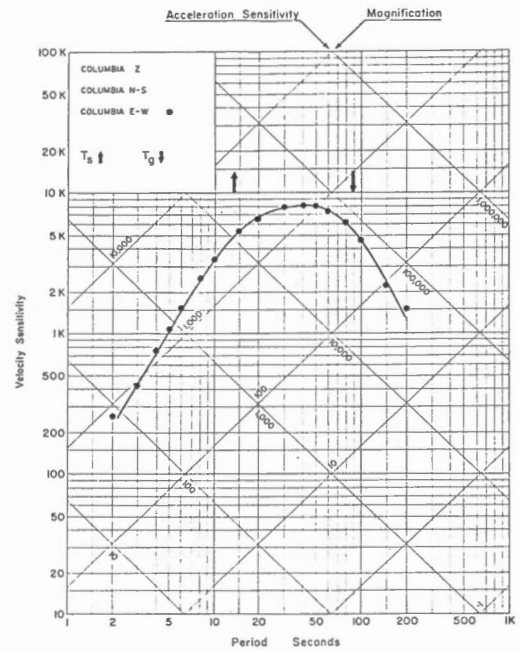
Foundation: Quartz Diorite



STATION: VICTORIA, B.C. (VIC)

$\phi = 48^{\circ}31'10''N$ $\lambda = 123^{\circ}24'55''W$ Altitude 197 M

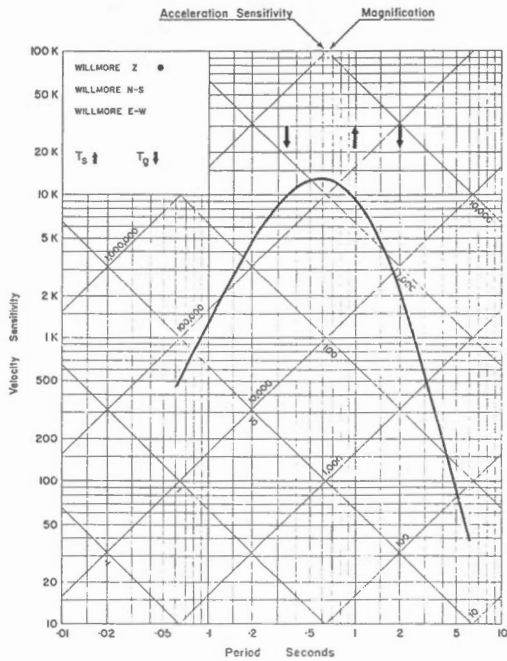
Foundation: Quartz Diorite



STATION: WHITEHORSE, Y.T. (Final) (WHC)

$\phi = 60^{\circ}44.2'N$ $\lambda = 135^{\circ}05.9'W$ Altitude 734 M

Foundation: Grandiorite



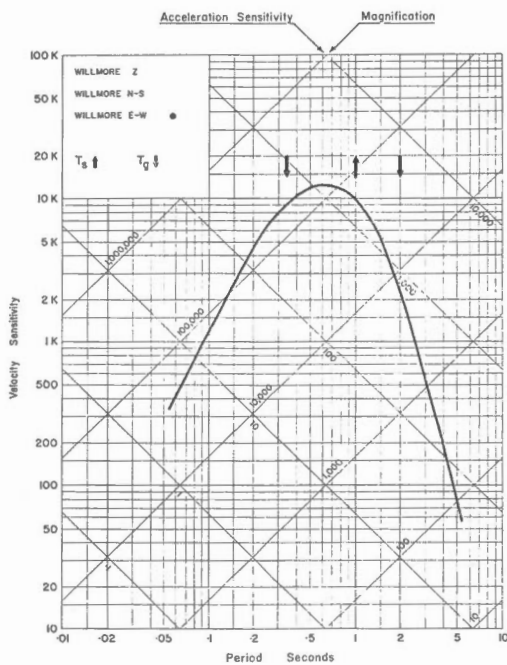
DATE OF CALIBRATION: November 28, 1974

SEISMOMETER: Willmore MKII T_S 0.96 D_S 0.68
 $G_L = 1.11$ v.s./cm @ $R_L = 545$ ohms
 AMPLIFIER: Teledyne EA310 - Gain 12.5K @ -18db
 HELICORDER: RV301 - 1 cm/v
 Corner frequencies indicated by "Tg" arrows.

STATION: WHITEHORSE, Y.T. (WHC)

$\phi = 60^{\circ}44.2'N$ $\lambda = 135^{\circ}05.9'W$ Altitude 734 M

Foundation: Grandiorite



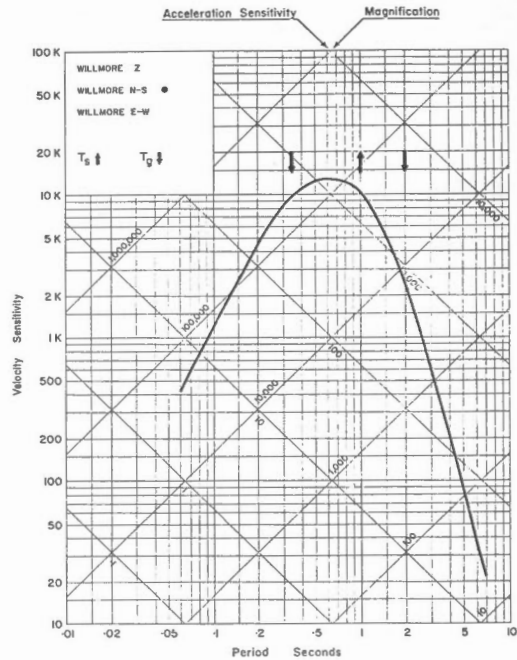
DATE OF CALIBRATION: November 28, 1974

SEISMOMETER: Willmore MKII T_S 1.0 D_S 0.61
 $G_L = 1.04$ v.s./cm @ $R_L = 545$ ohms
 AMPLIFIER: Teledyne EA310 - Gain 12.5K @ -18 db
 HELICORDER: RV301 - 1 cm/v
 Corner frequencies indicated by "Tg" arrows.

STATION: WHITEHORSE, Y.T. (WHC)

$\phi = 60^{\circ}44.2'N$ $\lambda = 135^{\circ}05.9'W$ Altitude 734 M

Foundation: Grandiorite



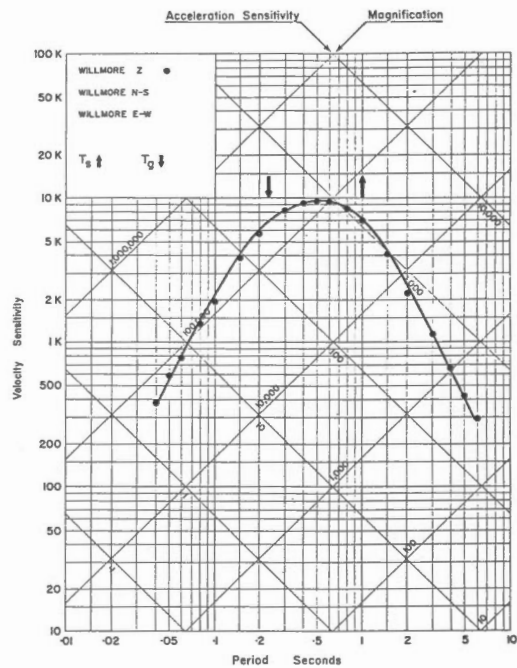
DATE OF CALIBRATION: November 28, 1974

SEISMOMETER: Willmore MKII T_S 1.0 D_S 0.60
 $G_L = 1.04$ v.s./cm @ $R_L = 545$ ohms
 AMPLIFIER: Teledyne EA310 - Gain 12.5K @ -18 db
 HELICORDER: RV301 - 1 cm/v
 Corner frequencies indicated by "Tg" arrows.

STATION: YELLOWKNIFE, N.W.T. (YKC) Final

$\phi = 62^{\circ}28.7'N$ $\lambda = 114^{\circ}28.4'W$ Altitude 198 M

Foundation: Granite



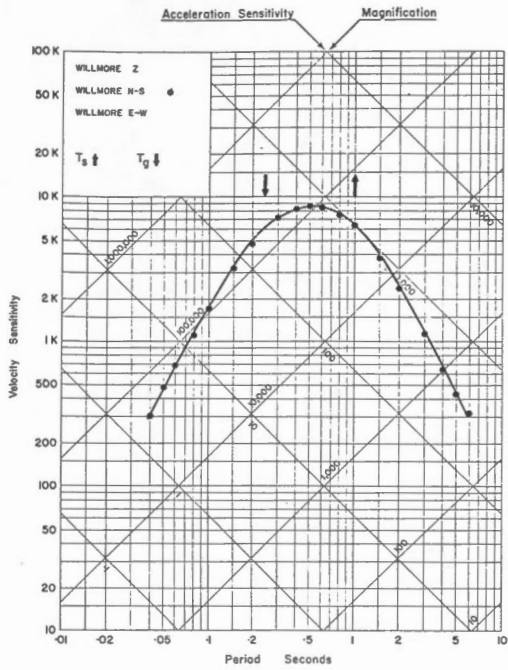
Dates of Calibration:

WILLMORE Z • March 23, 1974
 WILLMORE N-S
 WILLMORE E-W

STATION: YELLOWKNIFE, N.W.T. (YKC) Final

$\phi = 62^{\circ}28.7'N$ $\lambda = 114^{\circ}28.4'W$ Altitude 198 M

Foundation: Granite



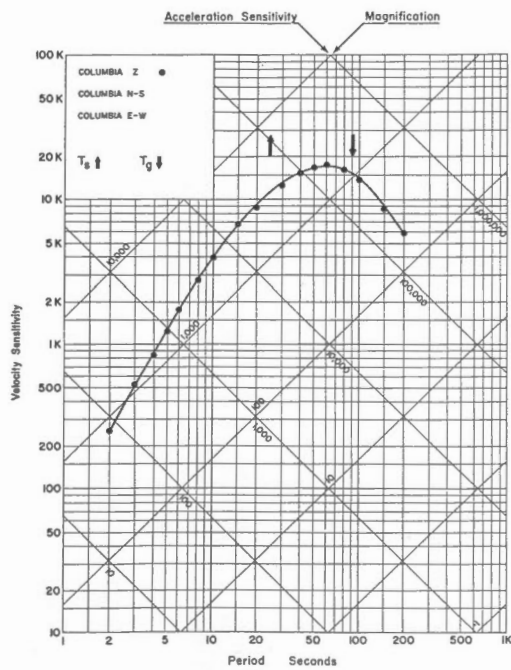
Dates of Calibration:

WILLMORE Z
WILLMORE N-S • March 23, 1974
WILLMORE E-W

STATION: YELLOWKNIFE, N.W.T. (YKC) Final

$\phi = 62^{\circ}28.7'N$ $\lambda = 114^{\circ}28.4'W$ Altitude 198 M

Foundation: Granite



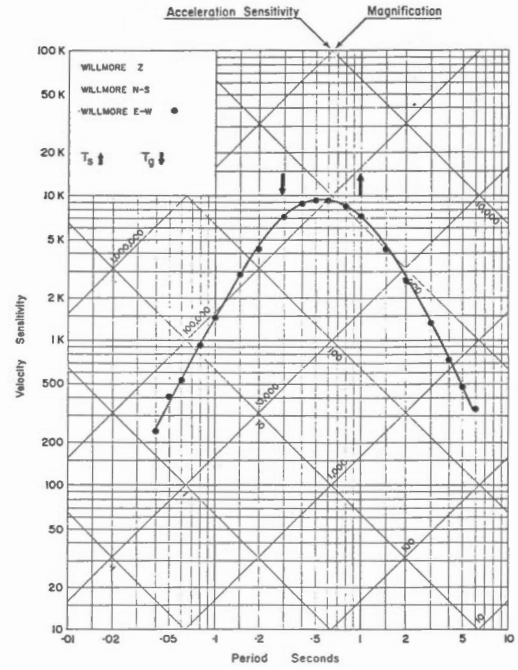
Dates of Calibration:

COLUMBIA Z • March 24, 1974
COLUMBIA N-S
COLUMBIA E-W

STATION: YELLOWKNIFE, N.W.T. (YKC) Final

$\phi = 62^{\circ}28.7'N$ $\lambda = 114^{\circ}28.4'W$ Altitude 198 M

Foundation: Granite



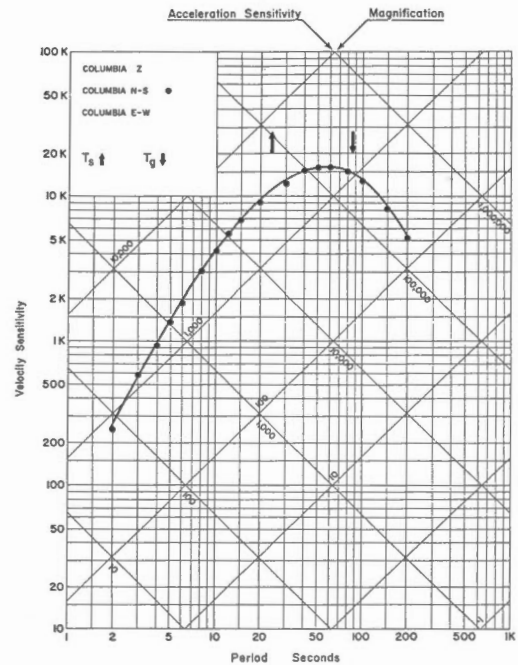
Dates of Calibration:

WILLMORE Z
WILLMORE N-S
WILLMORE E-W • March 23, 1974

STATION: YELLOWKNIFE, N.W.T. (YKC) Final

$\phi = 62^{\circ}28.7'N$ $\lambda = 114^{\circ}28.4'W$ Altitude 198 M

Foundation: Granite



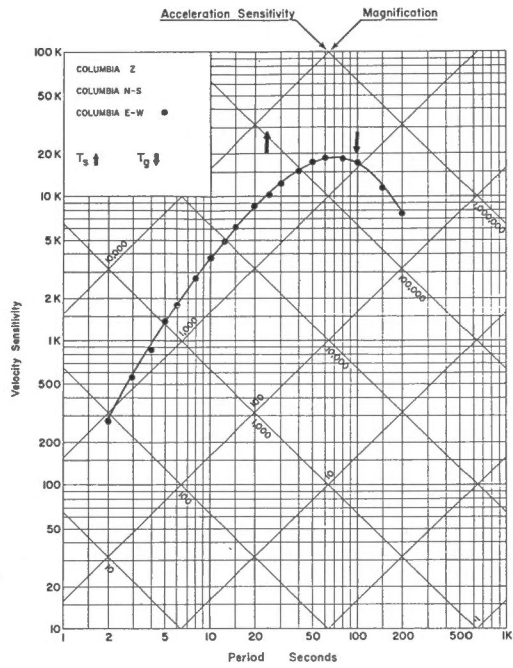
Dates of Calibration:

COLUMBIA Z
COLUMBIA N-S • March 25, 1974
COLUMBIA E-W

STATION: YELLOWKNIFE, N.W.T. (YKC) Final

$\phi = 62^{\circ}28.7'N$ $\lambda = 114^{\circ}28.4'W$ Altitude 198 M

Foundation: Granite



Dates of Calibration:

COLUMBIA Z

COLUMBIA N-S

COLUMBIA E-W • March 25, 1974

