

R-1204-ARPA
May 1974

Soviet Seismographic Stations and Seismic Instruments, Part I

Charles Shishkevish

A Report prepared for
DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

Rand
SANTA MONICA, CA. 90406

The research described in this Report was sponsored by the Defense Advanced Research Projects Agency under contract No. DAHC15-73-C-0181. Reports of The Rand Corporation do not necessarily reflect the opinions or policies of the sponsors of Rand research.

R-1204-ARPA

May 1974

Soviet Seismographic Stations and Seismic Instruments, Part I

Charles Shishkevish

A Report prepared for
DEFENSE ADVANCED RESEARCH PROJECTS AGENCY



H

PREFACE

This two-part Report was prepared under a continuing Rand study, sponsored by the Defense Advanced Research Projects Agency, of selected areas of Soviet science and technology. It presents data from open-source Soviet scientific literature on the network of 168 seismographic stations operating in the USSR, and is intended primarily for U.S. seismologists and geologists working with seismic data acquired from these stations and for all those interested in the capabilities of these stations to record both natural and man-made seismic events. A preliminary version, covering Soviet seismographic stations and equipment through 1966, was published in the *Geosciences Bulletin*, Series A, Vol. 3, Nos. 10-11, October-November 1972 [1]. Part I of the present Report contains a general description of the stations, with particular emphasis on seismograph systems, instrumental constants, and seismograph magnification curves; Part II will discuss seismographic instruments.

SUMMARY

This two-part Report presents data on the network of 168 seismographic stations known to be operating in the USSR. Part I contains a general description of the stations, with particular emphasis on seismograph systems, instrumental constants, and seismograph magnification curves; Part II will discuss seismographic instruments. The present Report is an updated and expanded version of one that appeared in early 1973, based on information dating to 1966, and incorporates the significant and detailed information on the status of base seismographic stations in 1969 and 1970 that became available after the first Report was written.

The Soviet seismographic station network consists of fifty-four base, sixty-one regional, and fifty-three expeditionary stations forming the Unified Seismic Observation System (ESSN). The ESSN stations are divided by Soviet seismologists into ten networks according to the seismic zone in which they are located. The functions of the base stations are to record earthquakes having surface wave magnitudes $M \geq 4$ and to acquire data on world seismicity and on the internal structure of the earth. The regional stations are responsible for recording weak local and near earthquakes not recorded by base stations. The expeditionary stations, which are semipermanent, perform the same function and are equipped with the same types of seismographs as the regional stations.

The Report includes three tables giving the following data: (1) descriptions of the seismographs operating at the ESSN stations in 1969-1970; (2) the nominal values of instrumental constants of the most widely used seismographs; and (3) the geographic coordinates of each of the seismic zones and the scientific institutions responsible for the operation of stations in that zone. Another table lists in alphabetical order the names of the 168 permanent seismographic stations, the abbreviated name of each station, the type of station, the seismographs used there, the geographic coordinates, and the name of the seismic zone in which the station is located. Maps are

included showing the location of seismographic stations in the USSR and the location of the stations within each of the ten seismic zones. One hundred thirty-seven figures show the magnification curves of seismographs at the fifty-four base and seventy-five of the regional and expeditionary stations, listed in alphabetical order.

The instrumental constants used by Soviet scientists are explained, and formulas are given for normal or indicator magnification, V_m , an unfamiliar parameter to Western seismologists. Another widely used term, T_m , the period range corresponding to magnification at 0.9 of the maximum gain, is defined and its implications and limitations are discussed.

CONTENTS

PREFACE	iii
SUMMARY	v
Section	
I. SEISMOGRAPHIC STATIONS AND INSTRUMENTS	1
II. INSTRUMENTAL CONSTANTS	35
III. MAGNIFICATION CURVES	60
REFERENCES	199

I. SEISMOGRAPHIC STATIONS AND INSTRUMENTS

This two-part Report presents data on the network of 168 seismographic stations known to be operating in the USSR. Part I contains a general description of the stations, with particular emphasis on seismograph systems, instrumental constants, and seismograph magnification curves; Part II will discuss seismographic instruments. The present Report is an updated and expanded version of one that appeared in early 1973 [1], based on information dating to 1966, and incorporates the significant and detailed information that became available after [1] was published, specifically, data on the status of base seismographic stations in 1969 [2] and 1970 [3]. Although a comprehensive description of regional stations is still not available, the publication of the two latest issues in the *Zemletryaseniya v SSSR* series [4,5] provides previously unavailable details on regional and expeditionary stations through 1969. Data from these two sources, including the names of the 114 regional stations operating in 1969 and the first listing [5] of instruments at the regional stations, their maximum magnification (V_m), and their period range (T_m), are also included in this Report. However, the geographic coordinates of many regional stations are still not given in Soviet publications, and magnification curves are available only for the sixteen Baykal stations.

The Soviet seismographic station network consists of base, regional, and expeditionary stations forming the Unified Seismic Observation System (ESSN). The functions of the base stations are to record earthquakes having surface wave magnitudes $M \geq 4$ and to acquire data on world seismicity and on the internal structure of the earth. The regional stations are responsible for recording weak local and near earthquakes not recorded by base stations. The expeditionary stations, which are semipermanent, perform the same function and are equipped with the same types of seismographs as the regional stations. Finally, extensive use is made of temporary stations outside the ESSN network to obtain seismic data for

the investigation of regional seismicity in areas where there are few or no seismographic stations, for the investigation of seismicity in and near cities where strong or destructive earthquakes have occurred, for seismic zoning in areas of extensive construction, and implicitly for the detection and monitoring of underground nuclear explosions, and so forth.

All Soviet seismographic stations are equipped with standard instruments and follow the same operating procedures. The seismographs operating at the ESSN stations in 1969-1970 are listed in Table 1. Table 2 gives the nominal values of instrumental constants of the most widely used seismographs. Base stations are usually equipped with: SK broadband or SKD extended-period systems; short-to-intermediate-period high-gain seismographs, such as the SKM-3, or the older SKh and SKM instruments; or engineering seismographs, such as the VEGIK. It is planned eventually to replace the remaining SK broadband instruments with SKD extended-period broadband systems. It is planned also to install SD-1 long-period systems at all base stations, but as late as 1970, only nine base stations and one regional station were equipped with SD-1's. Some base stations are also equipped with KPCh low-gain channels obtained by connecting a galvanometer to the seismometer damping coil. The magnification ratio of the main channel, with the KPCh usually operated in a standby mode, is between 10 and 15 to 1. The SK and SK-KPCh, that is, one or more components of the SK system operating at normal magnifications and the same component or components operating in a low-gain mode, are the most frequently used combinations involving the KPCh channels. Some stations, however, use SKD-KPCh, SKM-3--KPCh, and VEGIK-KPCh low-gain channels. The strong-motion instruments usually used at the base stations are the SMR-2, an improved version -- the SMTR, and the S5S [1-3].

Regional and expeditionary stations are usually equipped with high-gain seismographs, such as the SKM-3, SKM, SKh, and VEGIK; some operate broadband SK or SKD instruments, and a few are equipped with various combinations of both. The low-gain KPCh channels are also used at regional stations. The strong-motion instruments are usually limited to the SMR-2 or the SMTR.

Table 1

SOVIET SEISMOGRAPHS

SD-1	Standard long-period system or any of its three components: SD-1 (N-S,E-W) -- horizontal-component SD-1 seismographs SD-1 (Z) -- vertical-component SD-1 seismograph
SG	Galitzin system or any of its three components: GSG or SG (N-S,E-W) -- horizontal-component SG seismographs VSG or SG (Z) -- vertical-component SG seismograph
SK	Kirnos broadband seismograph system or any of its three components: SGK or SK (N-S,E-W) -- horizontal-component SK seismographs SVK or SK (Z) -- vertical-component SK seismograph
SKD	Kirnos-Arkhangel'skiy broadband extended-period system or any of its three components: SGKD or SKD (N-S,E-W) -- horizontal-component SKD seismographs SVKD or SKD (Z) -- vertical-component SKD seismograph
SKh	Kharin short-period system or any of its three components: GSKh or SKh (N-S,E-W) -- horizontal-component SKh seismographs VSKh or SKh (Z) -- vertical-component SKh seismograph
SKM	Kirnos high-gain, short-period system or any of its three components: SGKM or SKM (N-S,E-W) -- horizontal-component SKM seismographs SVKM or SKM (Z) -- vertical-component SKM seismograph
SKM-3	Kirnos high-gain, short-period system (later model of SKM) or any of its three components: SGKM-3 or SKM-3 (N-S,E-W) -- horizontal-component SKM-3 seismographs SVKM-3 or SKM-3 (Z) -- vertical-component SKM-3 seismograph
USF	Fedoseyenko high-gain, short-period system (sometimes called the USF-IIIM) or any of its three components: USF (N-S,E-W) -- horizontal-component USF seismographs USF (Z) -- vertical-component USF seismograph
VEGIK	Kirnos short-period system or any of its three components: VEGIK (N-S,E-W) -- horizontal-component VEGIK seismographs VEGIK (Z) -- vertical-component VEGIK seismograph
KPCh	Low-gain seismograph channel obtained by connecting a galvanometer to the seismometer damping coil and used mostly with SK and SKD seismographs (SK-KPCh, SKD-KPCh)
APT-1	Piezoelectric three-component strong-motion and blast accelerometer system

Table 1 (continued)

ESS	Portable three-component strong-motion system with an optical microrecorder designed for unattended operation; the ESS-1 is one of the earliest models of the system
S5S	Three-component strong-motion system consisting of three S5S seismometers and a recording oscillograph, or any of its three components; or Intermediate-gain intermediate-period system consisting of three S5S seismometers, three electronic amplifiers, and a visual recorder, or any of its three components: S5S (N-S,E-W) -- horizontal-component S5S seismographs S5S (Z) -- vertical-component S5S seismograph
SMR-2	Two strong-motion horizontal-component seismographs with direct mechanical recording; an alternate designation is SMR-2 (N-S,E-W)
SMTR	An improved model of the SMR-2 strong-motion system; alternate designations are SMR-2M, SMR-2M (N-S,E-W), or SMTR (N-S,E-W)
UAR-M	Optically recording three-component strong-motion accelerograph
VBP-3	Three-component system consisting of three VBP-3 seismometers and a recording oscillograph, or any of its three components: VBP-3 (N-S,E-W) -- horizontal-component VBP-3 seismographs VBP-3 (Z) -- vertical-component VBP-3 seismograph
UBOPE	Tsunami warning system consisting of two horizontal-component seismographs with direct mechanical recording for quick location of epicenters of possible tsunami-generating earthquakes and an azimuth measuring instrument UBOPE-0 -- includes two SMR-0 seismographs operating at a gain of ~1 UBOPE-1 -- includes two SMR-3 seismographs (similar to the SMR-2) operating at a gain of ~5 UBOPE-2 -- includes two mechanically recording seismographs operating at a gain of ~50

Table 2

INSTRUMENTAL CONSTANTS OF WIDELY USED SOVIET SEISMOGRAPHS

Instrument	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_{max} (sec)
SG	12 or 24	1	12 or 24	1	0	1000-1200	1200	5-10
SK (Z)	12.5	0.45	1-1.2	5-6	0.1	700-1000	1000	0.3-11
SK (N-S, E-W)	12.5	0.45	1-1.2	5-6	0.3-0.4	1000	1300	8-11
SKD	25	0.5	1.2	8	0.25	1000	1000	2.0-20
SKh	0.7-1.0	0.5-0.9	0.2-0.5	1-3	0.3	$(3-5) \times 10^4$	$(3-5) \times 10^4$	0.2-0.3
SKM	2.5	1.5-3	1-1.2	1.5-3	0.3	2×10^4	2×10^4	0.9-1.2
SKM-3 with GK-VII galvanometer	1.5	0.6	0.7	2	0.3	6×10^4	8×10^4	0.4-1.5
SKM-3 with GB-III galvanometer	2	1	0.2	8	0.3	10^5	10^5	0.1-1.5
USF with GK-VII galvanometer	1.5	0.8	0.5	1.5	0.4	11×10^4	18×10^4	0.6
USF with GB-III galvanometer	1.5	1.0	0.5	2.0	0.4	48×10^3	6×10^4	0.5-1
VEGIK	0.7	0.5	0.07	2-3	0.1	2×10^4	2×10^4	0.01-0.5
SD-1	25	1	83-105	0.5	0.20	900	1000	20-50
SMTR	5	0.45				7	8.4	0.1-7

All of the Soviet seismographs listed in Table 2, except the SMR-2 and the SMTR, record galvanometrically and are equipped with electromagnetic (velocity) transducers. Recording is on photographic paper at the following optimal paper speeds:

SK, SKD, SKM, SKM-3, SKh	30 mm/min
VEGIK, USF	60 mm/min [*]
SD-1	7.5 or 15 mm/min ^{**}

The SMR-2 records mechanically on smoked paper at a speed of 30 or 60 mm/min. The SMTR can record on either smoked or heat-sensitive paper for a period of up to 72 hours at the same paper speeds as the SMR-2. Various direct mechanically recording horizontal-component seismographs are used in the UBOPE-0, UBOPE-1, and UBOPE-2 tsunami warning systems.

At the end of 1969, the Unified Seismic Observation System consisted of fifty-four base, sixty-one regional, and fifty-three expeditionary stations. Most of the stations are located within seismic areas extending almost continuously along the eastern, southern, and southwestern boundaries of the Soviet Union. The ESSN stations are divided by Soviet seismologists into ten networks according to the seismic zone in which they are located^{***} (rather than by republic or other administrative subdivision). Eight of the base stations -- six teleseismic and two Antarctic -- are in aseismic or weakly seismic regions. Table 3 gives the coordinates of each of the seismic zones and the scientific institutions responsible for the operation of stations in that zone.

^{*} Paper speeds of 120 and 240 mm/min are sometimes used, especially at regional stations, for recording weak local earthquakes.

^{**} The actual speed is not specified; 7.5 mm/min and 15 mm/min are the lowest speeds that can be obtained with the standard PS II or PS II-M drum subassemblies used at ESSN seismographic stations.

^{***} Two stations were found to be located outside the boundaries of the zones in which the Soviets listed them: Kulkuduk, which is at 63°E longitude, is placed in the Central Asia zone, although the eastern boundary of Kopet-Dag and western boundary of Central Asia are considered to be at 65°E, and Okha, at 53°N latitude, is considered to be in the Far East, the boundaries of which are 43°-52°N.

Table 3 [5]

SEISMIC ZONES AND INSTITUTIONS OPERATING ZONAL STATIONS

Seismic Zone	Boundaries		Responsible Institution
	°N	°E	
Altay-Sayan	45-56	80-100	Inst. of Geology and Geophysics, Siberian Dept., AS USSR
Arctic	60-90	38E-169W	Pulkovo Central Station, Inst. of Physics of Earth, AS USSR
Baykal	48-60	96-120	Inst. of Earth's Crust, Siberian Dept., AS USSR
Carpathia	45-50	22-31	Seismology Section, L'vov Br., Inst. of Geophysics, AS USSR
Caucasus	38-45	38-52	Inst. of Geophysics, AS GSSR; Inst. of Geology imeni I. M. Gubkin, AS AzSSR
Central Asia	36-46	65-81	Inst. of Seismology, AS UzSSR Inst. of Seismic-Resistant Construction & Seismology, AS TaSSR Inst. of Geology, AS KiSSR Complex Seismological Expedition, Inst. of Physics of Earth, AS USSR
Crimea	43-45	32-37	Simferopol' Central Station, Inst. of Physics of Earth, AS USSR
Far East Kamchatka, Commander Islands, Primorskiy Kray	50-60	156-168	Pacific Ocean Seismological Expedition, Inst. of Physics of Earth, AS USSR Laboratory of Geophysical Standards, Inst. of Volcanology, Far East Scientific Center, AS USSR
Kuril Islands, Sakhalin	43-52	130-157	Sakhalin Multidiscipline Scientific-Research Inst., Far East Scientific Center, AS USSR
Kopet-Dag	36-44	52-65	Inst. of Physics of Earth and Atmosphere, AS TuSSR
Northeast and Yakutia	54-72	120-162	Yakut Branch, Siberian Dept., AS USSR Northeast Multidiscipline Scientific-Research Inst., Far East Scientific Center, AS USSR

The location of all but the two Antarctic stations is shown in Fig. 1. Figures 2-11 are more detailed area maps indicating station locations within each of the ten seismic zones (excluding the Antarctic and six teleseismic stations). An alphabetical listing of the 168 ESSN seismographic stations in January 1970 is given in Table 4. This table gives the following data for each station: (1) its full name, the abbreviated name or names used by Soviet seismologists, the international three-letter abbreviation,* the type of station -- base (b), regional (r), or expeditionary (exp), and the seismic instruments (using the designations given in Table 1); (2) the geographic coordinates; and (3) the name of the seismic zone and, where it may be of interest, the region or republic in which the station is located.

*For the sixty-six stations covered in *Operativnyy seysmologicheskii byulleten'*, *yeshedekadnyy* (Ten-Day Seismological Operations Bulletin), Obninsk Central Seismological Observatory, Institute of Physics of the Earth, Academy of Sciences, USSR, Nos. 1-20, 1972.

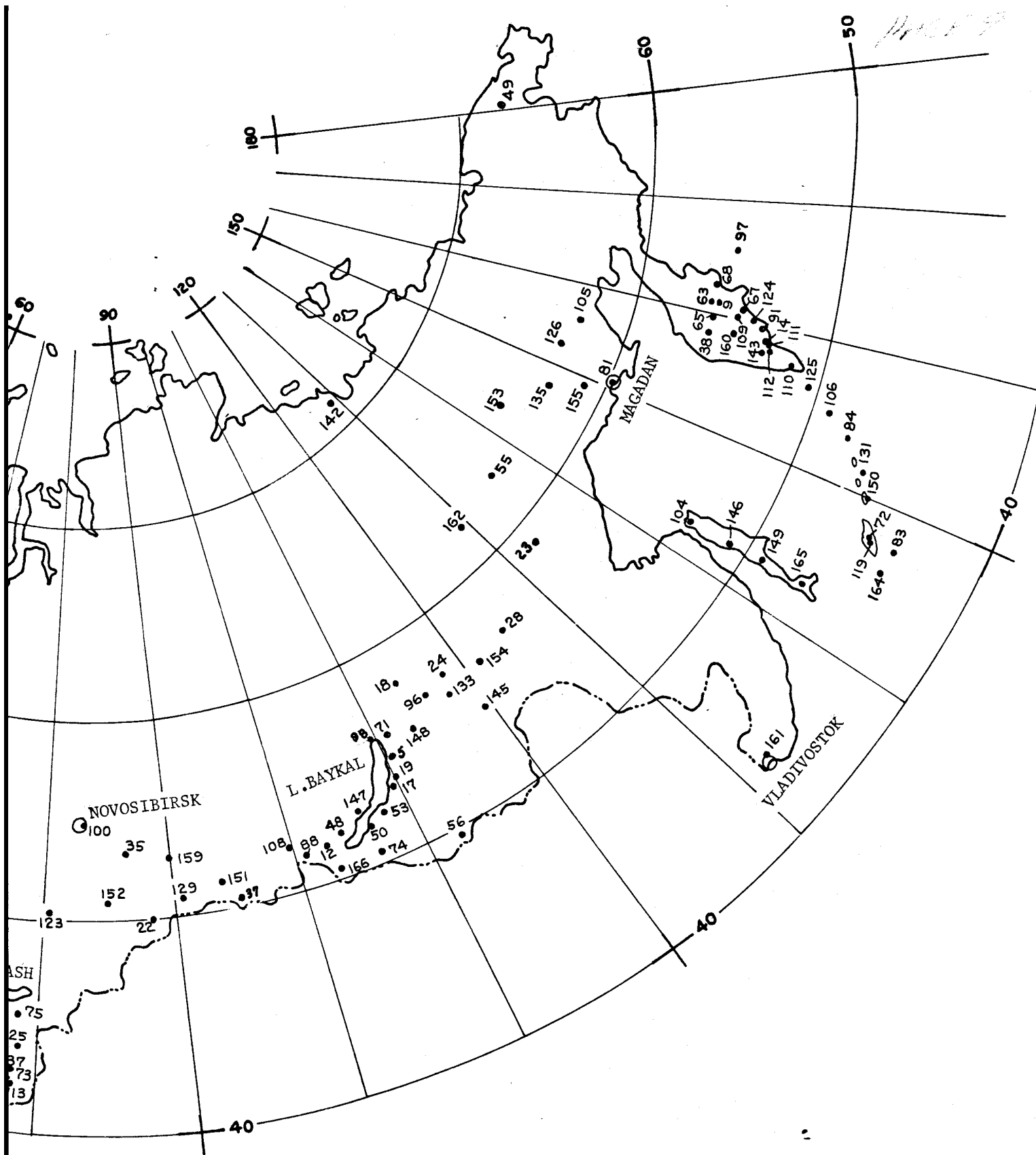


Fig. 1 -- Location of seismographic stations in the USSR
(Legend appears on next page)

Fig. 1 -- Location of Soviet seismographic stations (legend)

1. Abastumani	43. Garm	85. Mezhgor'ye	127. Shaartuz
2. Agalyk	44. Gegechkori	86. Mingechaur	128. Shemakha
3. Akhalkalaki	45. Gori	87. Mirnyy*	129. Shuy
4. Ak-Kuyli	46. Goris	88. Mondy	130. Simferopol'
5. Alla	47. Groznyy	89. Moskva	131. Simushir
6. Alma-Ata	48. Irkutsk	90. Murgab	132. Sochi
7. Alushta	49. Iul'tin	91. Mys Shipunskiy	133. Sredniy Kalar
8. Andizhan	50. Kabansk	92. Nakhichevan'	134. Stepanavan
9. Apakhonchich	51. Kalaydasht	93. Namangan	135. Susuman
10. Apatity	52. Kara-Su	94. Naryn	136. Sverdlovsk
11. Aral	53. Khaim	95. Nebit-Dag	137. Talgar
12. Arshan	54. Khaishi	96. Nelyaty	138. Tamdybulak
13. Ashkhabad	55. Khandyga	97. Nikol'skoye	139. Tashkent
14. Avacha	56. Khapcheranga	98. Nizhneangarsk	140. Tbilisi
15. Baku	57. Kheys	99. Novolazarevskaya *	141. Tbilisi II
16. Bakuriani	58. Khorog	100. Novosibirsk	142. Tiksi
17. Barguzin	59. Kirovabad	101. Nurata	143. Topolovo
18. Bodaybo	60. Kishinev	102. Obi-Garm	144. Tsebel'da
19. Bodon	61. Kizyl-Arvat	103. Obninsk	145. Tupik
20. Bogdanovka	62. Kizyl-Atrek	104. Okha	146. Tymovskoye
21. Bogi-Zagon	63. Klyuchi	105. Omsukchan	147. Tyrgan
22. Chagan-Uzun	64. Kosov	106. Onekotan	148. Uakit
23. Chagda	65. Kozyrevsk	107. Oni	149. Uglegorsk
24. Chara	66. Krasnovodsk	108. Orlik	150. Urup
25. Chilik	67. Kronoki	109. Ozero	151. Ust'-Eleget
26. Chimgan	68. Krutoberegovo	110. Pauzhetka	152. Ust'-Kan
27. Chimbkent	69. Kulkuduk	111. Petropavlovsk	153. Ust'-Nera
28. Chul'man	70. Kulyab	112. Petropavlovsk-Kamchatskiy	154. Ust'-Nyukzha
29. Chuyan-Garon	71. Kumora	113. Przheval'sk	155. Ust'-Omchug
30. Dushanbe	72. Kuril'sk	114. Pskem	156. Uzhgorod
31. Dusheti	73. Kurmenty	115. Pulkovo	157. Vannovskaya
32. Dzherino	74. Kyakhta	116. Pyatigorsk	158. Vardenis
33. Dzhirgatal'	75. Kzyl-Agach	117. Rakhov	159. Verkh-Baza
34. Dzhizak	76. Lagodekhi	118. Regar	160. Verkhne-Kamchatsk
35. El'tsovka	77. Leninakan	119. Reydovo	161. Vladivostok
36. Erevan	78. Lenkoran'	120. Rybach'ye	162. Yakutsk
37. Erzin	79. L'vov	121. Saberio	163. Yalta
38. Esso	80. Lyangar	122. Samarkand	164. Yuzhno-Kuril'sk
39. Fabrichnaya	81. Magadan	123. Semipalatinsk	165. Yuzhno-Sakhalinsk
40. Feodosiya	82. Makhachkala	124. Semlyachik	166. Zakamensk
41. Fergana	83. Malo-Kuril'sk	125. Severo-Kuril'sk	167. Zhiloy ostrov
42. Frunze	84. Matua	126. Seymchan	168. Zugdidi

* The two Antarctic stations are not shown on the map.

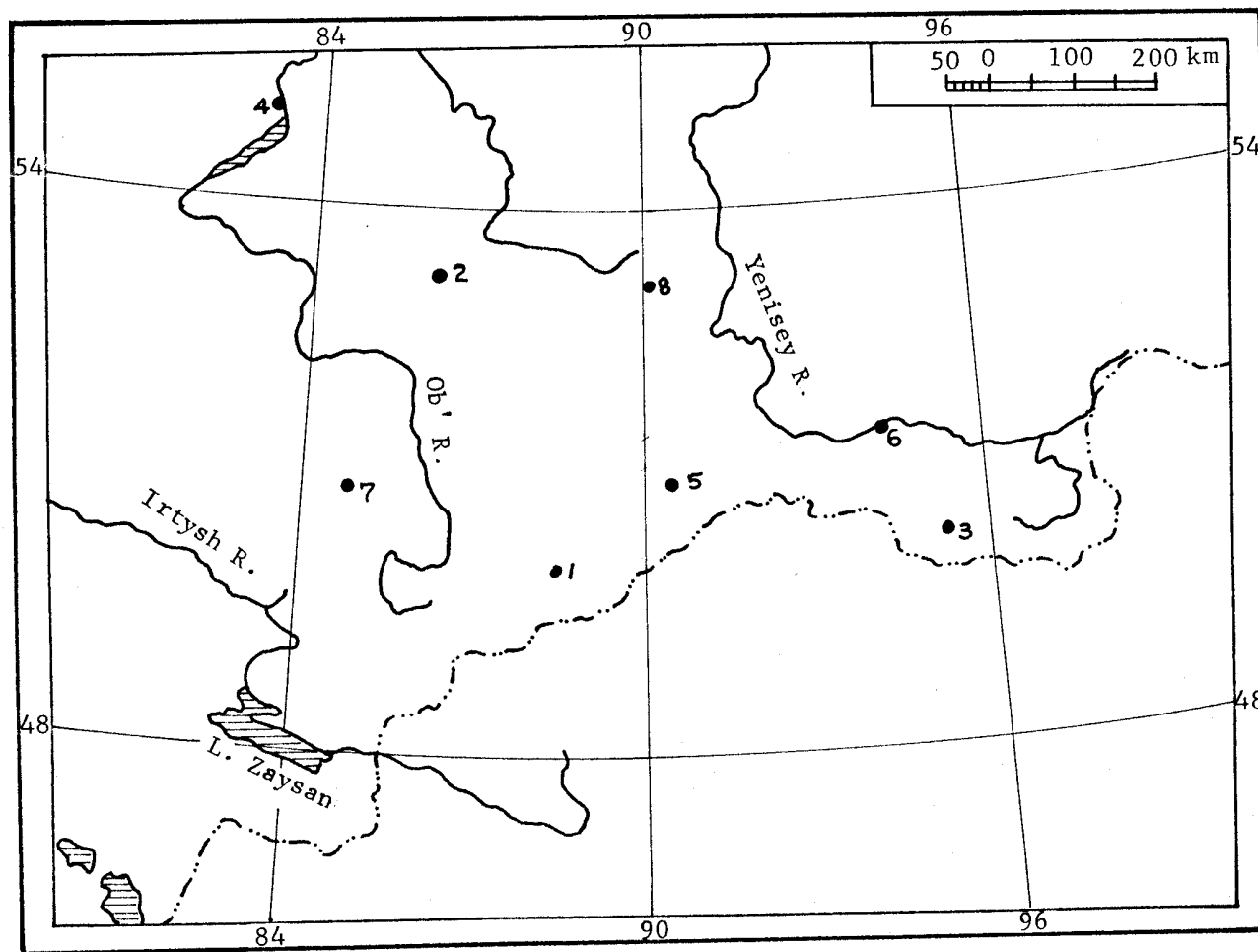


Fig. 2 -- Seismographic stations in Altay-Sayan

- | | |
|----------------------|-----------------------|
| 1. Chagan-Uzun (22) | 5. Shuy (129) |
| 2. El'tsovka (35) | 6. Ust'-Elegest (151) |
| 3. Erzin (37) | 7. Ust'-Kan (152) |
| 4. Novosibirsk (100) | 8. Verkh-Baza (159) |

NOTE: The number in parentheses after the station name in Figs. 2-11 indicates the station's number in Fig. 1 and Table 4.

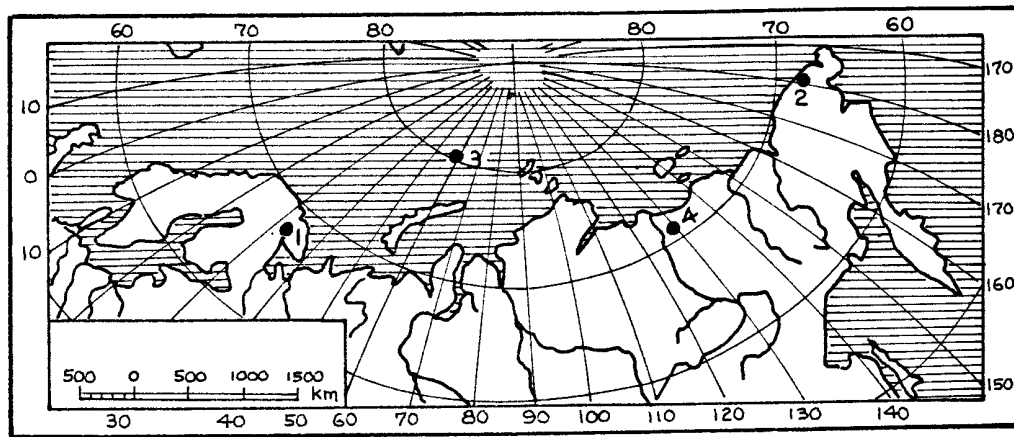


Fig. 3 -- Seismographic stations in the Arctic

1. Apatity (10)
2. Iul'tin (49)
3. Kheys (57)
4. Tiksi (142)

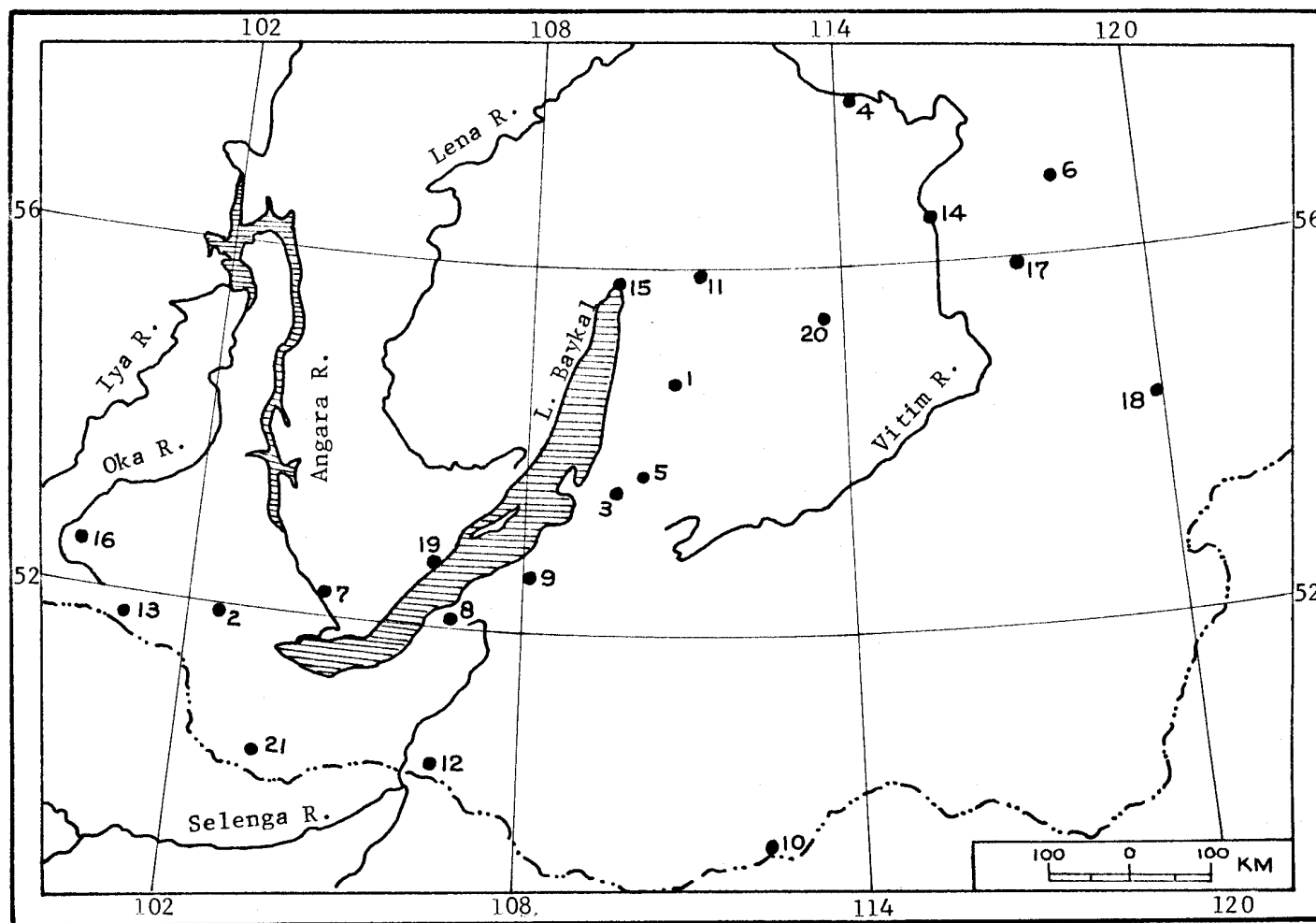


Fig. 4 -- Seismographic stations in Baykal

- | | | | |
|------------------|-----------------------|------------------------|-------------------------|
| 1. Alla (5) | 7. Irkutsk (48) | 12. Kyakhta (74) | 17. Sredniy Kalar (133) |
| 2. Arshan (12) | 8. Kabansk (50) | 13. Mondy (88) | 18. Tupik (145) |
| 3. Barguzin (17) | 9. Khaim (53) | 14. Nelyaty (96) | 19. Tyrgan (147) |
| 4. Bodaybo (18) | 10. Khapcheranga (56) | 15. Nizhneangarsk (98) | 20. Uakit (148) |
| 5. Bodon (19) | 11. Kumora (71) | 16. Orlik (108) | 21. Zakamensk (166) |
| 6. Chara (24) | | | |

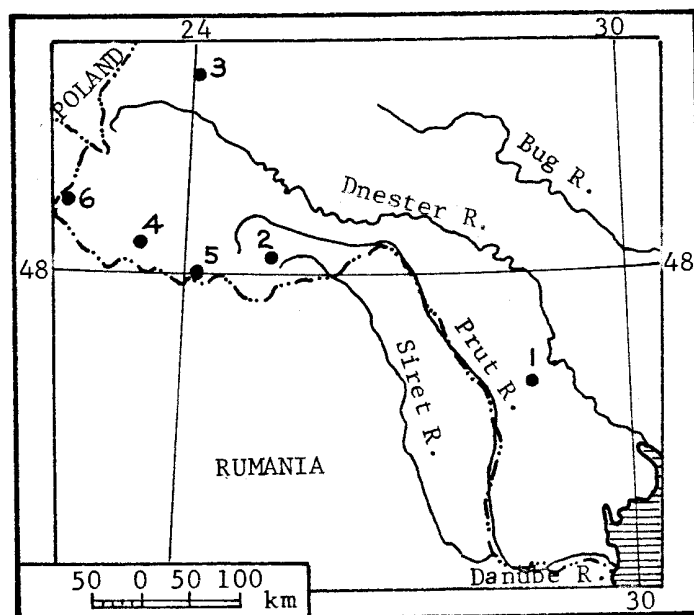


Fig. 5 -- Seismographic stations in Carpathia

1. Kishinev (60)
2. Kosov (64)
3. L'vov (79)
4. Mezghor'ye (85)
5. Rakhov (117)
6. Uzhgorod (156)

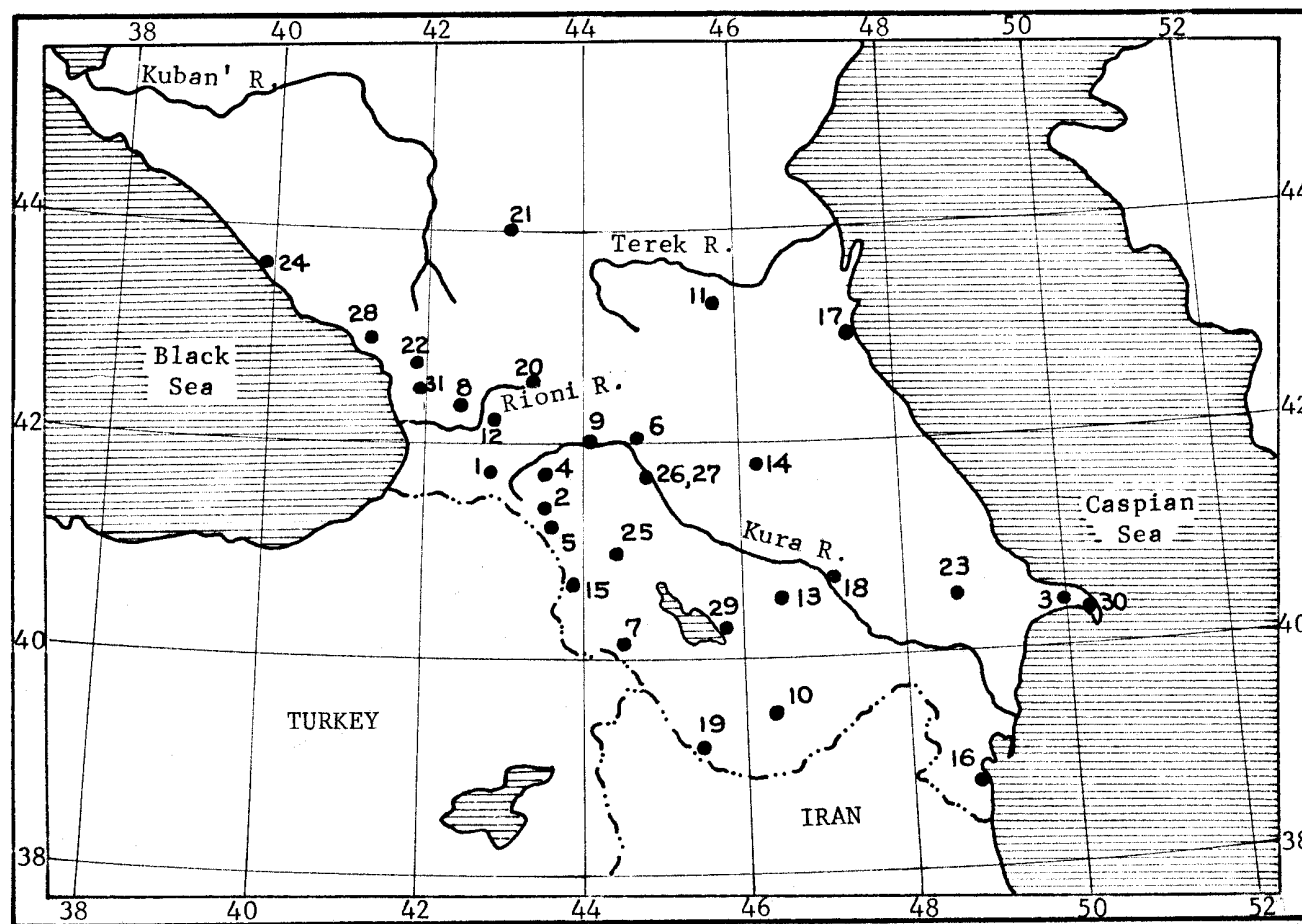


Fig. 6 -- Seismographic stations in the Caucasus

- | | | | | |
|--------------------|--------------------|-----------------------|----------------------|-------------------------|
| 1. Abastumani (1) | 8. Gegechkori (44) | 14. Lagodekhi (76) | 20. Oni (107) | 26. Tbilisi (140) |
| 2. Akhalkalaki (3) | 9. Gori (45) | 15. Leninakan (77) | 21. Pyatigorsk (116) | 27. Tbilisi II (141) |
| 3. Baku (15) | 10. Goris (46) | 16. Lenkoran' (78) | 22. Saberio (121) | 28. Tsebel'da (144) |
| 4. Bakuriani (16) | 11. Groznyy (47) | 17. Makhachkala (82) | 23. Shemakha (128) | 29. Vardenis (153) |
| 5. Bogdanovka (20) | 12. Khaishi (54) | 18. Mingechaur (86) | 24. Sochi (132) | 30. Zhiloy ostrov (167) |
| 6. Dusheti (31) | 13. Kirovabad (59) | 19. Nakhichevan' (92) | 25. Stepanavan (134) | 31. Zugdidi (168) |
| 7. Erevan (36) | | | | |

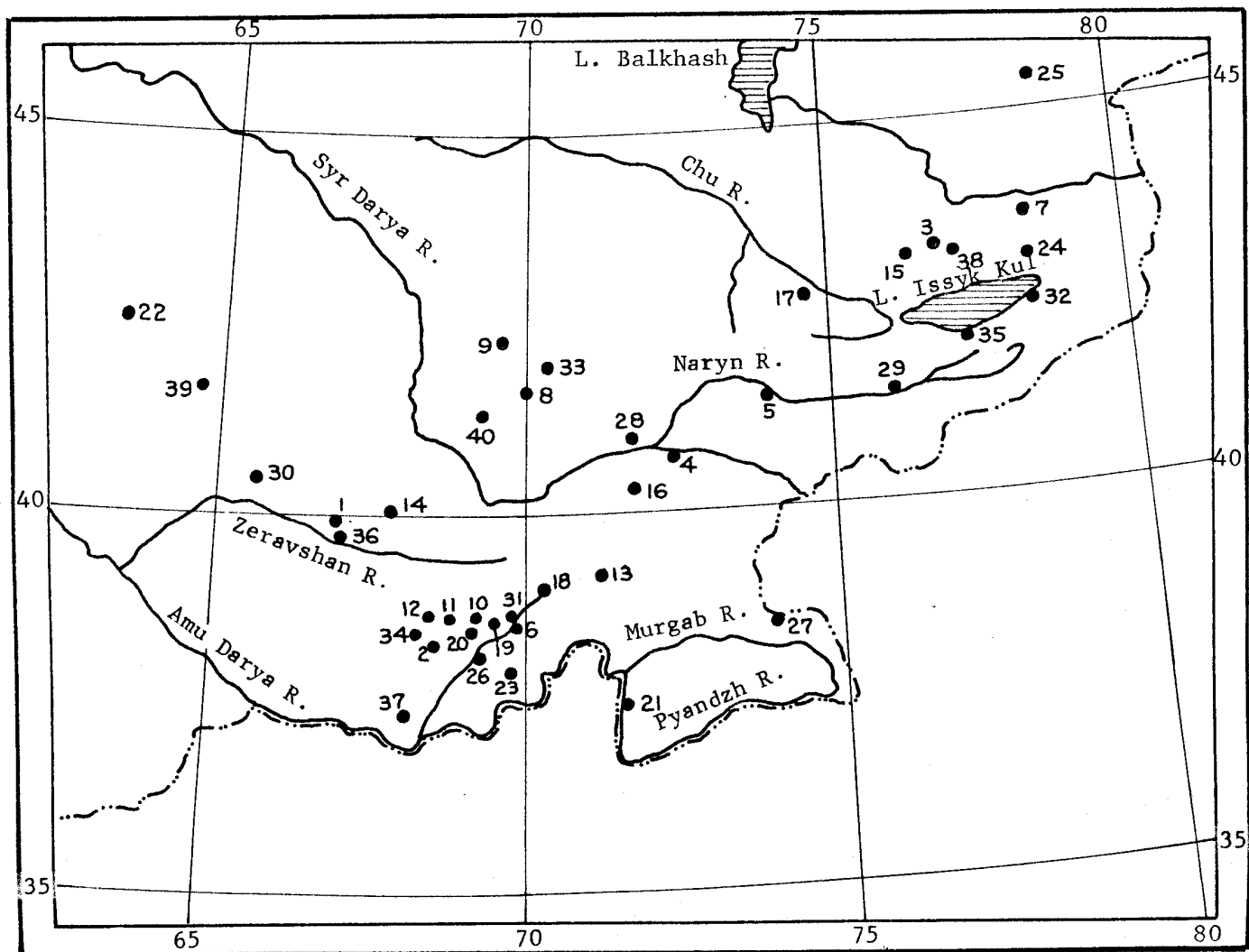


Fig. 7 -- Seismographic stations in Central Asia
(legend appears on p. 17)

Fig. 7 -- Seismographic stations in Central Asia (legend)

- | | |
|-----------------------|-----------------------|
| 1. Agalyk (2) | 21. Khorog (58) |
| 2. Ak-Kuyli (4) | 22. Kulkuduk (69) |
| 3. Alma-Ata (6) | 23. Kulyab (70) |
| 4. Andizhan (8) | 24. Kurmenty (73) |
| 5. Aral (11) | 25. Kzyl-Agach (75) |
| 6. Bogi-Zagon (21) | 26. Lyangar (80) |
| 7. Chilik (25) | 27. Murgab (90) |
| 8. Chimgan (26) | 28. Namangan (93) |
| 9. Chimkent (27) | 29. Naryn (94) |
| 10. Chuyan-Garon (29) | 30. Nurata (101) |
| 11. Dushanbe (30) | 31. Obi-Garm (102) |
| 12. Dzherino (32) | 32. Przheval'sk (113) |
| 13. Dzhirgatal' (33) | 33. Pskem (114) |
| 14. Dzhizak (34) | 34. Regar (118) |
| 15. Fabrichnaya (39) | 35. Rybach'ye (120) |
| 16. Fergana (41) | 36. Samarkand (122) |
| 17. Frunze (42) | 37. Shaartuz (127) |
| 18. Garm (43) | 38. Talgar (137) |
| 19. Kalaydasht (51) | 39. Tamdybulak (138) |
| 20. Kara-Su (52) | 40. Tashkent (139) |

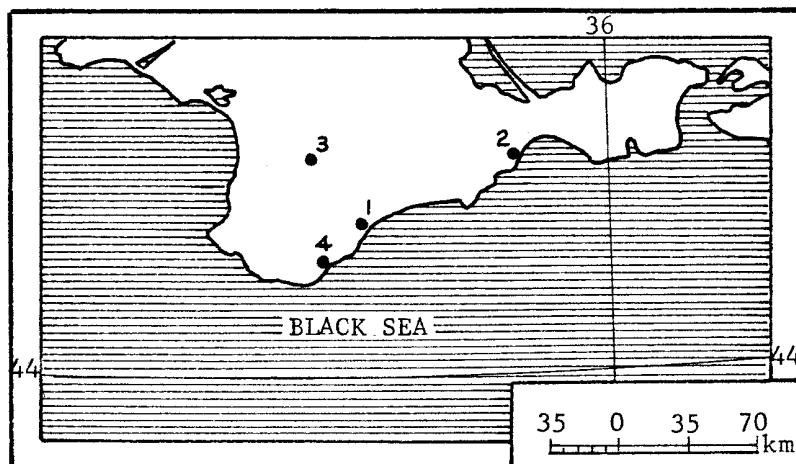


Fig. 8 -- Seismographic stations in Crimea

1. Alushta (7)
2. Feodosiya (40)
3. Simferopol' (130)
4. Yalta (163)

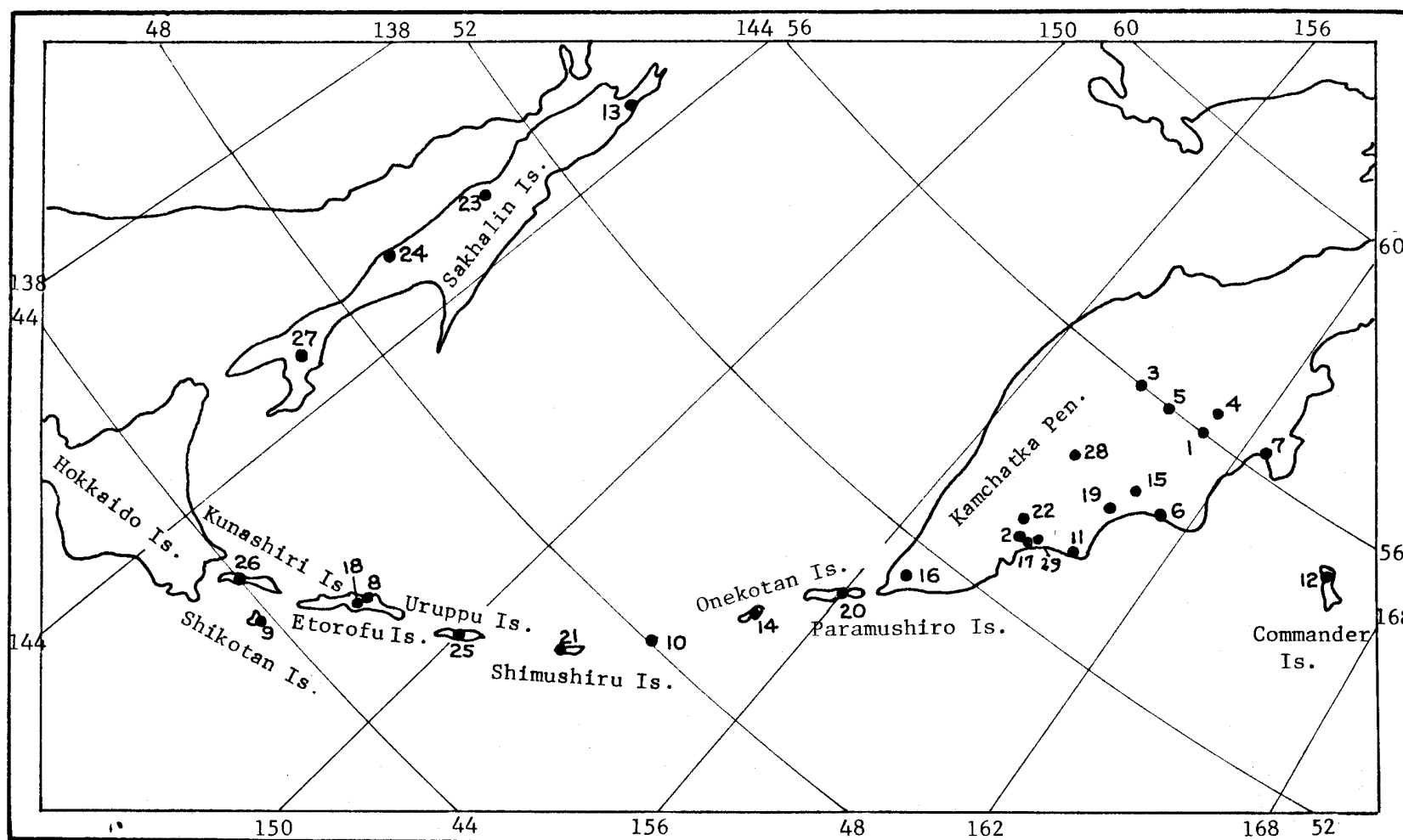


Fig. 9 -- Seismographic stations in the Far East
(legend appears on p. 20)

Fig. 9 -- Seismographic stations in the Far East (legend)

- | | |
|-------------------------|-------------------------------------|
| 1. Apakhonchich (9) | 16. Pauzhetka (110) |
| 2. Avacha (14) | 17. Petropavlovsk (111) |
| 3. Ezzo (38) | 18. Reydovo (119) |
| 4. Klyuchi (63) | 19. Semlyachik (124) |
| 5. Kozyrevsk (65) | 20. Severo-Kuril'sk (125) |
| 6. Kronoki (67) | 21. Simushir (131) |
| 7. Krutoberegovo (68) | 22. Topolovo (143) |
| 8. Kuril'sk (72) | 23. Tymovskoye (146) |
| 9. Malo-Kuril'sk (83) | 24. Uglegorsk (149) |
| 10. Matua (84) | 25. Urup (150) |
| 11. Mys Shipunskiy (91) | 26. Yuzhno-Kuril'sk (164) |
| 12. Nikol'skoye (97) | 27. Yuzhno-Sakhalinsk (165) |
| 13. Okha (104) | 28. Verkhne-Kamchatsk (160) |
| 14. Onkotan (106) | 29. Petropavlovsk-Kamchatskiy (112) |
| 15. Ozero (109) | |

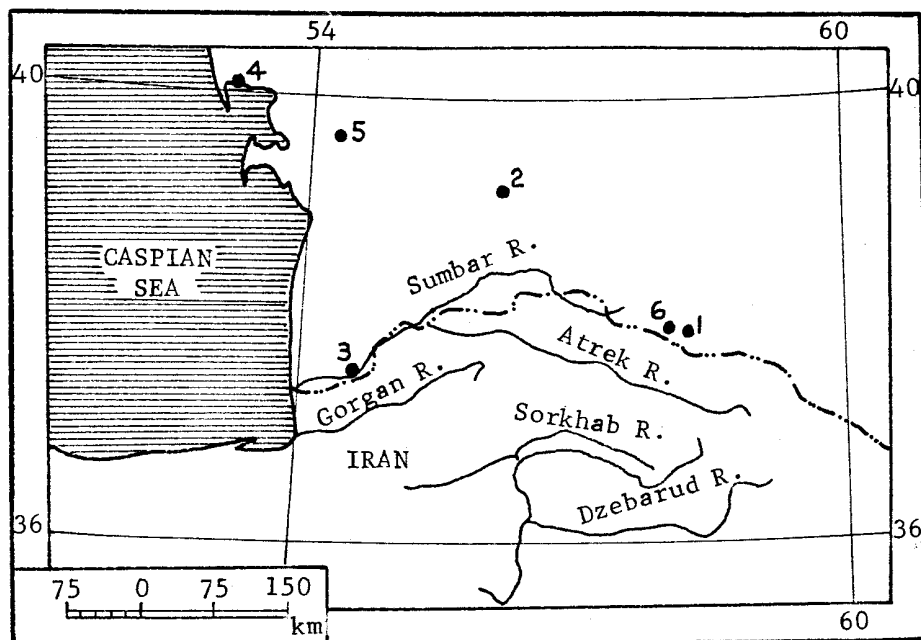


Fig. 10 -- Seismographic stations in Kopet-Dag

1. Ashkhabad (13)
2. Kizyl-Arvat (61)
3. Kizyl-Atrek (62)
4. Krasnovodsk (66)
5. Nebit-Dag (95)
6. Vannovskaya (157)

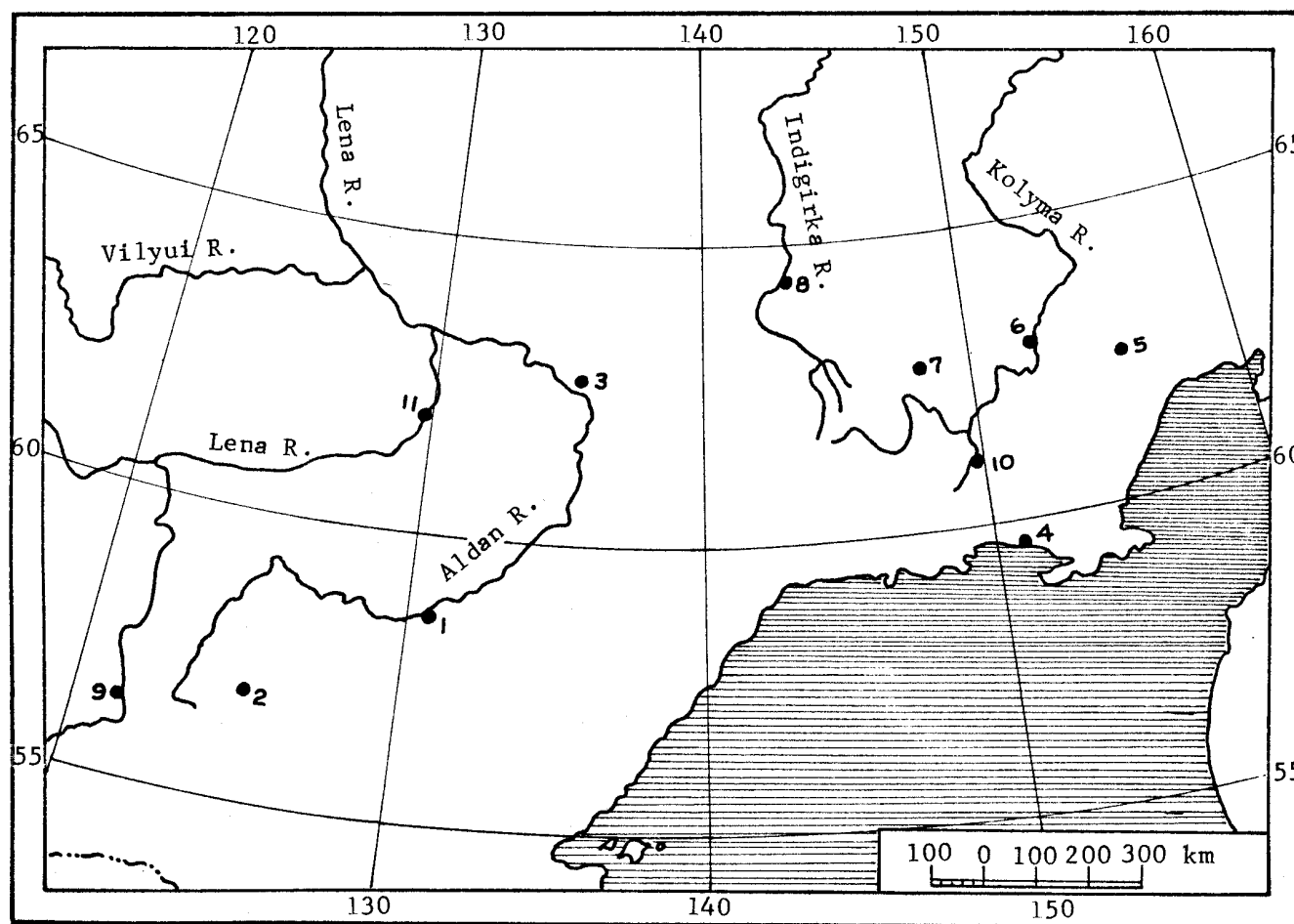


Fig. 11 -- Seismographic stations in Northeast and Yakutiya

- | | | |
|------------------|--------------------|-----------------------|
| 1. Chagda (23) | 5. Omsukchan (105) | 9. Ust'-Nyukzha (154) |
| 2. Chul'man (28) | 6. Seymchan (126) | 10. Ust'-Omchug (155) |
| 3. Khandyga (55) | 7. Susuman (135) | 11. Yakutsk (162) |
| 4. Magadan (81) | 8. Ust'-Nera (153) | |

Table 4 [1-5]

PERMANENT SEISMOGRAPHIC STATIONS

1. Abastumani (r) (Ab, Abs, ABS) SKD (Z), SKM-3	41°45'N, 42°50'E	Caucasus (Georgia)
2. Agalyk (exp) (Agl) SKM-3	39.9°N, 66.9°E	Central Asia (Uzbekistan)
3. Akhalkalaki (r) (A) SKM-3 (Z)	41°24'N, 43°29'E	Caucasus (Georgia)
4. Ak-Kuyli (exp) VEGIK	~38.2°N, ~68.5°E	Central Asia (Tadzhikistan)
5. Alla (r) (Al) SKM-3	54°42'N, 110°46'E	Baykal
6. Alma-Ata (r) (Al-A, Al) SKD, SKD-KPCh, SKM-3, SKM-3--KPCh, S5S, SMTR, VBP-3, APT-1 [6]	43°16'N, 76°57'E	Central Asia (Kazakhstan)
7. Alushta (r) (Al, Alsh) SK (Z), SKh, SMR-2	44°42'N, 34°25'E	Crimea
8. Andizhan (b) (An, And, ANR) SK, SK-KPCh, SKM-3, SMTR (N-S, E-W), UAR-M	40°45'N, 72°22'E	Central Asia (Uzbekistan)
9. Apakhonchich (exp) (Apkh) VEGIK	~56.0°N, ~160.9°E	Far East (Kamchatka)
10. Apatity (b) (Ap, Apt, APA) SKD, SKD-KPCh (Z), SKh, SKh-KPCh (Z), SD-1	67°33'N, 33°20'E	Arctic (Kola Peninsula)
11. Aral (r) SK	~41.4°N, ~73.9°E	Central Asia (Kirgizia)

NOTE: Coordinates preceded by ~ were determined from the Soviet *World Atlas* and are correct to 0.3°.

12.	Arshan (r) (Arsh, ARS) SKM-3	51°55'N, 102°30'E	Baykal
13.	Ashkhabad (b) (Ashkh, ASH) SK, SKM-3	37°57'N, 58°21'E	Kopet Dag
14.	Avacha (exp) (Av) VEGIK	53°04'N, 158°30'E	Far East (Kamchatka)
15.	Baku (b) (Bk, Bak, BAK) SK, SKM-3 (Z)	40°23'N, 49°54'E	Caucasus (Azerbaijan)
16.	Bakuriani (b) (Bkr, BKR) SK, SK-KPCh, SKD, SKM-3	41°44'N, 43°31'E	Caucasus (Georgia)
17.	Barguzin (r) (Brg) SKM	53°37'N, 109°37'E	Baykal
18.	Bodaybo (b) (Bdb, BDB) SKM-3	57°51'N, 114°11'E	Baykal
19.	Bodon (exp) SKM-3	53°43'N, 110°06'E	Baykal
20.	Bogdanovka (r) (Bgd) SKM-3 (Z)	41°16'N, 43°36'E	Caucasus (Georgia)
21.	Bogi-Zagon (exp) (Bg-Zn) VEGIK, VEGIK-KPCh (Z)	~38.5°N, ~69.8°E	Central Asia (Tadzhikistan)
22.	Chagan-Uzun (b) (Ch-U, Chgu, CUR) SKD, SKM-3, SKM-3--KPCh (E-W)	50°06'N, 88°21'E	Altay-Sayan
23.	Chagda (exp) SKM-3	58°45'N, 130°37'E	Yakutiya
24.	Chara (r) (Chr) VEGIK	56°54'N, 118°12'E	Baykal
25.	Chilik (r) (Chlk) SKM-3	43°34'N, 78°25'E	Central Asia (Kazakhstan)

26.	Chimgan (exp) (Chmg) VEGIK, VEGIK-KPCh (Z)	41°34'N, 70°01'E	Central Asia (Uzbekistan)
27.	Chimkent (r) (Chm) SK, SMTR (N-S,E-W)	42°19'N, 69°36'E	Central Asia (Kazakhstan)
28.	Chul'man (exp) SKM-3	~56.9°N, ~125°E	Yakutiya
29.	Chuyan-Garon (r) (Ch-Gr) SKM-3 (Z)	38°39'N, 69°10'E	Central Asia (Tadzhikistan)
30.	Dushanbe (b) (Dsh, Dshn, DSH) SK, SKD, SKD-KPCh, SMR-2	38°34'N, 68°46'E	Central Asia (Tadzhikistan)
31.	Dusheti (r) (Dush) SK, SKh, SMTR (N-S,E-W)	42°05'N, 44°42'E	Caucasus (Georgia)
32.	Dzherino (exp) (Dzhr) VEGIK, VEGIK-KPCh (Z)	~38.7°N, ~68.5°E	Central Asia (Tadzhikistan)
33.	Dzhirgatal' (r) (Dzhg) SKD	39°13'N, 71°14'E	Central Asia (Tadzhikistan)
34.	Dzhizak (exp) (Dzh) SKM-3, SMTR (N-S,E-W)	40.1°N, 67.8°E	Central Asia (Uzbekistan)
35.	El'tsovka (b) (El'ts, ELT) SKM-3, SKM-3--KPCh (E-W)	53°15'N, 86°16'E	Altay-Sayan
36.	Erevan (b) (Er, Erv, ERE) SMR-2 (N-S,E-W)	40°11'N, 44°30'E	Caucasus (Armenia)
37.	Erzin (exp) (Erz) SKM-3	50°15'N, 95°10'E	Altay-Sayan
38.	Esso (exp) (Es) SKM	55°56'N, 158°42'E	Far East (Kamchatka)
39.	Fabrichnaya (r) (Fbr) SKM-3	43°08'N, 76°26'E	Central Asia (Kazakhstan)
40.	Feodosiya (r) (F) SK, SKh (N-S,E-W)	45°01'N, 36°23'E	Crimea

41.	Fergana (r) (Fg) SK, SK-KPCh (N-S,E-W), SKM-3 (Z), SMTR (N-S,E-W)	40°23'N, 71°47'E	Central Asia (Uzbekistan)
42.	Frunze (b) (Fr, Frn, FRU) SK, SKD, SKM-3	42°50'N, 74°37'E	Central Asia (Kirgizia)
43.	Garm (b) (Grm, GAR) SKD, SKM-3, SKM-3--KPCh (N-S), SD-1 (N-S,E-W), SMTR, S5S (Z,E-W)	39°00'N, 70°19'E	Central Asia (Tadzhikistan)
44.	Gegechkori (r) (Gchr) SKM-3 (Z)	42°21'N, 42°23'E	Caucasus (Georgia)
45.	Gori (r) (G) SK, SKM-3 (Z)	41°59'N, 44°07'E	Caucasus (Georgia)
46.	Goris (b) (Grs, GRS) SK, SK-KPCh, VEGIK, SMTR (N-S,E-W)	39°30'N, 46°20'E	Caucasus (Armenia)
47.	Groznyy (r) (Gr, Grz, GRO) SK	43°19'N, 45°42'E	Caucasus (Azerbaijan)
48.	Irkutsk (b) (Irk, IRK) SKD, SKD-KPCh, SKM-3, SMTR (N-S,E-W)	52°16'N, 104°19'E	Baykal
49.	Iul'tin (b) (Ilt, ILT) SK, SK-KPCh, SKM-3, SD-1	67°50'N, 178°48'W	Arctic
50.	Kabansk (r) (Kb) SKD	52°03'N, 106°39'E	Baykal
51.	Kalaydasht (r) (Kld) VEGIK	~38.6°N, ~69.5°E	Central Asia (Tadzhikistan)
52.	Kara-Su (r) (Kr) SKM-3, SKM-3--KPCh (Z)	38°29'N, 68°59'E	Central Asia (Tadzhikistan)
53.	Khaim (exp) SKM-3	52°36'N, 108°05'E	Baykal
54.	Khaishi (exp) SKM-3 (Z)	42°57'N, 42°12'E	Caucasus

55.	Khandyga (exp) SKM-3	62°40'N, 135°36'E	Yakutiya
56.	Khapcheranga (r) SKM-3	49°42'N, 112°24'E	Baykal
57.	Kheys (b) (Khes, KHE) SK, SKM-3	80°37'N, 58°03'E	Arctic
58.	Khorog (b) (KhrG, KHO) SK, SK-KPCh, SMR-2 (N-S, E-W)	37°29'N, 71°32'E	Central Asia (Tadzhikistan)
59.	Kirovabad (b) (Krb, KRV) SK, SK-KPCh, SKM-3	40°39'N, 46°20'E	Caucasus (Azerbaijan)
60.	Kishinev (b) (Kshn, KIS) SK, SK-KPCh, SD-1 (Z)	47°01'N, 28°52'E	Carpathia
61.	Kizyl-Arvat (b) (K-A, Kzl, KAT) SK, SK-KPCh	39°12'N, 56°16'E	Kopet Dag
62.	Kizyl-Atrek (exp) (K-A) SKM-3	37°36'N, 54°46'E	Kopet Dag
63.	Klyuchi (exp) (Klch) SKh, SKM-3	56°19'N, 160°52'E	Far East (Kamchatka)
64.	Kosov (r) (Kos) SKD, SKM-3	48°19'N, 25°04'E	Carpathia
65.	Kozyrevsk (exp) (Kz) SKh	56°04'N, 159°52'E	Far East (Kamchatka)
66.	Krasnovodsk (exp) (Krs) VEGIK	40°00'N, 53°00'E	Kopet Dag
67.	Kronoki (exp) (Krn) VEGIK	54°36'N, 161°10'E	Far East (Kamchatka)
68.	Krutoberegovo (exp) VEGIK	56°15'N, 162°42'E	Far East (Kamchatka)
69.	Kulkuduk (exp) (K-K) SKM-3	42.5°N, 63.3°E	Central Asia (Uzbekistan)

70.	Kulyab (b) (Kl, Klb, KUL) SK-KPCh (N-S), SKM (Z), SK (N-S,E-W)	37°54'N, 69°45'E	Central Asia (Tadzhikistan)
71.	Kumora (r) (Kmr) SKM-3	55°53'N, 111°13'E	Baykal
72.	Kuril'sk (b) (Kur, KUR) SK, SKD, VEGIK (Z), UBOPE-2, SMR-3 (N-S,E-W)	45°14'N, 147°52'E	Far East Kurils (Etorofu Island)
73.	Kurmenty (r) (Krm) SKM-3	43°00'N, 78°27'E	Central Asia (Kazakhstan)
74.	Kyakhta (r) (Kkht) SKD	50°22'N, 106°27'E	Baykal
75.	Kzyl-Agach (exp) SKM-3	45°25'N, 78°45'E	Central Asia (Kazakhstan)
76.	Lagodekhi (exp) SKM-3 (Z), SMTR (N-S,E-W)	41°49'N, 46°16'E	Caucasus (Georgia)
77.	Leninakan (r) (Ln) SKD (Z), VEGIK, SD-1	40°41'N, 43°51'E	Caucasus (Armenia)
78.	Lenkoran' (r) (Lnk) SKh	38°46'N, 48°50'E	Caucasus (Azerbaijan)
79.	L'vov (b) (Lv, LvV, LVV) SK (Z), SKD	49°49'N, 24°02'E	Carpathia
80.	Lyngar (exp) (Lng) SKM-3 (Z)	~38.2°N, ~69.2°E	Central Asia (Tadzhikistan)
81.	Magadan (b) (Mgd, MAG) SK	59°33'N, 150°48'E	Northeast
82.	Makhachkala (b) (Mk, Mkh, Mkhk, MAK) SK, SK-KPCh, SKh (E-W), S5S	43°01'N, 47°26'E	Caucasus
83.	Malokuril'sk (r) (M-K) SKD, SKM-3 (Z)	43°52'N, 146°49'E	Far East Kurils (Shikotan Island)

84.	Matua (r) VEGIK (Z), S5S (E-W)	48°05'N, 153°13'E	Far East Kurils (Matsuwa Island)
85.	Mezhgor'ye (r) (Mzhg) SKM-3	48°31'N, 23°31'E	Carpathia
86.	Mingechaur (exp) SKh	40°45'N, 47°03'E	Caucasus
87.	Mirnyy (b) (Mrn, MIR) SK, SKM-3 (Z), SD-1 (Z)	66°33'S, 93°00'E	Antarctic
88.	Mondy (b) (Mnd, MOY) SKM-3	51°41'N, 100°59'E	Baykal
89.	Moskva (b) (Msk, MOS) SG, SK, SKD+M21/3 (Z), SKh (Z) [7]	55°44'N, 37°38'E	Teleseismic
90.	Murgab (b) (Mg, Mrg, MUR) SK	38°22'N, 73°56'E	Central Asia (Tadzhikistan)
91.	Mys Shipunskiy (exp) VEGIK	~53.1°N, ~160.0°E	Far East (Kamchatka)
92.	Nakhichevan' (r) (Nkhch) SK	39°12'N, 45°24'E	Caucasus (Azerbaijan)
93.	Namangan (r) (Nmn, NAM) SK, SMTR (N-S, E-W)	40°59'N, 71°40'E	Central Asia (Uzbekistan)
94.	Naryn (b) (Nr, Nrn, NRN) SK, SKM-3	41°26'N, 76°00'E	Central Asia (Kirgizia)
95.	Nebit-Dag (exp) S5S	39°30'N, 54°22'E	Kopet Dag
96.	Nelyaty (r) (Nlt) SKM-3	56°29'N, 115°41'E	Baykal
97.	Nikol'skoye (exp) (Nk) VEGIK	55°12'N, 166°00'E	Far East (Commander Islands)
98.	Nizhneangarsk (r) (Nan, NIZ) SKM	55°47'N, 109°33'E	Baykal

99.	Novolazarevskaya (b) (N-L, Nlz, NVL) SK, SKD (Z), USF	70°46'S, 11°50'E	Antarctic
100.	Novosibirsk (b) SKD, SKM-3	55°02'N, 82°55'E	Altay-Sayan
101.	Nurata (exp) (Nur) SKM-3	40°33'N, 65°41'E	Central Asia (Uzbekistan)
102.	Obi-Garm (r) (Obg) VEGIK, VEGIK-KPCh (Z), SMTR (N-S,E-W)	38°43'N, 69°43'E	Central Asia (Tadzhikistan)
103.	Obninsk (b) (Obn, OBN) SK, SKD, SKM-3, Benioff, Press-Ewing	55°10'N, 36°27'E	Teleseismic
104.	Okha (b) (Okha, OKH) SK, VEGIK	53°33'N, 142°56'E	Sakhalin
105.	Omsukchan (exp) SKM-3	62°32'N, 155°48'E	Northeast
106.	Onkotan (exp) VEGIK, S5S (N-S,E-W)	49°23'N, 154°47'E	Far East Kurils (Onkotan Island)
107.	Oni (exp) SKD (Z), SKM-3, SMTR (N-S,E-W)	42°35'N, 43°26'E	Caucasus (Georgia)
108.	Orlik (r) (Orl) SKM-3	52°30'N, 99°55'E	Baykal
109.	Ozero (exp) (Oz) VEGIK	~54.7°N, ~160.4°E	Far East (Kamchatka)
110.	Pauzhetka (exp) (Pzh) VEGIK	~51.5°N, ~156.8°E	Far East (Kamchatka)
111.	Petropavlovsk (exp) VEGIK, UBOPE-0, UBOPE-1, UBOPE-2	53°00'N, 158°38'E	Far East (Kamchatka)
112.	Petropavlovsk-Kamchatskiy (b) (Ptr, PET) SK, SK-KPCh, SKD, SKM-3, SD-1	53°01'N, 158°39'E	Far East (Kamchatka)
113.	Przheval'sk (b) (Przh, PRZ) SK, SK-KPCh (E-W), SKM-3	42°29'N, 78°24'E	Central Asia (Kirgizia)

114.	Pskem (exp) (Psk) VEGIK	41°56'N, 70°22'E	Central Asia (Uzbekistan)
115.	Pulkovo (b) (Plk, PUL) SK, SG, SKD+M21/3, SKD+M21/3--KPCh, VEGIK (Z), SD-1 (Z)	59°46'N, 30°19'E	Teleseismic
116.	Pyatigorsk (r) (Pt, Ptg, PYA) SK, SKM-3	44°02'N, 43°04'E	Caucasus
117.	Rakhov (r) (Rakh) SKD, SKM-3	47°57'N, 24°10'E	Carpathia
118.	Regar (r) (Rgr) SKD, VEGIK, VEGIK-KPCh (z)	38°30'N, 68°14'E	Central Asia (Tadzhikistan)
119.	Reydovo (r) SKM-3 (Z)	45°16'N, 148°02'E	Far East Kurils (Etorofu Island)
120.	Rybach'ye (r) (Rbch) SK, SKM-3	42°08'N, 77°10'E	Central Asia (Kirgizia)
121.	Saberio (exp) SKD (Z), SKM-3	42°39'N, 41°54'E	Caucasus
122.	Samarkand (r) (Sm, Smr, SAM) SK, SMR-2 (N-S, E-W)	39°40'N, 66°59'E	Central Asia (Uzbekistan)
123.	Semipalatinsk (b) (Smp, SEM) SK, SKM-3	50°24'N, 80°15'E	Teleseismic
124.	Semlyachik (exp) (Sml) VEGIK	54°07'N, 160°11'E	Far East (Kamchatka)
125.	Severo-Kuril'sk (b) (S-K, SVK, SKR) SK-KPCh, SKD, SKM-3, UBOPE-2 (N-S, E-W), UBOPE-0 (E-W), SMTR, Wiechert	50°40'N, 156°06'E	Far East Kurils (Paramushiro Island)
126.	Seymchan (exp) SKD, SKM-3	62°53'N, 152°26'E	Northeast

127.	Shaartuz (exp) (Shrt) SKD, SKM (Z)	37°16'N, 68°08'E	Central Asia (Tadzhikistan)
128.	Shemakha (r) (Shmkh, SHE) SK (Z), SKh	40°38'N, 48°38'E	Caucasus (Azerbaijan)
129.	Shuy (exp) (Shuy) SKM-3	50°51'N, 90°24'E	Altay-Sayan
130.	Simferopol' (b) (Smf, SIM) SK, SK-KPCh, SKD, SKh, SD-1 (N-S,E-W)	44°57'N, 34°07'E	Crimea
131.	Simushir (b) (Smsh, SIU) SK, VEGIK, S5S	46°51'N, 151°52'E	Far East Kurils (Shimushiru Island)
132.	Sochi (b) (Sch, Soch, SOC) SK, SKD, SKM-3	43°35'N, 39°43'E	Caucasus
133.	Sredniy Kalar (r) (Sr-K) VEGIK	55°52'N, 117°22'E	Baykal
134.	Stepanavan (r) (S, Stp, STE) SKD, SKM-3 (Z)	41°00'N, 44°23'E	Caucasus (Georgia)
135.	Susuman (exp) SKM-3	62°47'N, 148°10'E	Northeast
136.	Sverdlovsk (b) (Svr, SVE) SG	56°48'N, 60°38'E	Teleseismic
137.	Talgar (b) (Tlg, TLG) SKD, SKD-KPCh (Z), SKM-3	43°14'N, 77°14'E	Central Asia (Kazakhstan)
138.	Tamdybulak (exp) (T-B) SKM-3, SMTR (N-S,E-W)	41.6°N, 64.6°E	Central Asia (Uzbekistan)
139.	Tashkent (b) (Tshk, TAS) SK, SKD-KPCh (Z), SKM-3, SKM-3--KPCh (Z), SD-1, SMTR, ESS-1	41°20'N, 69°18'E	Central Asia (Uzbekistan)

140.	Tbilisi (b) (Tb, Tbl, TIF) SK, SG	41°43'N, 44°48'E	Caucasus (Georgia)
141.	Tbilisi II (r) (Mtatsminda) SKM-3 (Z)	41°43'N, 44°48'E	Caucasus (Georgia)
142.	Tiksi (b) (Tks, TIK) SK	71°38'N, 128°52'E	Arctic
143.	Topolovo (exp) (Tp) VEGIK	~53.3°N, ~158.4°E	Far East Kamchatka
144.	Tsebel'da (r) (Tsb) SKM-3 (Z)	43°01'N, 41°17'E	Caucasus (Georgia)
145.	Tupik (b) (Tpk, TUP) SKM-3	54°26'N, 119°54'E	Baykal
146.	Tymovskoye (exp) SKD (Z), SKM-3	50°51'N, 142°39'E	Far East Sakhalin
147.	Tyrgan (r) (Trg, TRG) SKM-3	52°45'N, 106°20'E	Baykal
148.	Uakit (r) (Uk, OOA) SKM-3	55°30'N, 113°37'E	Baykal
149.	Uglegorsk (r) (Ugl) SKD (Z), VEGIK (Z)	49°05'N, 142°04'E	Far East Sakhalin
150.	Urup (exp) VEGIK, S5S (N-S, E-W)	46°00'N, 150°00'E	Far East Kurils (Uruppu Island)
151.	Ust'-Elegest (b) (U-E, Uel, UER) SKD, SKM-3, SKM-3--KPCh (E-W)	51°34'N, 94°05'E	Altay-Sayan
152.	Ust'-Kan (r) (U-K) SKD, SKM-3	50°57'N, 84°45'E	Altay-Sayan
153.	Ust'-Nera (r) SKM-3	64°34'N, 143°12'E	Yakutiya
154.	Ust'-Nyukzha (exp) SKM-3	56°34'N, 121°37'E	Yakutiya

155.	Ust'-Omchug (exp) SKM-3	61°09'N, 149°38'E	Northeast
156.	Uzhgorod (b) (Uzhg, UZH) SKD, SKD-KPCh, SKM-3, SMR-2 (N-S,E-W)	48°38'N, 22°18'E	Carpathia
157.	Vannovskaya (r) (V, Vn, Van, VAN) VEGIK, SMR-2	37°57'N, 58°06'E	Kopet Dag
158.	Vardenis (exp) (Basargechar) SKM-3	40°11'N, 45°43'E	Caucasus (Armenia)
159.	Verkh-Baza (exp) (V-B) SKM-3	~53.3°N, ~90.1°E	Altay-Sayan
160.	Verkhne-Kamchatsk (exp) (V-K) VEGIK	54°38'N, 158°25'E	Far East (Kamchatka)
161.	Vladivostok (b) (Vld, VLA) SK, SK-KPCh, SKM-3 (Z)	43°07'N, 131°54'E	Teleseismic (Primorskiy Kray)
162.	Yakutsk (b) (Yak, Yakt, YAK) SK, SK-KPCh (N-S), SKM-3 (N-S,E-W)	62°01'N, 129°43'E	Yakutiya
163.	Yalta (r) (Ya) SKh, SMR-2 (N-S,E-W)	44°30'N, 34°10'E	Crimea
164.	Yuzhno-Kuril'sk (r) (Yu-K) VEGIK (Z), VEGIK-KPCh (N-S,E-W)	44°02'N, 145°51'E	Far East Kurils (Kunashiri Island)
165.	Yuzhno-Sakhalinsk (b) (Yu-S, Yuskh, YSS) SK, SKD, SKM-3, Press-Ewing, UBOPE-1, UBOPE-2 (N-S,E-W) SMTR (N-S,E-W), Wiechert	47°01'N, 142°43'E	Far East (Sakhalin)
166.	Zakamensk (b) (Zkm, ZAK) SKD, SKM-3	50°23'N, 103°17'E	Baykal
167.	Zhiloy ostrov (r) SKh	40°19'N, 50°36'E	Caucasus (Azerbaijan)
168.	Zugdidi (r) (Zgd) SKh (Z)	42°31'N, 41°53'E	Caucasus (Georgia)

II. INSTRUMENTAL CONSTANTS

Soviet seismologists describe seismographs in terms of the following constants: * seismometer period (T_s); seismometer damping factor (D_s); galvanometer period (T_g); galvanometer damping factor (D_g); coupling coefficient (σ^2); normal magnification ($\bar{V}$); maximum magnification (V_m); and the period range (T_m) corresponding to magnification $V = 0.9 V_m$. Two of these constants, $\bar{V}$ and T_m , are not used by American seismologists.

The frequency response, or magnification, V , of a moving-coil, galvanometrically recording seismograph is given by:

$$V = \frac{2A}{1} \left(\frac{K_s}{K_g} \frac{4D_s D_g \sigma^2}{T_s T_g} \right)^{1/2} \cdot \frac{1}{(T^{-2} + a + bT^2 + cT^4 + dT^6)^{1/2}} \quad (1)$$

where A is the optical lever; l is the pendulum length; K_s and K_g are the moments of inertia of the seismometer and galvanometer, respectively; T is the period; $a = m^2 - 2p$; $b = p^2 - 2mq + 2s$; $c = q^2 - 2ps$; $d = s^2$;

$$m = 2 \left(\frac{D_s}{T_s} + \frac{D_g}{T_g} \right); \quad p = \frac{1}{T_s^2} + \frac{1}{T_g^2} + \frac{4D_s D_g}{T_s T_g} (1 - \sigma^2); \quad q = 2 \left(\frac{D_s}{T_s T_g^2} + \frac{D_g}{T_g T_s^2} \right);$$

$s = \frac{1}{T_s^2 T_g^2}$; and the remaining symbols are as defined in paragraph 1 above.

Frequency response can also be written as a product of two terms:

$$V = \bar{V}U(T) \quad (2)$$

* Determined routinely once a year at base stations and irregularly, but apparently also once a year at most regional and expeditionary stations.

where $\bar{V}$ is a period-independent constant that the Soviets call *normal* or *indicator* magnification and $U(T)$ is the period-dependent term they call *frequency characteristic* of the seismograph. For a system where

$T_s > T_g$ and $D_s < D_g$:

$$\bar{V} = \frac{2A}{1} \left(\frac{K_s D_s T_g}{K_g D_g T_s} \sigma^2 \right)^{1/2} \quad (3)$$

and

$$U(T) = \frac{2D_g/T_g}{(T^{-2} + a + bT^2 + cT^4 + dT^6)^{1/2}} \quad (4)$$

Expressions (3) and (4) were obtained by dividing and multiplying the two terms of (1) by a "fudge" factor $2D_g/T_g$ to make $\bar{V}$ reasonably close to maximum magnification. For an "inverted" system where $T_s < T_g$ and $D_s > D_g$:

$$\bar{V} = \frac{2A}{1} \left(\frac{K_s D_g T_s}{K_g D_s T_g} \sigma^2 \right)^{1/2} \quad (5)$$

and

$$U(T) = \frac{2D_s/T_s}{(T^{-2} + a + bT^2 + cT^4 + dT^6)^{1/2}} \quad (6)$$

where the "fudge" factor is $2D_s/T_s$.

It should be noted that, while the normal magnification is usually less than or equal to maximum magnification, it can also be larger than maximum magnification. For example, $\bar{V} > V_m$ for SG seismographs and the Press-Ewing system operating at the Yuzhno-Sakhalinsk station.

The period range T_m measured at 90 percent of the maximum gain, used by Soviet seismologists, is rather unusual, especially in view of

the fact that T_m and V_m are frequently the only data that they publish for seismographs deployed at regional and expeditionary stations. It is claimed that for the base stations T_m is determined with an accuracy of 0.05 sec when the upper limit of $T_m \leq 1$ sec, with an accuracy of up to 0.1 sec when the upper limit of $T_m \leq 10$ sec, and an accuracy of up to 1 sec for the upper limit of $T_m \leq 100$ sec. Since the frequency response of a seismograph is extremely sensitive even to small differences in T_m , large differences are possible in estimated response curves drawn from the data on V_m and T_m , as was done in this Report for forty-six regional and expeditionary stations. The T_m of seismographs at Soviet regional and expeditionary stations appears to be less accurately determined than that of instruments at base stations. Therefore, the frequency response curves of seismographs at forty-six regional and expeditionary stations drawn for this Report from the data on V_m and T_m , where the long-period slope (T^{-3} part of the curve) was estimated from the available response curves for the same instruments with the same T_m but usually with different V_m , are only rough approximations of the actual curves.

The use of T_m for broadband instruments with a hump is also misleading. For example, in the case of the SMTR strong-motion system $T_m = 2-5$, falsely indicating a narrow-band response for what actually is a broadband instrument. No explanation could be found in the Soviet seismological literature for the use of this rather unusual parameter.

Table 5 summarizes available data on the instrumental constants of seismographs by ESSN station, listed in alphabetical order. A dash indicates that the constant is unavailable, and a blank space indicates that a particular constant does not apply to the instrument under consideration.

A complete set of instrumental constants* is available for the following: fifty-three of the fifty-four base stations operating in 1970

*The instrumental constants of the low-gain KPCh channels are available for only eight of the twenty-five base stations equipped with these channels. However, since all of the constants but the coupling coefficient and magnification are identical to the main channel and since the magnification can be determined approximately from the frequency response curves of KPCh channels plotted in Figs. 12-149, only the value of the coupling coefficient σ^2 is actually unknown.

(the data on the Moscow station date back to 1963); one regional station -- Alma-Ata -- for 1972; all three regional stations in the Crimea -- Alushta, Feodosiya, and Yalta -- for 1970; and four stations in Baykal -- Bodon and Khaim (both expeditionary) and Khapcheranga and Nelyaty (both regional) -- for 1969. Nominal values of instrumental constants are also available for the following twelve of the fifteen expeditionary stations in Kamchatka and the Commander Islands, which are equipped with VEGIK instruments: Apakhonchich, Avacha, Kronoki, Krutoberegovo, Mys Shipunskiy, Nikol'skoye, Ozero, Pauzhetka, Petropavlovsk, Semlyachik, Topolovo, and Verkhne-Kamchatsk. The only constants available for the remaining ninety-four regional and expeditionary stations are the maximum magnification (V_m) and the period range (T_m). An ~ sign before the maximum magnification and period range of seismographs at the sixteen regional and expeditionary stations in Baykal indicates that these constants were determined approximately from the available magnification curves of instruments operating at these stations. Most of the data on the constants of regional and expeditionary station seismographs refer to 1969.

Table 5 [1-5]

INSTRUMENTAL CONSTANTS, BY SEISMOGRAPH AND STATION

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Abastumani	SKD Z	--	--	--	--	--	--	500	0.2-18
	SKM-3 Z	--	--	--	--	--	--	22600	0.4-0.8
Agalyk	SKM-3 N-S, E-W	--	--	--	--	--	--	20620	0.2-1.4
	SKM-3 Z	--	--	--	--	--	--	20592	0.2-1.4
Akhalkalaki	SKM-3 Z	--	--	--	--	--	--	22600	0.4-0.8
Ak-Kuyli	VEGIK N-S	--	--	--	--	--	--	1000	0.05-0.9
	VEGIK E-W	--	--	--	--	--	--	1000	0.05-1.1
	VEGIK Z	--	--	--	--	--	--	9583	0.06-0.9
Alla	SKM-3 N-S, E-W, Z	--	--	--	--	--	--	11000	~0.4-0.5
Alma-Ata [6]	SKD N-S, E-W, Z	25	0.5	1.2	8.0	0.25	1000	--	0.2-20
	SKD-KPCh, N-S, E-W, Z	25	0.5	1.2	8.0	$(63-74) \times 10^{-5}$	50	--	0.2-20
	SKM-3 N-S	2.0	0.5	0.60	2.0	0.025	5000	--	0.2-2.0
	SKM-3 E-W	2.0	0.5	0.55	2.0	0.021	5000	--	0.2-2.0
	SKM-3 Z	2.0	0.5	0.64	2.0	0.04	5000	--	0.2-2.0
	SKM-3--KPCh N-S, E-W, Z	2.0	0.5	0.29	2.0	0.01	250	--	0.1-1.8
	SKM-3 Z	1.0	0.3	1.0*	0.3	0.067	--	15000	1.0
	SKM-3 Z	1.0	0.7	0.2*			2000	--	0.1-1.0
	SKM-3 Z	1.0	0.7	0.2*			100	--	0.1-1.0
	SKM-3 Z	1.0	0.7	0.2*			5	--	0.1-1.0
	S5S N-S, E-W, Z	5.0	1.5	0.08*			~7000		~1.3-5.0
	S5S N-S	5.0	0.65	0.21	28	--	200	--	0.2-5.0
	S5S N-S	5.0	0.65	0.20	18	--	20	--	0.2-5.0
	S5S N-S	5.0	0.65	0.20	26	--	2	--	0.2-5.0
	SMTR N-S	5.0	0.456				7.12	8.78	4.0
	SMTR E-W	5.0	0.456				7.01	8.66	4.0
	VBP-3 N-S	1.6	0.6	0.206	15	152×10^{-4}	18	--	0.1-1.5
	VBP-3 E-W	1.6	0.6	0.176	15	61×10^{-4}	16	--	0.1-1.5
	VBP-3 Z	1.6	0.6	0.176	15	93×10^{-4}	14	--	0.1-1.5

* Galvanometer period of the N-002 recorder.

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Alushta	SK Z	13.3	0.47	1.13	4.72	0.18	900	900	0.3-11
	SKh N-S,E-W	0.76	0.74	0.22	1.74	0.246	--	21000	0.2-0.5
	SKh Z	0.88	0.90	0.22	1.60	0.35	--	15000	0.2-0.5
	SMR-2 N-S,E-W	5.0	0.456				7	--	2-5
Andizhan	SK N-S,E-W	12.5	0.45	1.2	5.0	0.040	1000	1040	0.3-11
	SK Z	12.5	0.59	1.2	5.0	0.274	1000	1100	0.5-8.5
	SKM-3 N-S,E-W,Z	1.8	0.40	0.6	0.7	0.003	10000	10700	0.45-1.05
	SMTR N-S,E-W	5.0	0.456				7	8.6	2-5
	UAR-M	0.045	0.7-0.8			(V _g [acceleration sensitivity] ~16mm/g)			--
Apakhonchich [8]	VEGIK N-S,E-W	1.2	0.4	0.075	5.8	<0.15	7000	7000	0.05-1.0
	VEGIK Z	1.2	0.4	0.075	5.8	<0.15	8000	8000	0.05-1.0
Apatity	SKD N-S,E-W,Z	25	0.50	1.2	8.0	0.254	1000	1040	0.2-20
	SKD N-S,E-W,Z	25	0.50	1.2	8.0	0.064	500	500	0.2-20
	SKh N-S	0.55	0.55	1.0	5.0	0.331	13400	19200	0.40-0.6
	SKh E-W	0.55	0.55	1.0	4.9	0.385	16500	25600	0.40-0.6
	SKh Z	0.55	0.55	1.0	5.1	0.396	17970	27200	0.40-0.6
	SD-1 N-S	25	1.0	88.3	0.48	0.218	900	970	20-50
	SD-1 E-W	25	1.0	81.3	0.52	0.210	900	970	20-50
	SD-1 Z	25	1.0	80.8	0.47	0.205	900	970	20-50
Aral	SK N-S,E-W,Z	--	--	--	--	--	--	1500	--
Arshan	SKM-3 N-S,E-W,Z	--	--	--	--	--	--	~6600	~0.12-4.0
Ashkhabad	SK N-S,E-W	12.5	0.45	1.2	5.0	0.030	960	1000	0.3-11
	SK Z	12.5	0.71	1.2	5.0	0.229	970	970	0.3-8.0
	SKM-3 N-S	1.9	0.50	0.62	0.70	0.001	6350	7300	0.45-0.95
	SKM-3 E-W	2.0	0.53	0.44	0.69	0.001	5900	6000	0.50-0.85
	SKM-3 Z	1.9	0.49	0.60	0.69	0.001	6100	6500	0.25-0.65
Avacha [8]	VEGIK N-S	0.7	0.4	0.075	5.8	<0.15	8000	8000	0.05-1.0
	VEGIK E-W	0.7	0.4	0.075	5.8	<0.15	12000	12000	0.05-1.0
	VEGIK Z	0.7	0.4	0.075	5.8	<0.15	4000	4000	0.05-1.0
Baku	SK N-S,E-W	12.5	0.45	1.2	5.0	0.024	970	1020	0.3-11
	SK Z	12.5	0.45	1.2	5.0	0.112	460	500	0.5-11

Table 5 (cont.)

Station	Seismograph and Component	T _s (sec)	D _s	T _g (sec)	D _g	σ^2	$\bar{V}$	V _m	T _m (sec)
Bakuriani	SK N-S, E-W	12.5	0.45	1.2	5.0	0.080	1500	1600	0.3-11
	SK Z	12.5	0.62	1.2	5.0	0.339	820	900	0.4-8.0
	SKD N-S, E-W, Z	25	0.5	1.2	8.0	0.250	1060	1080	0.2-20
	SKM-3 N-S	1.74	0.53	0.37	1.84	0.180	47600	50000	0.2-1.3
	SKM-3 E-W, Z	1.74	0.53	0.37	1.84	0.180	45700	48000	0.2-1.3
Barguzin	SKM N-S, E-W, Z	--	--	--	--	--	--	~38000	~0.7-1.2
Bodaybo	SKM-3 N-S	1.74	0.53	0.37	1.84	0.160	43200	45400	0.2-1.3
	SKM-3 E-W	1.72	0.53	0.37	1.84	0.160	43800	46000	0.2-1.3
	SKM-3 Z	1.74	0.53	0.37	1.84	0.160	46700	49000	0.2-1.3
Bodon	SKM-3 N-S, E-W, Z	1.74	0.53	0.37	1.84	0.160	--	~45000	~0.2-1.2
Bogdanovka	SKM-3 Z	--	--	--	--	--	--	22750	0.4-0.8
Bogi-Zagon	VEGIK N-S, E-W	--	--	--	--	--	--	10900	0.02-0.5
	VEGIK Z	--	--	--	--	--	--	12248	0.02-0.5
Chagan-Uzun	SKD N-S	25	0.42	1.2	7.9	0.287	1060	1160	1.0-22
	SKD E-W	25	0.55	1.2	5.9	0.248	1170	1170	0.2-13
	SKD Z	25	0.41	1.2	6.4	0.272	1670	1700	0.3-15
	SKM-3 N-S	2.0	0.50	0.4	1.5	0.250	47200	49500	0.25-1.10
	SKM-3 E-W	2.0	0.45	0.4	2.0	0.220	41000	45300	0.4-1.8
	SKM-3--KPCh E-W	2.0	0.45	0.4	2.0	0.0037	4540	4660	0.25-1.4
	SKM-3 Z	2.0	0.50	0.4	1.5	0.250	44550	46800	0.25-1.1
Chagda	SKM-3 N-S	--	--	--	--	--	--	38000	0.2-1.1
	SKM-3 E-W	--	--	--	--	--	--	38600	0.2-1.1
	SKM-3 Z	--	--	--	--	--	--	34200	0.2-1.1
Chara	VEGIK N-S, E-W, Z	--	--	--	--	--	--	~16000	~0.05-0.14
Chilik	SKM-3 N-S, E-W, Z	--	--	--	--	--	--	20000	0.1-1.5
Chimgan	VEGIK N-S	--	--	--	--	--	--	10719	0.01-1.0
	VEGIK E-W	--	--	--	--	--	--	10106	0.1-0.9
	VEGIK Z	--	--	--	--	--	--	9957	0.01-0.9
	VEGIK-KPCh Z	--	--	--	--	--	--	100	0.01-0.9

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Chimkent	SK N-S	--	--	--	--	--	--	1037	0.7-10
	SK E-W	--	--	--	--	--	--	967	0.3-11
	SK Z	--	--	--	--	--	--	1143	0.9-9.0
	SMTR N-S, E-W	--	--	--	--	--	--	7	2-5
Chul'man	SKM-3 N-S	--	--	--	--	--	--	48200	0.3-1.0
	SKM-3 E-W	--	--	--	--	--	--	25200	0.2-1.3
	SKM-3 Z	--	--	--	--	--	--	24700	0.3-1.0
Chuyan-Garon	SKM-3 Z	--	--	--	--	--	--	20000	0.05-1.7
Dushanbe	SK N-S, E-W	12.5	0.45	1.2	5.0	0.020	1000	1030	0.3-11
	SK Z	12.5	0.46	1.2	5.0	0.216	900	1030	4.0-11
	SKD N-S, E-W, Z	25	0.5	1.2	8.0	0.250	900	950	0.2-20
Dusheti	SK N-S, E-W	--	--	--	--	--	--	1800	0.5-11
	SK Z	--	--	--	--	--	--	800	0.8-11
	SKh N-S, E-W	--	--	--	--	--	--	22000	0.4-0.5
	SKh Z	--	--	--	--	--	--	20800	0.4-0.5
Dzherino	VEGIK N-S	--	--	--	--	--	--	17400	0.3-0.9
	VEGIK E-W	--	--	--	--	--	--	16700	0.08-0.9
	VEGIK Z	--	--	--	--	--	--	16800	0.03-0.85
Dzhirgatal'	SKD N-S	--	--	--	--	--	--	1200	8.0-17.5
	SKD E-W	--	--	--	--	--	--	1000	0.2-14
	SKD Z	--	--	--	--	--	--	1100	9.3-10.6
Dzhizak	SKM-3 N-S	--	--	--	--	--	--	17397	0.2-1.2
	SKM-3 E-W	--	--	--	--	--	--	20570	0.2-1.4
	SKM-3 Z	--	--	--	--	--	--	21771	0.2-1.2
	SMTR N-S, E-W	--	--	--	--	--	--	7	2-5
El'tsovka	SKM-3 N-S	2.0	0.50	0.4	1.5	0.250	52500	55400	0.2-1.3
	SKM-3 E-W	2.0	0.50	0.4	1.5	0.250	46800	49400	0.2-1.3
	SKM-3 Z	2.0	0.50	0.4	1.5	0.250	44000	46600	0.2-1.3
	SKM-3--KPCh E-W	2.0	0.50	0.4	1.5	0.0023	4500	4300	0.2-1.3
Erevan	SMR-2 N-S, E-W	5.0	0.456				7.2	8.7	0.2-4.9
Erzin	SKM-3 N-S, E-W	--	--	--	--	--	--	51500	0.2-1.4
	SKM-3 Z	--	--	--	--	--	--	48500	0.2-1.4
Esso	SKM N-S, E-W, Z	1.2	--	--	--	--	--	30000	0.05-1.0

Table 5 (cont.)

Station	Seismograph and Components	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Fabrichnaya	SKM-3 N-S,E-W	--	--	--	--	--	--	15000	0.1-1.0
	SKM-3 Z	--	--	--	--	--	--	15000	0.1-1.5
Feodosiya	SK N-S,E-W	4.0	0.50	1.20	1.7	0.028	--	3000	0.6-3.0
	SK Z	--	--	--	--	--	--	1100	0.3-8.0
	SKh* N-S,E-W	1.0	0.61	0.38	1.81	0.19	--	11000	0.6-0.9
Fergana	SK N-S,E-W	--	--	--	--	--	--	1039	0.3-11
	SK Z	--	--	--	--	--	--	1116	0.7-9.0
	SK-KPCh N-S,E-W	--	--	--	--	--	--	102	0.3-11
	SKM-3 Z	--	--	--	--	--	--	10337	0.2-1.4
	SMTR N-S,E-W	--	--	--	--	--	--	7	2-5
Frunze	SK N-S,E-W	12.5	0.45	1.2	5.0	0.032	1000	1050	0.3-11
	SK Z	13.9	0.48	1.08	4.5	0.340	1000	1070	0.3-11
	SKD N-S,E-W,Z	25	0.5	1.2	8.0	0.250	1000	1040	0.2-20
	SKM-3 N-S,E-W,Z	1.81	0.40	0.6	0.695	0.012	24100	26000	0.45-1.0
Garm	SKD N-S	20	0.35	0.71	11	0.144	1500	1700	0.2-19
	SKD E-W	20	0.35	0.75	10	0.123	1500	1720	0.2-19
	SKD Z	20	0.38	0.75	10	0.277	1000	1160	0.2-19
	SKM-3 N-S	2.0	0.5	0.20	4	0.223	40000	42000	0.1-1.5
	SKM-3--KPCh N-S	2.0	0.5	0.20	4	--	4000	4200	0.1-1.5
	SKM-3 E-W	2.0	0.5	0.18	4	0.185	40000	40000	0.1-1.5
	SKM-3 Z	2.0	0.5	0.18	4	0.184	40000	40000	0.1-1.5
	SD-1 N-S	25	1.0	87	0.48	0.0037	100	106	18-50
	SD-1 E-W	25	1.0	82	0.47	0.0029	100	106	18-50
	S5S E-W	5.0	0.5	0.20	29	0.0005	40	43	0.1-4.5
	S5S Z	5.0	0.5	0.20	20	0.031	400	420	0.1-4.5
	SMTR N-S	5	0.456				7.2	8.6	2.0-4.9
	SMTR E-W	5	0.456				6.8	8.0	2.0-4.9

* Used with galvanometer notch filter with the following constants:

$T_g' = 0.25$ sec, $D_g' = 1.6$, $\sigma_{sg}' = 0.254$, $\sigma_{gg}' = 0.72$.

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Gegechkori	SKM-3 Z	--	--	--	--	--	--	3280	0.3-0.8
Gori	SK N-S,E-W	--	--	--	--	--	--	1800	0.3-11
	SK Z	--	--	--	--	--	--	1375	6-11
	SKM-3 Z	--	--	--	--	--	--	3100	0.3-0.8
Goris	SK N-S,E-W	12.5	0.45	1.2	5.0	0.073	1600	1700	0.3-11
	SK Z	12.5	0.45	1.2	5.0	0.232	800	940	4.0-10.5
	VEGIK N-S,E-W,Z	1.8	0.40	0.6	0.69	0.023	9200	10000	0.45-1.0
	SMTR N-S,E-W	5.0	0.456				7	8.4	3.4-6.5
Groznyy	SK N-S,E-W	--	--	--	--	--	--	1400	0.3-11
	SK Z	--	--	--	--	--	--	1000	0.3-11
Irkutsk	SKD N-S,E-W,Z	25	0.5	1.2	8.0	0.250	1160	1200	0.2-20
	SKM-3 N-S,E-W,Z	1.8	0.50	1.4	0.5	0.025	15600	18200	1.2-1.8
	SKM-3 N-S,E-W	1.8	0.50	1.4	0.5	0.025	18400	20600	1.2-1.8
	SKM-3 N-S,E-W	1.8	0.50	1.4	0.5	0.006	9000	9450	1.2-1.8
	SKM-3 Z	1.8	0.50	1.4	0.5	0.025	17600	19100	1.2-1.8
	SKM-3 Z	1.8	0.50	1.4	0.5	0.006	8600	9200	1.2-1.8
	SMTR N-S,E-W	5.0	0.456				7	8.6	2.0-4.9
Iul'tin	SK N-S,E-W	12.5	0.45	1.2	5.0	0.090	1600	1700	0.3-11
	SK Z	12.5	0.45	1.2	5.0	0.447	900	1270	7.0-11
	SK N-S	12.5	0.45	1.2	5.0	0.080	1500	1600	0.3-11
	SK E-W	12.5	0.42	1.2	5.0	0.095	1500	1660	0.6-11.5
	SK Z	12.5	0.45	1.2	5.0	0.449	1060	1500	7.0-11
	SK E-W	12.5	0.45	1.2	5.0	0.089	1500	1600	0.4-11
	SKM-3 N-S	1.5	0.7	0.39	2.0	0.170	50000	52000	0.2-1.0
	SKM-3 E-W	1.5	0.7	0.40	2.0	0.170	50000	52000	0.2-1.0
	SKM-3 Z	1.5	0.7	0.40	2.0	0.200	50000	52000	0.2-1.0
	SKM-3 N-S,E-W,Z	1.5	0.7	0.40	2.0	0.120	49000	50000	0.2-1.0
	SD-1 N-S	25	0.99	83.2	0.52	0.278	1000	1120	20-55
	SD-1 E-W	25	1.00	87.0	0.5	0.267	940	1020	20-55
	SD-1 Z	25	1.00	82.2	0.5	0.304	970	1100	20-60
Kabansk	SKD N-S,E-W,Z	--	--	--	--	--	--	~1200	~0.3-18

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Kalaydasht	VEGIK N-S	--	--	--	--	--	--	14000	0.03-0.80
	VEGIK E-W	--	--	--	--	--	--	11200	0.03-0.75
	VEGIK Z	--	--	--	--	--	--	12540	0.03-0.80
Kara-Su	SKM-3 N-S, Z	--	--	--	--	--	--	20000	0.05-1.0
	SKM-3 E-W	--	--	--	--	--	--	17200	0.05-1.0
	SKM-3--KPCh Z	--	--	--	--	--	--	1000	0.02-0.7
Khaim	SKM-3 N-S, E-W, Z	1.74	0.53	0.37	1.84	0.160	--	~45000	~0.2-1.2
Khaishi	SKM-3 Z	--	--	--	--	--	--	22600	0.3-0.9
Khandyga	SKM-3 N-S	--	--	--	--	--	--	24800	0.2-1.3
	SKM-3 E-W	--	--	--	--	--	--	27700	0.2-1.3
	SKM-3 Z	--	--	--	--	--	--	23800	0.2-1.3
Khapcheranga	SKM-3 N-S, E-W, Z	1.74	0.53	0.37	1.84	0.160	--	~45000	~0.2-1.2
Kheys	SK N-S, E-W	12.5	0.45	1.2	5.0	0.014	850	870	0.3-11
	SK Z	12.5	0.59	1.2	5.1	0.319	1050	1140	0.8-10
	SK Z	12.5	0.59	1.2	5.1	0.080	520	530	0.3-8.0
	SKM-3 N-S	1.60	0.49	0.30	1.94	0.052	26720	28000	0.2-1.3
	SKM-3 E-W	1.61	0.51	0.38	1.95	0.051	26680	28000	0.2-1.3
	SKM-3 Z	1.60	0.50	0.38	2.05	0.051	24150	24400	0.2-1.3
Khorog	SK N-S	12.4	0.45	1.2	5.0	0.072	1580	1760	0.3-11
	SK E-W	12.5	0.45	1.2	5.0	0.084	1800	1900	0.3-11
	SK Z	12.4	0.45	1.2	5.0	0.400	940	1230	6.0-11
	SMR-2 N-S, E-W	5.0	0.456				7.6	9.5	2.4-4.5
Kirovabad	SK N-S, E-W	12.5	0.45	1.2	5.0	0.073	1250	1330	0.3-11
	SK Z	12.5	0.45	1.2	5.0	0.298	710	860	6.0-11
	SKM-3 N-S, E-W	1.74	0.53	0.37	1.84	0.160	45000	50000	0.20-1.25
	SKM-3 Z	1.74	0.53	0.37	1.84	0.200	45000	50000	0.20-1.25
Kishinev	SK N-S, E-W	12.5	0.45	1.2	5.0	0.080	1620	1730	0.3-11
	SK Z	12.5	0.45	1.2	5.0	0.386	860	1140	4.0-11
	SD-1 Z	25	1.0	85.9	0.5	0.208	1000	1080	18-55
Kizyl-Arvat	SK N-S, E-W	12.5	0.45	1.2	5.0	0.070	1470	1560	0.3-11
	SK Z	12.5	0.45	1.2	5.0	0.310	920	1100	5.5-11

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Kizyl-Atrek	SKM-3 N-S	---	---	---	---	---	---	4473	0.3-1.0
	SKM-3 E-W	---	---	---	---	---	---	3900	0.3-1.1
	SKM-3 Z	---	---	---	---	---	---	4100	0.3-1.1
Klyuchi [8]	SKh N-S	1.0	---	0.3	---	---	---	3000	~0.15-0.32
	SKh E-W	1.0	---	0.3	---	---	---	8000	~0.15-0.32
	SKh Z	---	---	---	---	---	---	1000	~0.15-0.32
	SKM-3 N-S	---	---	---	---	---	---	1050	~0.2-1.4
	SKM-3 E-W	---	---	---	---	---	---	10450	~0.2-1.4
	SKM-3 Z	---	---	---	---	---	---	9240	~0.2-1.4
Kosov	SKD N-S	---	---	---	---	---	---	1100	0.3-20
	SKD E-W	---	---	---	---	---	---	1090	0.3-20
	SKD Z	---	---	---	---	---	---	1050	0.3-20
	SKM-3 N-S	---	---	---	---	---	---	10050	0.2-1.4
	SKM-3 E-W	---	---	---	---	---	---	10450	0.2-1.4
	SKM-3 Z	---	---	---	---	---	---	9240	0.2-1.4
Kozyrevsk [8]	SKh N-S, E-W	1.0	---	0.3	---	---	---	5000	~0.15-0.32
	SKh Z	1.0	---	0.3	---	---	---	6000	~0.15-0.32
Krasnovodsk	VEGIK N-S	---	---	---	---	---	---	22800	0.1-0.7
	VEGIK E-W	---	---	---	---	---	---	27000	0.1-0.8
	VEGIK Z	---	---	---	---	---	---	21600	0.1-0.8
Kronoki [8]	VEGIK N-S, E-W, Z	1.2	0.4	0.075	5.8	<0.15	5000	5000	0.05-1.0
Krutoberegovo [8]	VEGIK N-S, E-W, Z	1.2	0.4	0.075	5.8	<0.15	5000	5000	0.05-1.0
Kulkuduk	SKM-3 N-S	---	---	---	---	---	---	20583	0.2-1.4
	SKM-3 E-W	---	---	---	---	---	---	20549	0.2-1.4
	SKM-3 Z	---	---	---	---	---	---	20468	0.2-1.4
Kulyab	SK N-S	12.6	0.45	1.2	5.0	0.049	1010	1060	0.3-11
	SK E-W	12.5	0.45	1.2	5.0	0.028	1000	1020	0.3-11
	SKM Z	5.0	0.50	1.15	5.0	0.004	1080	1200	0.5-4.8
Kumora	SKM-3 N-S, E-W, Z	---	---	---	---	---	---	~28000	~0.2-1.2
Kuril'sk	SK N-S, E-W	12.5	0.45	1.2	5.0	0.007	500	500	0.3-11
	SK N-S, E-W	12.5	0.45	1.2	5.0	0.001	200	200	0.3-11
	SK N-S, E-W	12.5	0.45	1.2	5.0	0.00001	20	20	0.3-11
	SK Z	12.5	0.55	1.2	4.1	0.258	1000	1080	0.4-9.0
	SK Z	12.5	0.55	1.2	4.1	0.064	500	540	0.3-8
	SK Z	12.5	0.55	1.2	4.1	0.0006	50	50	0.3-8

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Kuril'sk (cont.)	SKD N-S,E-W,Z	25	0.5	1.2	8.0	0.250	1000	1040	0.2-20
	SKD N-S,E-W,Z	25	0.5	1.2	8.0	0.062	500	500	0.2-17
	SKD N-S,E-W,Z	25	0.5	1.2	8.0	0.010	200	200	0.2-15
	VEGIK Z	0.68	0.5	0.07	4.0	0.040	10000	10000	0.1-0.5
	UBOPE-2 N-S,E-W	4.0	0.453				36	56	1.1-2.6
	SMR-3 N-S,E-W	3.5	0.467				5	7.5	1.3-2.5
	SMR-3 N-S	3.0	0.860				1	1.17	0.2-1.3
Kurmenty	SKM-3 N-S	--	--	--	--	--	--	29000	0.1-1.5
	SKM-3 E-W	--	--	--	--	--	--	27000	0.1-1.5
	SKM-3 Z	--	--	--	--	--	--	30000	0.1-1.5
Kyakhta	SKD N-S,E-W,Z	--	--	--	--	--	--	~1100	~0.2-16
Kzyl-Agach	SKM-3 N-S,E-W	--	--	--	--	--	--	35000	0.1-1.2
	SKM-3 Z	--	--	--	--	--	--	40000	0.1-1.2
Lagodekhi	SKM-3 Z	--	--	--	--	--	--	23000	0.3-0.9
	SMTR N-S,E-W	--	--	--	--	--	--	9	2-5
Leninakan	SKD Z	--	--	--	--	--	--	960	1-10
	VEGIK N-S,E-W	--	--	--	--	--	--	1500	0.4-1.1
	VEGIK Z	--	--	--	--	--	--	1460	0.4-1.1
	VEGIK N-S,E-W	--	--	--	--	--	--	9500	0.5-1.1
	VEGIK Z	--	--	--	--	--	--	9400	0.5-1.1
	SD-1 N-S,E-W	--	--	--	--	--	--	155	18-42
	SD-1 Z	--	--	--	--	--	--	155	16-49
Lenkoran'	SKh N-S,E-W	--	--	--	--	--	--	3100	0.2-1.2
	SKh Z	--	--	--	--	--	--	2520	0.2-1.2
L'vov	SK Z	13.3	0.47	1.13	4.6	0.180	630	660	0.3-11
	SKD N-S	25	0.5	1.2	8.0	0.250	1060	1100	0.2-20
	SKD E-W	25	0.5	1.2	8.0	0.250	1120	1160	0.2-20
	SKD Z	25	0.5	1.2	8.0	0.250	1030	1120	0.2-20
Lyangar	SKM-3 Z	--	--	--	--	--	--	5000	0.05-1.7
Magadan	SK N-S	12.6	0.45	1.2	5.1	0.084	1660	1770	0.3-11
	SK E-W	12.3	0.45	1.2	5.0	0.083	1670	1800	0.3-11
	SK Z	10.3	0.45	1.2	4.6	0.318	980	1200	4.5-8.5

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Makhachkala	SK N-S, E-W	12.5	0.45	1.2	5.0	0.032	1000	1040	0.3-11
	SK N-S, E-W	12.5	0.45	1.2	5.0	0.008	500	520	0.3-11
	SK Z	14.0	0.49	1.07	4.4	0.077	500	520	0.3-11
	SKh E-W	1.0	1.0	0.5	1.4	0.0048	5000	4300	0.2-0.6
	S5S N-S	5.0	0.59	0.2	27.0	~0	10	10	0.1-1.0
	S5S N-S	5.0	0.59	0.2	27.0	~0	1	1	0.1-3.0
	S5S N-S	5.0	0.60	0.1	11.1	~0	10	10	0.1-3.5
	S5S E-W	5.0	0.60	0.1	11.1	~0	1	1	0.1-3.5
	S5S Z	5.0	0.68	0.2	26.4	~0	10	10	0.1-2.5
Malo-Kuril'sk	SKD	--	--	--	--	--	--	1000	0.1-16
	SKM-3 Z	--	--	--	--	--	--	60000	0.5
Matua	VEGIK Z	--	--	--	--	--	--	16000	0.6
	S5S N-S, E-W	--	--	--	--	--	--	50	0.1-4
Mezhgor'ye	SKM-3 N-S	--	--	--	--	--	--	30500	0.2-0.8
	SKM-3 E-W	--	--	--	--	--	--	29700	0.2-0.8
	SKM-3 Z	--	--	--	--	--	--	26000	0.2-0.9
Mingechaur	SKh N-S, E-W	--	--	--	--	--	--	1300	0.1-0.3
	SKh Z	--	--	--	--	--	--	7000	0.2-0.4
Mirnyy	SK N-S	12.5	0.44	1.1	6.7	0.086	1230	1420	4.0-11.5
	SK E-W	12.5	0.44	1.1	6.7	0.082	1320	1460	4.0-11.5
	SK Z	12.5	0.41	1.1	6.7	0.204	870	1280	7.0-11
	SKM-3 Z	1.1	0.59	0.259	0.99	0.091	49900	51100	0.20-0.45
	SD-1 Z	25	1.1	96	0.56	0.177	900	940	16-50
Mondy	SKM-3 N-S, E-W, Z	1.74	0.53	0.37	1.84	0.160	32000	33500	0.20-1.30
Moskva [7]*	SK 45° N-E	12.5	0.45	1.2	5.1	0.016	650	660	0.3-10
	SK 45° S-E	12.5	0.45	1.2	5.0	0.013	670	680	0.3-10
	SK Z	17.0	0.45	1.2	4.7	0.30	1100	1100	0.3-14
	SKD+M21/3 Z *	30.0	0.7	23.0	2.3	0.324	1600	1900	18-29
	SG N-S	9.4	1.0	9.5	1.0	--	1580	1030	5-6
	SG E-W	9.5	1.0	9.5	1.0	--	1580	1030	5-6
	SG Z	9.4	1.0	9.4	1.0	--	1570	1020	5-6
	SKh Z	1.5	0.39	3.8	1.35	0.189	9520	12000	1.3-1.7

* SKD with a nonstandard M21/3 galvanometer.

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Murgab	SK N-S	11.4	0.50	0.93	3.9	0.094	1970	1970	0.3-4.0
	SK E-W	12.3	0.62	1.20	5.1	0.048	1410	1410	0.3-4.0
	SK Z	11.3	0.44	1.20	5.2	0.336	930	930	0.3-4.0
	SK N-S, E-W	12.5	0.45	1.2	5.0	0.074	1500	1600	0.3-11
	SK Z	12.5	0.45	1.2	5.0	0.459	1000	1400	4-11
Mys Shipunskiy [8]	VEGIK N-S, E-W	1.2	0.4	0.075	5.8	<0.15	5000	5000	0.05-1.0
	VEGIK Z	1.2	0.4	0.075	5.8	<0.15	10000	10000	0.05-1.0
Nakhichevan'	SK N-S, E-W	--	--	--	--	--	--	1365	0.3-10
	SK Z	--	--	--	--	--	--	800	0.3-10
Namangan	SK N-S	--	--	--	--	--	--	1023	0.9-9.0
	SK E-W	--	--	--	--	--	--	1118	0.9-9.0
	SK Z	--	--	--	--	--	--	1033	0.5-11
	SMTR N-S, E-W	--	--	--	--	--	--	7	2-5
Naryn	SK N-S, E-W	12.5	0.45	1.2	5.0	0.027	1000	1040	0.3-11.0
	SK Z	14.3	0.49	1.05	4.4	0.427	1000	1080	0.3-11.0
	SKM-3 N-S, E-W, Z	1.64	0.51	0.39	1.94	0.050	24000	25000	0.20-1.25
Nebit-Dag	S5S N-S	--	--	--	--	--	--	5025	0.2-1.0
	S5S E-W	--	--	--	--	--	--	5000	0.2-1.0
	S5S Z	--	--	--	--	--	--	5070	0.2-1.0
Nelyaty	SKM-3 N-S, E-W, Z	1.74	0.53	0.37	1.84	0.16	--	~38000	~0.2-1.2
Nikol'skoye [8]	VEGIK N-S, E-W, Z	1.2	0.4	0.075	5.8	<0.15	7000	7000	0.05-1.0
Nizhneangarsk	SKM N-S, E-W, Z	--	--	--	--	--	--	~26000	~0.2-1.3
Novolazarevskaya	SK N-S, E-W	12.5	0.45	1.2	5.2	0.063	1440	1550	0.3-11.0
	SKD Z	26	0.5	1.18	8.0	0.300	1000	1040	0.2-20.0
	USF N-S, E-W	1.5	1.0	0.54	1.0	0.300	127000	128000	0.35-0.85
	USF Z	1.5	1.0	0.56	1.0	0.300	88700	88000	0.40-0.85
Novosibirsk	SKD N-S	25	0.57	1.2	7.8	0.198	960	960	0.2-17.0
	SKD E-W	25	0.63	1.2	7.9	0.200	1080	1080	0.2-17.0
	SKD Z	25	0.52	1.2	7.7	0.278	1020	1090	0.3-17.0
	SKM-3 N-S, E-W	2.0	0.50	0.4	1.5	0.250	39400	41300	0.2-1.3
	SKM-3 Z	2.0	0.50	0.4	1.5	0.250	38900	40000	0.2-1.3
Nurata	SKM-3 N-S	--	--	--	--	--	--	20581	0.2-1.4
	SKM-3 E-W	--	--	--	--	--	--	21077	0.2-1.4
	SKM-3 Z	--	--	--	--	--	--	20563	0.2-1.4

Table 5 (cont.)

Station	Seismograph and Component	T _s (sec)	D _s	T _g (sec)	D _g	σ^2	$\bar{V}$	V _m	T _m (sec)
Obi-Garm	VEGIK N-S	--	--	--	--	--	--	15500	0.65-0.95
	VEGIK E-W	--	--	--	--	--	--	15250	0.65-0.95
	VEGIK Z	--	--	--	--	--	--	14780	0.62-0.95
	VEGIK-KPCh Z	--	--	--	--	--	--	1590	0.75-0.95
	SMTR N-S, E-W	--	--	--	--	--	--	7	2-5
Obninsk	SK N-S, E-W	12.5	0.45	1.2	5.0	0.018	750	810	0.3-11
	SK Z	12.5	0.54	1.2	5.0	0.278	700	820	2.5-9.0
	SKD N-S, E-W, Z	25	0.50	1.2	8.0	0.250	920	1000	0.2-20
	SKM-3 N-S	1.22	0.50	0.52	1.52	0.060	39100	46000	0.32-0.95
	SKM-3 E-W	1.20	0.50	0.51	1.43	0.045	40500	46000	0.32-0.95
	SKM-3 Z	1.22	0.50	0.50	1.47	0.060	39100	46000	0.32-0.95
	P-E* N-S	30.8	1.74	95.5	0.86	0.012	830	870	12-45
	P-E E-W	30.6	1.68	100.5	0.86	0.012	830	870	12-45
	P-E Z	29.9	1.56	91.5	0.85	0.012	830	870	12-45
Okha	SK N-S, E-W	12.5	0.45	1.2	5.0	0.056	1200	1250	0.40-0.60
	SK N-S, E-W	12.5	0.45	1.2	5.0	0.019	700	720	0.3-11
	SK N-S, E-W	12.5	0.45	1.2	5.0	0.0036	300	320	0.3-11
	SK Z	12.5	0.65	1.2	5.0	0.159	700	750	0.40-9.0
	SK Z	12.5	0.65	1.2	5.0	0.020	250	260	0.25-6.5
	VEGIK N-S	0.68	0.35	0.41	0.7	0.380	12000	15600	0.35-0.65
	VEGIK N-S	0.68	0.35	0.41	0.7	0.0095	6000	8000	0.35-0.65
	VEGIK N-S	0.68	0.35	0.41	0.7	0.0024	3000	4000	0.40-0.60
	VEGIK E-W	0.71	0.35	0.39	0.7	0.380	12000	15600	0.35-0.65
	VEGIK E-W	0.71	0.35	0.7	0.7	0.0095	6000	8000	0.35-0.65
	VEGIK E-W	0.71	0.35	0.7	0.7	0.0024	3000	4000	0.40-0.60
	VEGIK Z	0.70	0.35	0.37	0.7	0.380	12000	15600	0.35-0.65
	VEGIK Z	0.70	0.35	0.37	0.7	0.0095	6000	8000	0.35-0.65
	VEGIK Z	0.70	0.35	0.37	0.7	0.0024	3000	4000	0.40-0.60
Omsukchan	SKM-3 N-S, E-W	--	--	--	--	--	--	9000	0.6-0.8
	SKM-3 Z	--	--	--	--	--	--	1400	0.6-0.8
Onkotan	VEGIK N-S, E-W	--	--	--	--	--	--	1200	0.1-0.6
	VEGIK Z	--	--	--	--	--	--	20000	0.1-0.6
	S5S N-S, E-W	--	--	--	--	--	--	200	0.1-3.0

* Press-Ewing

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Oni	SKD Z	--	--	--	--	--	--	500	0.2-18
	SKM-3 N-S,E-W	--	--	--	--	--	--	62000	0.4-0.9
	SKM-3 Z	--	--	--	--	--	--	63400	0.4-0.9
	SMTR N-S,E-W	--	--	--	--	--	--	7	2-5
Orlik	SKM-3 N-S,E-W,Z	--	--	--	--	--	--	~30000	~0.2-0.9
Ozero [8]	VEGIK N-S,E-W	1.2	0.4	0.075	5.8	<0.15	5000	5000	0.05-1.0
	VEGIK Z	1.2	0.4	0.075	5.8	<0.15	1000	10000	0.05-1.0
Pauzhetka [8]	VEGIK E-W	1.2	0.4	0.075	5.8	<0.15	500	500	0.05-1.0
	VEGIK N-S,Z	1.2	0.4	0.075	5.8	<0.15	7000	7000	0.05-1.0
Petropavlovsk[8]	VEGIK N-S,E-W,Z	1.2	0.4	0.075	5.8	<0.15	8000	8000	0.05-1.0
Petropavlovsk- Kamchatskiy	SK N-S,E-W	12.5	0.45	1.2	5.0	0.014	590	600	0.3-11
	SK N-S,E-W	12.5	0.45	1.2	5.0	0.0036	290	300	0.3-11
	SK Z	12.5	0.45	1.2	5.0	0.362	940	1200	5.5-11
	SK Z	12.5	0.45	1.2	5.0	0.091	470	520	0.4-10
	SKD N-S,E-W,Z	25	0.5	1.2	8.0	0.250	980	1000	0.2-20
	SKD N-S,E-W,Z	25	0.5	1.2	8.0	0.062	500	500	0.2-15
	SKD N-S,E-W,Z	25	0.5	1.2	8.0	0.010	200	200	0.2-15
	SKM-3 N-S,E-W,Z	1.21	0.495	0.595	0.5	0.0043	22700	25000	0.5-0.8
	SKM-3 N-S,E-W,Z	1.21	0.495	0.595	0.5	0.0010	11360	12500	0.5-0.8
	SD-1 N-S	25	1.0	81	0.5	0.230	960	1060	19-55
	SD-1 E-W	25	1.0	77	0.5	0.220	960	1060	19-55
	SD-1 Z	25	1.0	86	0.6	0.278	960	1060	19-55
Przheval'sk	SK N-S,E-W	12.5	0.45	1.2	5.0	0.039	1000	1040	0.3-11
	SK Z	14.6	0.496	1.03	4.3	0.483	1000	1080	0.3-11
	SKM-3 N-S,E-W,Z	1.5	0.6	0.7	2.1	0.038	15000	15900	0.35-1.20
	SKM-3 N-S,E-W,Z	1.5	0.6	0.7	2.1	0.0015	3000	3180	0.35-1.20
Pskem	VEGIK N-S	--	--	--	--	--	--	15043	0.014-0.9
	VEGIK E-W	--	--	--	--	--	--	14811	0.014-0.9
	VEGIK Z	--	--	--	--	--	--	16729	0.5-1.0

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Pulkovo	SK N-S, E-W	12.5	0.45	1.2	5.0	0.097	1760	1890	0.3-11
	SK Z	12.5	0.45	1.2	5.0	0.290	930	1020	0.5-10
	SKD N-S, E-W	25	0.5	1.2	8.0	0.250	1000	1050	0.2-20
	SKD+M21/3 N-S	30	0.6	23.3	0.7	0.021	1700	1710	17-27
	SKD+M21/3 E-W	30	0.6	25.2	0.7	0.021	1700	1730	16-27
	SKD+M21/3 Z	30	0.6	26.0	0.7	0.200	1700	1980	20-30
	SG N-S, E-W	9.5	1.0	9.5	1.0	0.040	1160	770	3.8-8.5
	SG Z	9.6	1.0	9.7	1.0	0.017	1390	910	3.8-8.5
	VEGIK Z	1.5	0.35	4.2	0.6	0.090	7240	7600	1.30-1.85
	SD-1 Z	25	1.0	83.4	0.5	0.360	870	990	20-55
Pyatigorsk	SK N-S, E-W, Z	--	--	--	--	--	--	1000	0.3-11
	SKM-3 N-S, E-W, Z	--	--	--	--	--	--	10000	0.2-1.2
Rakhov	SKD N-S	--	--	--	--	--	--	1020	0.3-20
	SKD E-W	--	--	--	--	--	--	1080	0.3-20
	SKD Z	--	--	--	--	--	--	1040	0.3-20
	SKM-3 N-S	--	--	--	--	--	--	41500	0.2-1.0
	SKM-3 E-W	--	--	--	--	--	--	42500	0.2-1.0
	SKM-3 Z	--	--	--	--	--	--	37800	0.2-0.9
Regar	SKD	--	--	--	--	--	--	~1000	~0.3-20
	VEGIK N-S	--	--	--	--	--	--	10000	0.02-0.7
	VEGIK E-W	--	--	--	--	--	--	10000	0.02-0.9
	VEGIK-KPCh Z	--	--	--	--	--	--	10000	0.02-0.7
Reydovo	SKM-3 Z	--	--	--	--	--	--	60000	0.5
Rybach'ye'	SK N-S, E-W	--	--	--	--	--	--	1400	--
	SK Z	--	--	--	--	--	--	500	--
	SKM-3 N-S, E-W	--	--	--	--	--	--	30000	--
	SKM-3 Z	--	--	--	--	--	--	34000	--
Saberio	SKD Z	--	--	--	--	--	--	500	0.2-1.8
	SKM-3 Z	--	--	--	--	--	--	23000	0.3-0.9

Table 5 (cont.)

Station	Seismograph and Component	T _s (sec)	D _s	T _g (sec)	D _g	σ^2	$\bar{V}$	V _m	T _m (sec)
Samarkand	SK N-S	--	--	--	--	--	--	1002	3.0-9.0
	SK E-W	--	--	--	--	--	--	1309	7.0-12
	SK Z	--	--	--	--	--	--	929	0.3-10
	SMR-2 N-S, E-W	--	--	--	--	--	--	7	2-5
Semipalatinsk	SK N-S, E-W	12.5	0.45	1.2	5.0	0.084	1500	1600	0.3-11
	SK Z	14.7	0.496	1.02	4.25	0.560	1000	1100	0.3-11
	SKM-3 N-S, E-W, Z	2.0	0.80	1.2	0.8	0.130	31600	30000	0.8-1.4
Semlyachik [8]	VEGIK N-S	1.2	0.4	0.075	5.8	<0.15	5000	5000	0.05-1.0
	VEGIK E-W, Z	1.2	0.4	0.075	5.8	<0.15	3000	3000	0.05-1.0
Severo- Kuril'sk	SKD N-S, E-W	25	0.5	1.2	8.0	0.250	1050	1090	0.2-20
	SKD N-S, E-W	25	0.5	1.2	8.0	0.0625	520	540	0.2-20
	SKD N-S, E-W	25	0.5	1.2	8.0	0.0156	260	270	0.2-20
	SKD Z	25	0.5	1.2	5.0	0.160	1000	1000	0.3-10
	SKD Z	25	0.5	1.2	5.0	0.040	500	500	0.3-10
	SKD Z	25	0.5	1.2	5.0	0.010	250	250	0.3-10
	SKM-3 N-S	0.67	0.40	0.32	1.0	0.006	20000	24200	0.15-0.60
	SKM-3 N-S	0.67	0.40	0.32	1.0	0.0014	10000	13000	0.15-0.60
	SKM-3 N-S	0.67	0.40	0.32	1.0	0.0003	5000	6000	0.15-0.60
	SKM-3 E-W	0.67	0.40	0.32	1.0	0.006	20000	24200	0.15-0.60
	SKM-3 E-W	0.67	0.40	0.32	1.0	0.0016	10000	13000	0.25-0.60
	SKM-3 E-W	0.67	0.40	0.32	1.0	0.0004	5000	6000	0.25-0.60
	SKM-3 Z	0.67	0.40	0.32	1.0	0.008	20000	24200	0.25-0.60
	SKM-3 Z	0.67	0.40	0.32	1.0	0.0021	10000	13000	0.25-0.60
	SKM-3 Z	0.67	0.40	0.32	1.0	0.0005	5000	6000	0.25-0.60
	UBOPE-2 N-S, E-W	3.1	0.45				30	42	2.0-3.2
	UBOPE-2 N-S, E-W	3.4	0.45				33	40	1.0-3.2
	UBOPE-0 E-W	2.0	0.20				1	2.2	1.3-2.1
	SMTR N-S, E-W	5.4	0.40				7	9.4	2.5-5.5
	Wiechert N-S, E-W	2.3	0.13				30	63	1.7-2.7
	Wiechert Z	2.0	0.12				40	62	2.0-2.7

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Seymchan	SKD N-S,E-W,Z	---	--	---	--	---	--	1000	1-17
	SKM-3 N-S,E-W,Z	---	--	---	--	---	--	40000	1.3
Shaartuz	SKD N-S	---	--	---	--	---	--	1600	0.3-20
	SKD E-W	---	--	---	--	---	--	1300	0.2-19.5
	SKD Z	---	--	---	--	---	--	2600	2.6-3.3
	SKM Z	---	--	---	--	---	--	1800	0.1-3
Shemakha	SK Z	---	--	---	--	---	--	500	7.0
	SKh N-S,E-W	---	--	---	--	---	--	23400	0.5-0.6
	SKh Z	---	--	---	--	---	--	27000	0.5-0.6
Shuy	SKM-3 N-S	---	--	---	--	---	--	41200	0.2-1.4
	SKM-3 E-W	---	--	---	--	---	--	43200	0.2-1.4
	SKM-3 Z	---	--	---	--	---	--	42200	0.2-1.4
Simferopol'	SK N-S,E-W	12.5	0.45	1.2	5.0	0.073	1500	1600	0.3-11
	SK Z	13.3	0.47	1.13	4.72	0.180	900	960	0.3-11
	SKD N-S,E-W,Z	25	0.5	1.2	8.0	0.250	1000	1100	0.2-20
	SKh N-S,E-W	1.0	0.70	0.36	3.0	0.100	10000	10200	0.1-0.8
	SKh Z	1.0	0.75	0.18	1.7	0.050	10000	9800	0.1-0.35
	SD-1 N-S	25	1.00	105	0.52	0.230	900	1050	21-49
	SD-1 E-W	25	0.87	70	0.34	0.210	520	700	30-60
Simushir	SK N-S,E-W	12.5	0.45	1.2	5.0	0.042	1200	1250	0.3-11
	SK N-S,E-W	12.5	0.45	1.2	5.0	0.011	600	620	0.3-11
	SK N-S,E-W	12.5	0.45	1.2	5.0	0.001	200	200	0.3-11
	SK Z	12.5	0.45	1.2	5.0	0.339	800	990	5.5-10
	SK Z	12.5	0.45	1.2	5.0	0.191	600	690	4.0-10
	SK Z	12.5	0.45	1.2	5.0	0.021	200	210	0.3-10
	VEGIK N-S,E-W,Z	0.7	0.8	0.4	0.6	0.036	12000	17600	0.40-0.65
	VEGIK N-S,E-W,Z	0.7	0.3	0.4	0.6	0.009	6000	8800	0.40-0.65
	VEGIK N-S,E-W,Z	0.7	0.3	0.4	0.6	0.002	3000	4400	0.40-0.65
	S5S E-W	5.0	0.5	1.0	2.5	0.00018	50	50	0.35-4

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Sochi	SK N-S, E-W	12.5	0.45	1.2	5.0	0.025	1000	1040	0.3-11
	SK Z	14.9	0.498	1.2	5.0	0.469	1000	1040	0.3-11
	SKD N-S, E-W, Z	25	0.5	1.2	8.0	0.250	1000	1060	0.2-20
	SKM-3 N-S, E-W, Z	2.15	0.7	0.6	2.5	0.0065	10000	10000	0.2-1.2
Sredniy Kalar	VEGIK N-S, E-W, Z	--	--	--	--	--	--	~38000	~0.05-0.03
Stepanavan	SKD N-S, E-W	--	--	--	--	--	--	1000	0.2-18
	SKD Z	--	--	--	--	--	--	710	0.2-18
	SKM-3 Z	--	--	--	--	--	--	2000	0.3-0.6
Susuman	SKM-3 N-S, E-W	--	--	--	--	--	--	12000	0.7
	SKM-3 Z	--	--	--	--	--	--	18000	0.7
Sverdlovsk	SG N-S	24.4	1.0	24.4	1.0	0.310	2200	1760	14-24
	SG E-W	23	1.0	23	1.0	0.310	2200	1760	13-23
	SG Z	12	1.0	12	1.0	0.102	3300	2240	5.0-10.5
Talgar	SKD N-S, E-W	20	0.45	0.39	20	0.050	1450	1450	0.1-16
	SKD Z	20	0.45	0.38	20	0.200	1040	1070	0.1-16
	SKD-KPCh Z	20	0.45	0.40	20	0.00045	50	50	0.1-13.5
	SKM-3 N-S, E-W, Z	1.5	0.6	0.17	4.0	0.300	80000	84000	0.1-1.1
Tamdybulak	SKM-3 N-S	--	--	--	--	--	--	20654	0.2-1.4
	SKM-3 E-W	--	--	--	--	--	--	20942	0.2-1.4
	SKM-3 Z	--	--	--	--	--	--	20561	0.2-1.4
	SMTR N-S, E-W	--	--	--	--	--	--	7	2-5
Tashkent	SK N-S, E-W, Z	12.5	0.45	1.2	5.0	0.090	1000	1070	0.3-11
	SKM-3 N-S, E-W	2.0	0.49	1.2	0.59	0.0008	2000	2300	0.96-1.7
	SKM-3 Z	2.0	0.50	1.2	0.60	0.0058	5000	5730	0.95-1.7
	SD-1 N-S, E-W	25	1.0	85	0.5	0.206	700	900	18-55
	SD-1 Z	25	1.0	83.7	0.5	0.192	700	900	18-55
	SMTR N-S, E-W	5.0	0.456				6.9	8.6	2.0-5.0
	ESS-1 N-S	1.4	0.591				2.0	2.07	0.10-1.30
	ESS-1 E-W	1.8	0.591				0.5	2.53	0.10-1.60
	ESS-1 Z	1.0	0.591				1.0	1.05	0.10-0.85

Table 5 (cont.)

Station	Seismograph and Component	T _s (sec)	D _s	T _g (sec)	D _g	σ^2	$\bar{V}$	V _m	T _g (sec)
Tbilisi	SK N-S,E-W	12.5	0.45	1.2	5.0	0.076	1560	1640	0.3-11
	SK Z	12.5	0.68	1.2	5.0	0.384	1370	1520	0.8-9.0
	SG N-S	12.8	1	12.8	1	---	900	600	4.8-10
	SG E-W	12.6	1	12.6	1	---	960	630	4.8-10
	SG Z	12.4	1	12.4	1	---	820	520	4.8-10
Tbilisi II	SKM-3 Z	---	---	---	---	---	---	23000	0.3-0.9
Tiksi	SK N-S,E-W	12.5	0.45	1.2	5.0	0.080	1600	1700	0.3-11
	SK Z	12.5	0.59	1.2	5.0	0.301	1000	1100	5.0-10
Topolovo [8]	VEGIK N-S,E-W,Z	1.2	0.4	0.075	5.8	<0.15	10000	10000	0.05-1.0
Tsebel'da	SKM-3 Z	---	---	---	---	---	---	21000	0.2-0.5
Tupik	SKM-3 N-S,E-W	1.74	0.53	0.37	1.84	0.160	50200	52700	0.25-1.20
	SKM-3 Z	1.74	0.53	0.37	1.84	0.160	44300	46450	0.25-1.20
Tymovskoye	SKD Z	---	---	---	---	---	---	1000	0.1-16
	SKM-3 N-S,E-W	---	---	---	---	---	---	70000	0.5
	SKM-3 Z	---	---	---	---	---	---	21000	0.5-0.6
Tyrgan	SKM-3 N-S,E-W,Z	---	---	---	---	---	---	~29000	~0.3-1.3
Uakit	SKM-3 N-S,E-W,Z	---	---	---	---	---	---	~42000	~0.2-1.2
Uglegorsk	SKD Z	---	---	---	---	---	---	1000	0.1-16
	VEGIK Z	---	---	---	---	---	---	9500	0.7
Urup	VEGIK N-S,E-W	---	---	---	---	---	---	10000	0.1-0.6
	VEGIK Z	---	---	---	---	---	---	20000	0.1-0.6
	S5S N-S,E-W	---	---	---	---	---	---	200	0.1-4.0
Ust'-Eleget	SKD N-S	25	0.61	1.2	8.0	0.224	1230	1230	0.2-16
	SKD E-W	25	0.63	1.2	8.1	0.182	1070	1070	0.2-16
	SKD Z	25	0.68	1.2	8.1	0.232	1200	1220	0.2-16
	SKM-3 N-S	2.0	0.50	0.4	1.5	0.250	41000	43400	0.25-1.3
	SKM-3 E-W	2.0	0.50	0.4	1.5	0.250	39100	41200	0.25-1.3
	SKM-3--KPCh E-W	2.0	0.50	0.4	1.5	0.026	4500	4650	0.25-1.3
	SKM-3 Z	2.0	0.50	0.4	1.5	0.250	43250	45600	0.25-1.3

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_g (sec)
Ust'-Kan	SKD N-S	--	--	--	--	--	--	1200	0.2-18
	SKD E-W	--	--	--	--	--	--	1300	0.2-18
	SKD Z	--	--	--	--	--	--	1000	0.2-18
	SKM-3 N-S	--	--	--	--	--	--	36500	0.2-1.6
	SKM-3 E-W	--	--	--	--	--	--	41700	0.2-1.4
	SKM-3 Z	--	--	--	--	--	--	43100	0.2-1.4
Ust'-Nera	SKM-3 N-S	--	--	--	--	--	--	26000	0.4-1.6
	SKM-3 E-W	--	--	--	--	--	--	26400	0.4-1.6
	SKM-3 Z	--	--	--	--	--	--	27300	0.6-1.5
Ust'-Nyukzha	SKM-3 N-S	--	--	--	--	--	--	27300	0.3-1.1
	SKM-3 E-W	--	--	--	--	--	--	27100	0.3-1.0
	SKM-3 Z	--	--	--	--	--	--	20700	0.3-1.0
Ust'-Omchug	SKM-3 N-S, E-W	--	--	--	--	--	--	18000	0.7
	SKM-3 Z	--	--	--	--	--	--	20000	0.7
Uzhgorod	SKD N-S, E-W, Z	25	0.5	1.2	8	0.250	1000	1030	0.2-20
	SKM-3 N-S, E-W, Z	1.4	0.7	0.4	2.0	0.180	40000	42000	0.2-0.9
	SMR-2 N-S, E-W	5.0	0.456				7	8.5	1.5-5.0
Vannovskaya	VEGIK N-S	--	--	--	--	--	--	19000	0.1-1.0
	VEGIK E-W	--	--	--	--	--	--	18500	0.1-1.0
	VEGIK Z	--	--	--	--	--	--	20000	0.1-1.0
Vardenis	SKM-3 N-S, E-W	--	--	--	--	--	--	9200	0.2-0.8
	SKM-3 Z	--	--	--	--	--	--	10250	0.2-0.8
Verkh-Baza	SKM-3 N-S	--	--	--	--	--	--	39300	0.2-1.4
	SKM-3 E-W	--	--	--	--	--	--	45600	0.2-1.4
	SKM-3 Z	--	--	--	--	--	--	45900	0.2-1.4
Verkhne Kamchatsk [8]	VEGIK N-S, E-W, Z	1.2	0.4	0.075	5.8	<0.15	8000	8000	0.05-1.0

Table 5 (cont.)

Station	Seismograph and Component	T _s (sec)	D _s	T _g (sec)	D _g	σ^2	$\bar{V}$	V _m	T _m (sec)
Vladivostok	SKM-3 Z	1.22	0.50	0.59	0.5	0.034	24400	27260	0.5-0.8
	SK N-S	12.5	0.45	1.2	5.0	0.098	1640	1770	0.3-11
	SK E-W	12.5	0.45	1.2	5.0	0.094	1680	1800	0.3-11
	SK Z	12.5	0.50	1.2	5.0	0.306	980	1160	5.0-10
Yakutsk	SK N-S, E-W	12.5	0.45	1.2	5.0	0.100	1840	1980	0.3-11
	SK Z	12.5	0.60	1.2	5.0	0.320	830	910	0.6-10
	SKM-3 N-S	1.5	0.6	0.8	2.68	0.236	31000	38000	0.7-1.4
	SKM-3 E-W	1.5	0.6	0.8	1.90	0.218	36000	43000	0.7-1.4
Yalta	SKh N-S, E-W, Z	--	--	--	--	--	--	22000	0.2-0.5
	SMR-2 N-S, E-W	--	--	--	--	--	--	7	2-5
Yuzhno- Kuril'sk	VEGIK Z	--	--	--	--	--	--	10000	0.1-0.5
	VEGIK-KPCh N-S, E-W	--	--	--	--	--	--	300	0.1-1.7
Yuzhno- Sakhalinsk	SK N-S	12.3	0.45	1.2	5.0	0.0004	50	50	0.3-10.5
	SK E-W	12.8	0.45	1.2	5.0	0.004	150	150	0.3-10.5
	SK Z	12.5	0.45	1.2	5.0	0.023	250	250	0.3-10.5
	SKD N-S, E-W, Z	25	0.5	1.2	8.0	0.250	1000	1040	0.2-20
	SKD N-S, E-W, Z	25	0.5	1.2	8.0	0.062	500	500	0.2-20
	SKM-3 N-S, E-W	1.26	0.49	0.5	0.6	0.038	30000	32000	0.45-0.75
	SKM-3 N-S, E-W	1.26	0.49	0.5	0.6	0.0096	15000	16200	0.45-0.75
	SKM-3 Z	1.26	0.49	0.5	0.6	0.019	30000	32000	0.45-0.75
	SKM-3 Z	1.26	0.49	0.5	0.6	0.0047	15000	16200	0.45-0.75
	P-E N-S	28.0	1.6	92	0.856	0.026	2000	1950	12-40
	P-E E-W	25.6	1.5	92	0.856	0.025	2000	1940	12-38
	P-E Z	29.0	1.7	96.8	0.900	0.033	2000	1920	12-44
	P-E N-S	18.9	1.04	90	0.70	0.026	2060	2040	12-30
	P-E E-W	23.2	1.5	94	0.85	0.026	1910	1860	10-38
	P-E Z	28.0	1.62	89	0.70	0.032	1800	1780	13-55

Table 5 (cont.)

Station	Seismograph and Component	T_s (sec)	D_s	T_g (sec)	D_g	σ^2	$\bar{V}$	V_m	T_m (sec)
Yuzhno- Sakhalinsk (cont.)	UBOPE-2 N-S,E-W	3.3	0.46				32	39	1.5-3.2
	UBOPE-2 N-S,E-W	3.0	0.42				15	19.5	1.6-2.8
	Wiechert N-S,E-W	6.0	0.47				70	85	2.5-6.0
	Wiechert Z	3.8	0.39				40	55	2.2-3.8
	SMTR N-S,E-W	6.0	0.38				7	9.8	3.5-6
Zakamensk	SKD N-S,E-W,Z	25	0.5	1.2	8.0	0.250	1030	1100	0.2-20
	SKM-3 N-S,E-W,Z	1.73	0.58	0.37	1.84	0.160	48000	50400	0.2-1.3
Zhiloy ostrov	SKh N-S,E-W	--	--	--	--	--	--	5300	0.3
	SKh Z	--	--	--	--	--	--	9220	0.2
Zugdidi	SKh Z	--	--	--	--	--	--	3135	0.2

III. MAGNIFICATION CURVES

Figures 12-149 show the magnification curves of seismographs at fifty-four base and seventy-five regional and expeditionary stations (listed in alphabetical order), including a single mean curve for each of the three-component systems at the sixteen regional and expeditionary stations in Baykal. The magnification curves of VEGIK seismographs at the twelve expeditionary stations in Kamchatka were reconstructed from a small figure in [8] and the frequency-response curve for a VEGIK system at the Severo-Kuril'sk station in 1969 [2] having the same instrumental constants as the VEGIK seismographs at the twelve Kamchatka stations. The approximate magnification curves of seismographs at forty-six regional and expeditionary stations were drawn on the basis of constants (maximum gain V_m and period range T_m) given in Table 5 and the general shape of the magnification curves of such seismographs. No attempt was made to construct the magnification curves of seismographs at the remaining thirty-nine regional and expeditionary stations for the following reasons: nonstandard behavior of the curves as a result of sharp peaking; generally unpredictable behavior of the frequency response curves of the older VEGIK and SKh instruments; insufficient or erroneous data on V_m , T_m , or both; and others. The magnification curves of instruments at the base stations refer to 1970; those of regional and expeditionary stations usually date to 1969.

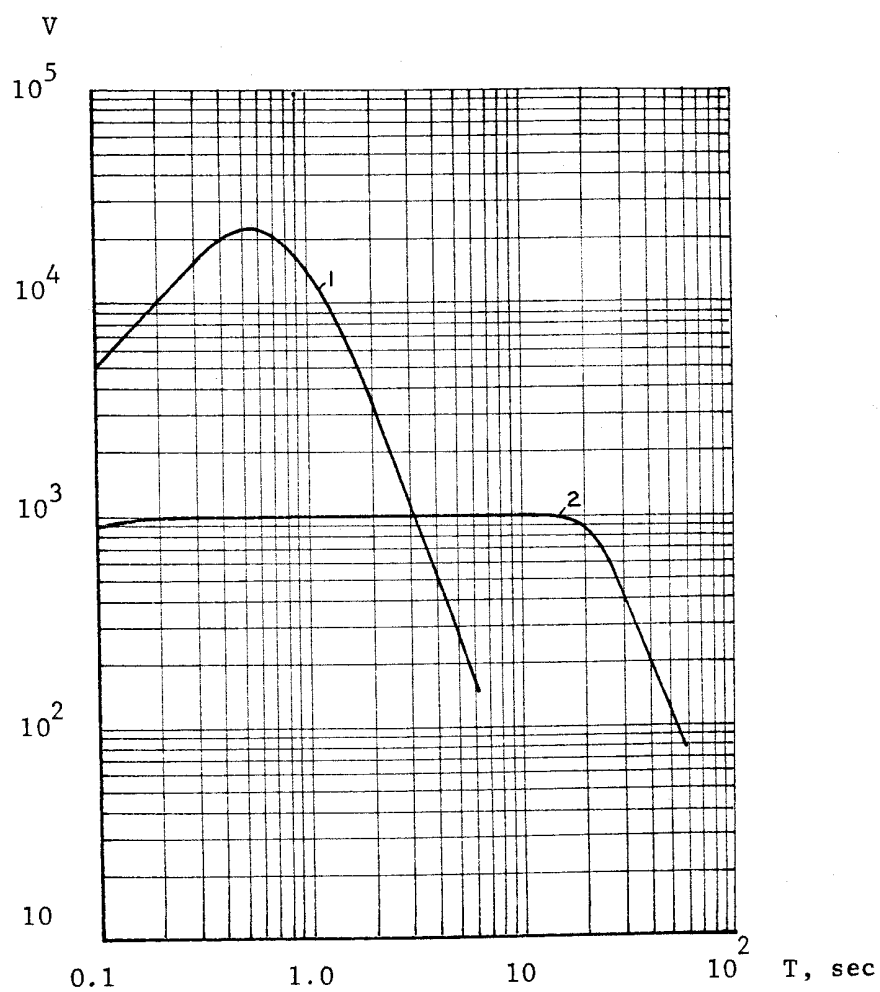


Fig. 12 -- Approximate magnification curves of seismographs at the Abastumani station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (Z)
- 2 -- SKD (Z)

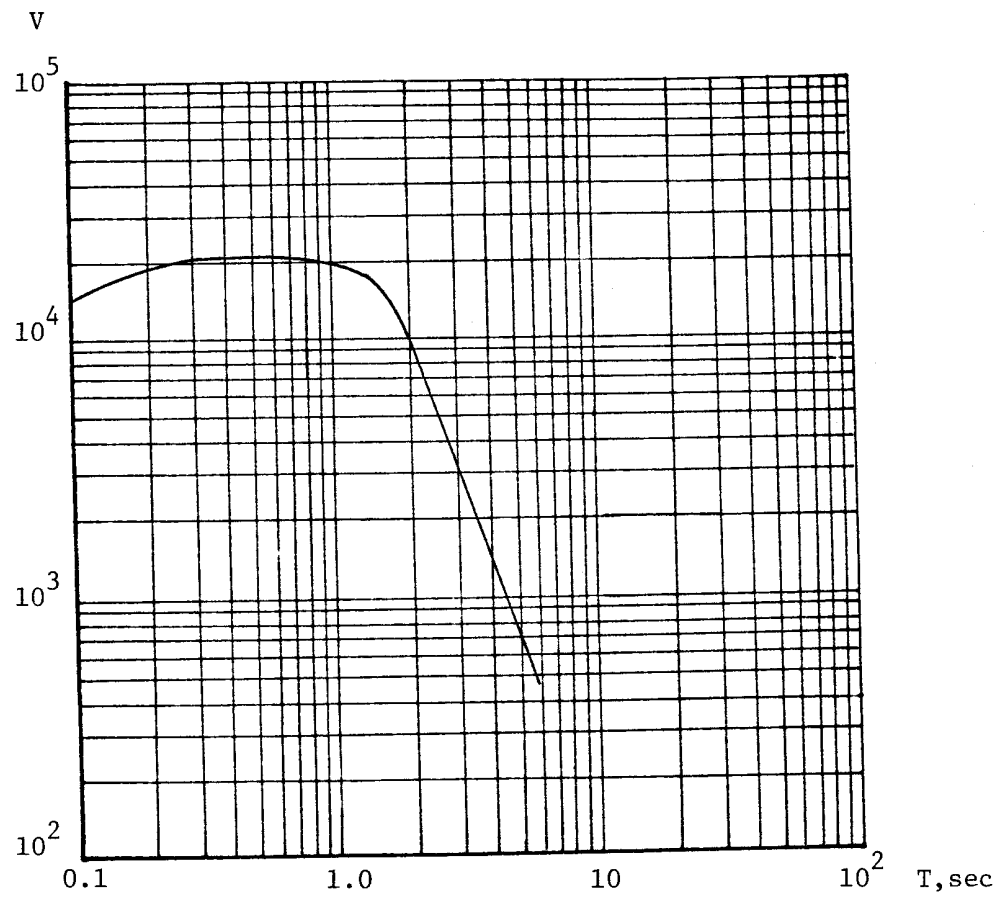


Fig. 13 -- Approximate magnification curve of seismographs at the Agalyk station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (N-S, E-W, Z)

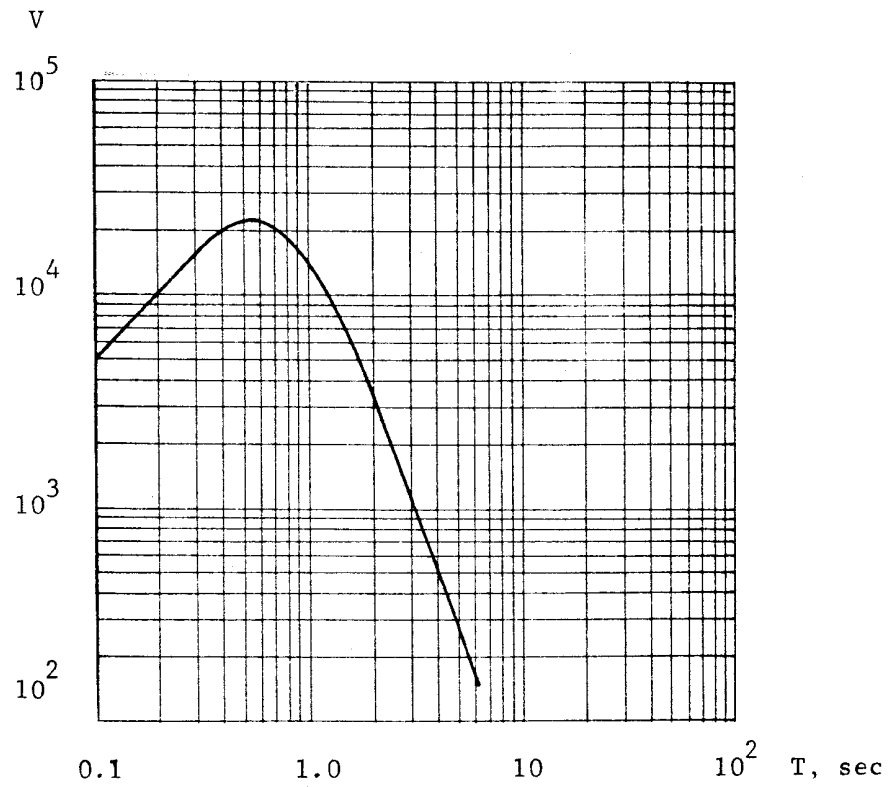


Fig. 14 -- Approximate magnification curves of seismographs at the Akhalkalaki station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (Z)

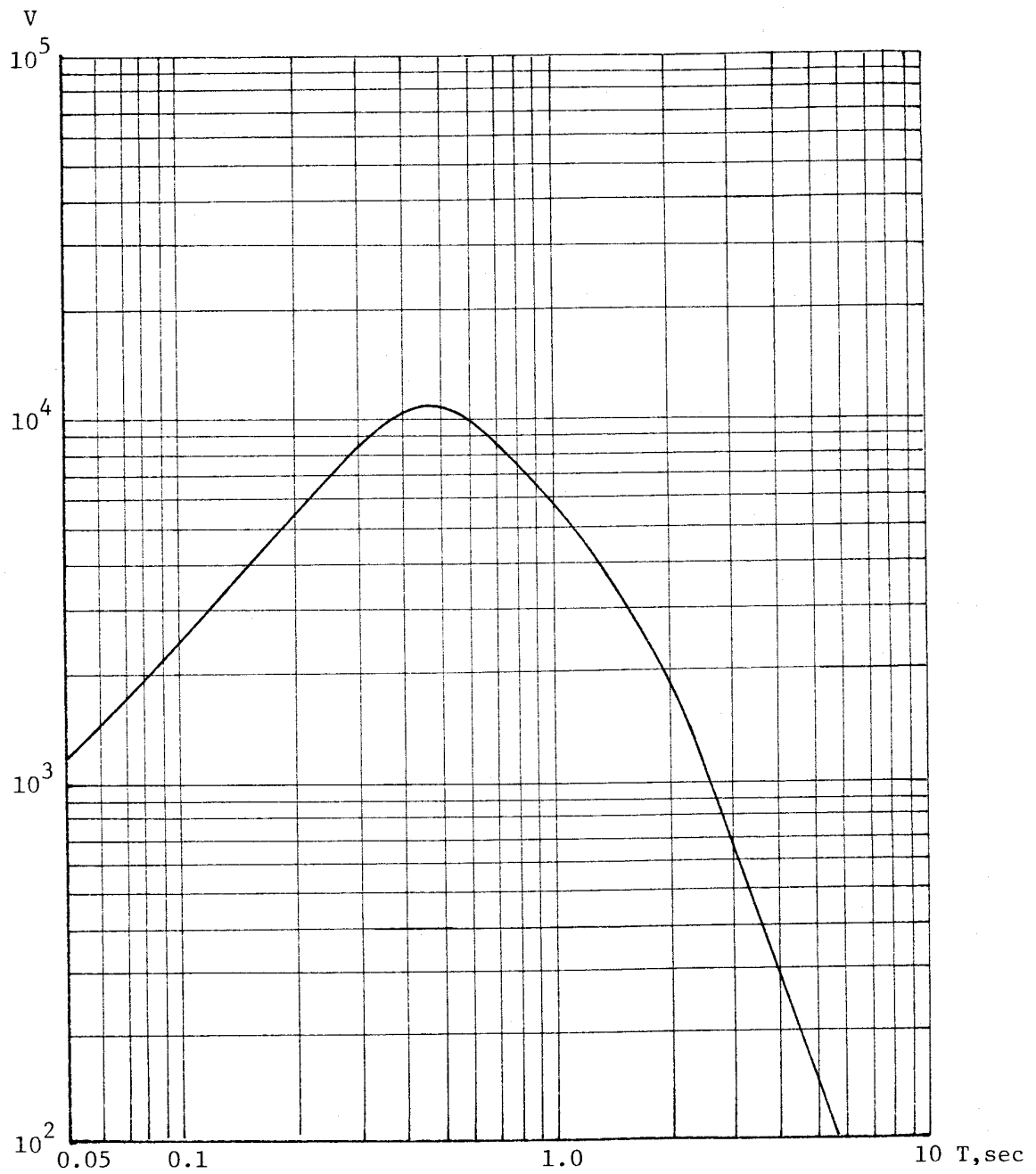


Fig. 15 -- Mean magnification curve of the three-component SKM-3 system at the Alla station in 1969 [5].

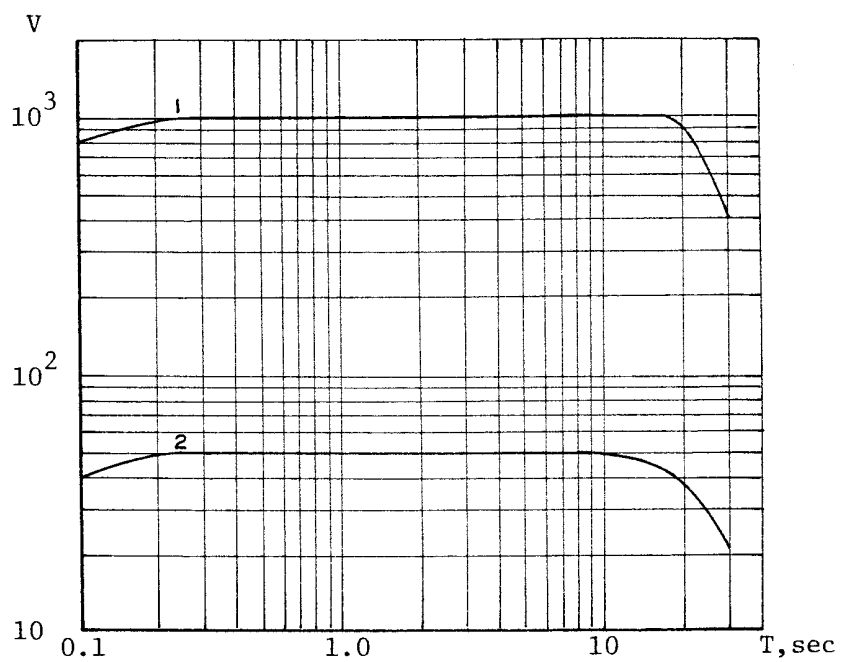


Fig. 16 -- Magnification curves of SKD and SKD-KPCh seismographs at the Alma-Ata station in 1972 [6]

- 1 -- SKD (N-S, E-W, Z)
- 2 -- SKD-KPCh (N-S, E-W, Z)

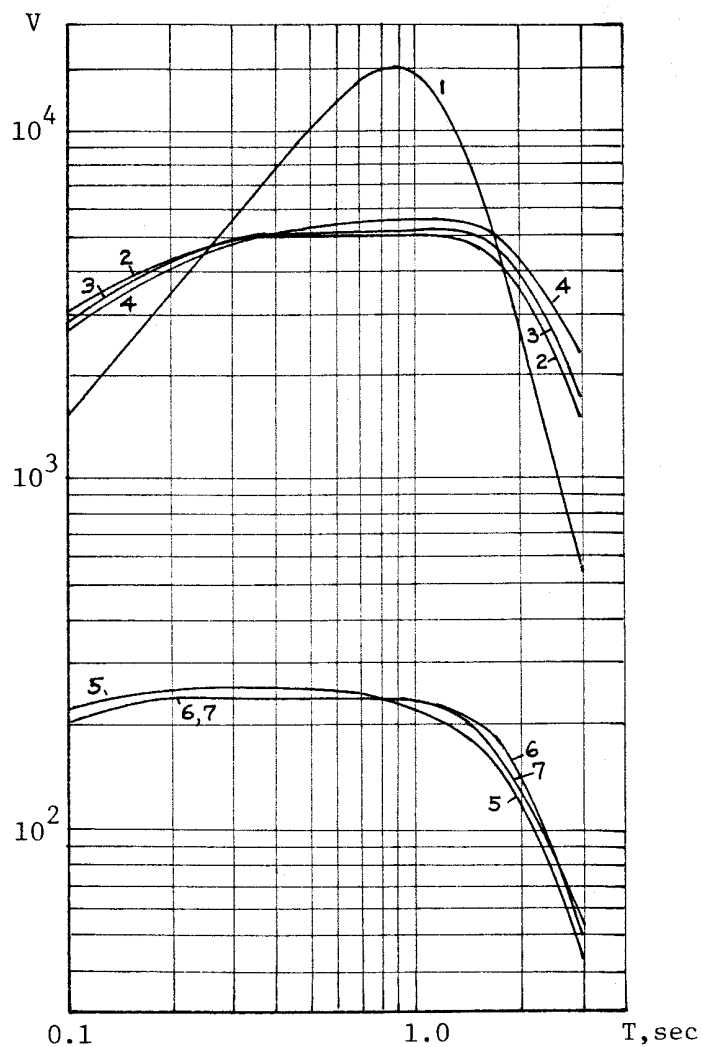


Fig. 17 -- Magnification curves of SKM-3 and SKM-3--KPCh seismographs at the Alma-Ata station in 1972 [6]

- 1 -- SKM-3 (Z)
- 2 -- SKM-3 (E-W)
- 3 -- SKM-3 (N-S)
- 4 -- SKM-3 (Z)
- 5 -- SKM-3--KPCh (Z)
- 6 -- SKM-3--KPCh (E-W)
- 7 -- SKM-3--KPCh (N-S)

NOTE: Magnification curves are not available for the SKM-3 (Z) seismograph equipped with an N-002 hot-pen recorder and operated at three different gains (see Table 5).

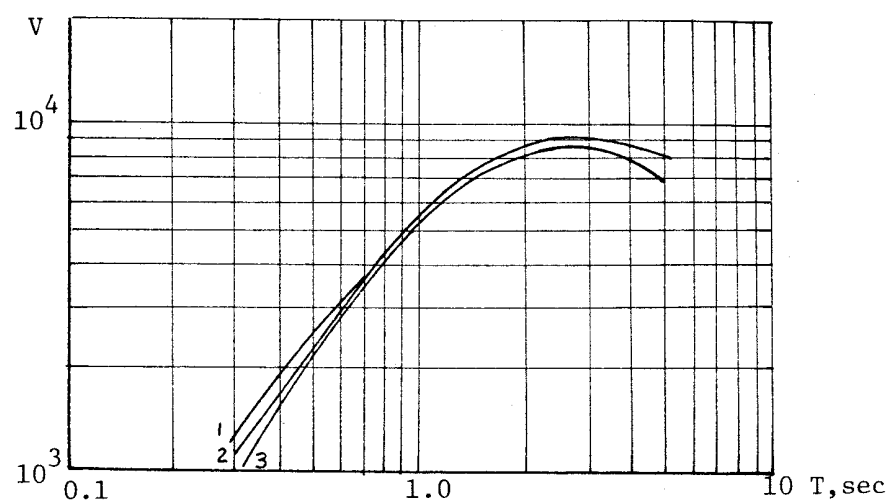


Fig. 18 -- Magnification curves of the seismograph system consisting of S5S seismometers, UPN-3 amplifiers, and N-002 hot-pen recorder at the Alma-Ata station in 1972 [6]

- 1 -- E-W
- 2 -- Z
- 3 -- N-S

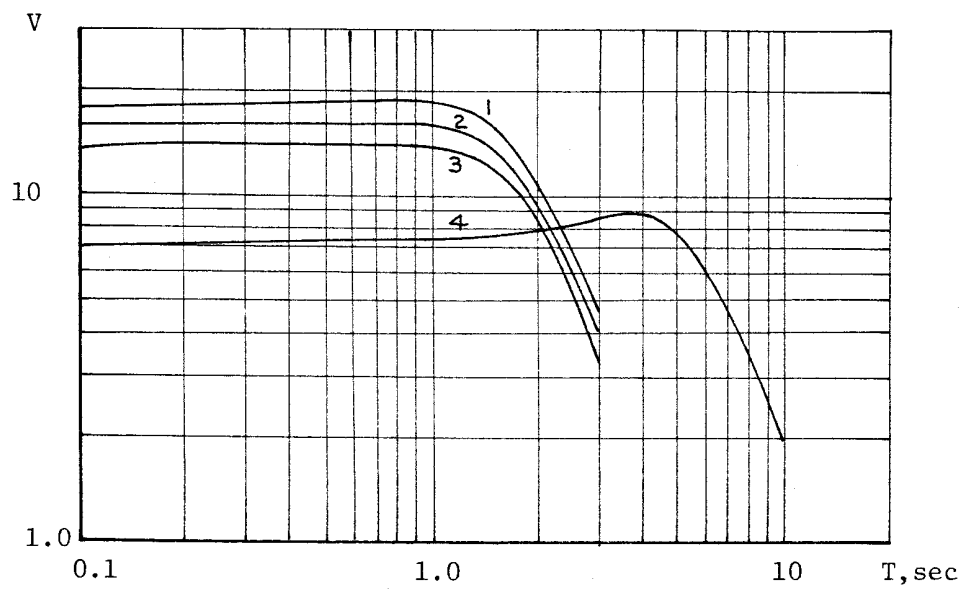


Fig. 19 -- Magnification curves of VBP-3 and SMTR strong-motion systems at the Alma-Ata station in 1972 [6]

- 1 -- VBP-3 (N-S)
- 2 -- VBP-3 (E-W)
- 3 -- VBP-3 (Z)
- 4 -- SMTR (N-S, E-W)

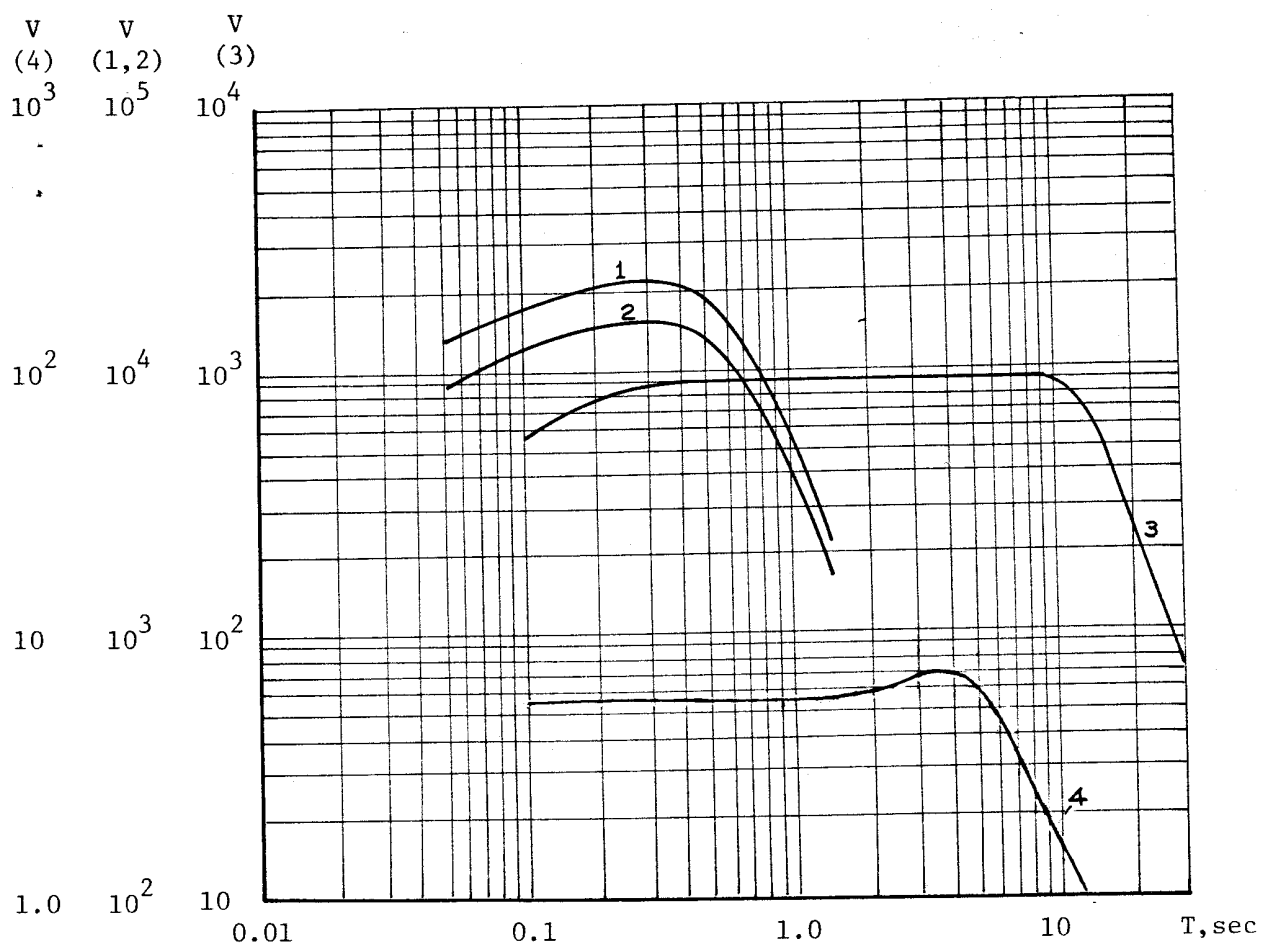


Fig. 20 -- Magnification curves of seismographs at the Alushta station in 1969 plotted on the basis of instrumental constants listed in Table 5 and the magnification curves given in [9]

- 1 -- SKh (N-S, E-W)
- 2 -- SKh (Z)
- (Curves 1 and 2 may be identical)
- 3 -- SK (Z)
- 4 -- SMR-2 (N-S, E-W)

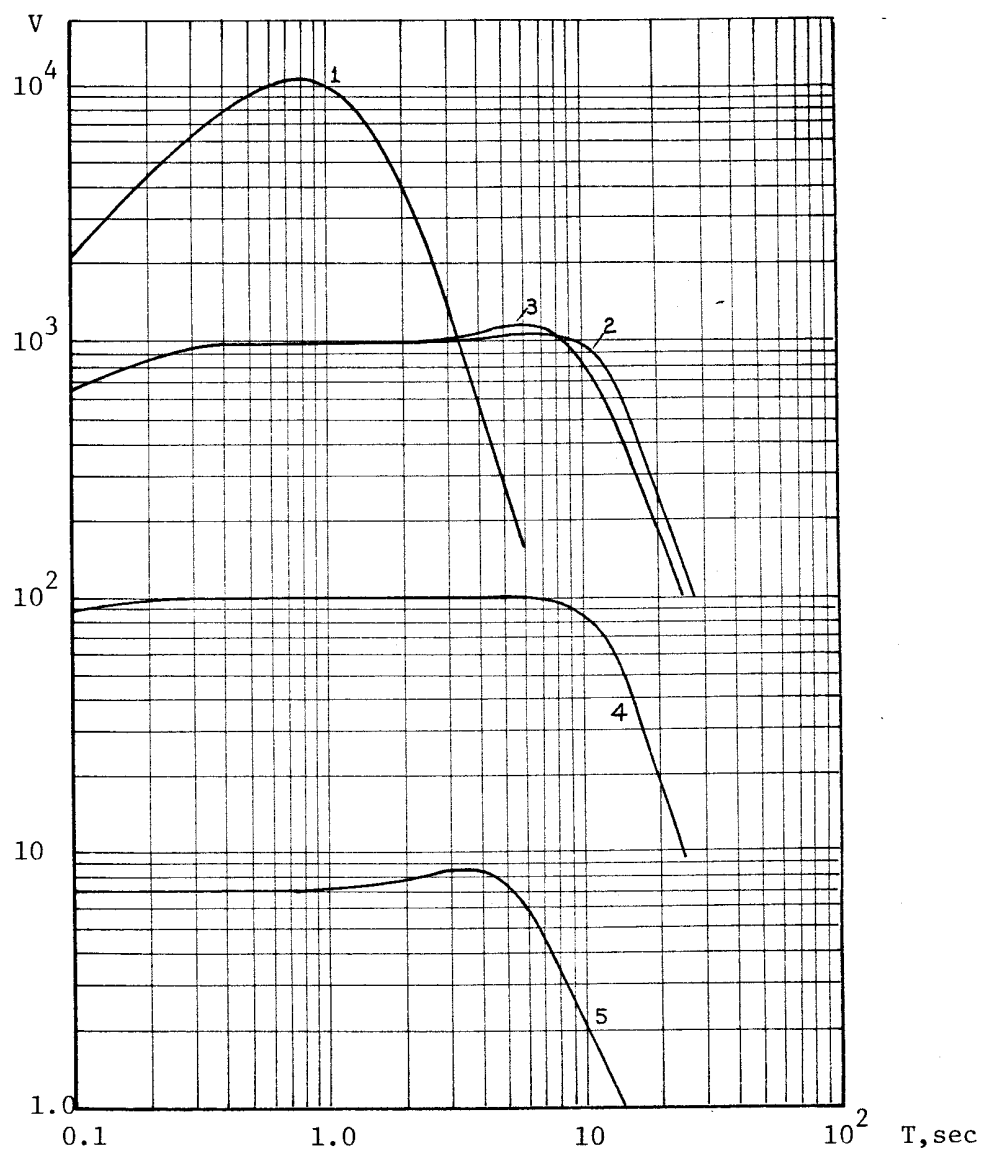


Fig. 21 -- Magnification curves of seismographs at the Andizhan station in 1970 [3]

- 1 -- SKM-3 (N-S,E-W,Z)
- 2 -- SK (N-S,E-W)
- 3 -- SK (Z)
- 4 -- SK-KPCh (N-S,E-W,Z)
- 5 -- SMTR (N-S,E-W)

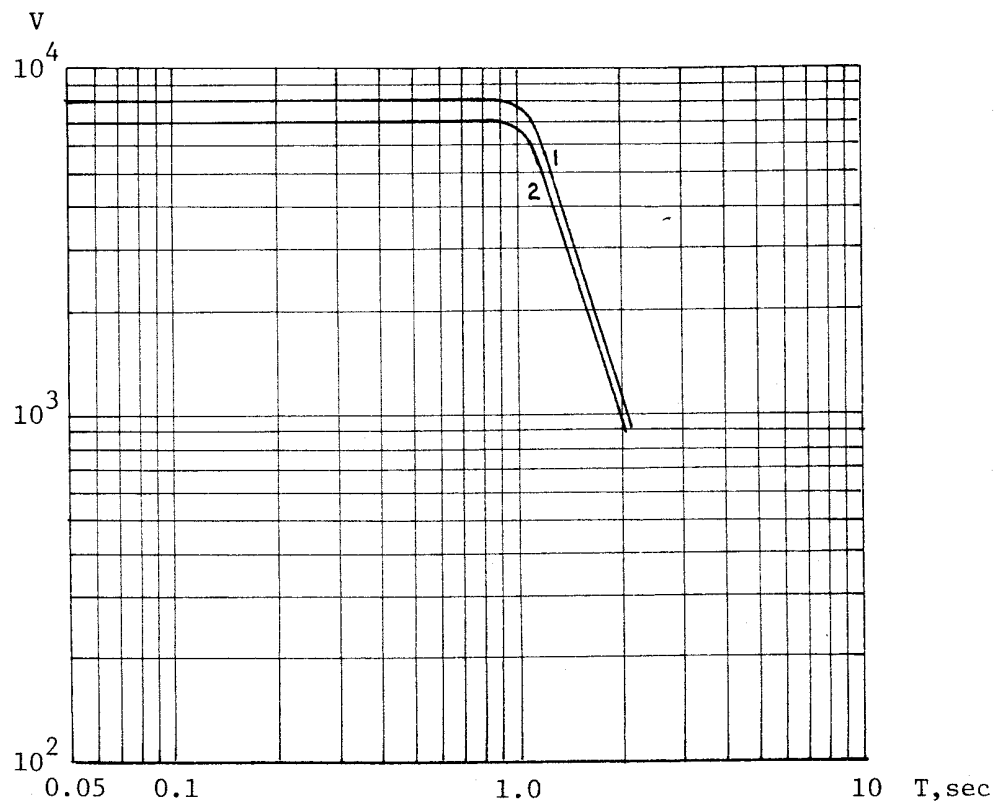


Fig. 22 -- Magnification curves of seismographs at the Apakhonchich station in 1969 [8]

- 1 -- VEGIK (Z)
- 2 -- VEGIK (N-S, E-W)

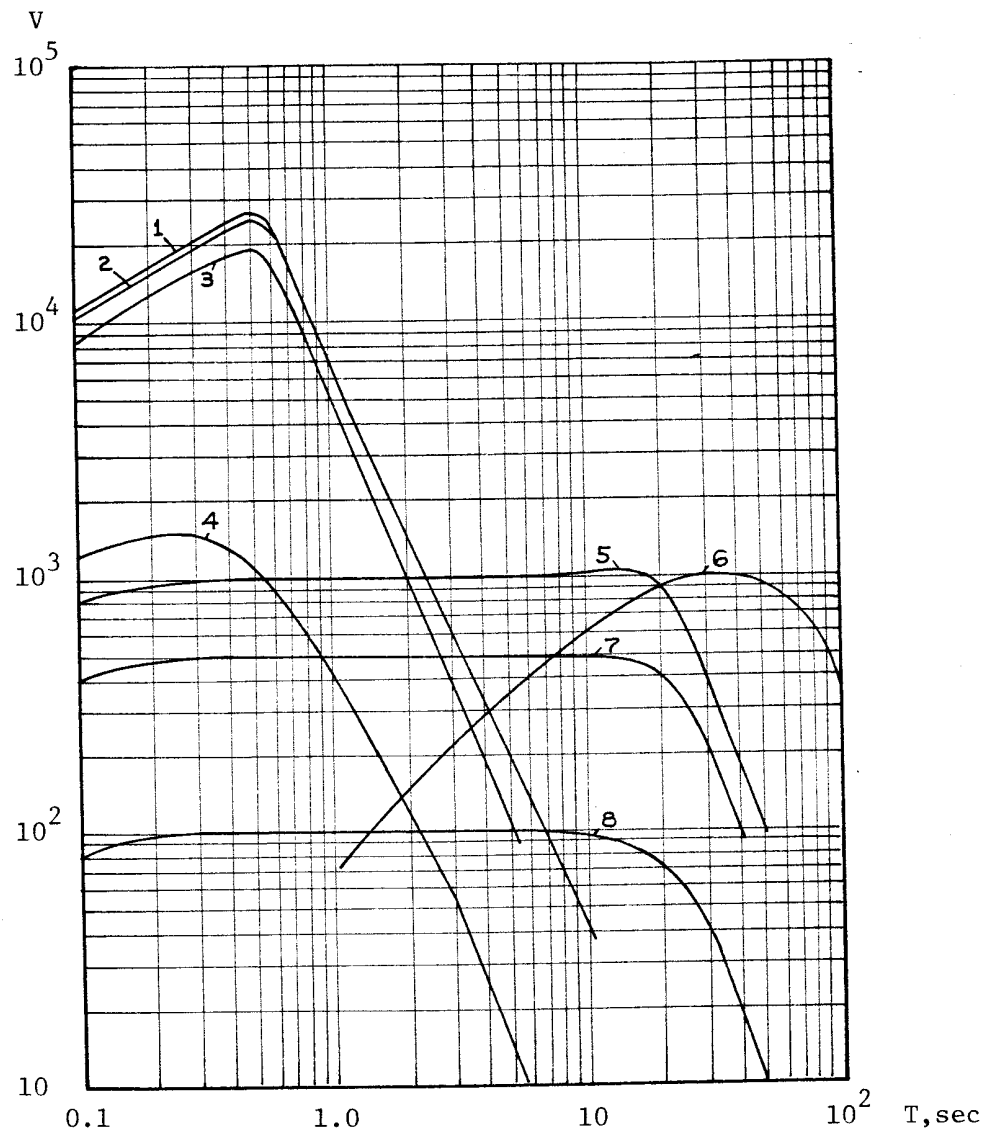


Fig. 23 -- Magnification curves of seismographs at the Apatity station in 1970 [3]

- 1 -- SKh (Z)
- 2 -- SKh (E-W)
- 3 -- SKh (N-S)
- 4 -- SKh-KPCh (Z)
- 5 -- SKD (N-S, E-W, Z)
- 6 -- SD-1 (N-S, E-W, Z)
- 7 -- SKD (N-S, E-W, Z)
- 8 -- SKD-KPCh (Z)

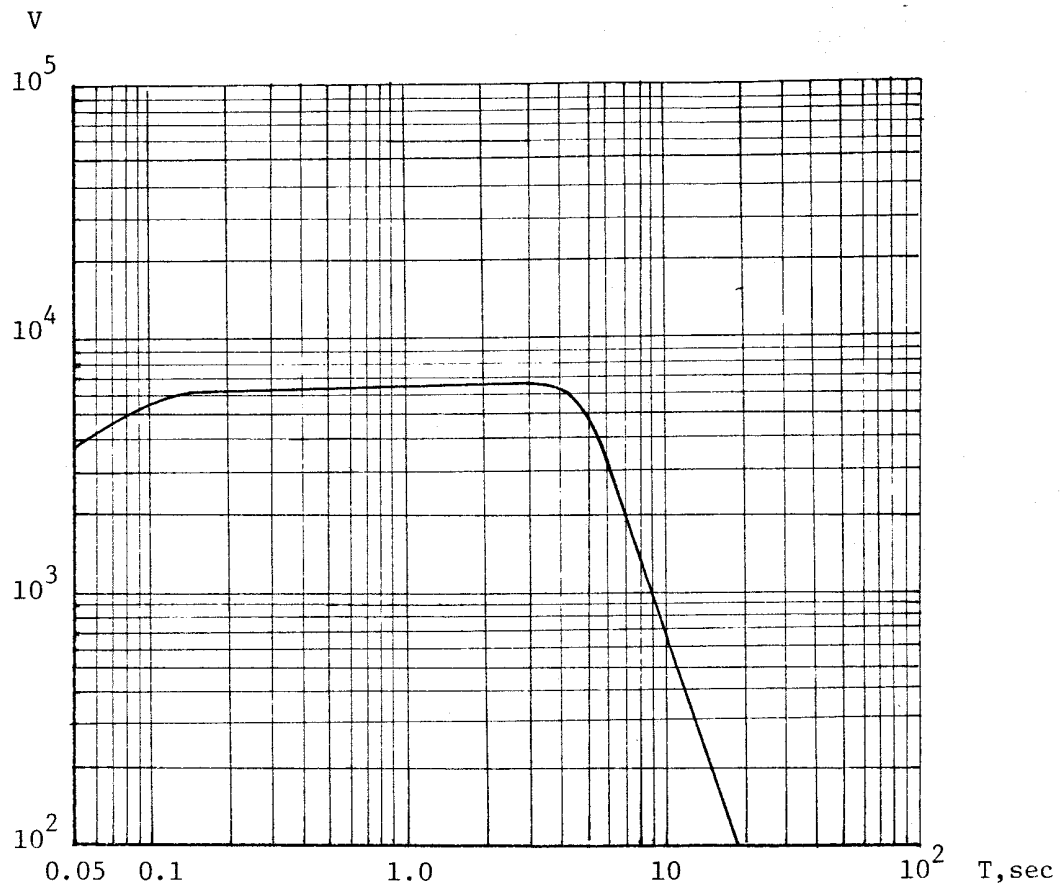


Fig. 24 -- Mean magnification curve of the three-component SKM-3 system at the Arshan station in 1968 [4]

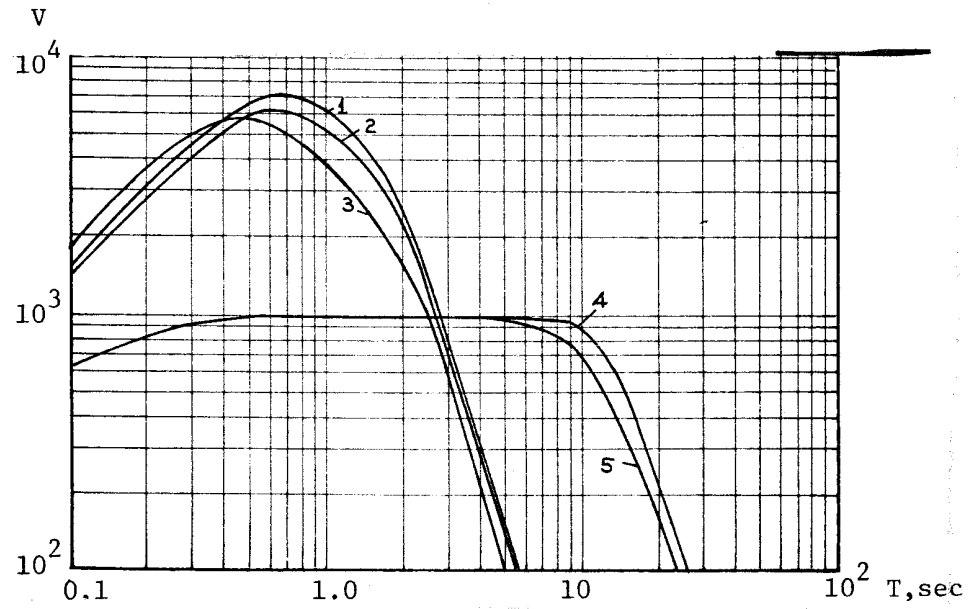


Fig. 25 -- Magnification curves of seismographs at the Ashkhabad station in 1970 [3]

- 1 -- SKM-3 (N-S)
- 2 -- SKM-3 (Z)
- 3 -- SKM-3 (E-W)
- 4 -- SK (N-S, E-W)
- 5 -- SK (Z)

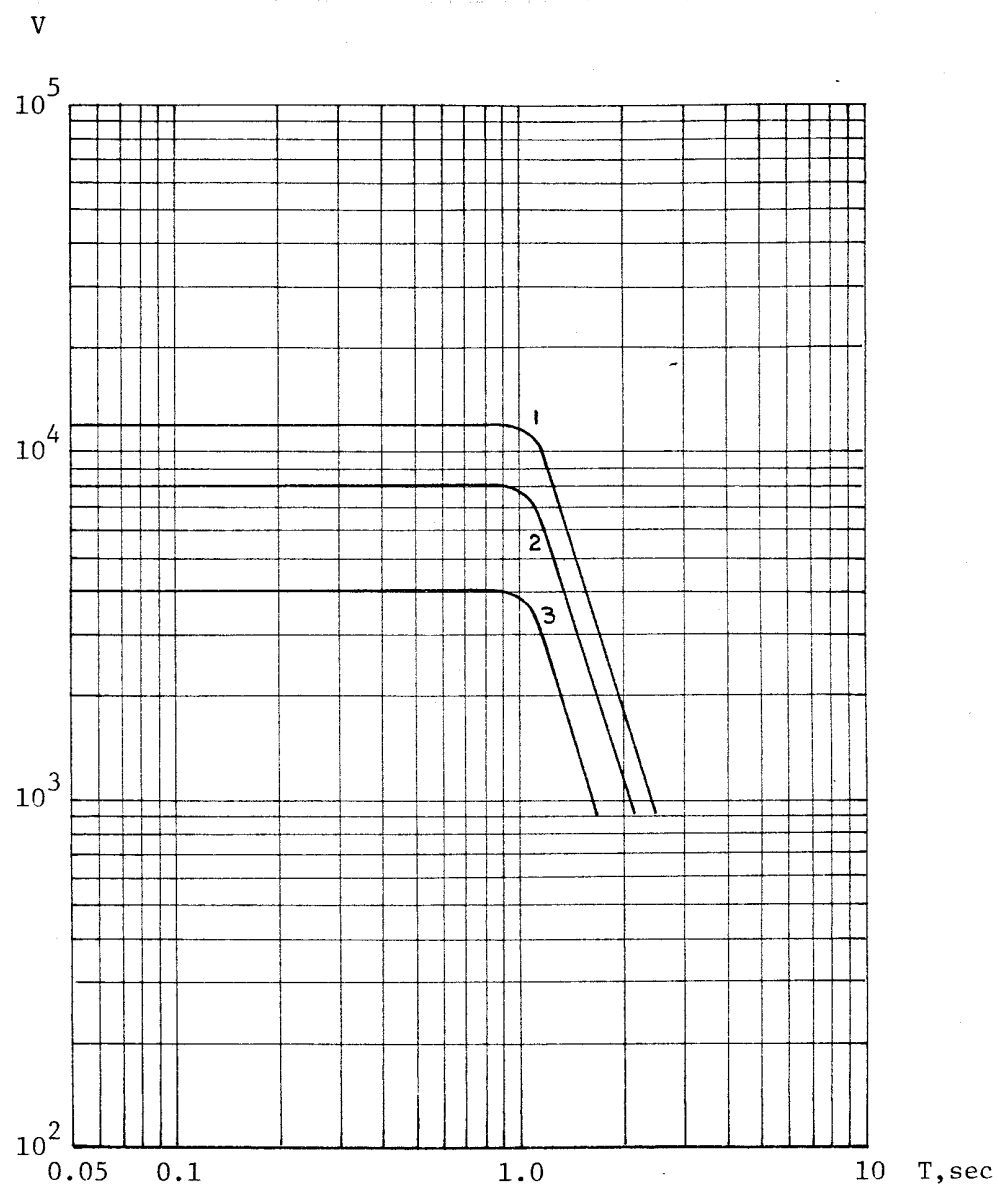


Fig. 26 -- Magnification curves of seismographs at the Avacha station in 1969 [8]

- 1 -- VEGIK (E-W)
- 2 -- VEGIK (N-S)
- 3 -- VEGIK (Z)

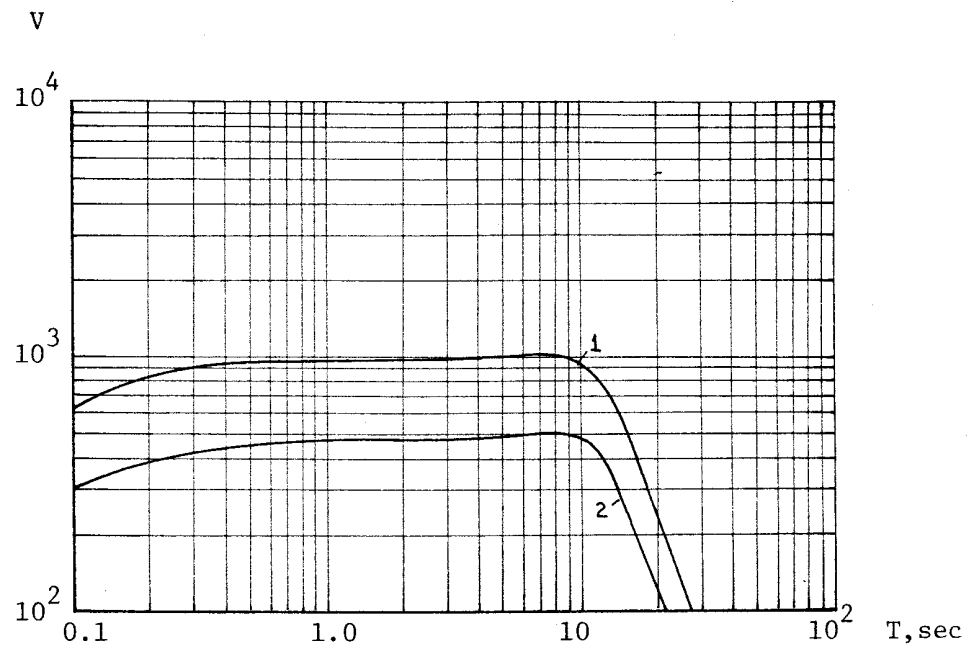


Fig. 27 -- Magnification curves of seismographs at the Baku station in 1970 [3]

- 1 -- SK (N-S, E-W)
- 2 -- SK (Z)

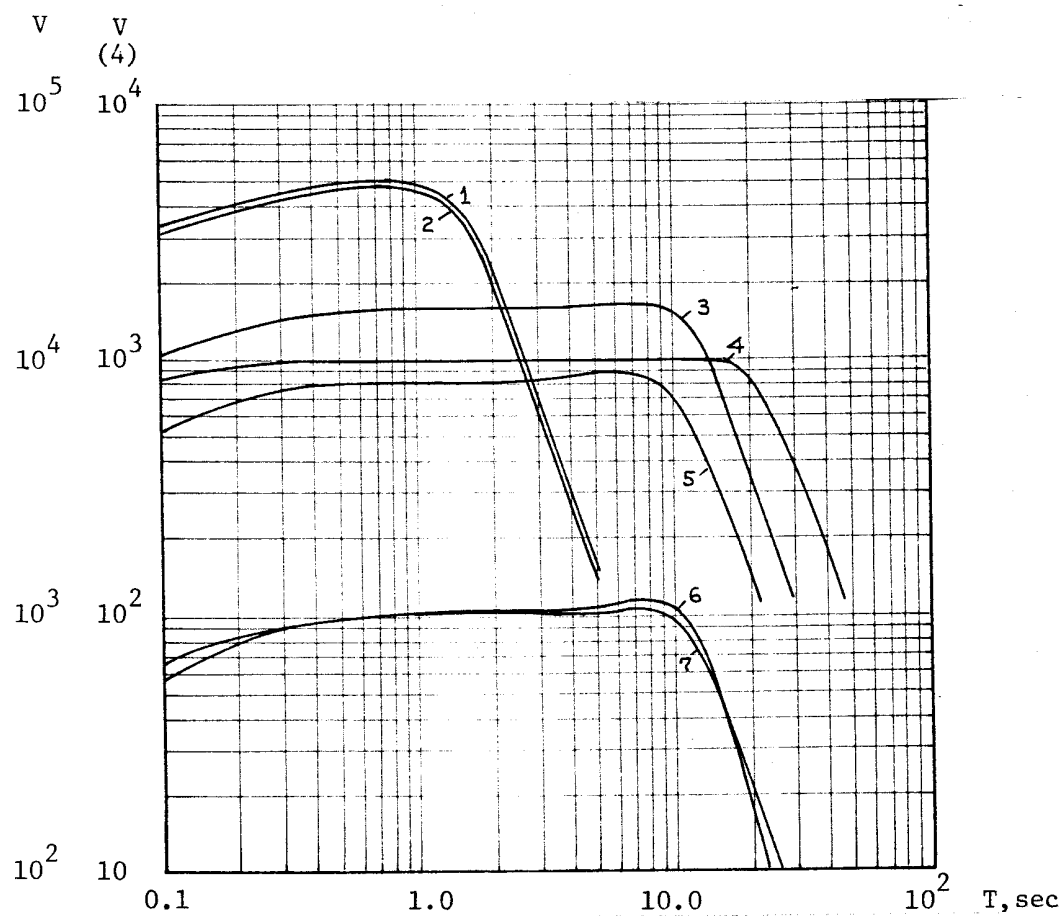


Fig. 28 -- Magnification curves of seismographs at the Bakuriani station in 1970 [3]

- 1 -- SKM-3 (N-S)
- 2 -- SKM-3 (E-W, Z)
- 3 -- SK (N-S, E-W)
- 4 -- SKD (N-S, E-W, Z)
- 5 -- SK (Z)
- 6 -- SK-KPCh (Z)
- 7 -- SK-KPCh (N-S, E-W)

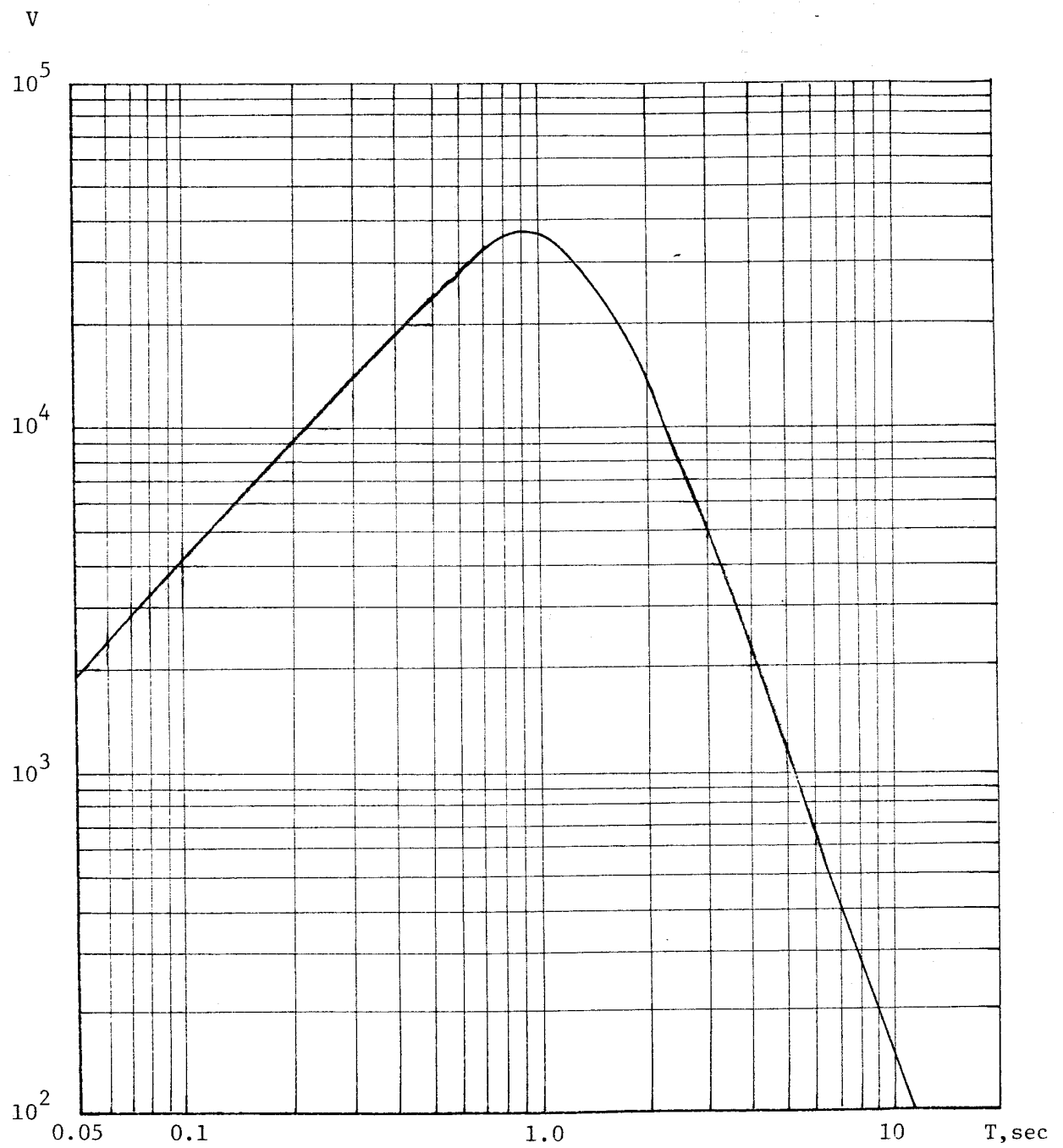


Fig. 29 -- Mean magnification curve of the three-component SKM system at the Barguzin station in 1969 [5]

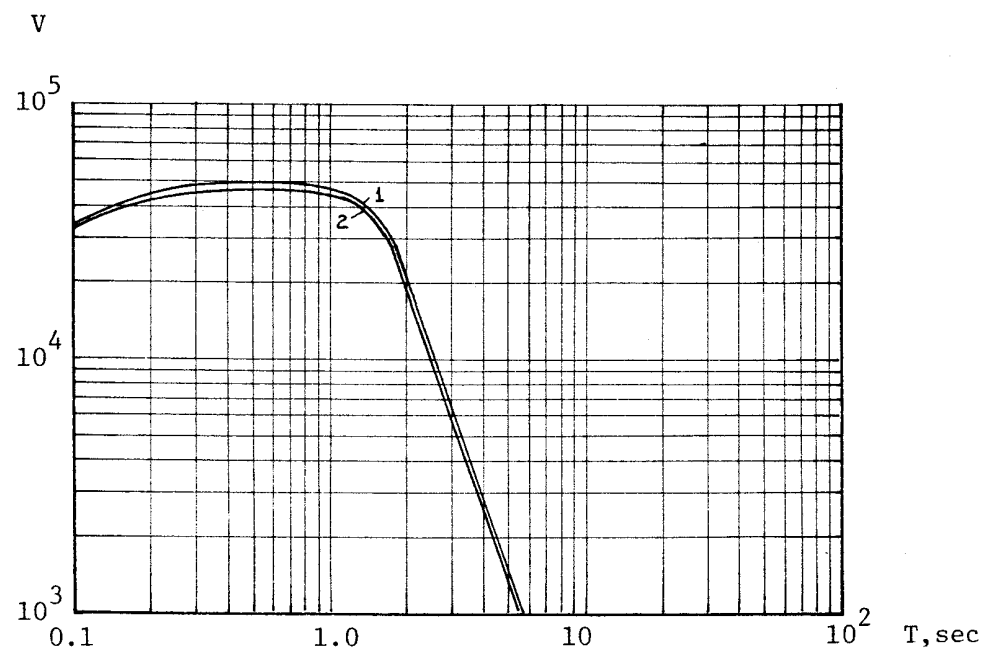


Fig. 30 -- Magnification curves of seismographs at the Bodaybo station in 1970 [3]

- 1 -- SKM-3 (Z)
- 2 -- SKM-3 (N-S, E-W)

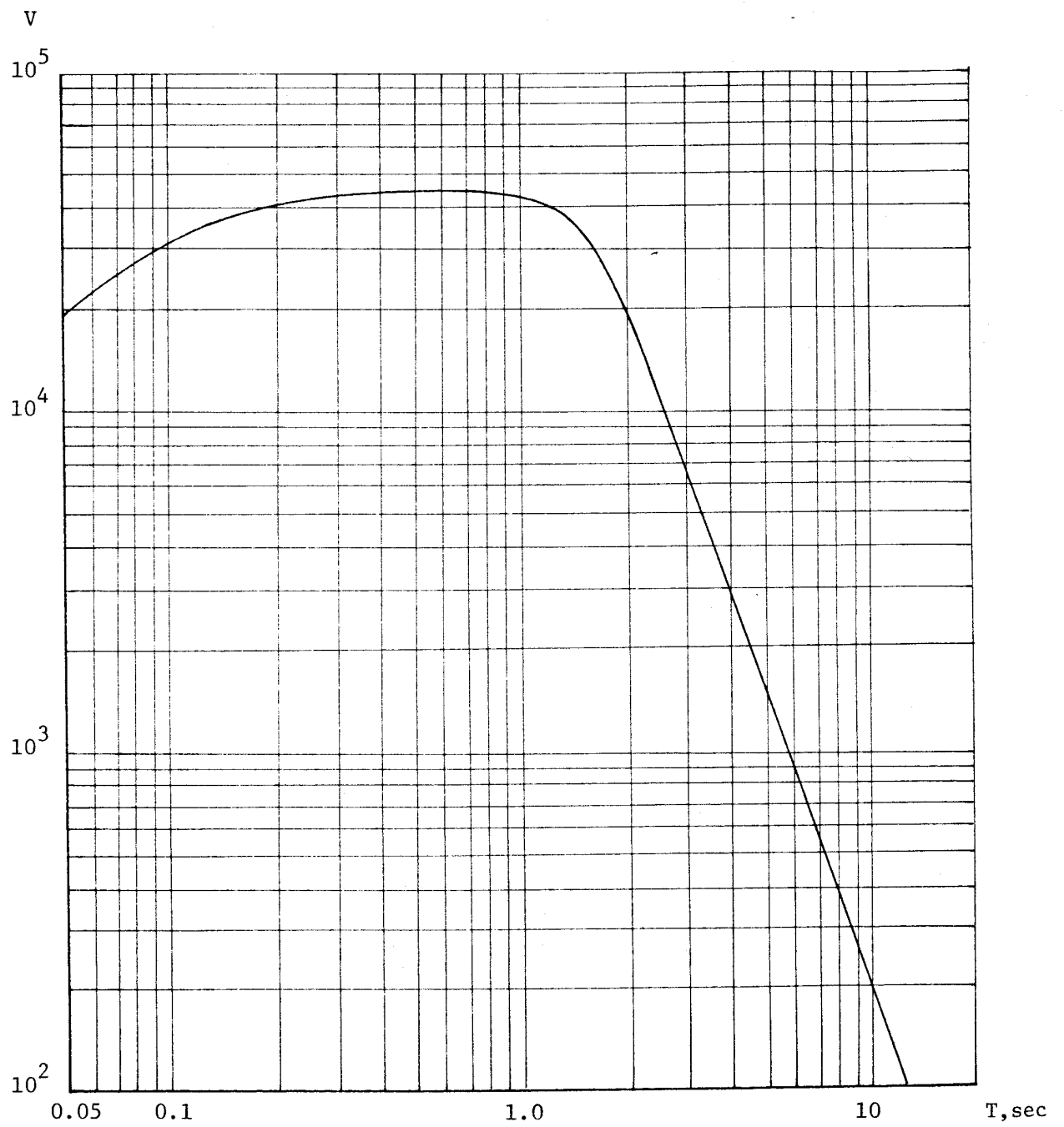


Fig. 31 -- Mean magnification curve for the three-component SKM-3 system at the Bodon station in 1969 [5]

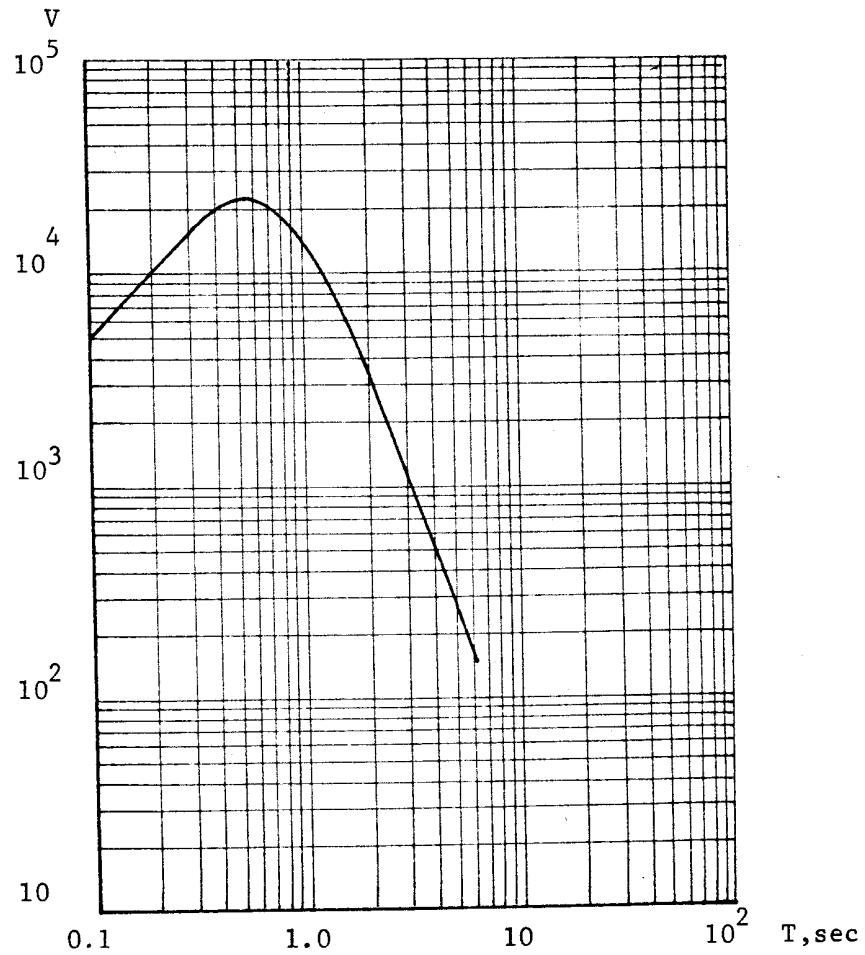


Fig. 32 -- Approximate magnification curve of seismographs at the Bogdanovka station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (Z)

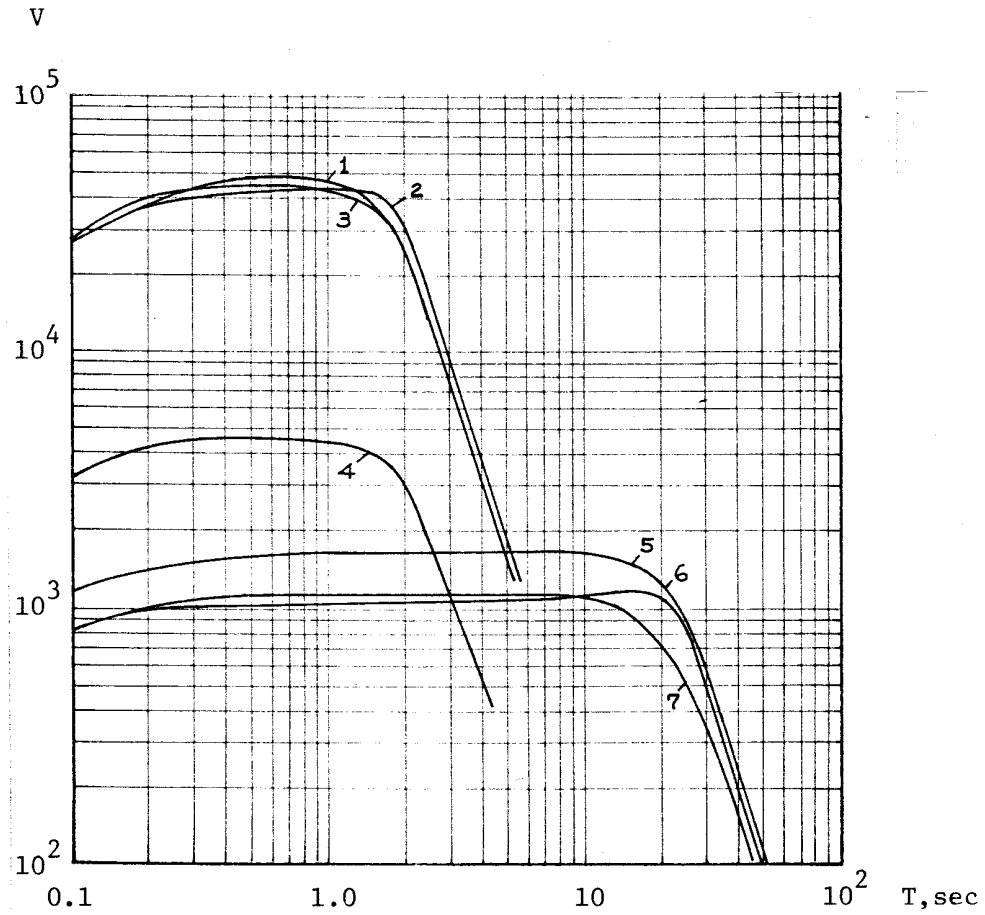


Fig. 33 -- Magnification curves of seismographs at the Chagan-Uzun station in 1970 [3]

- 1 -- SKM-3 (N-S)
- 2 -- SKM-3 (E-W)
- 3 -- SKM-3 (Z)
- 4 -- SKM-3--KPCh (E-W)
- 5 -- SKD (Z)
- 6 -- SKD (N-S)
- 7 -- SKD (E-W)

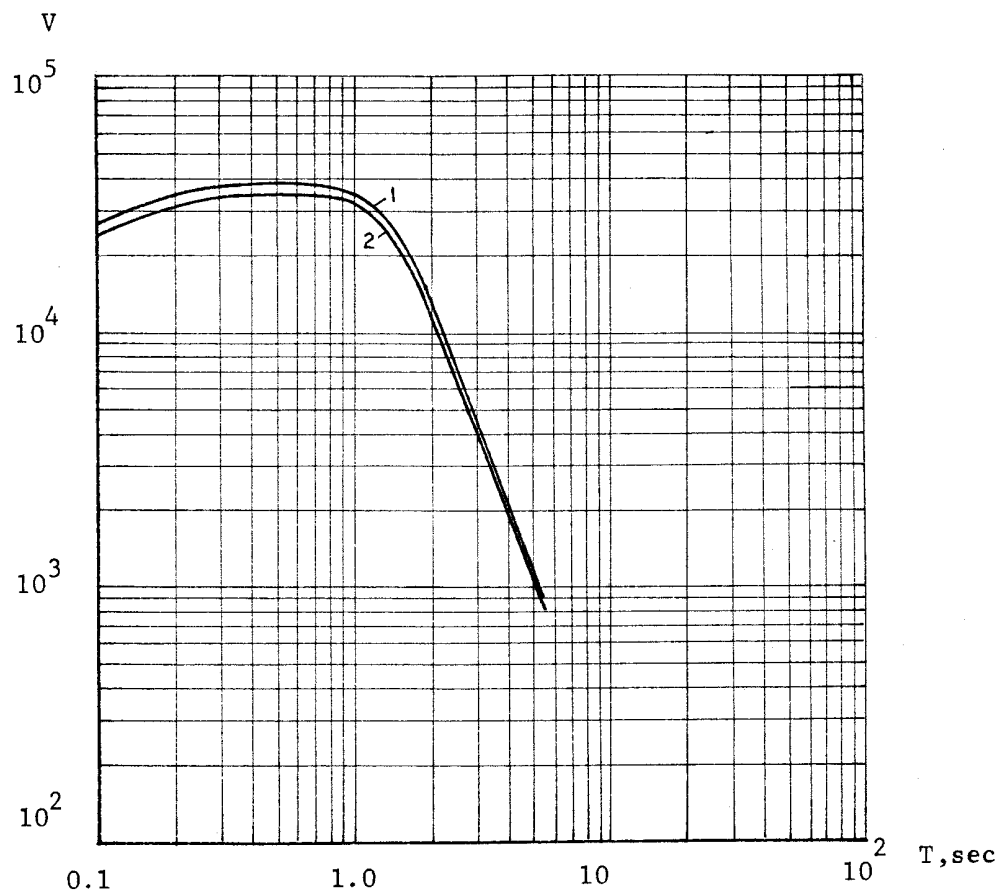


Fig. 34 -- Approximate magnification curves of seismographs at the Chagda station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (N-S,E-W)
- 2 -- SKM-3 (Z)

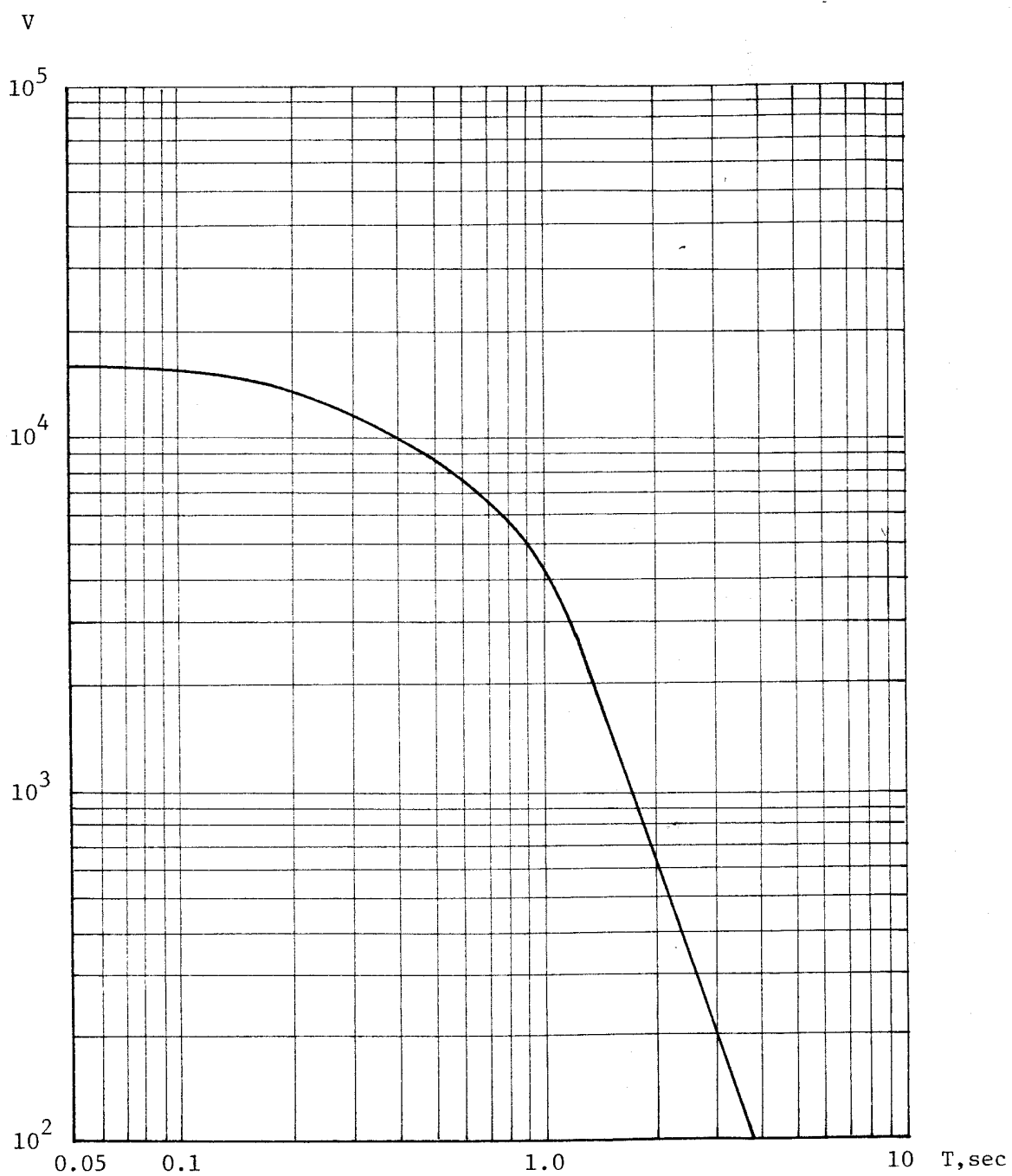


Fig. 35 -- Mean magnification curve of the three-component VEGIK system at the Chara station in 1969 [5]

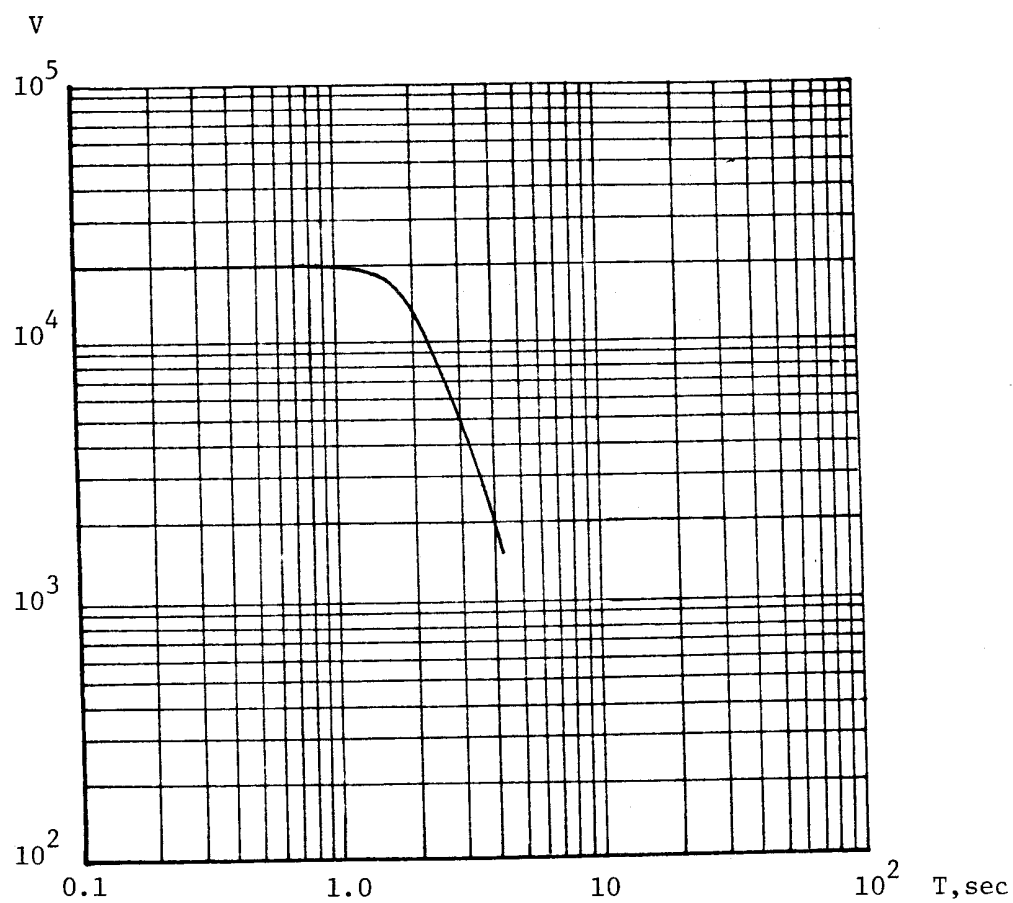


Fig. 36 -- Approximate magnification curve of seismographs at the Chilik station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (N-S, E-W, Z)

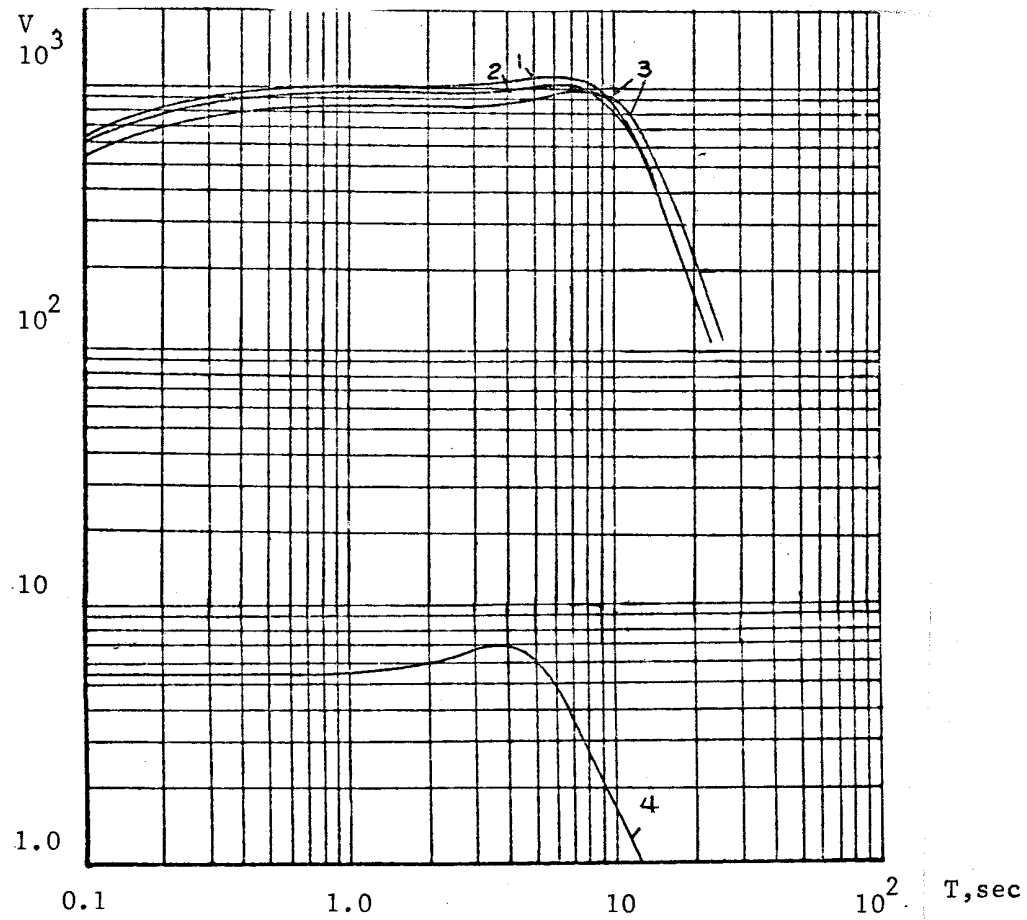


Fig. 37 -- Approximate magnification curves of seismographs at the Chimkent station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SK (Z)
- 2 -- SK (E-W)
- 3 -- SK (N-S)
- 4 -- SMTR (N-S, E-W)

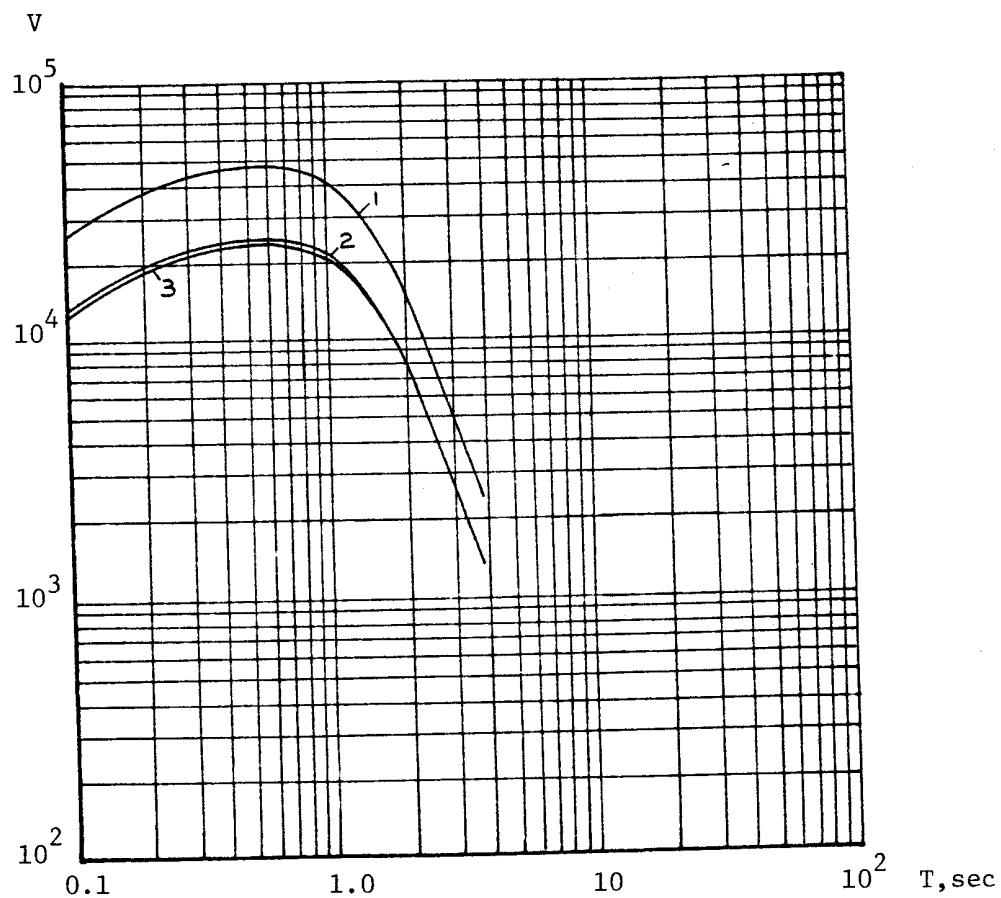


Fig. 38 -- Approximate magnification curves of seismographs at the Chul'man station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (N-S)
- 2 -- SKM-3 (E-W)
- 3 -- SKM-3 (Z)

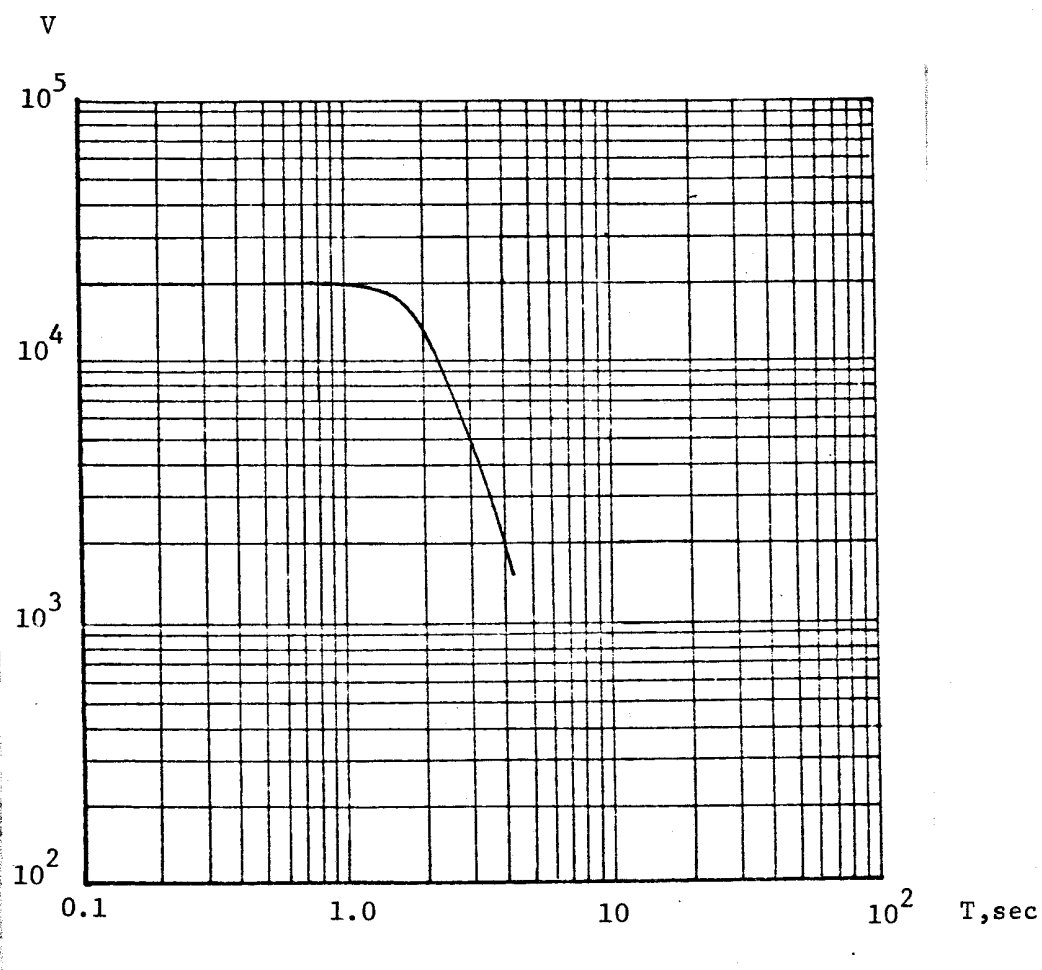


Fig. 39 -- Approximate magnification curve of seismographs at the Chuyan-Garon station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (Z)

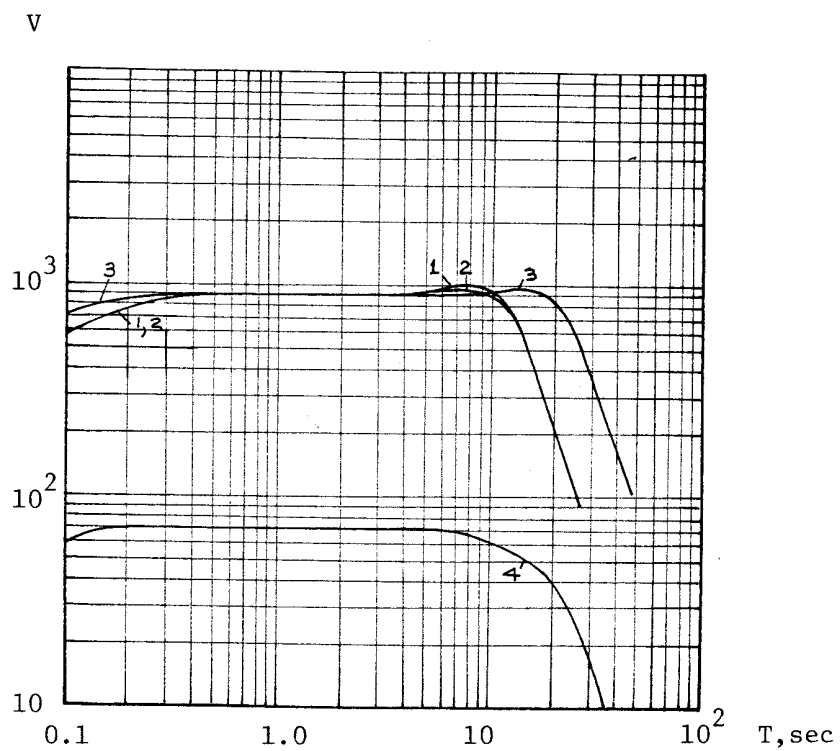


Fig. 40 -- Magnification curves of seismographs at the Dushanbe station in 1969-1970 [2]

- 1 -- SK (Z)
- 2 -- SK (N-S, E-W)
- 3 -- SKD (N-S, E-W, Z)
- 4 -- SKD-KPCh (N-S, E-W, Z)

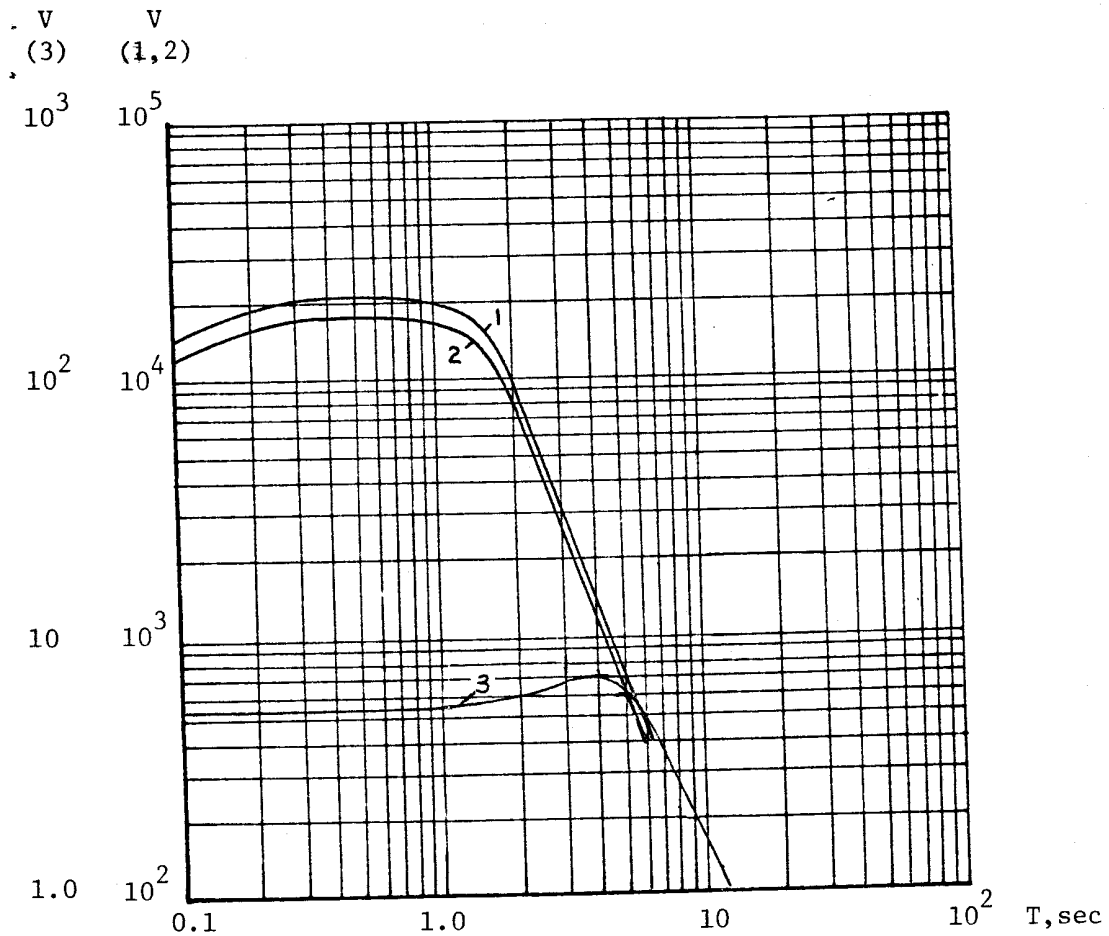


Fig. 41 -- Approximate magnification curves of seismographs at the Dzhizak station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (N-S,Z)
- 2 -- SKM-3 (E-W)
- 3 -- SMTR (N-S,E-W)

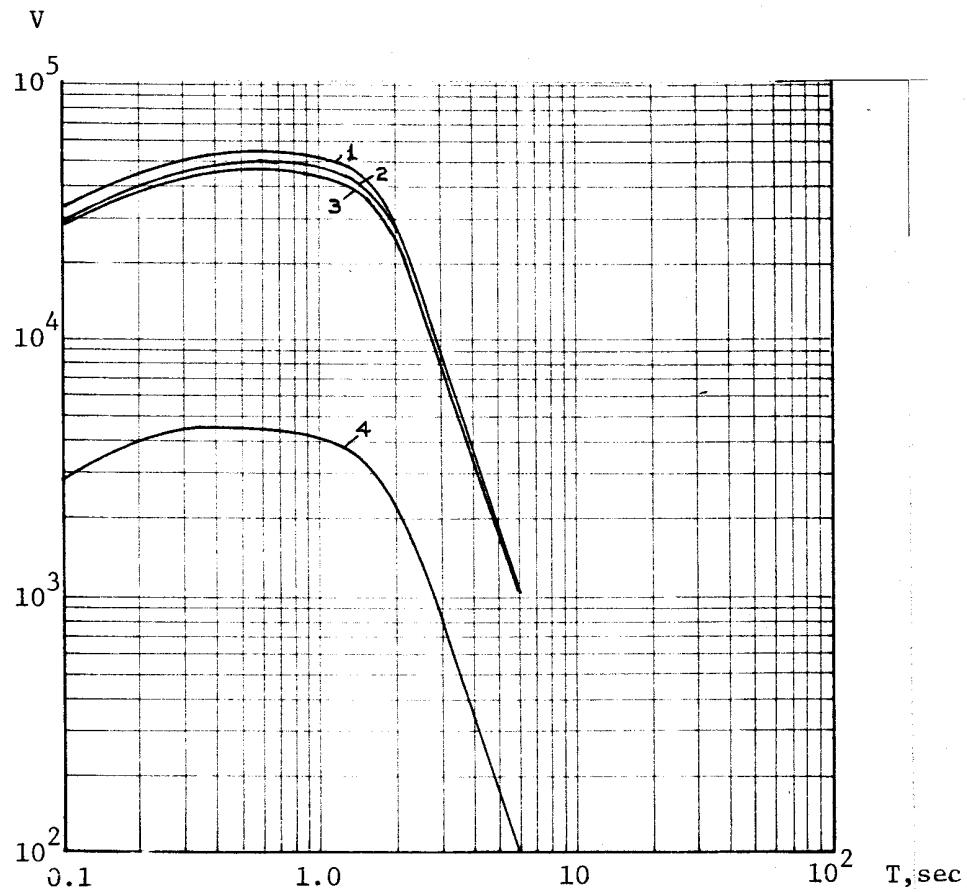


Fig. 42 -- Magnification curves of seismographs at the El'tsovka station in 1970 [3]

- 1 -- SKM-3 (N-S)
- 2 -- SKM-3 (E-W)
- 3 -- SKM-3 (Z)
- 4 -- SKM-3--KPCh (E-W)

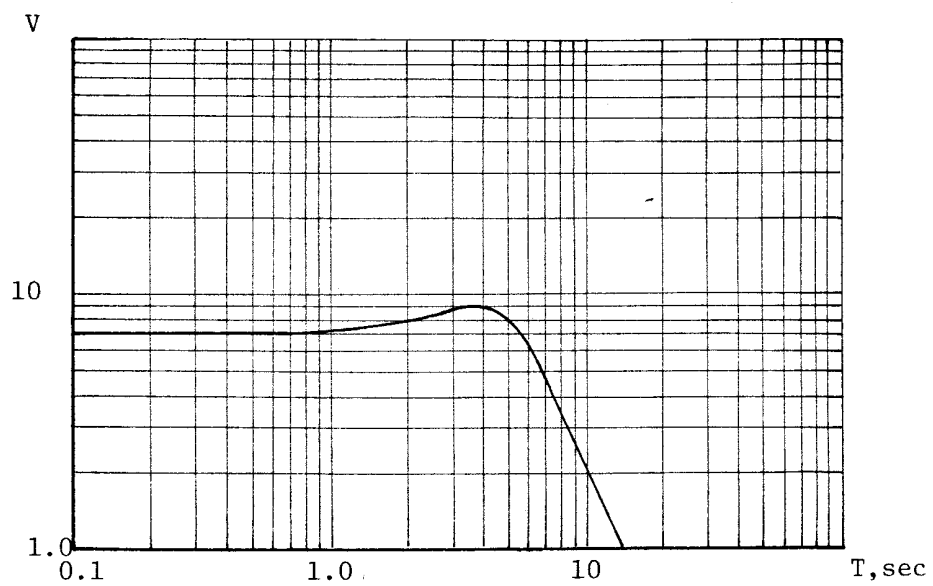


Fig. 43 -- Magnification curves of seismographs at the Erevan station in 1970 [3]

SMR-2 (N-S, E-W, Z)

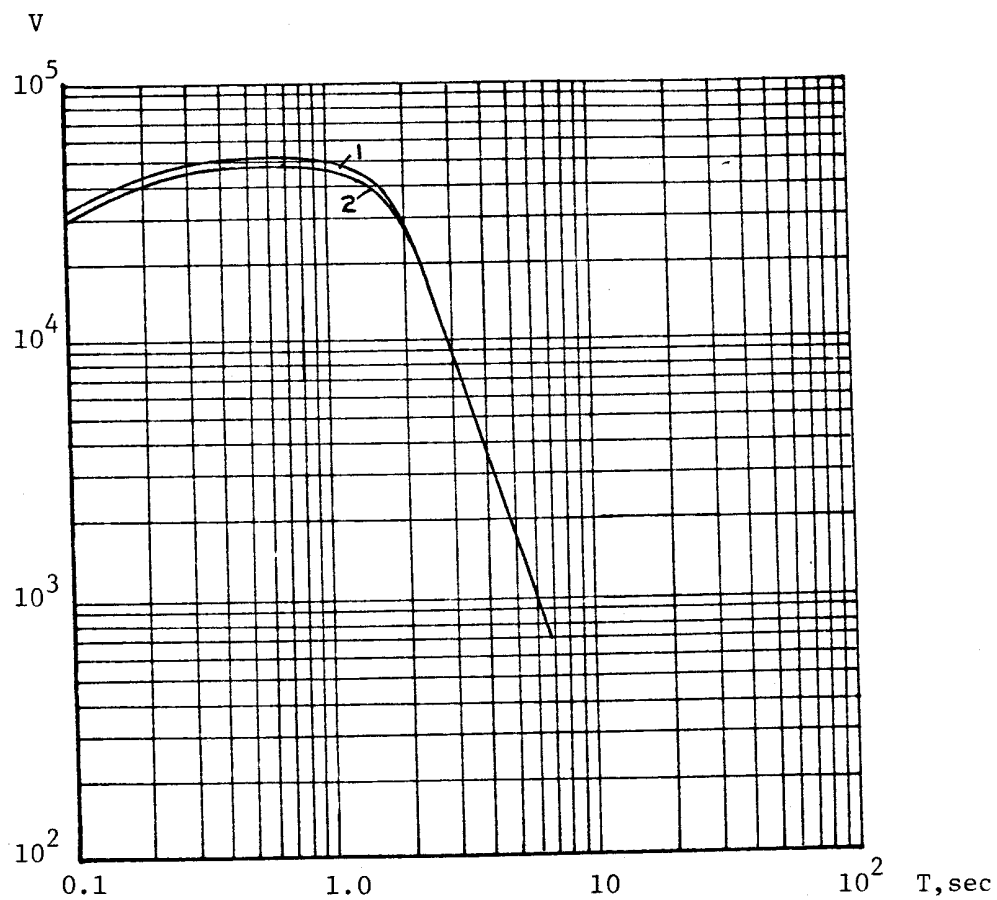


Fig. 44 -- Approximate magnification curves of seismographs at the Erzin station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (N-S, E-W)
- 2 -- SKM-3 (Z)

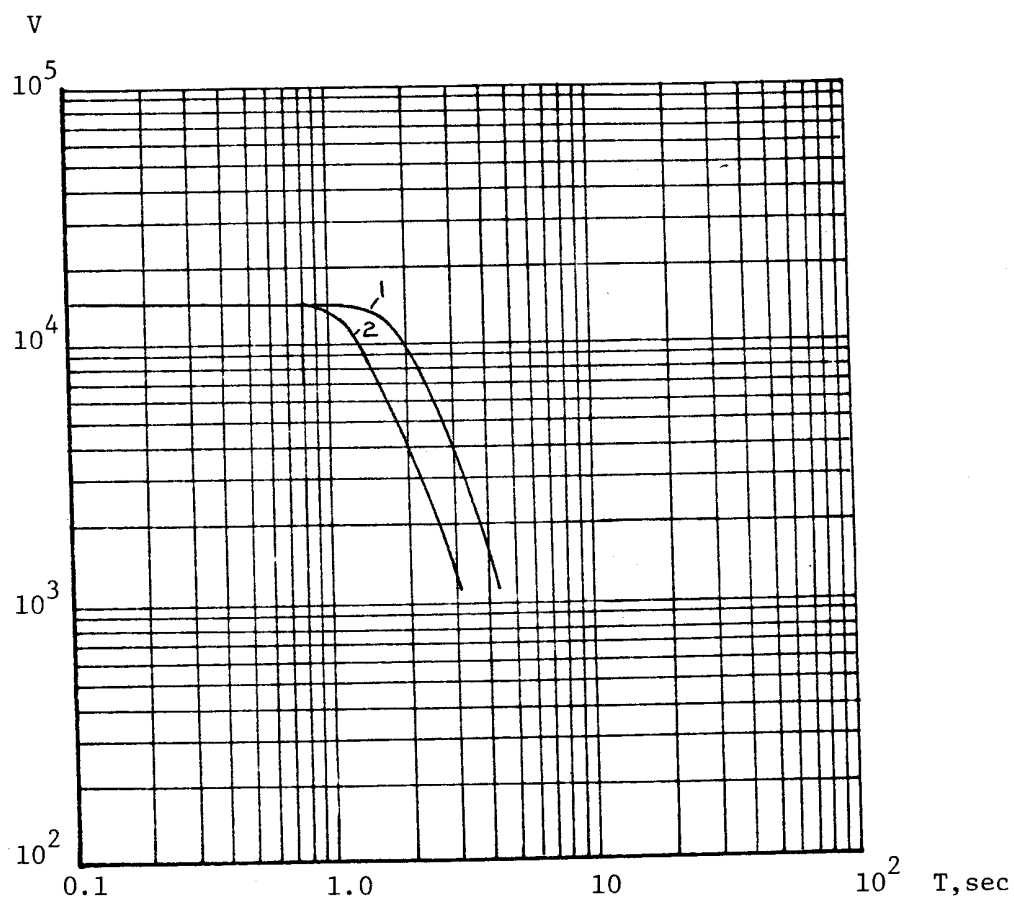


Fig. 45 -- Approximate magnification curves of seismographs at the Fabrichnaya station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (N-S, E-W)
- 2 -- SKM-3 (Z)

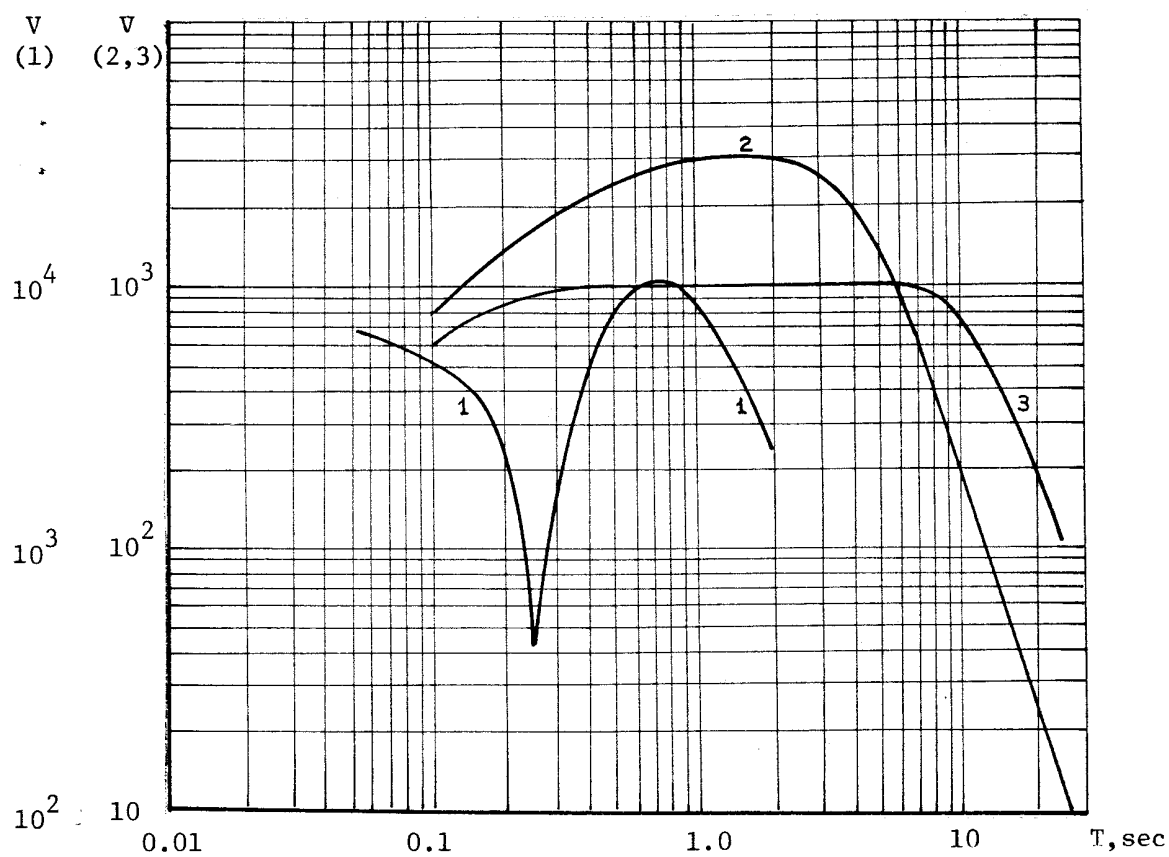


Fig. 46 -- Magnification curves of seismographs at the Feodosiya station in 1969 plotted on the basis of instrumental constants listed in Table 5 and the magnification curves given in [9].

1 -- SKh (N-S,E-W) (with a galvanometer notch filter)
 2 -- SK (N-S,E-W)
 3 -- SK (Z)

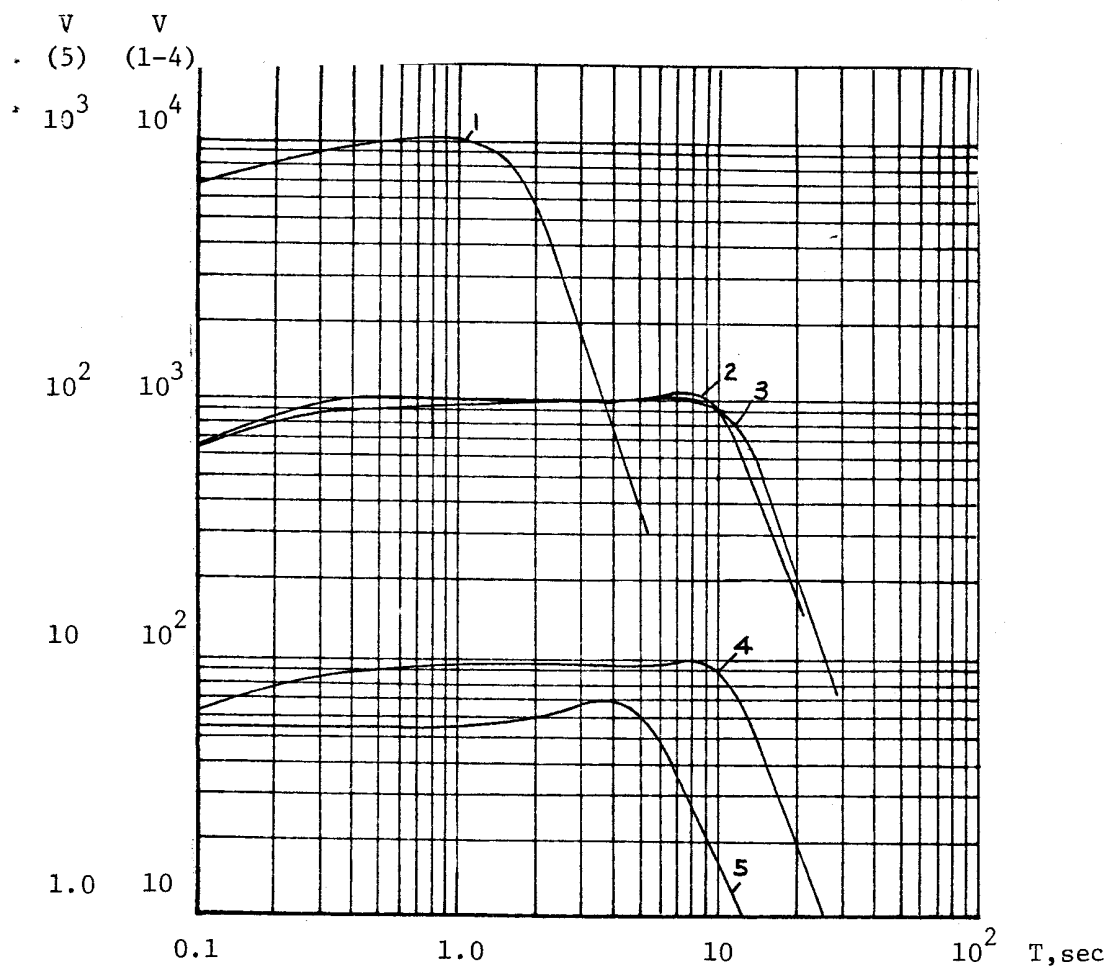


Fig. 47 -- Approximate magnification curves of seismographs at the Fergana station in 1968 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (Z)
- 2 -- SK (Z)
- 3 -- SK (N-S, E-W)
- 4 -- SK-KPCh (N-S, E-W)
- 5 -- SMTR (N-S, E-W)

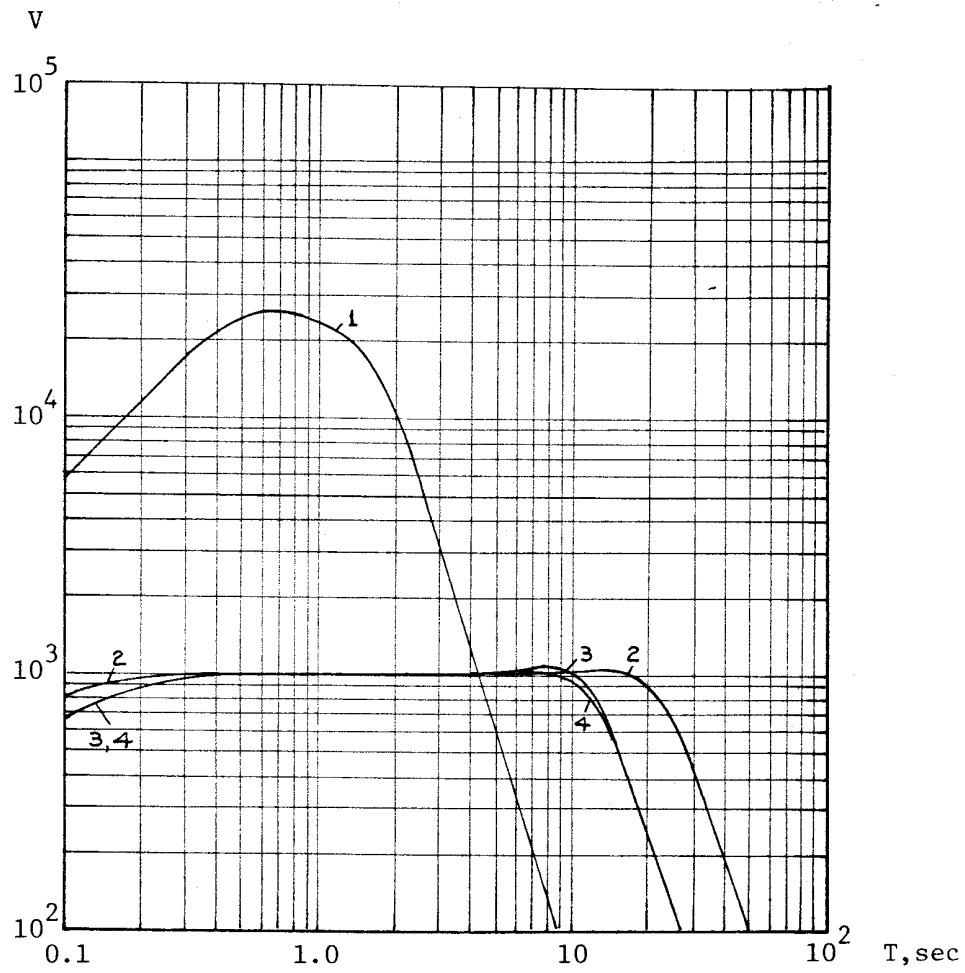


Fig. 48 -- Magnification curves of seismographs at the Frunze station in 1970 [3]

- 1 -- SKM-3 (N-S, E-W, Z)
- 2 -- SKD (N-S, E-W, Z)
- 3 -- SK (Z)
- 4 -- SK (N-S, E-W)

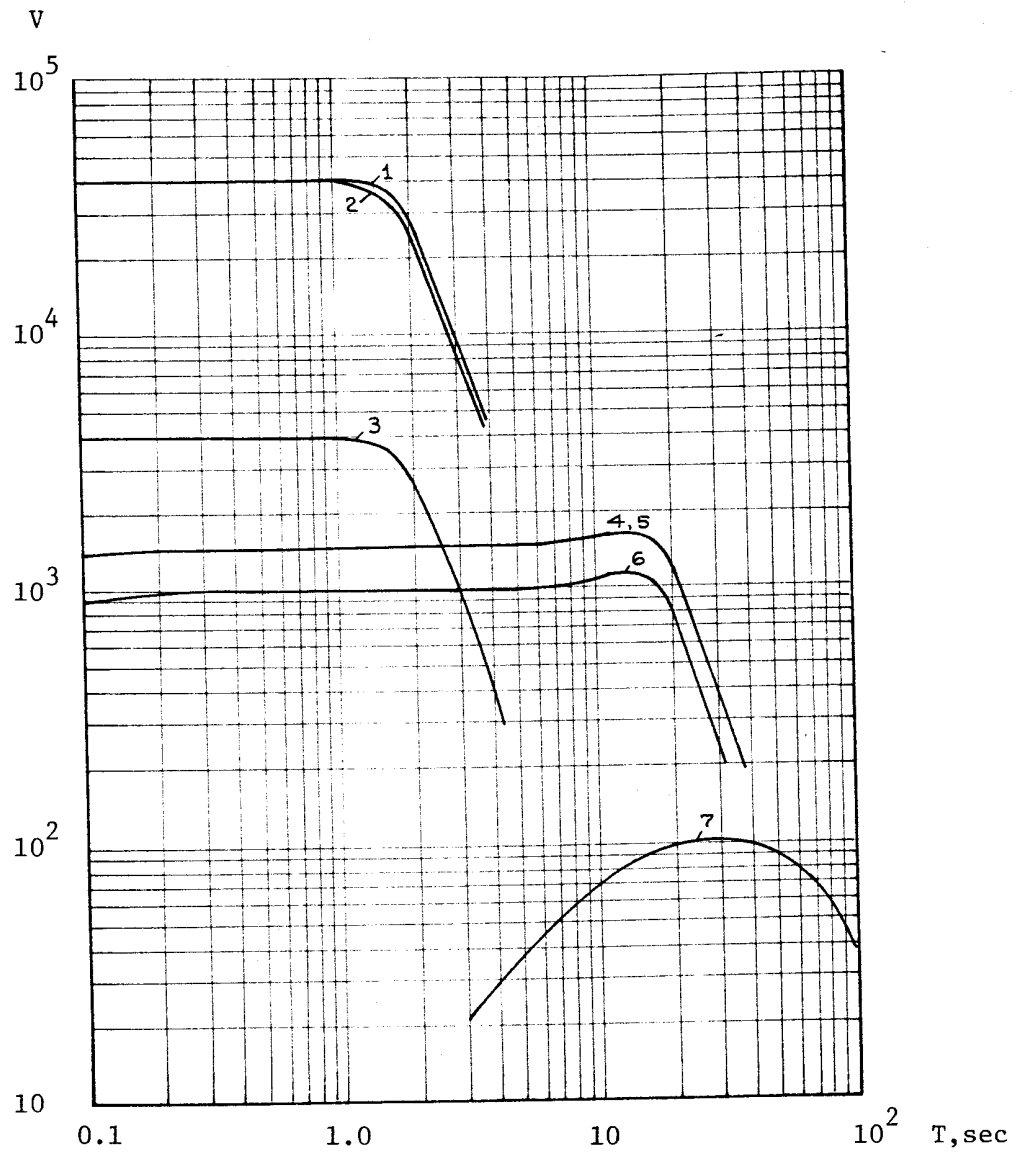


Fig. 49 -- Magnification curves of seismographs at the Garm station in 1970 [3]

- 1 -- SKM-3 (N-S)
- 2 -- SKM-3 (E-W, Z)
- 3 -- SKM-3--KPCh (N-S)
- 4 -- SKD (N-S)
- 5 -- SKD (E-W)
- 6 -- SKD (Z)
- 7 -- SD-1 (N-S, E-W)

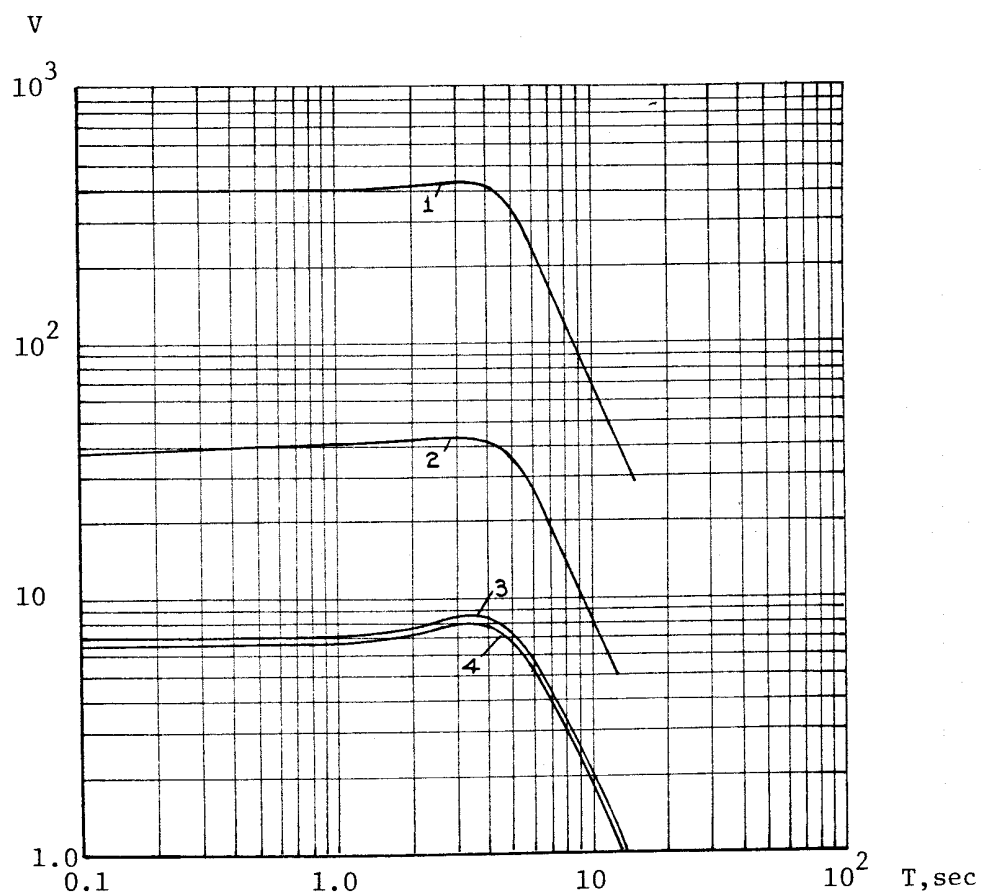


Fig. 50 -- Magnification curves of strong-motion instruments
at the Garm station in 1970 [3]

- 1 -- S5S (Z)
- 2 -- S5S (E-W)
- 3 -- SMTR (N-S)
- 4 -- SMTR (E-W)

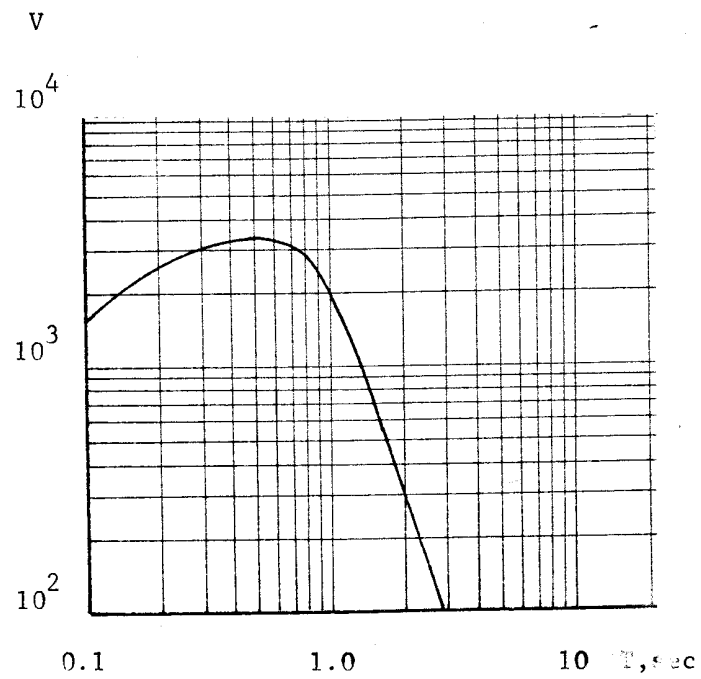


Fig. 51 -- Approximate magnification curve of seismographs at the Gegarkori station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (Z)

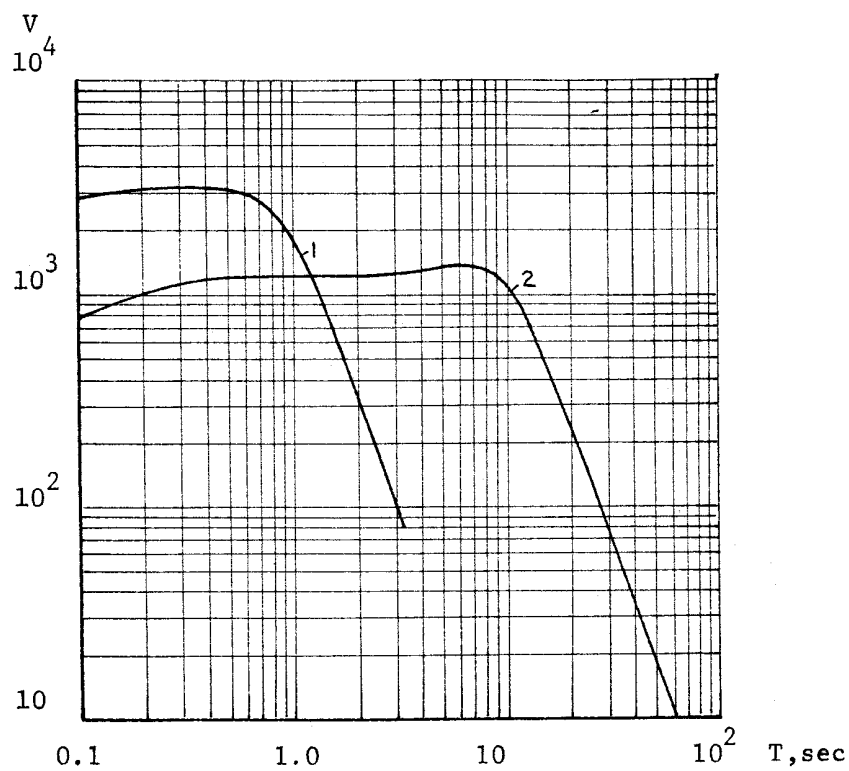


Fig. 52 -- Approximate magnification curves of seismographs at the Gori station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (Z)
- 2 -- SK (N-S, E-W, Z)

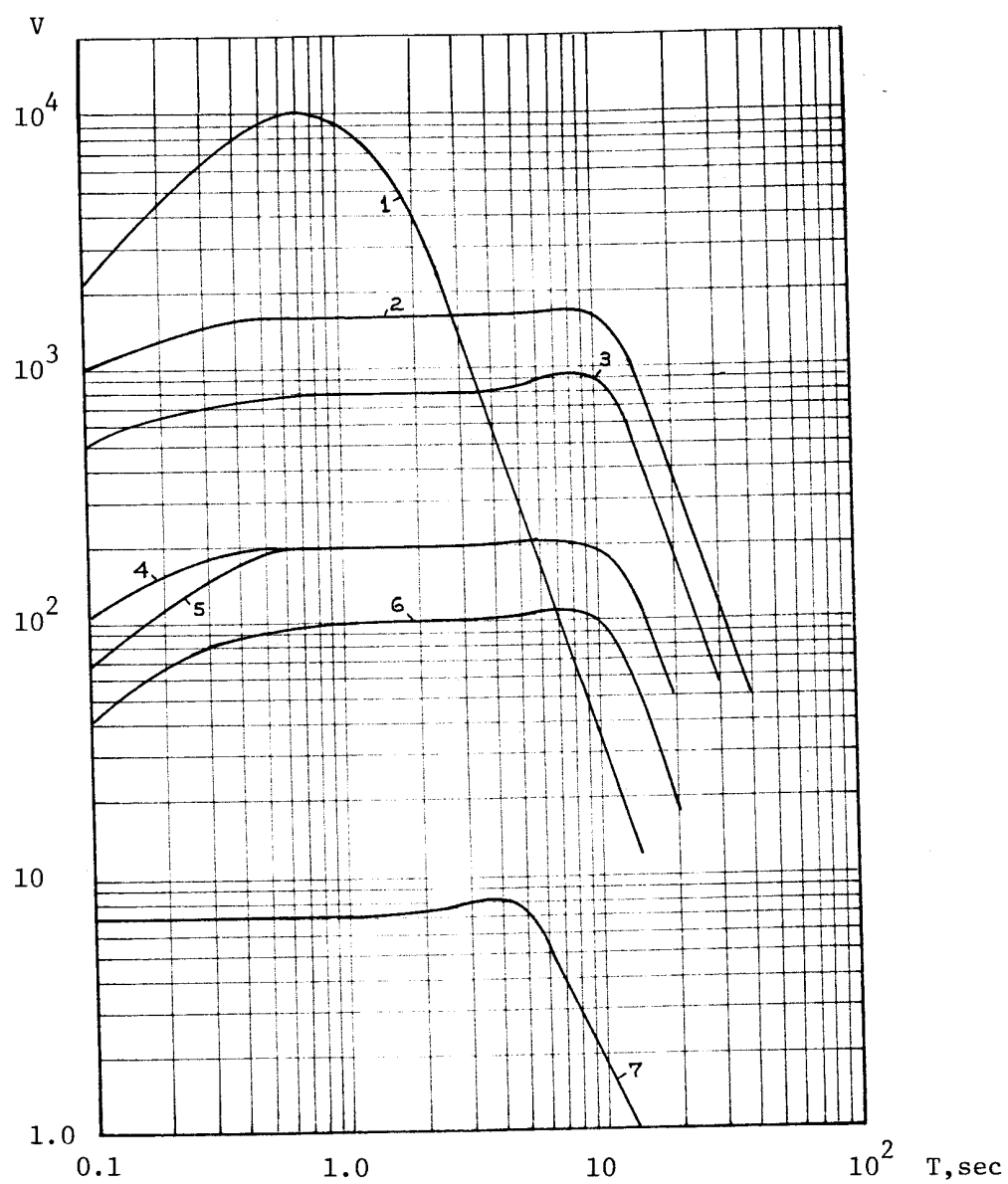


Fig. 53 -- Magnification curves of seismographs at the Goris station in 1970 [3]

- 1 -- VEGIK (N-S, E-W, Z)
- 2 -- SK (N-S, E-W)
- 3 -- SK (Z)
- 4 -- SK-KPCh (N-S)
- 5 -- SK-KPCh (E-W)
- 6 -- SK-KPCh (Z)
- 7 -- SMTR (N-S, E-W)

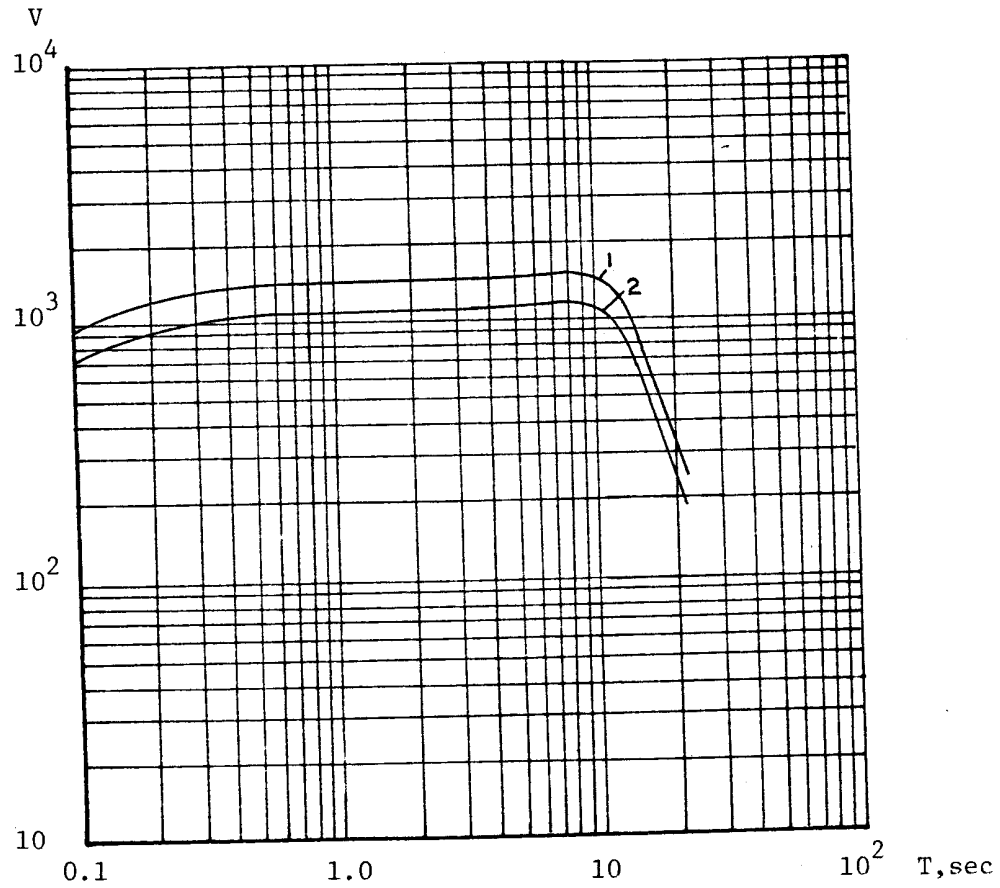


Fig. 54 -- Approximate magnification curves of seismographs at the Grozny station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SK (N-S, E-W)
- 2 -- SK (Z)

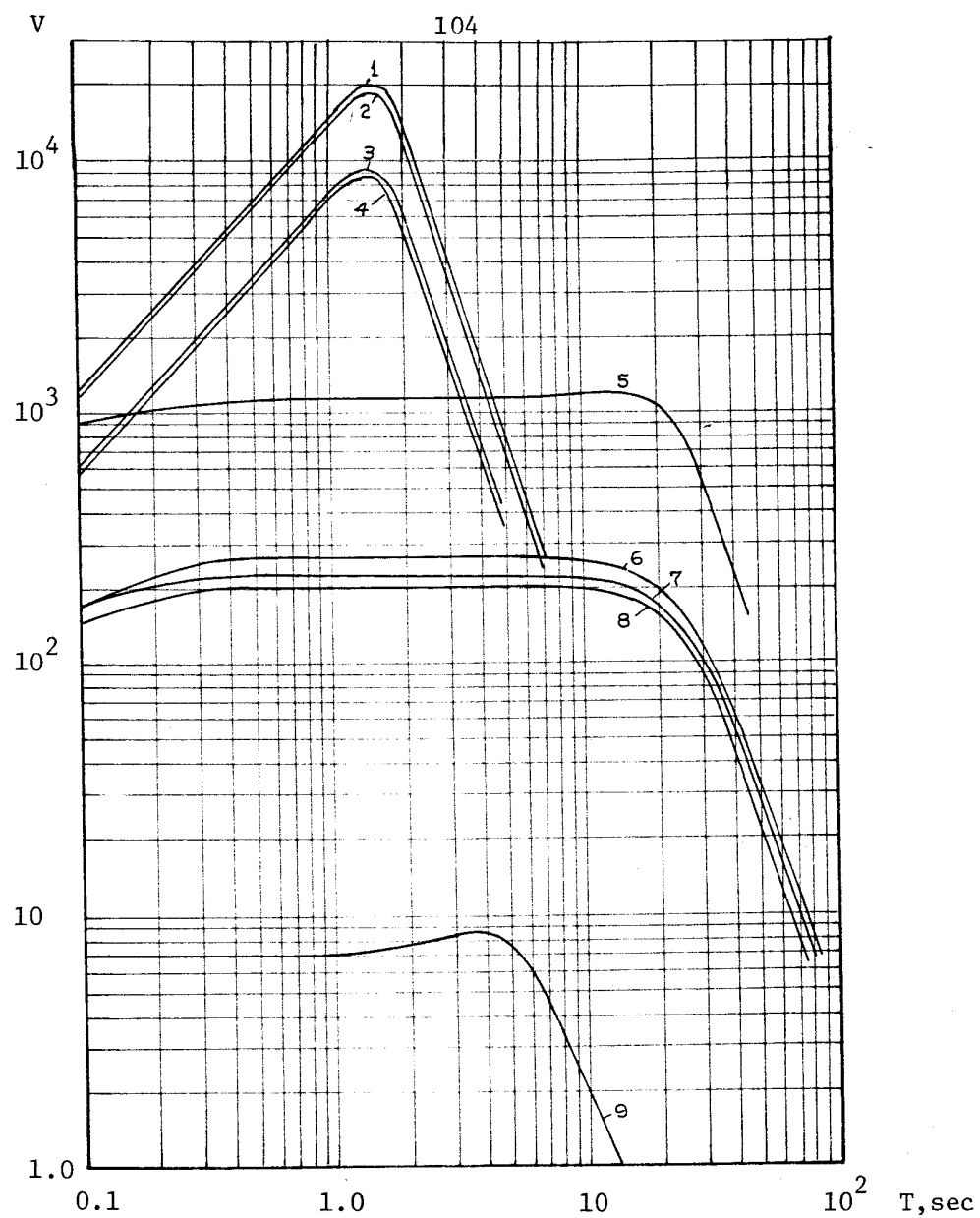


Fig. 55 -- Magnification curves of seismographs at the Irkutsk station in 1970 [3]

- 1 -- SKM-3 (N-S, E-W)
- 2 -- SKM-3 (Z)
- 3 -- SKM-3 (N-S, E-W)
- 4 -- SKM-3 (Z)
- 5 -- SKD (N-S, E-W, Z)
- 6 -- SKD-KPCh (Z)
- 7 -- SKD-KPCh (N-S)
- 8 -- SKD-KPCh (Z)
- 9 -- SMTR (N-S, E-W)

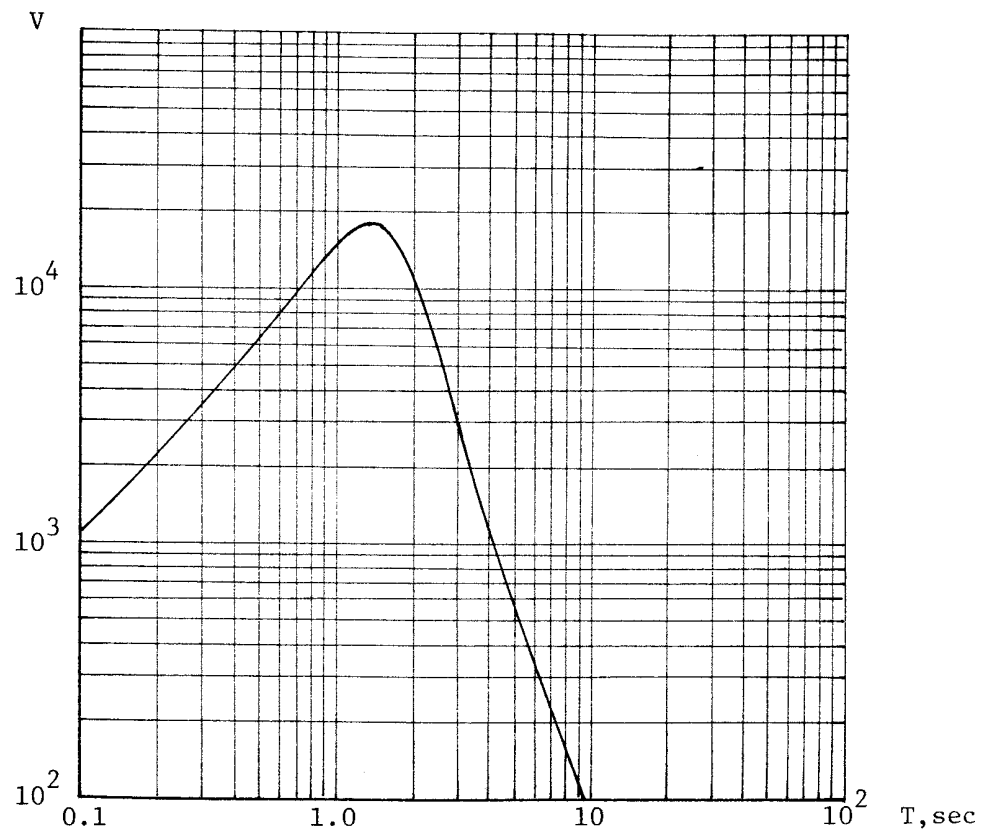


Fig. 56 -- Magnification curve of seismographs at the Irkutsk station in 1970 [3]

SKM-3 (N-S, E-W, Z)

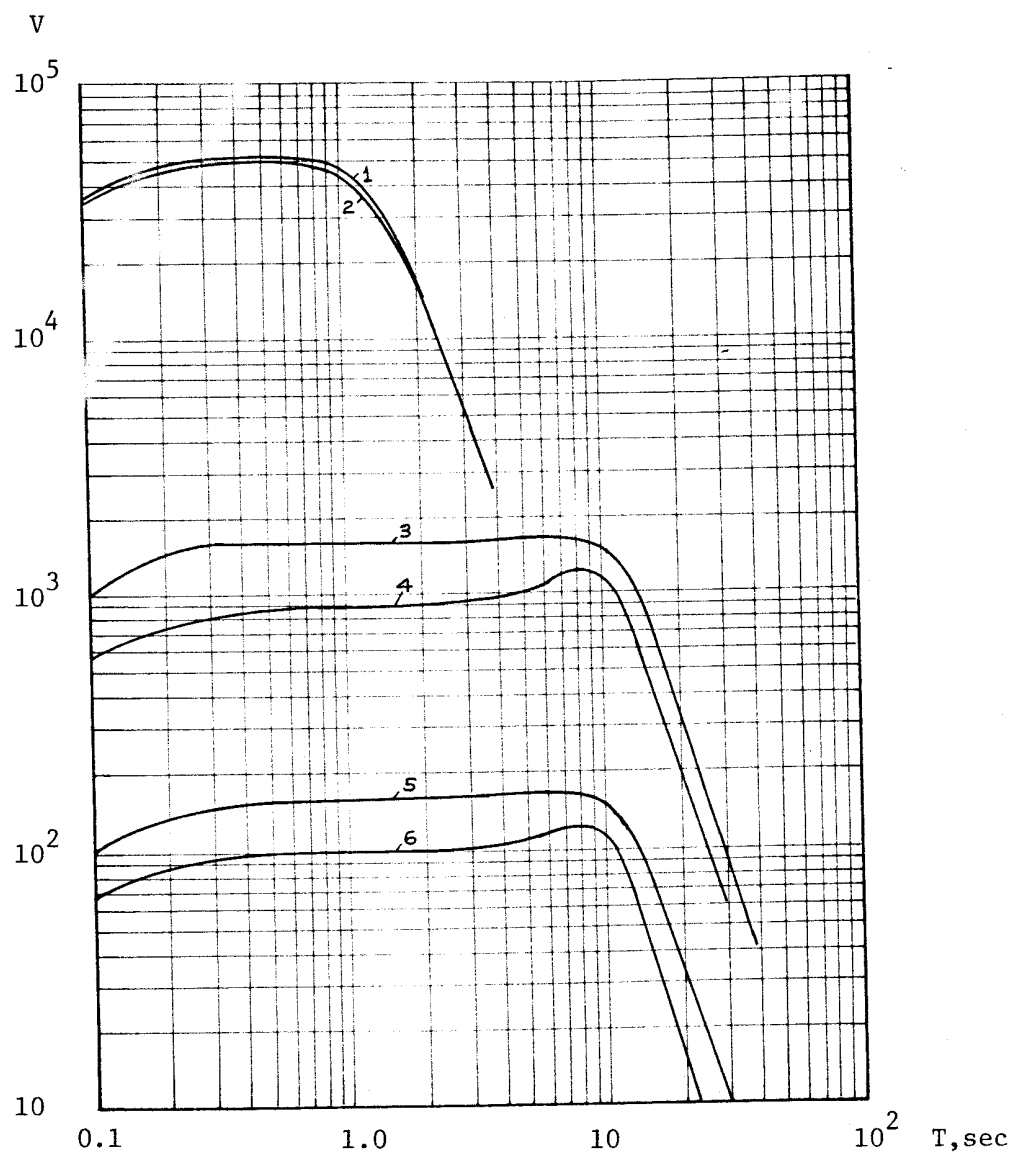


Fig. 57 -- Magnification curves of seismographs at the Iul'tin station in 1970 [3]

- 1 -- SKM-3 (N-S, E-W, Z)
- 2 -- SKM-3 (N-S, E-W, Z)
- 3 -- SK (N-S, E-W)
- 4 -- SK (Z)
- 5 -- SK-KPCh (N-S, E-W)
- 6 -- SK-KPCh (Z)

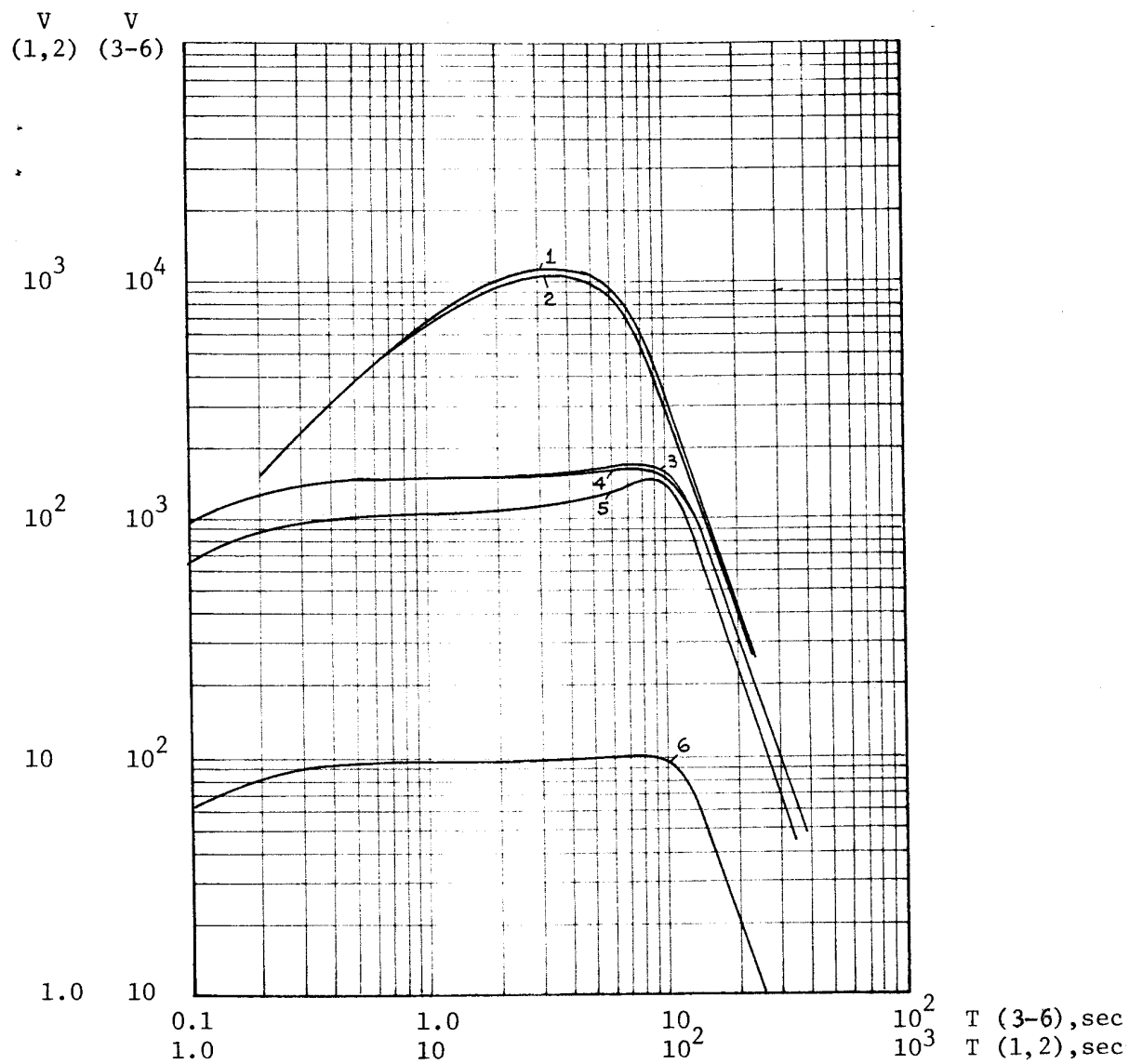


Fig. 58 -- Magnification curves of seismographs at the Iul'tin station in 1970 [3]

- 1 -- SD-1 (N-S,Z)
- 2 -- SD-1 (E-W)
- 3 -- SK (N-S,E-W)
- 4 -- SK (E-W)
- 5 -- SK (Z)
- 6 -- SK-KPCh (E-W)

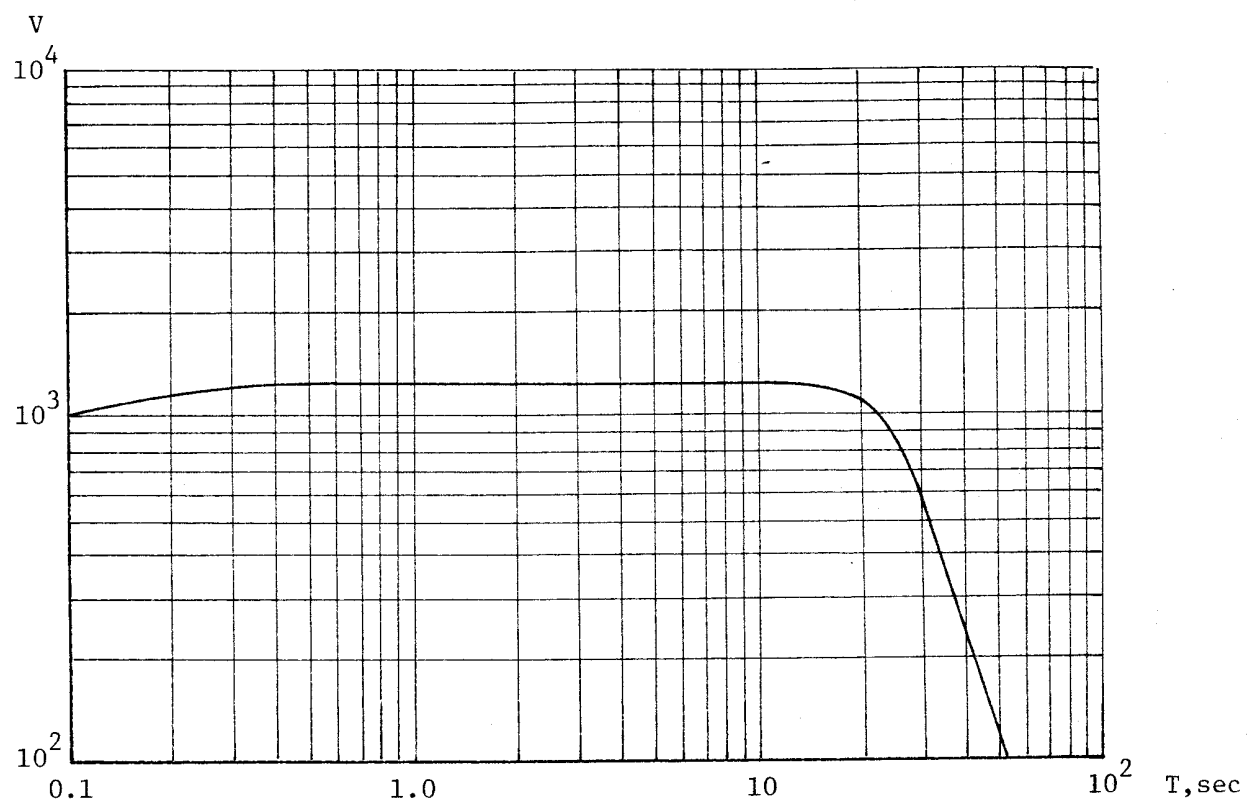


Fig. 59 -- Mean magnification curve of the three-component SKD system at the Kabansk station in 1969 [5]

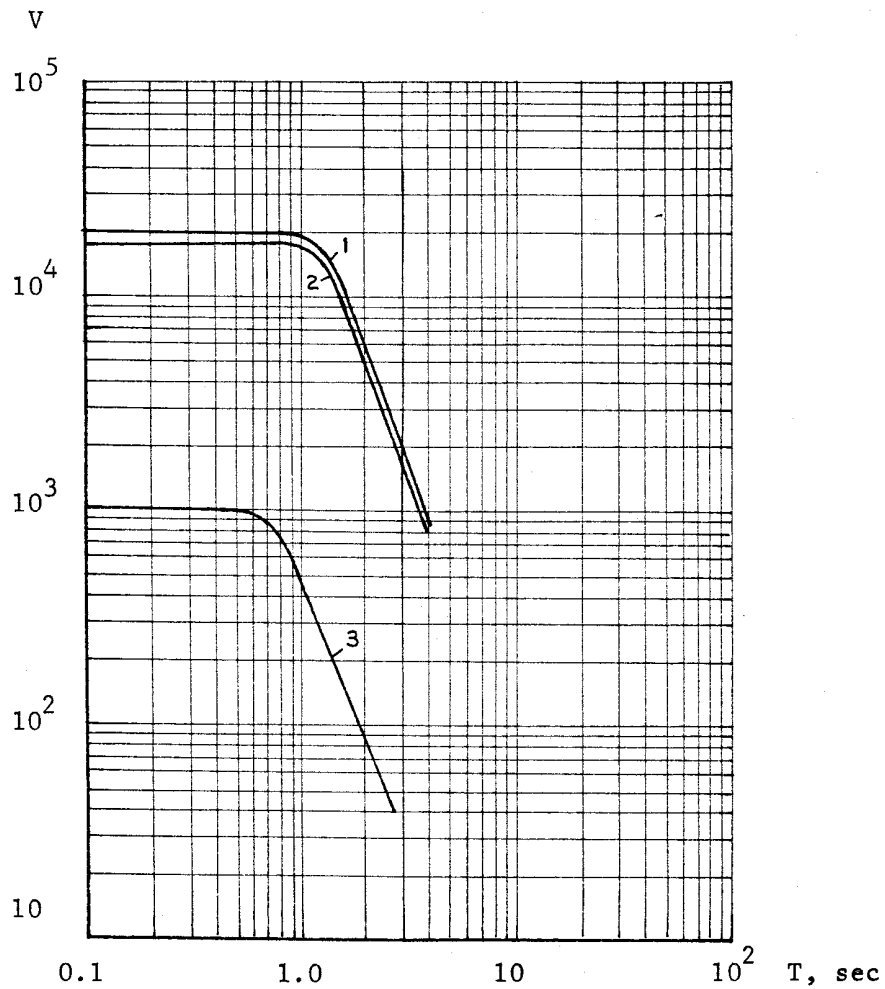


Fig. 60 -- Approximate magnification curves of seismographs at the Kara-Su station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (E-W,Z)
- 2 -- SKM-3 (N-S)
- 3 -- SKM-3--KPCh (Z)

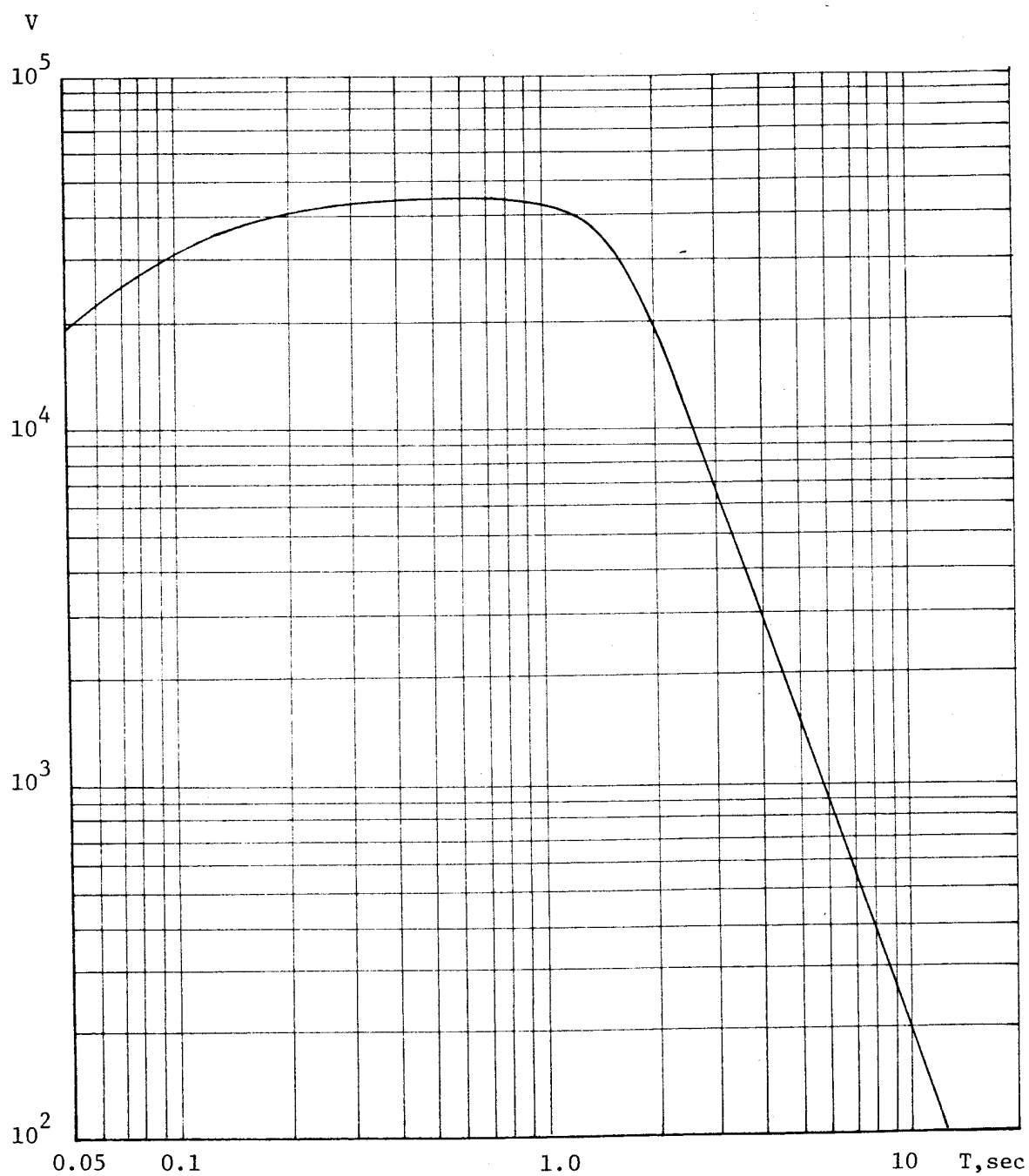


Fig. 61 -- Mean magnification curve of the three-component SKM-3 system at the Khaim station in 1969 [5]

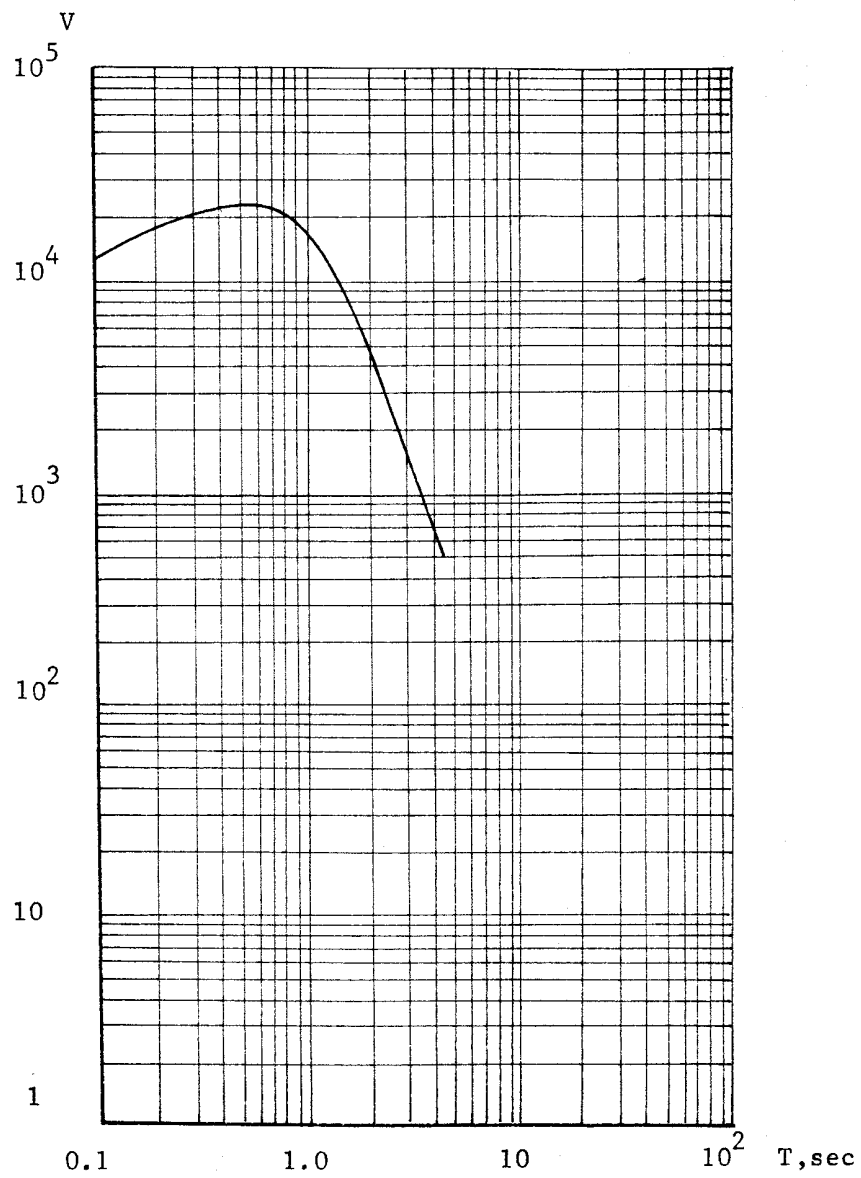


Fig. 62 -- Approximate magnification curve of seismographs at the Khaishi station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (Z)

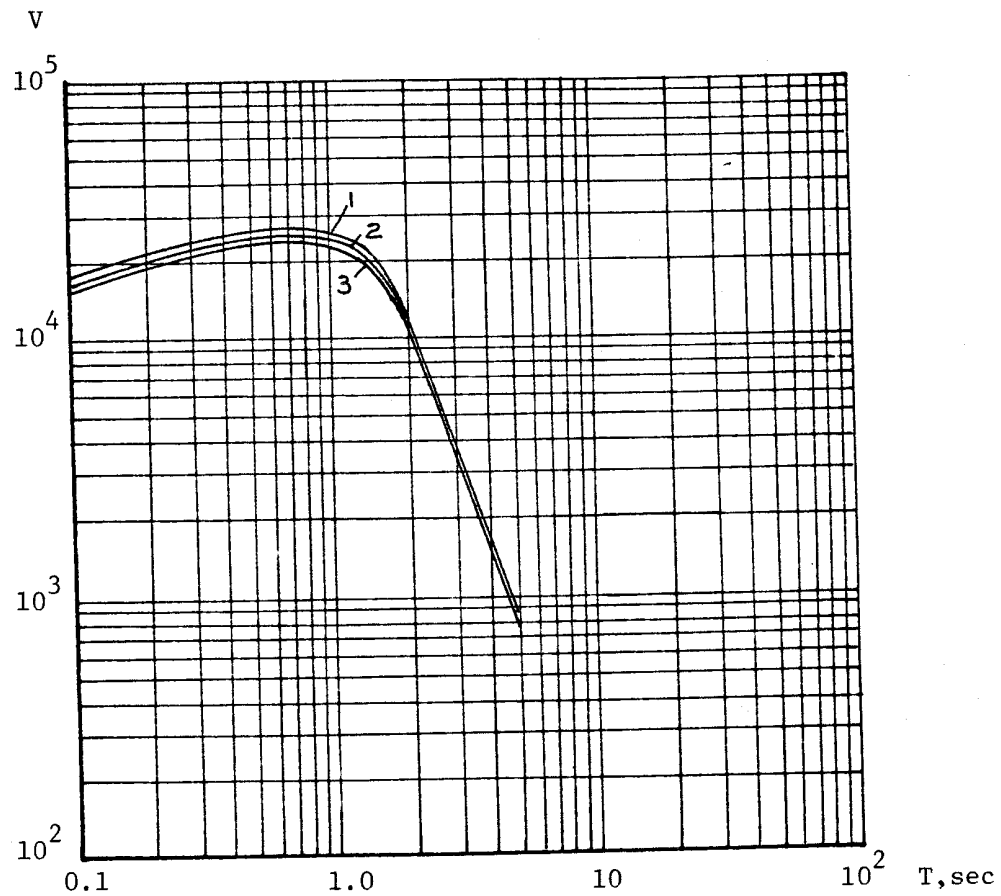


Fig. 63 -- Approximate magnification curves of seismographs at the Khandyga station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (E-W)
- 2 -- SKM-3 (N-S)
- 3 -- SKM-3 (Z)

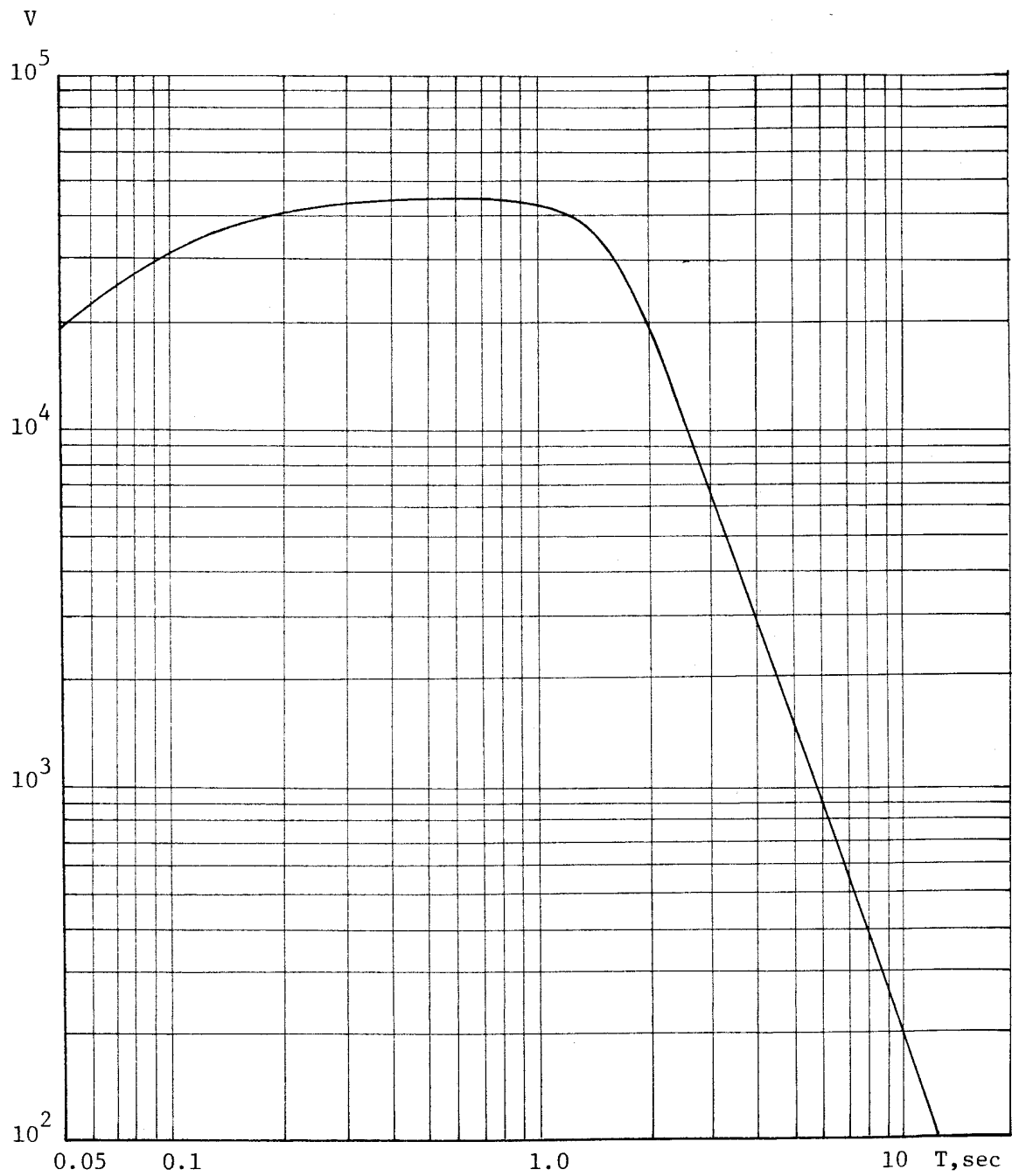


Fig. 64 -- Mean magnification curve of the three-component SKM-3 system at the Khapcheranga station in 1969 [5]

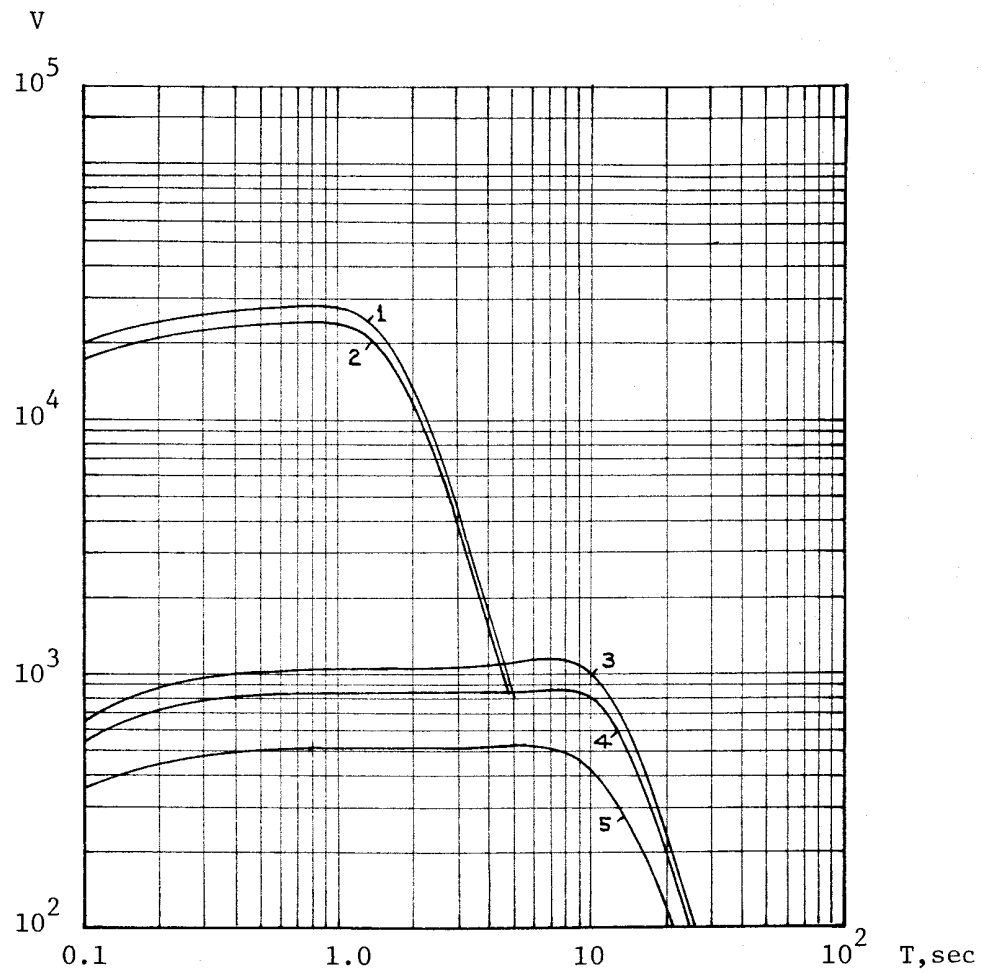


Fig. 65 -- Magnification curves of seismographs at the Kheys station in 1970 [3]

- 1 -- SKM-3 (N-S,E-W)
- 2 -- SKM-3 (Z)
- 3 -- SK (Z)
- 4 -- SK (N-S,E-W)
- 5 -- SK (Z)

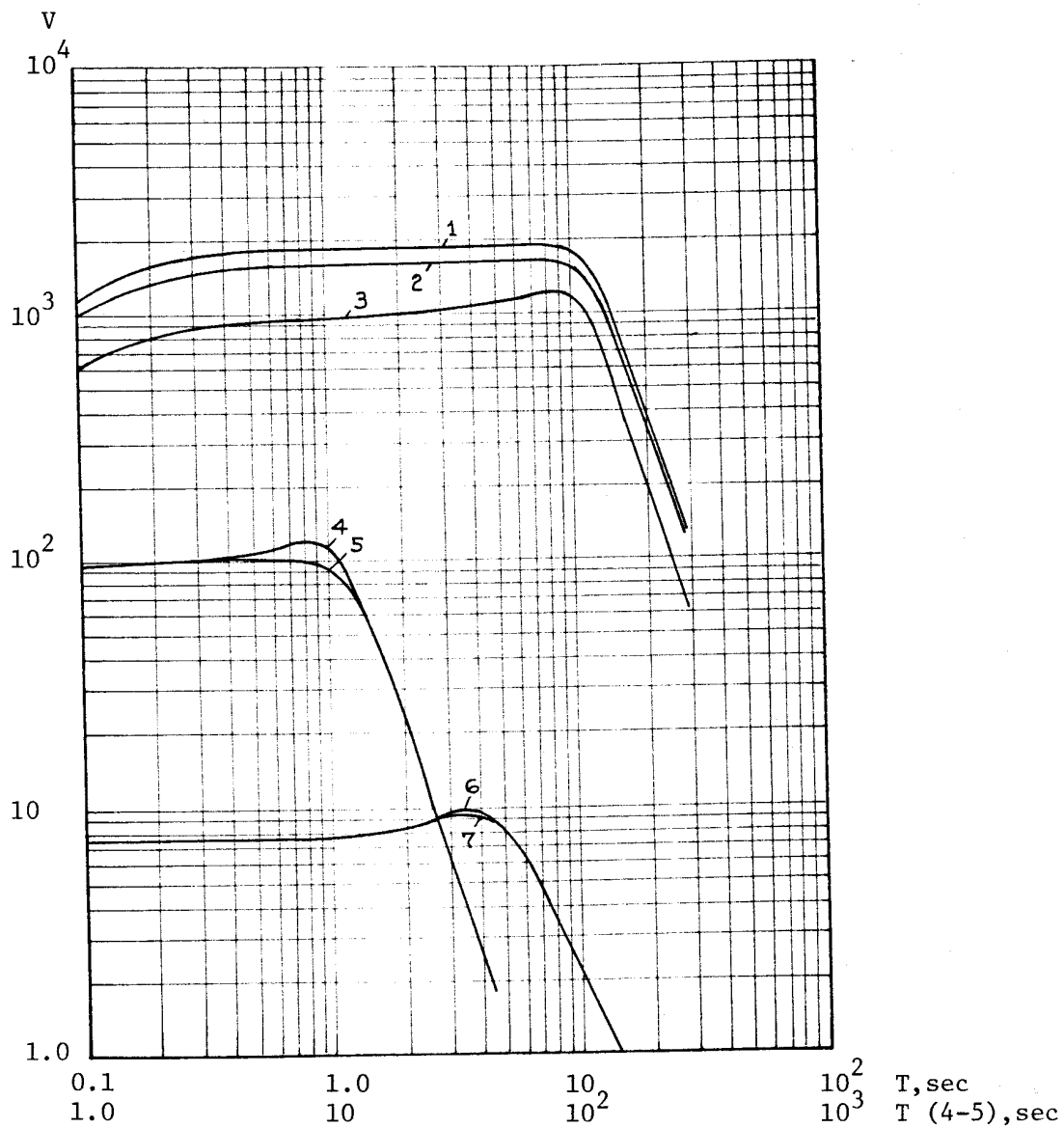


Fig. 66 -- Magnification curves of seismographs at the Khorog station in 1970 [3]

- 1 -- SK (N-S)
- 2 -- SK (E-W)
- 3 -- SK (Z)
- 4 -- SK-KPCh (Z)
- 5 -- SK-KPCh (N-S, E-W)
- 6 -- SMR-2 (E-W)
- 7 -- SMR-2 (N-S)

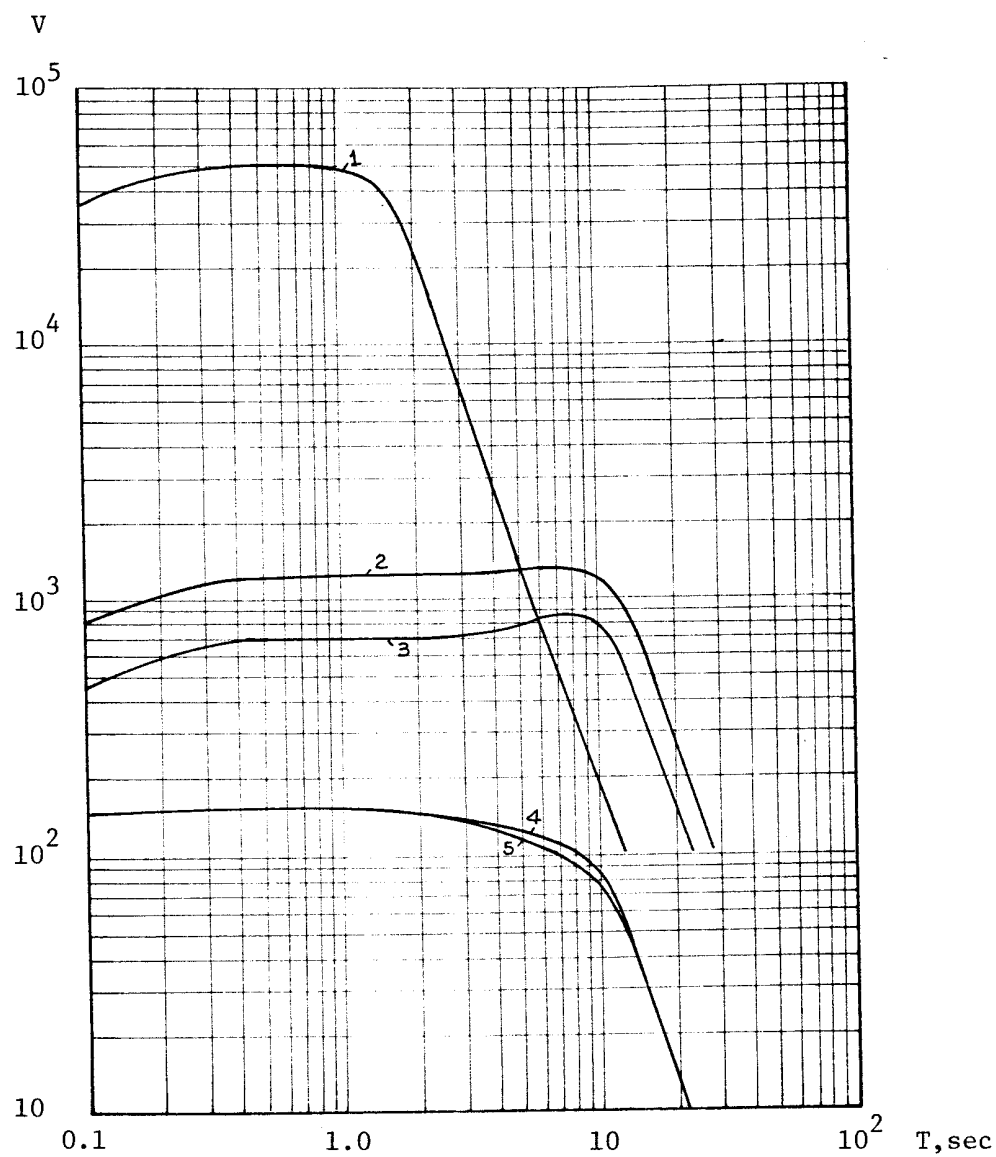


Fig. 67 -- Magnification curves of seismographs at the Kirovabad station in 1970 [3]

- 1 -- SKM-3 (N-S,E-W,Z)
- 2 -- SK (N-S,E-W)
- 3 -- SK (Z)
- 4 -- SK-KPCh (N-S,E-W)
- 5 -- SK-KPCh (Z)

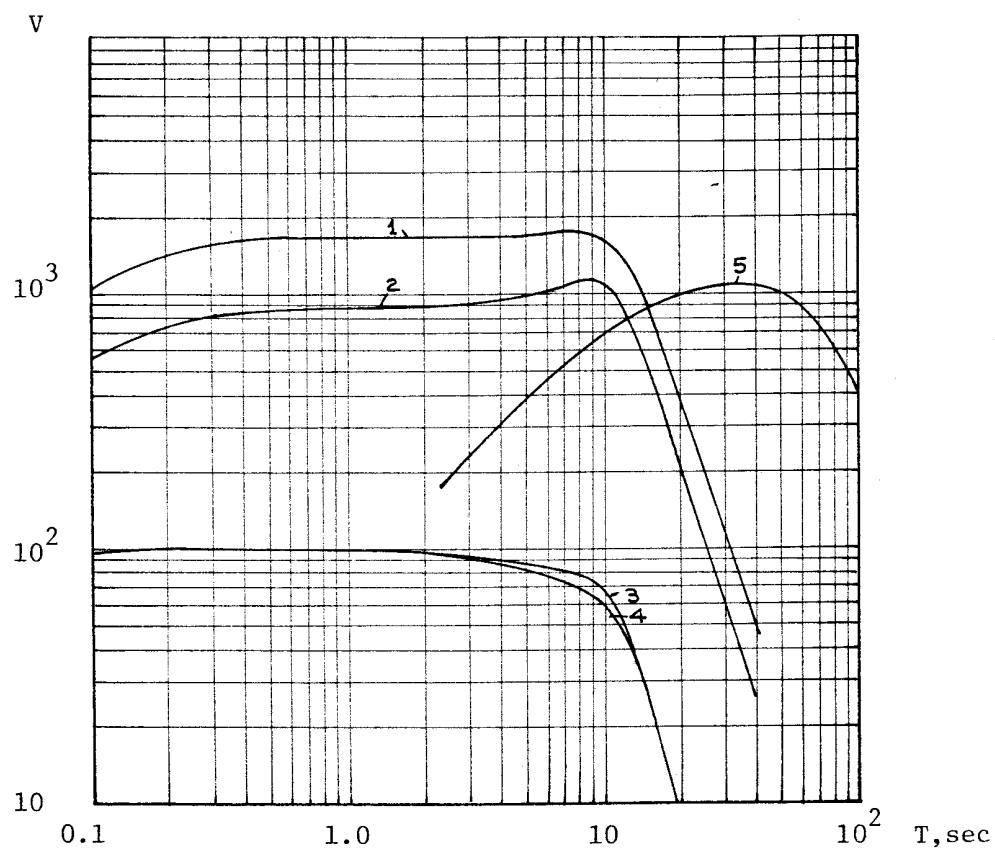


Fig. 68 -- Magnification curves of seismographs at the Kishinev station in 1970 [3]

- 1 -- SK (N-S, E-W)
- 2 -- SK (Z)
- 3 -- SK-KPCh (Z)
- 4 -- SK-KPCh (N-S, E-W)
- 5 -- SD-1 (Z)

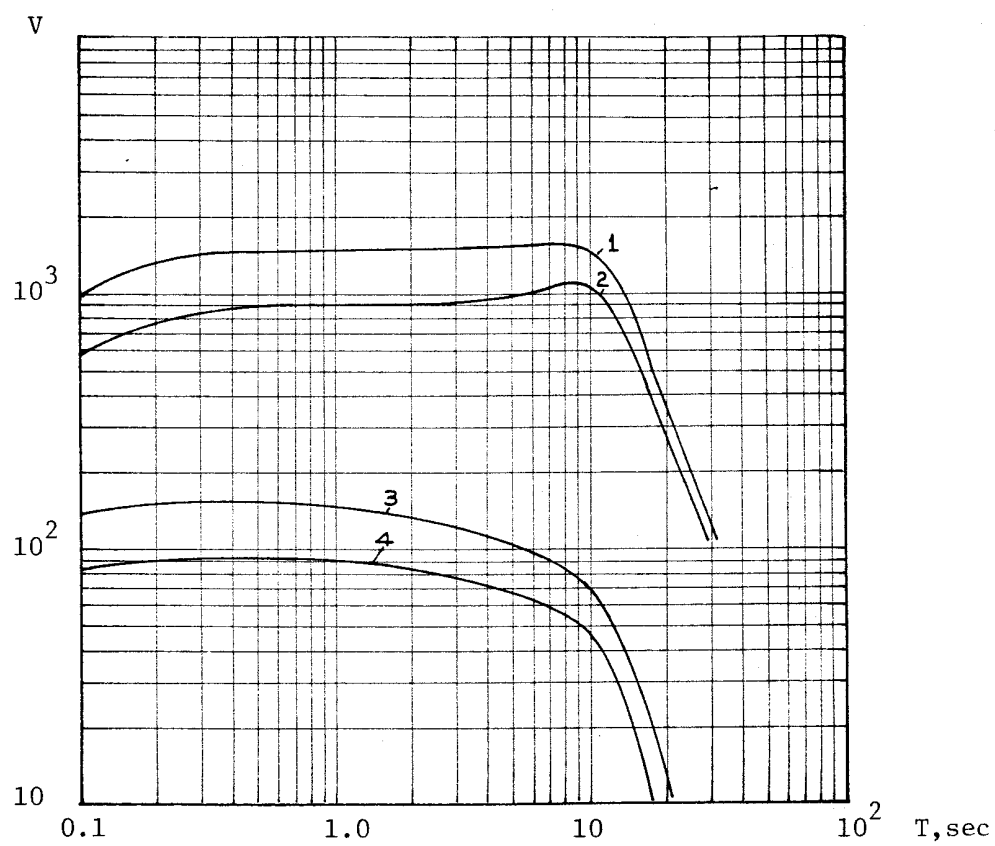


Fig. 69 -- Magnification curves of seismographs at the Kizyl-Arvat station in 1970 [3]

- 1 -- SK (N-S, E-W)
- 2 -- SK (Z)
- 3 -- SK-KPCh (N-S, E-W)
- 4 -- SK-KPCh (Z)

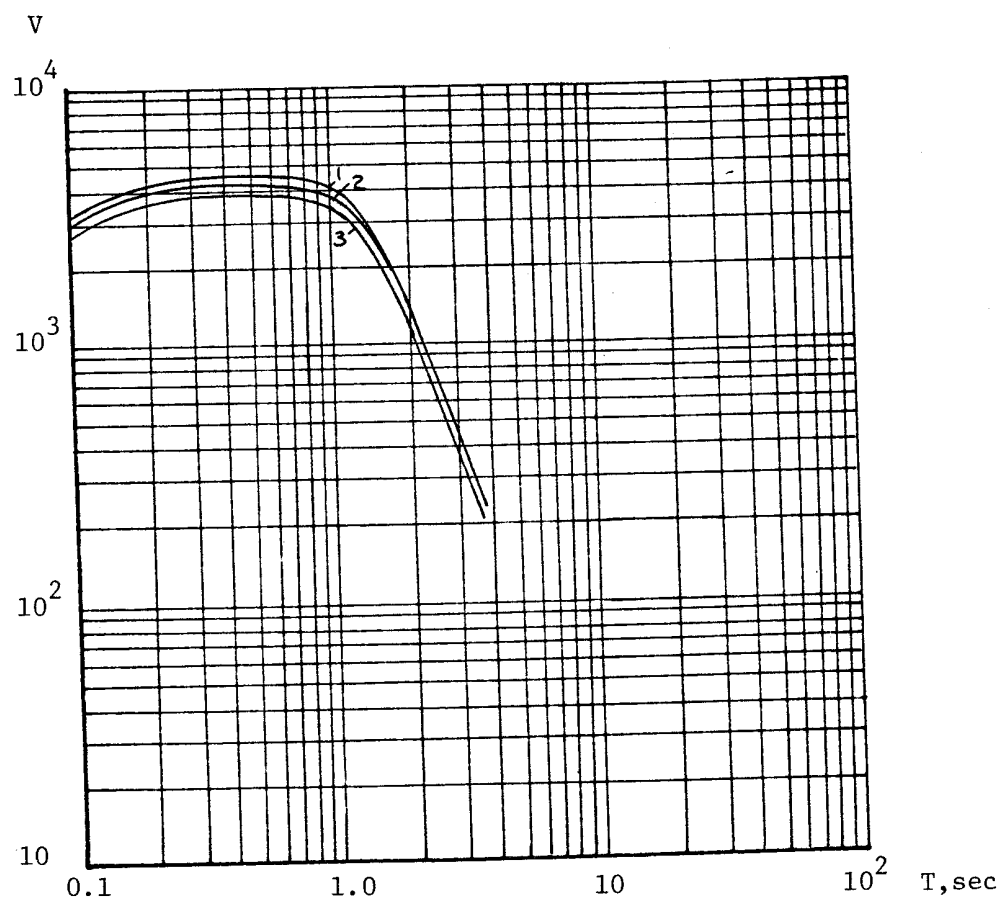


Fig. 70 -- Approximate magnification curves of seismographs at the Kizyl-Atrek station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (E-W)
- 2 -- SKM-3 (Z)
- 3 -- SKM-3 (N-S)

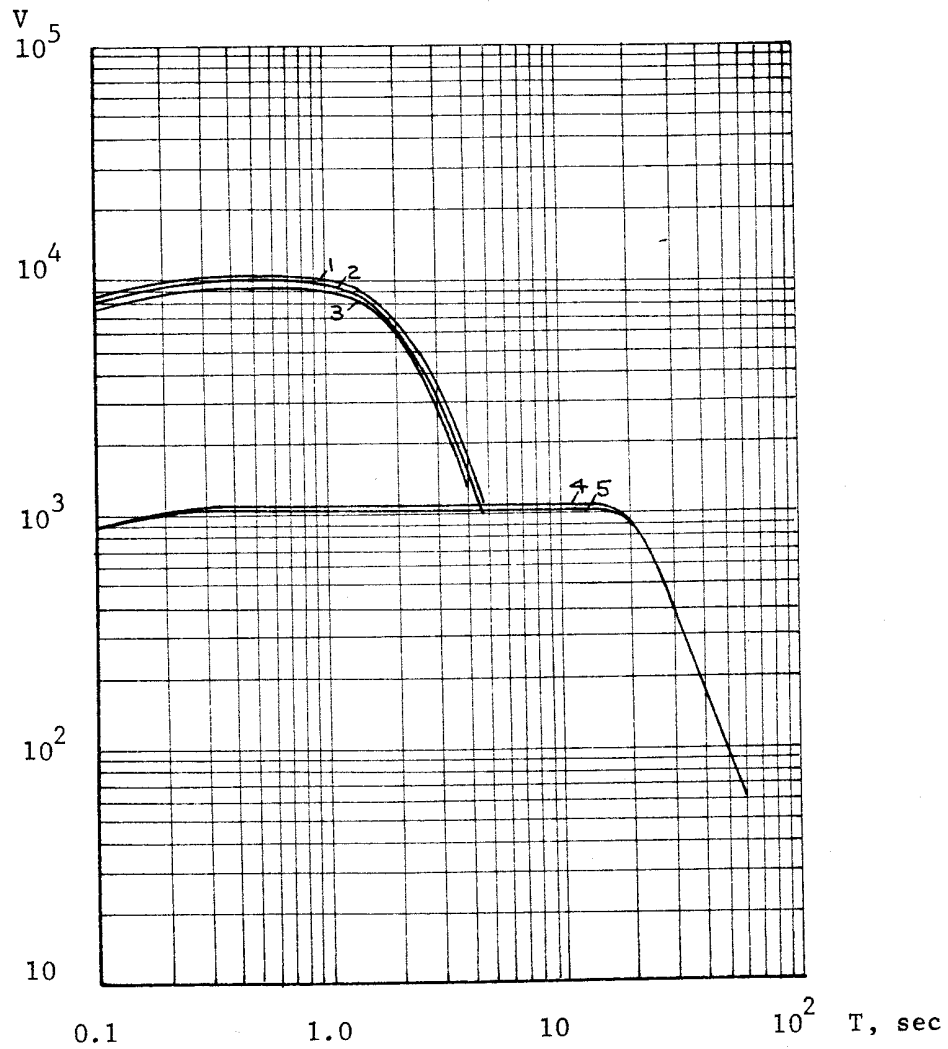


Fig. 71 -- Approximate magnification curves of seismographs at the Kosov station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (E-W)
- 2 -- SKM-3 (N-S)
- 3 -- SKM-3 (Z)
- 4 -- SKD (N-S, E-W)
- 5 -- SKD (Z)

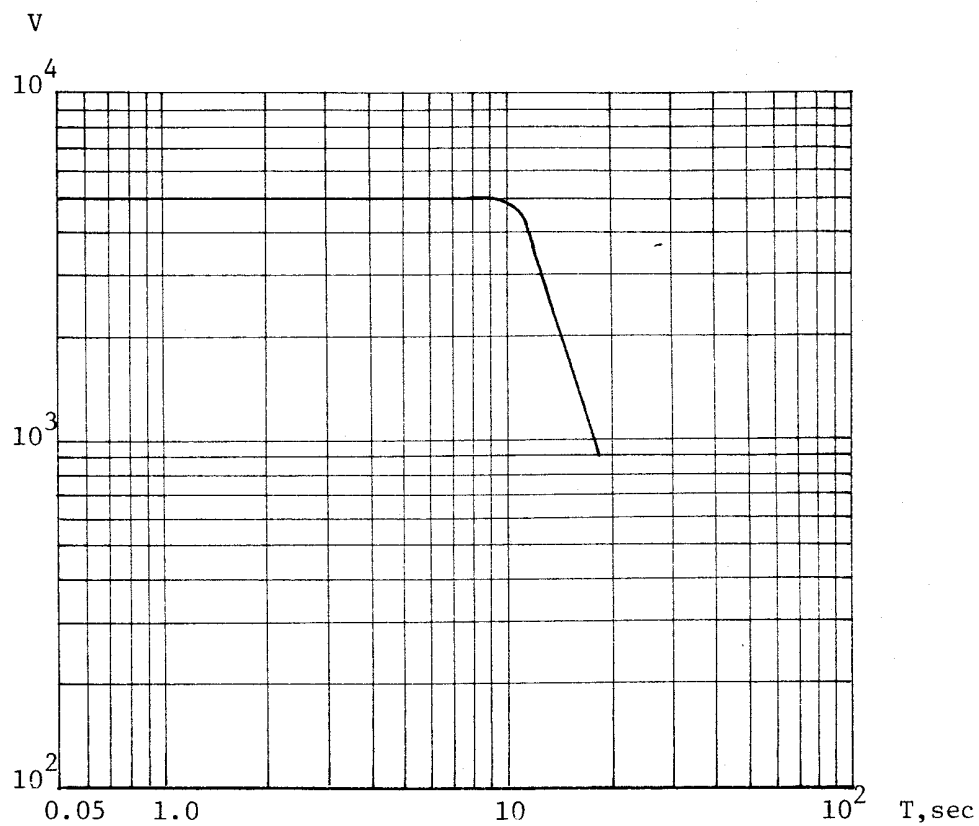


Fig. 72 -- Magnification curve of seismographs at the Kronoki station in 1969 [8]

VEGIK (N-S, E-W, Z)

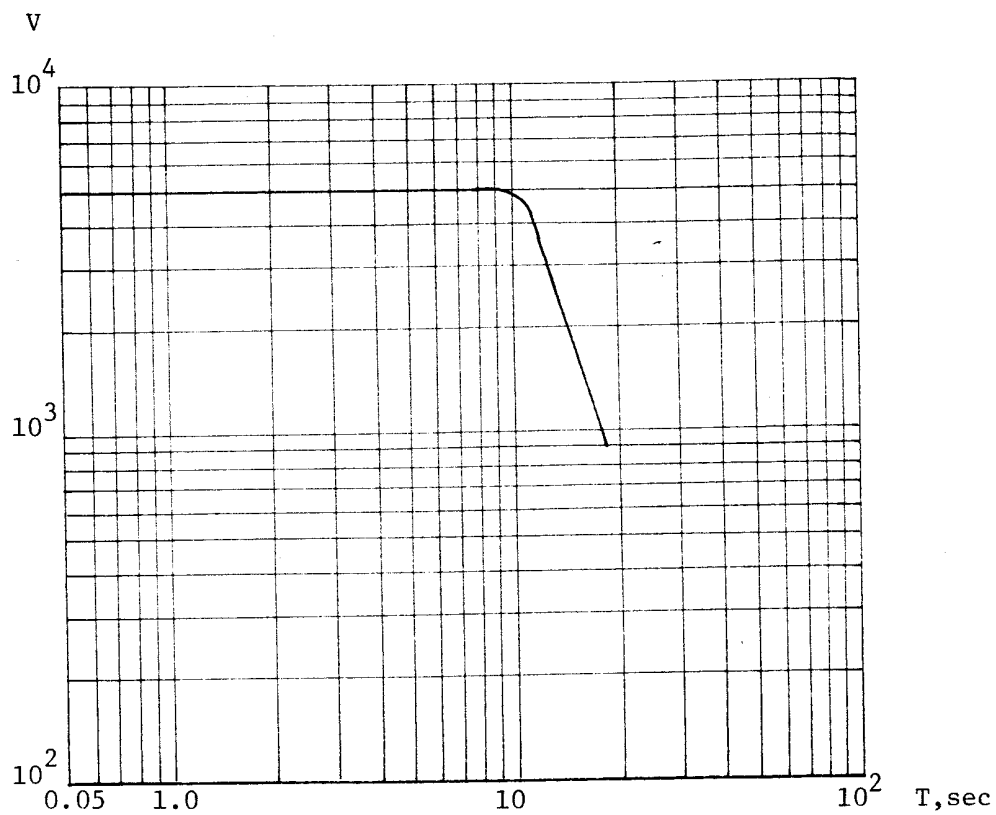


Fig. 73 -- Magnification curve of seismographs at the Krutoberegovo station in 1969 [8]

VEGIK (N-S, E-W, Z)

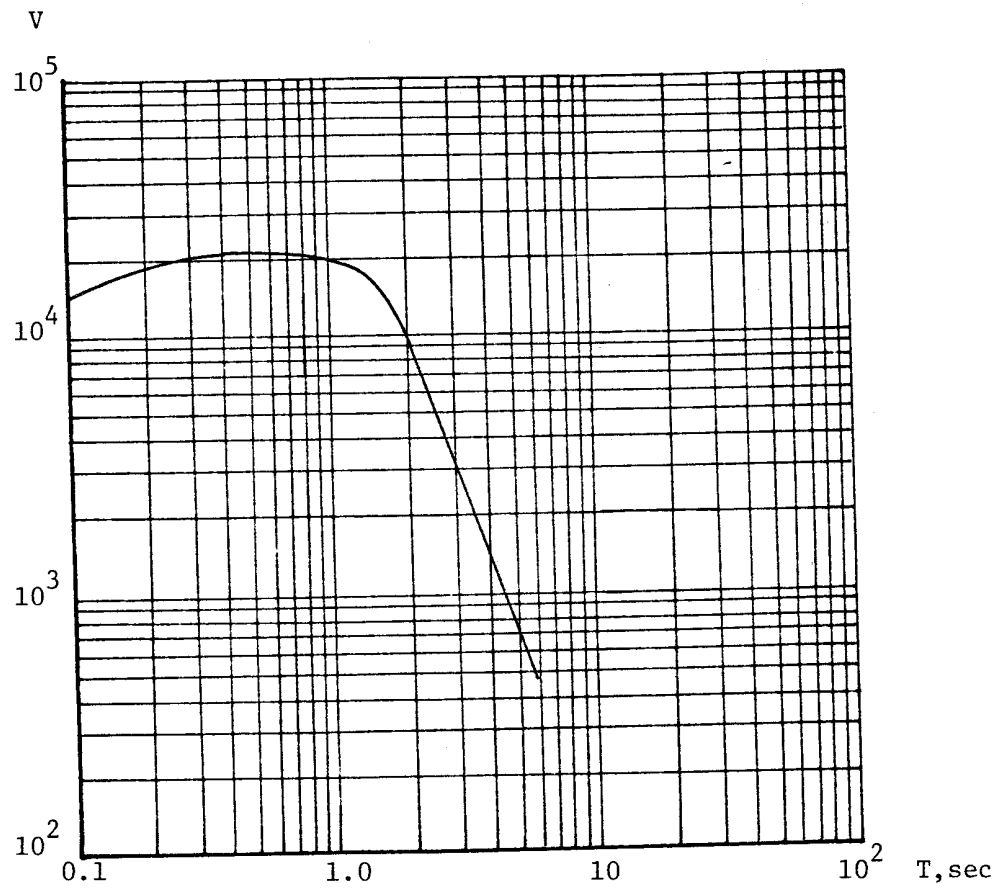


Fig. 74 -- Approximate magnification curve of seismographs at the Kulkuduk station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (N-S, E-W, Z)

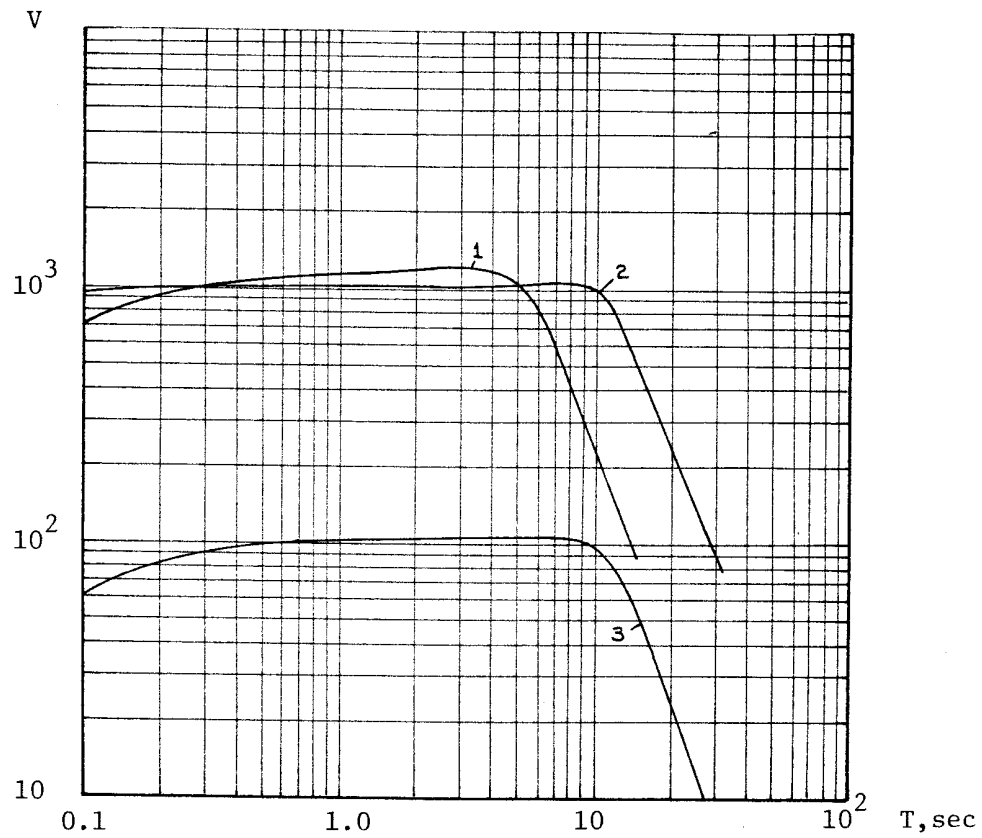


Fig. 75 -- Magnification curves of seismographs at the Kulyab station in 1970 [3]

- 1 -- SKM (Z)
- 2 -- SK (N-S, E-W)
- 3 -- SK-KPCh (N-S)

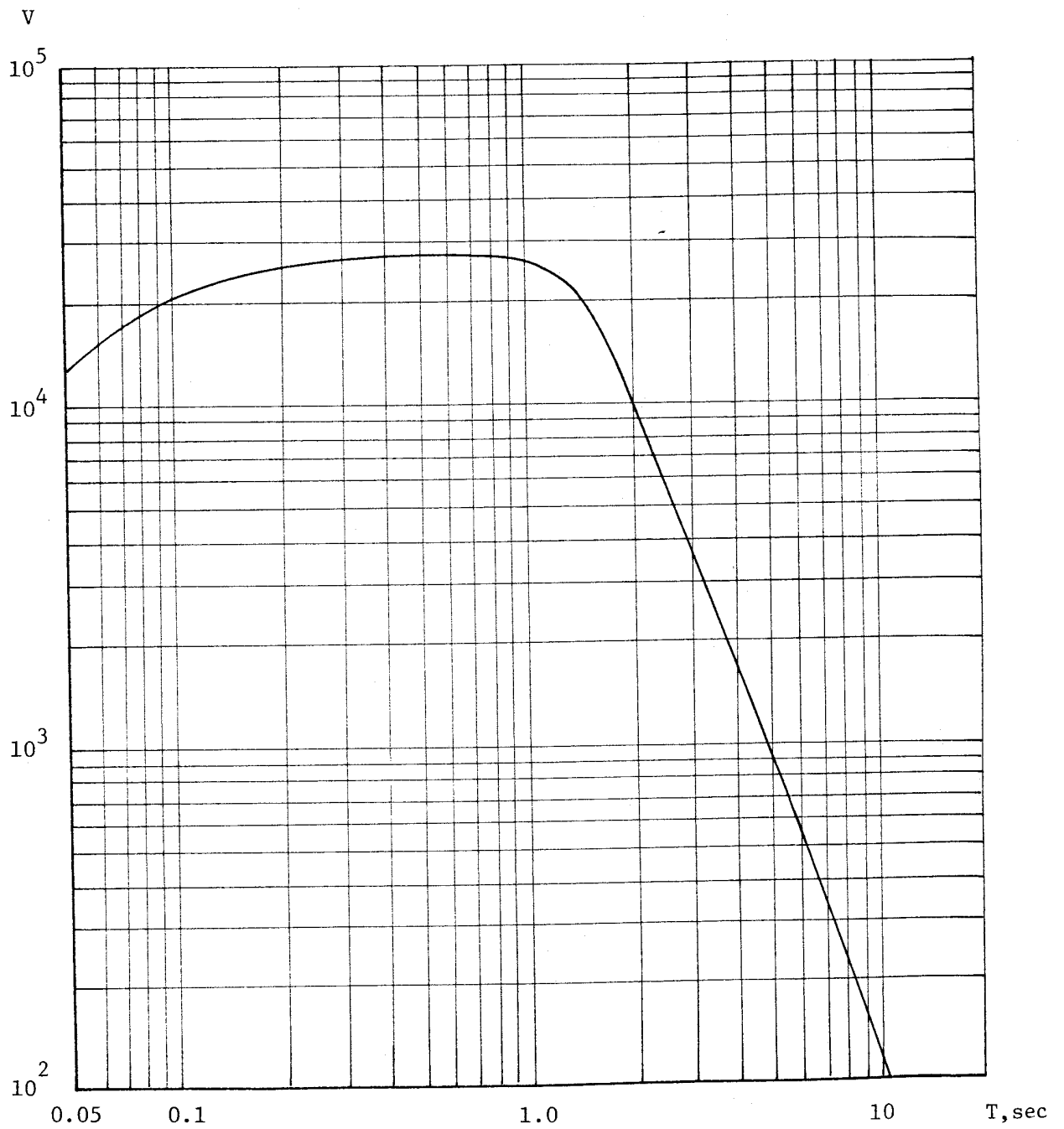


Fig. 76 -- Mean magnification curve of the three-component SKM-3 system at the Kumora station in 1969 [5].

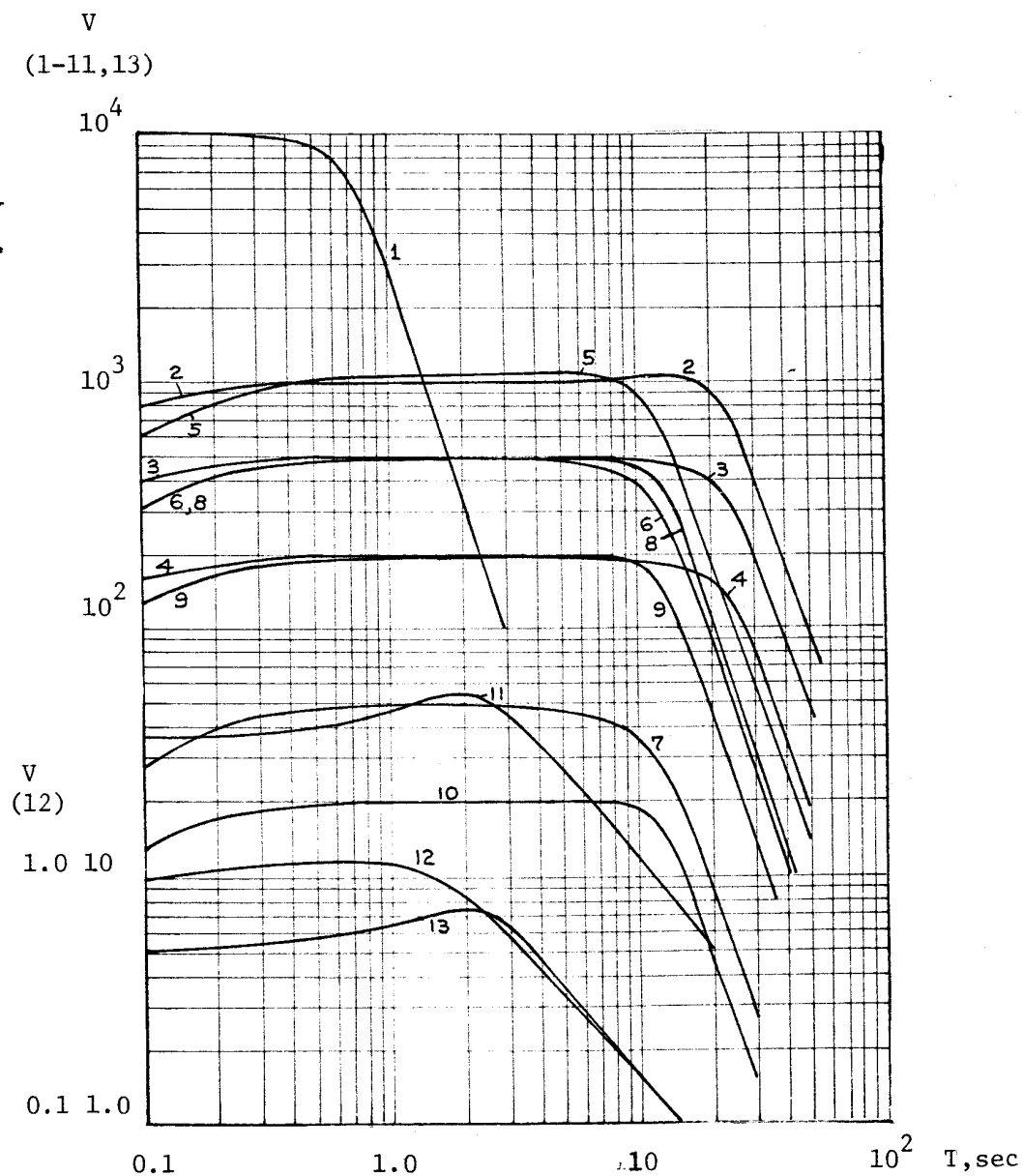


Fig. 77 -- Magnification curves of seismographs at the Kuril'sk station in 1970 [3]

- | | |
|----------------------|-------------------------|
| 1 -- VEGIK (Z) | 8 -- SK (N-S,E-W) |
| 2 -- SKD (N-S,E-W,Z) | 9 -- SK (N-S,E-W) |
| 3 -- SKD (N-S,E-W,Z) | 10 -- SK (N-S,E-W) |
| 4 -- SKD (N-S,E-W,Z) | 11 -- UBOPE-2 (N-S,E-W) |
| 5 -- SK (Z) | 12 -- SMR-3 (N-S) |
| 6 -- SK (Z) | 13 -- SMR-3 (N-S,E-W) |
| 7 -- SK (Z) | |

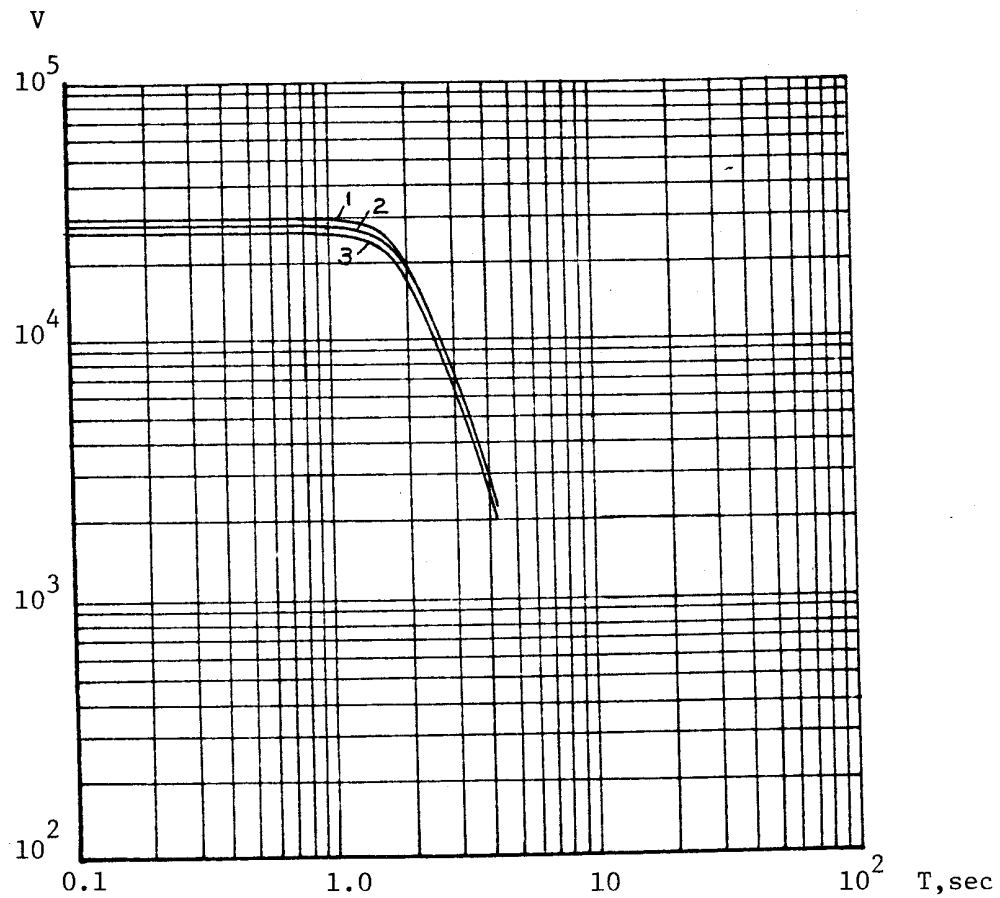


Fig. 78 -- Approximate magnification curves of seismographs at the Kurmenty station in 1968 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (Z)
- 2 -- SKM-3 (N-S)
- 3 -- SKM-3 (E-W)

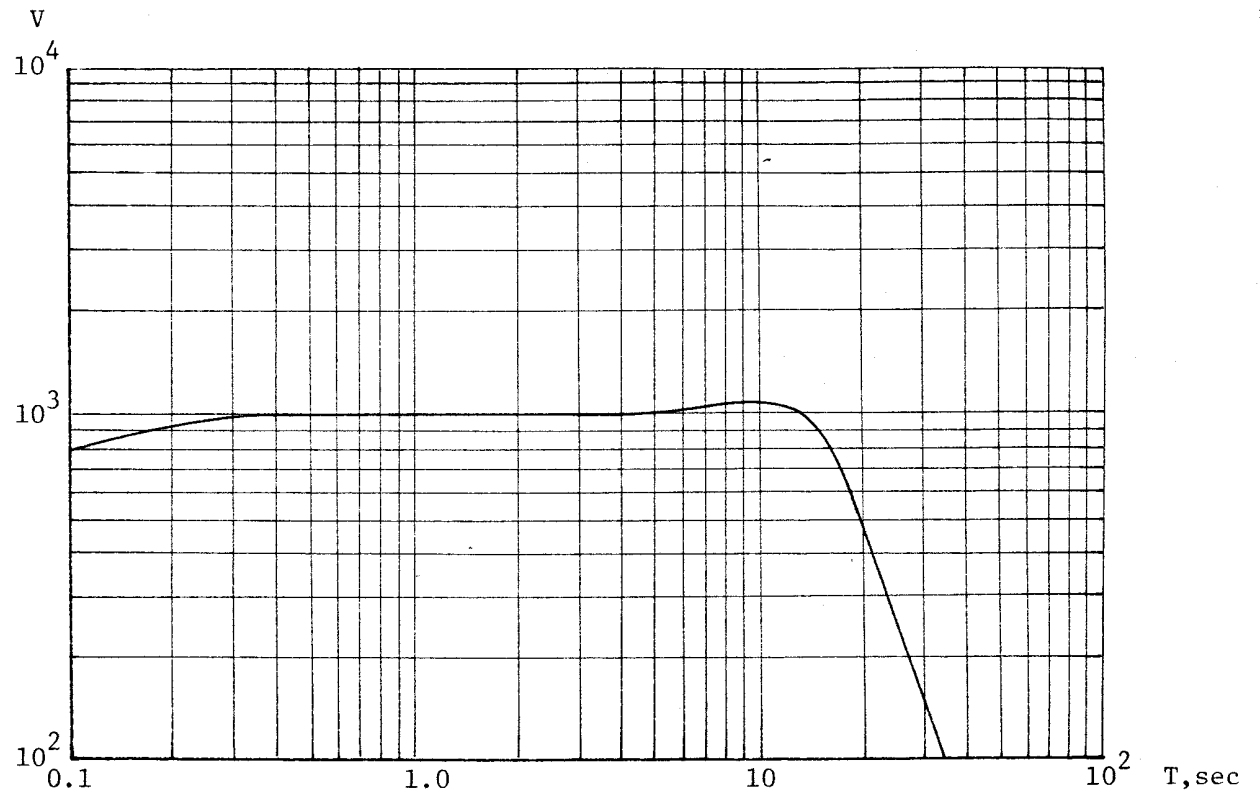


Fig. 79 -- Mean magnification curve of the three-component SKD system at the Kyakhta station in 1969 [5]

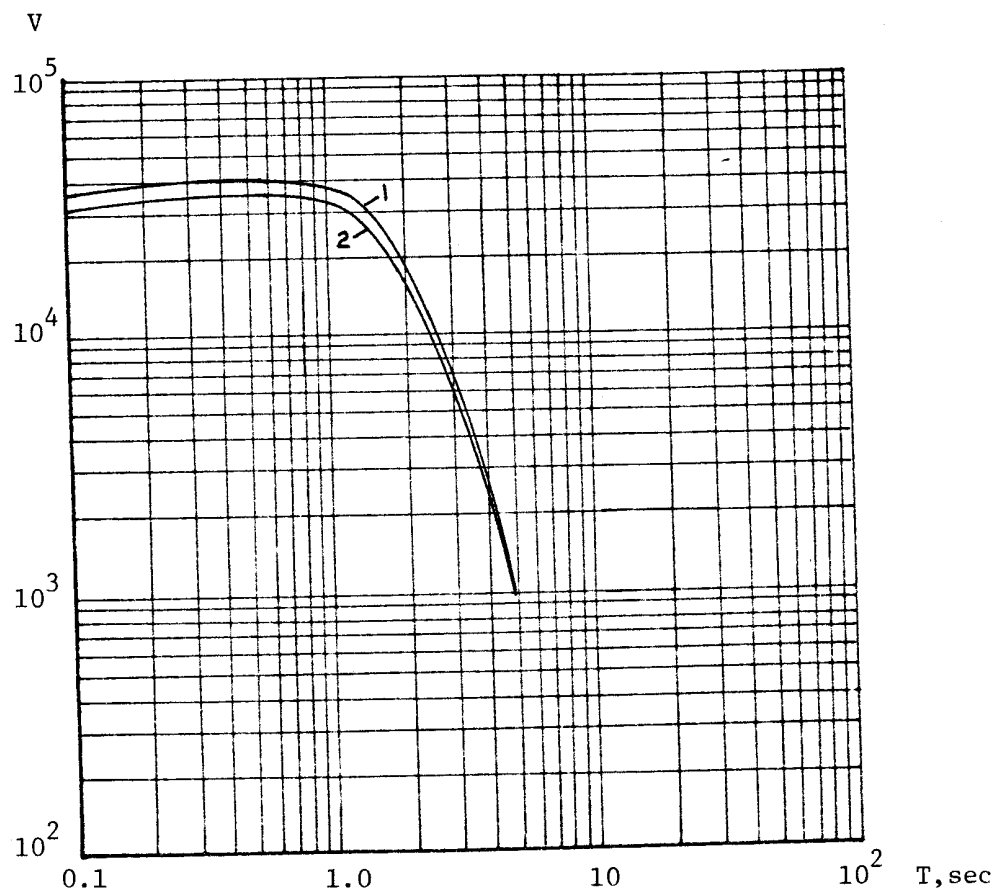


Fig. 80 -- Approximate magnification curves of seismographs at the Kzyl-Agach station in 1968 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (Z)
- 2 -- SKM-3 (N-S, E-W)

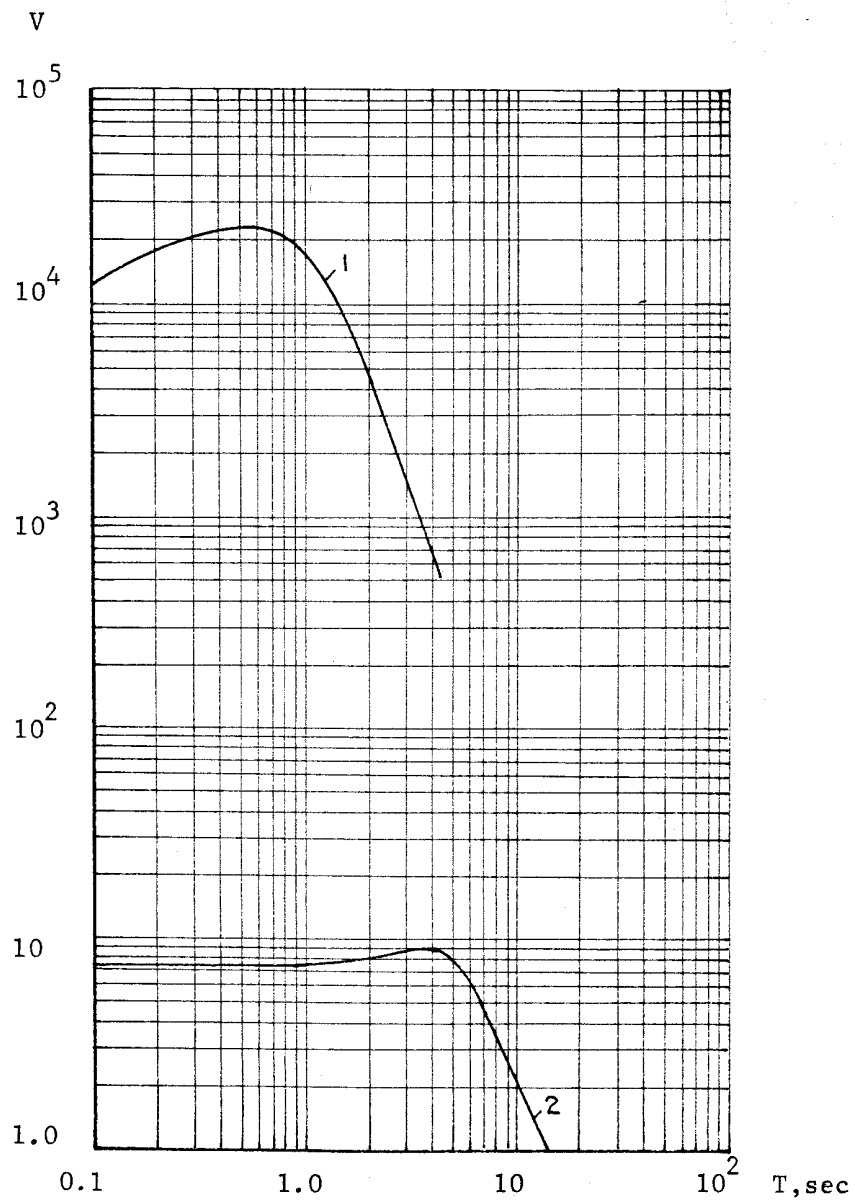


Fig. 81 -- Approximate magnification curves of seismographs at the Lagodekhi station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (Z)
- 2 -- SMTR (N-S, E-W)

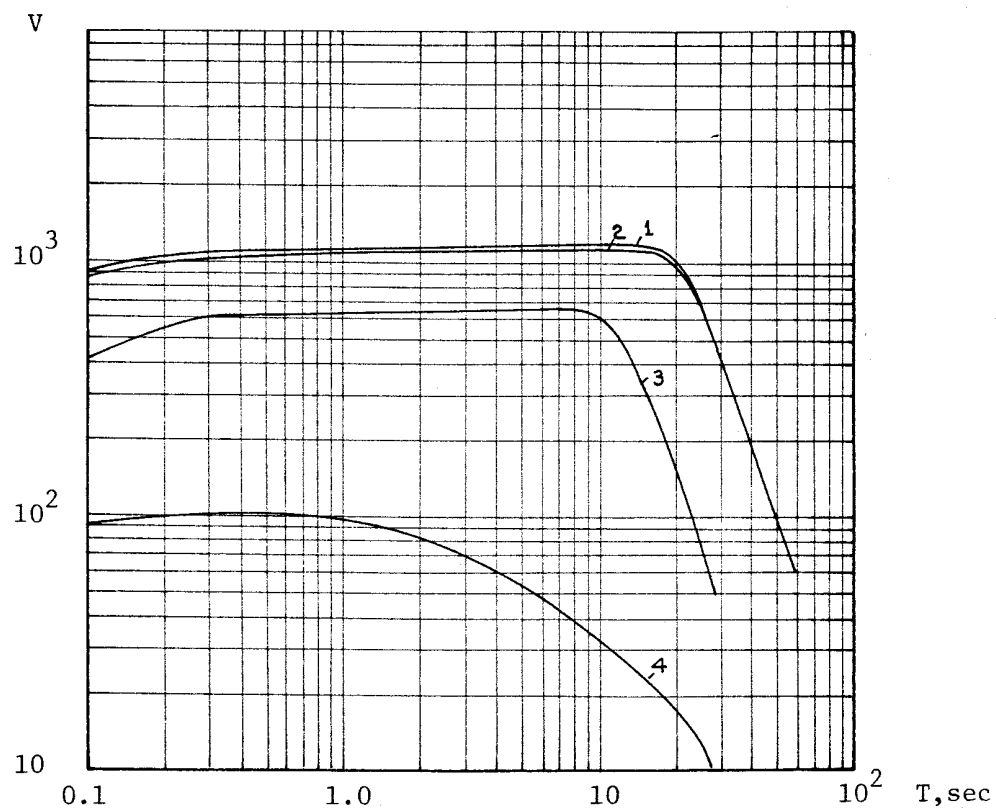


Fig. 82 -- Magnification curves of seismographs at the L'vov station in 1970 [3]

- 1 -- SKD (E-W)
- 2 -- SKD (N-S, Z)
- 3 -- SK (Z)
- 4 -- SKD-KPCh (N-S, E-W, Z)

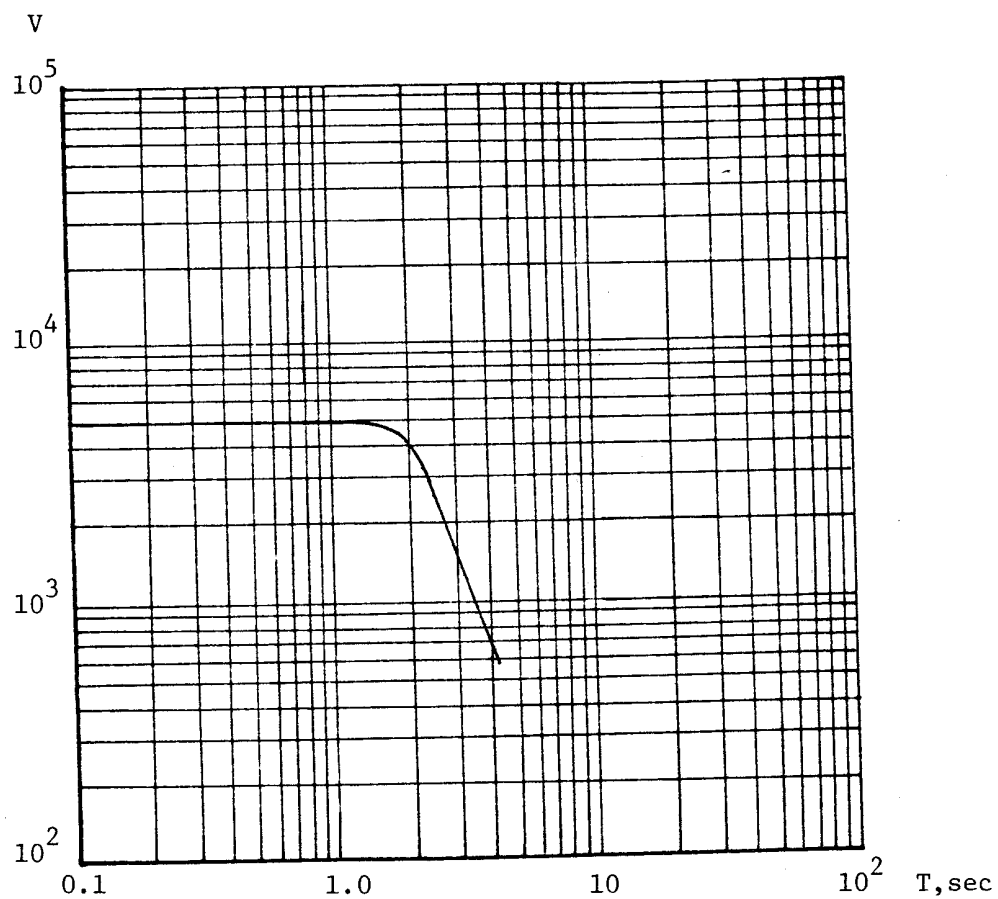


Fig. 83 -- Approximate magnification curve of seismographs at the Lyangar station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (Z)

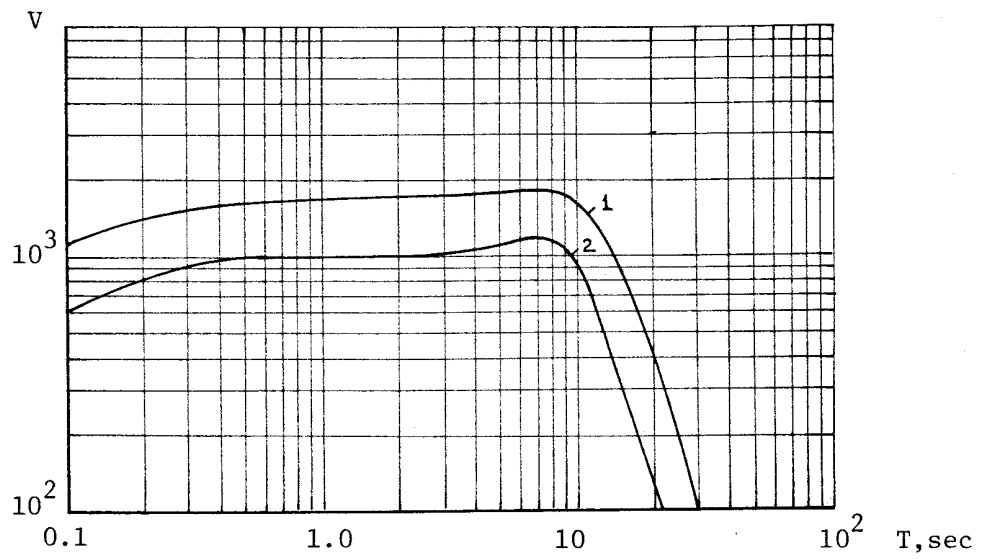


Fig. 84 -- Magnification curves of seismographs at the Magadan station in 1970 [3]

- 1 -- SK (N-S, E-W)
- 2 -- SK (Z)

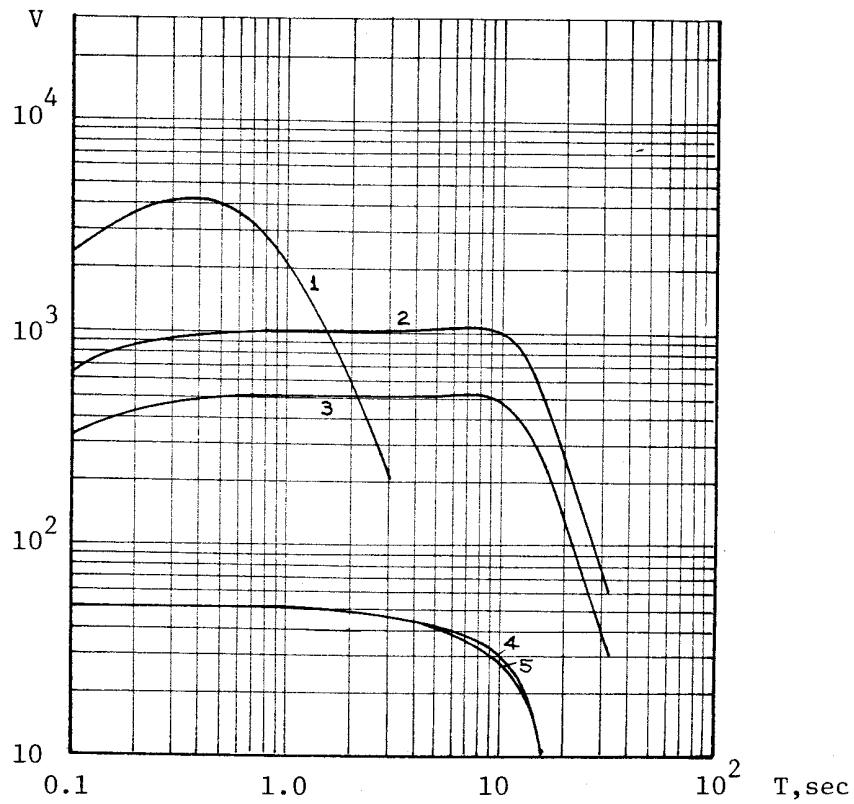


Fig. 85 -- Magnification curves of seismographs at the Makhachkala station in 1969-1970 [2]

- 1 -- SKh (E-W)
- 2 -- SK (N-S, E-W)
- 3 -- SK (N-S, E-W, Z)
- 4 -- SK-KPCh (Z)
- 5 -- SK-KPCh (N-S, E-W)

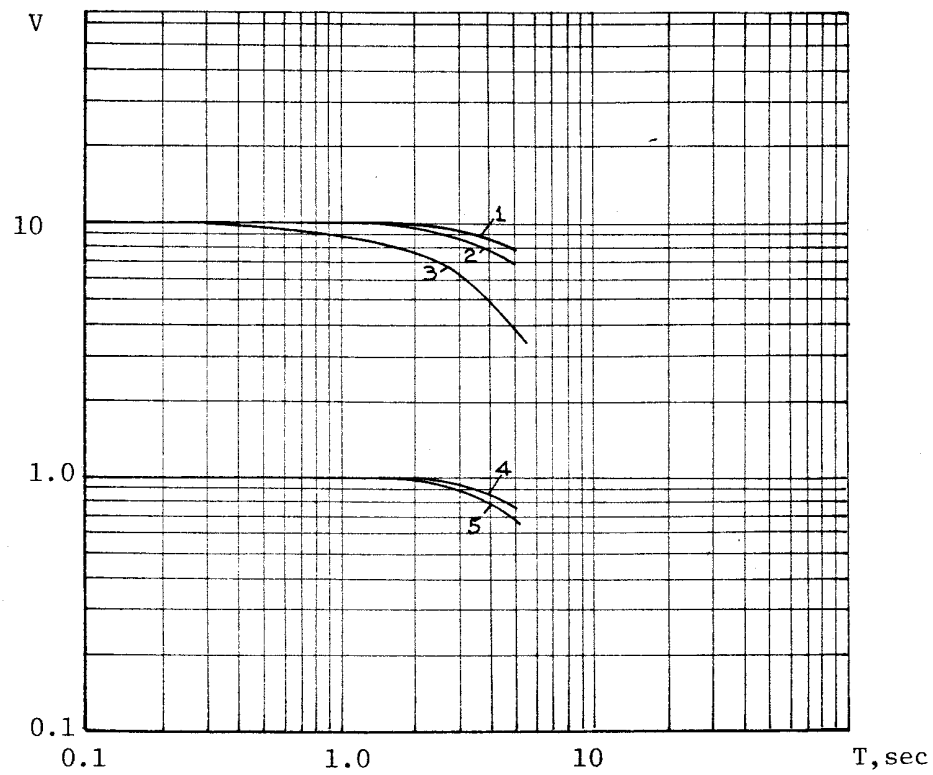


Fig. 86 -- Magnification curves of strong-motion instruments at the Makhachkala station in 1970 [3]

- 1 -- S5S (E-W)
- 2 -- S5S (Z)
- 3 -- S5S (N-S)
- 4 -- S5S (E-W)
- 5 -- S5S (N-S)

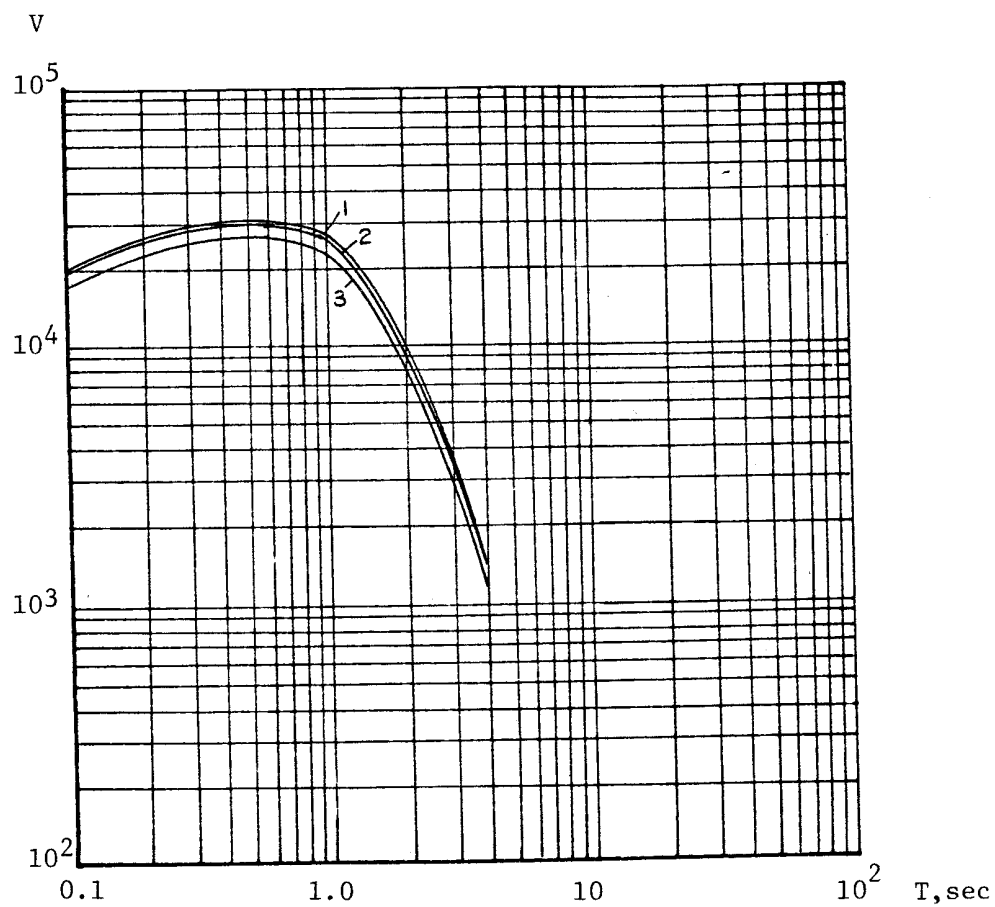


Fig. 87 -- Approximate magnification curves of seismographs at the Mezghor'ye station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (N-S)
- 2 -- SKM-3 (E-W)
- 3 -- SKM-3 (Z)

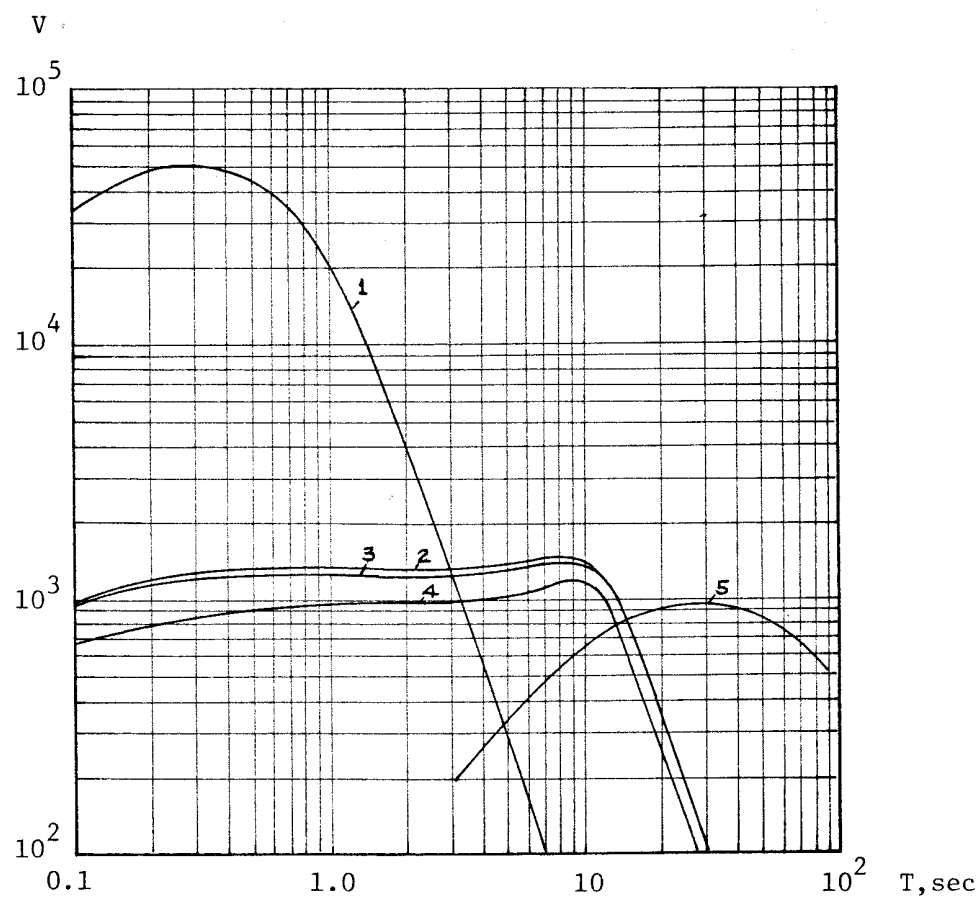


Fig. 88 -- Magnification curves of seismographs at the Mirnyy station in 1970 [3]

- 1 -- SKM-3 (Z)
- 2 -- SK (N-S)
- 3 -- SK (E-W)
- 4 -- SK (Z)
- 5 -- SD-1 (Z)

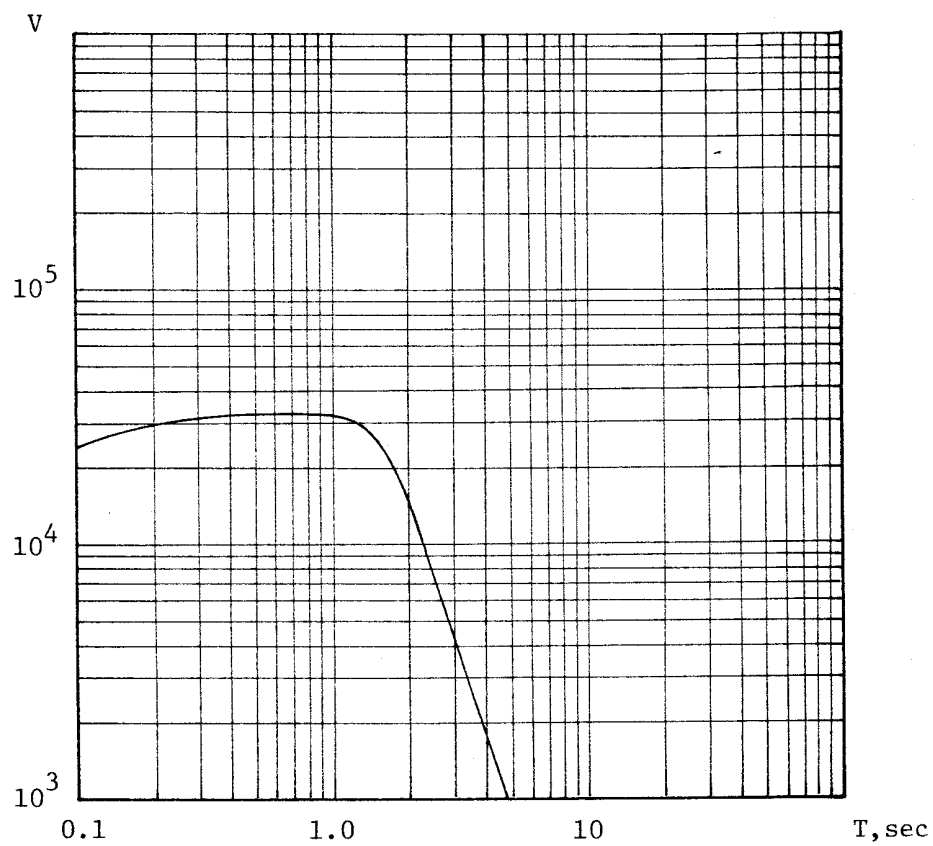


Fig. 89 -- Magnification curves of seismographs at the Mondy station in 1970 [3]

SKM-3 (N-S,E-W,Z)

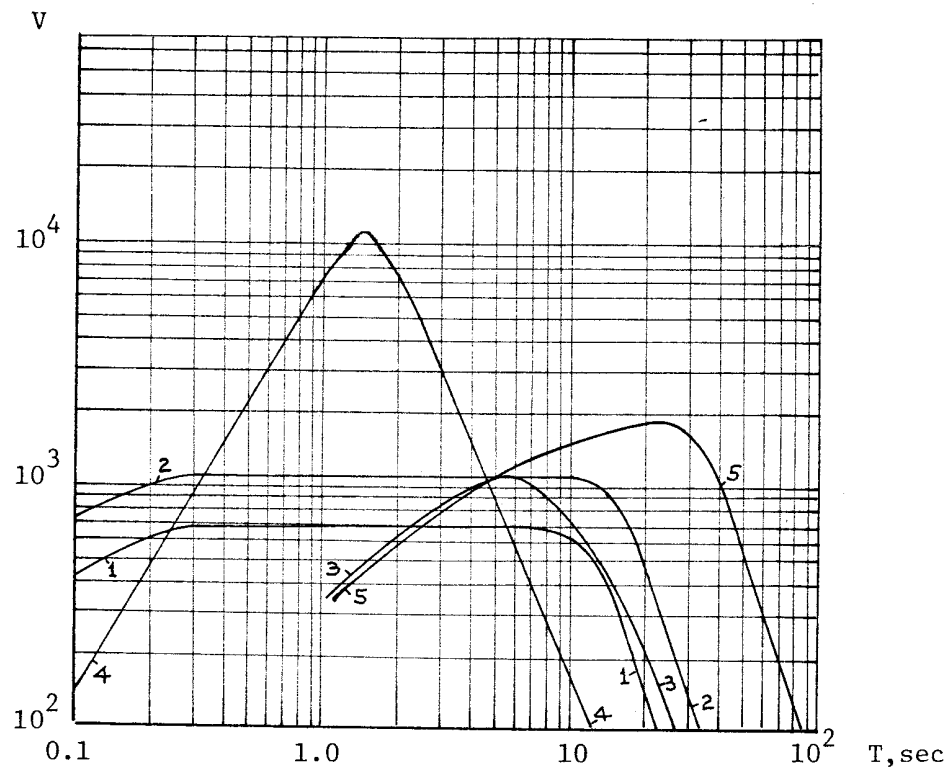


Fig. 90 -- Magnification curves of seismographs at the Moskva station in 1963 [7]

- 1 -- SK (45° N-E, 45° S-E)
- 2 -- SK (Z)
- 3 -- SG (N-S, E-W, Z)
- 4 -- SKh (Z)
- 5 -- SKD+M21/3 (Z)

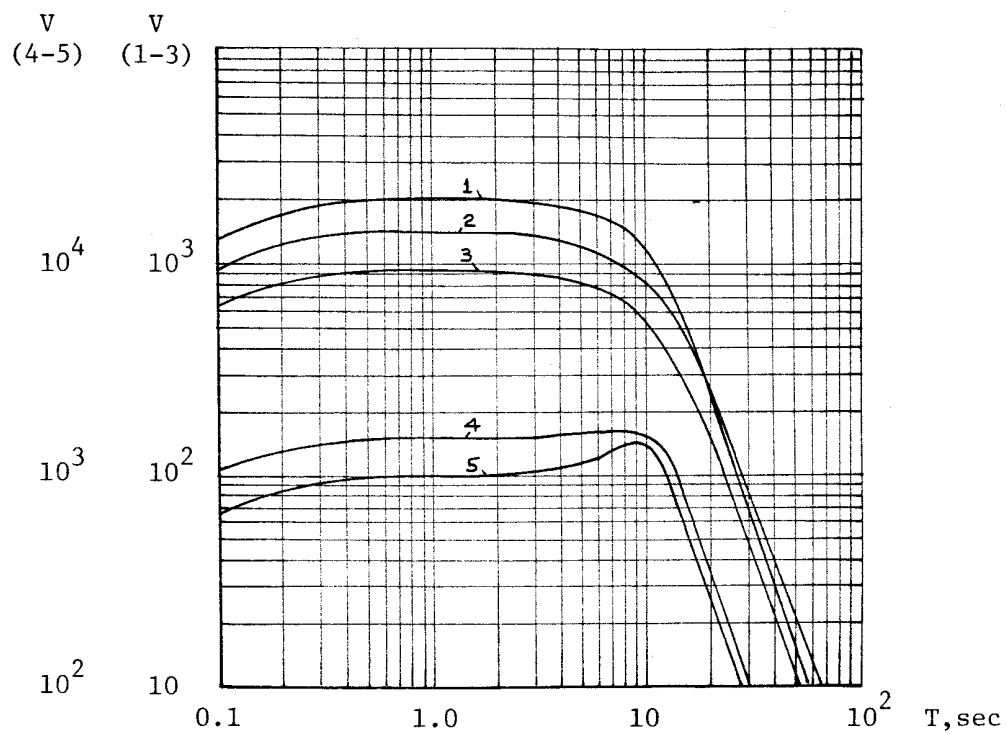


Fig. 91 -- Magnification curves of seismographs at the Murgab station in 1969 and 1970 [2]

- 1 -- SK (N-S)
- 2 -- SK (E-W)
- 3 -- SK (Z)
- 4 -- SK (N-S, E-W)
- 5 -- SK (Z)

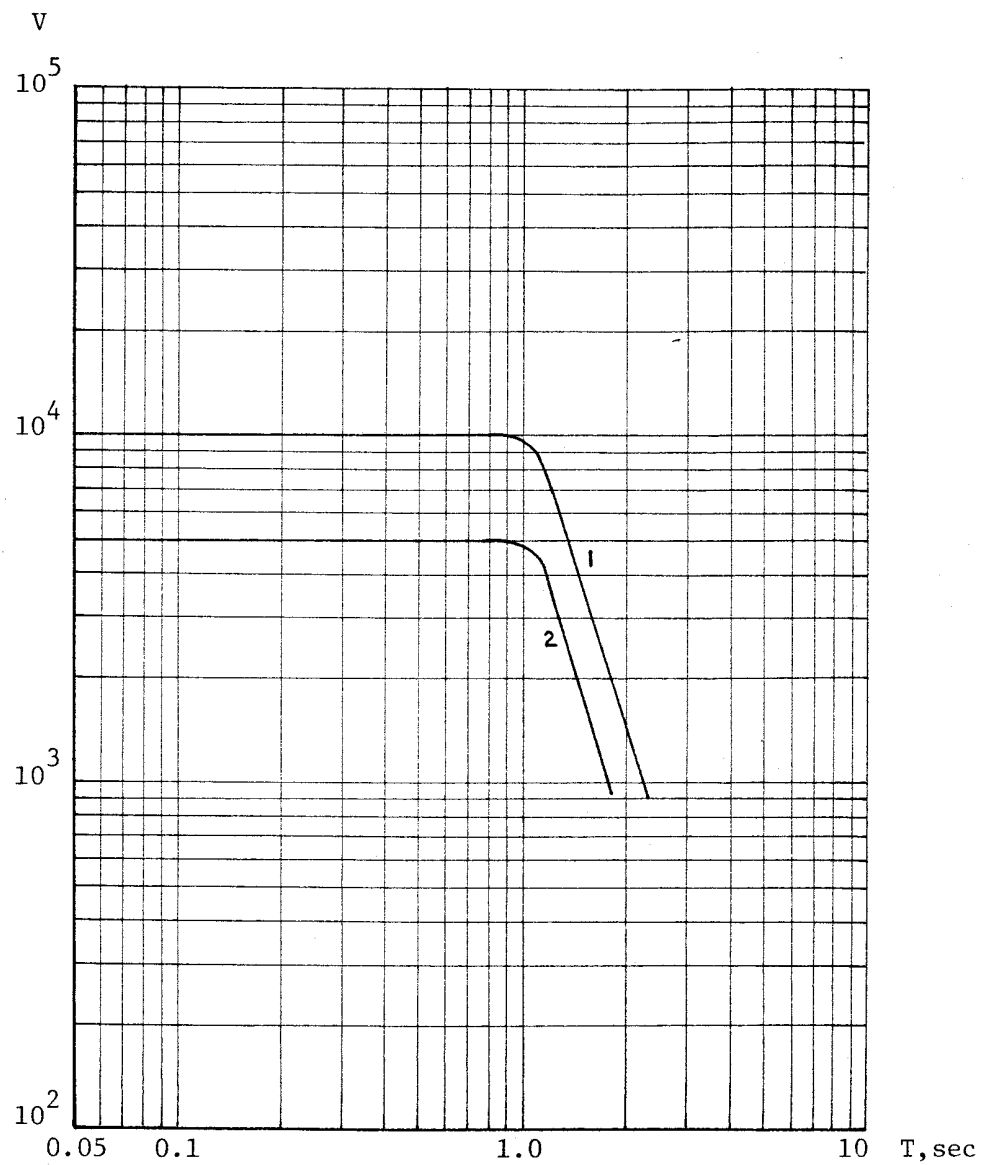


Fig. 92 -- Magnification curves of seismographs at the Mys Shipunskiy station in 1969 [8]

- 1 -- VEGIK (Z)
- 2 -- VEGIK (N-S, E-W)

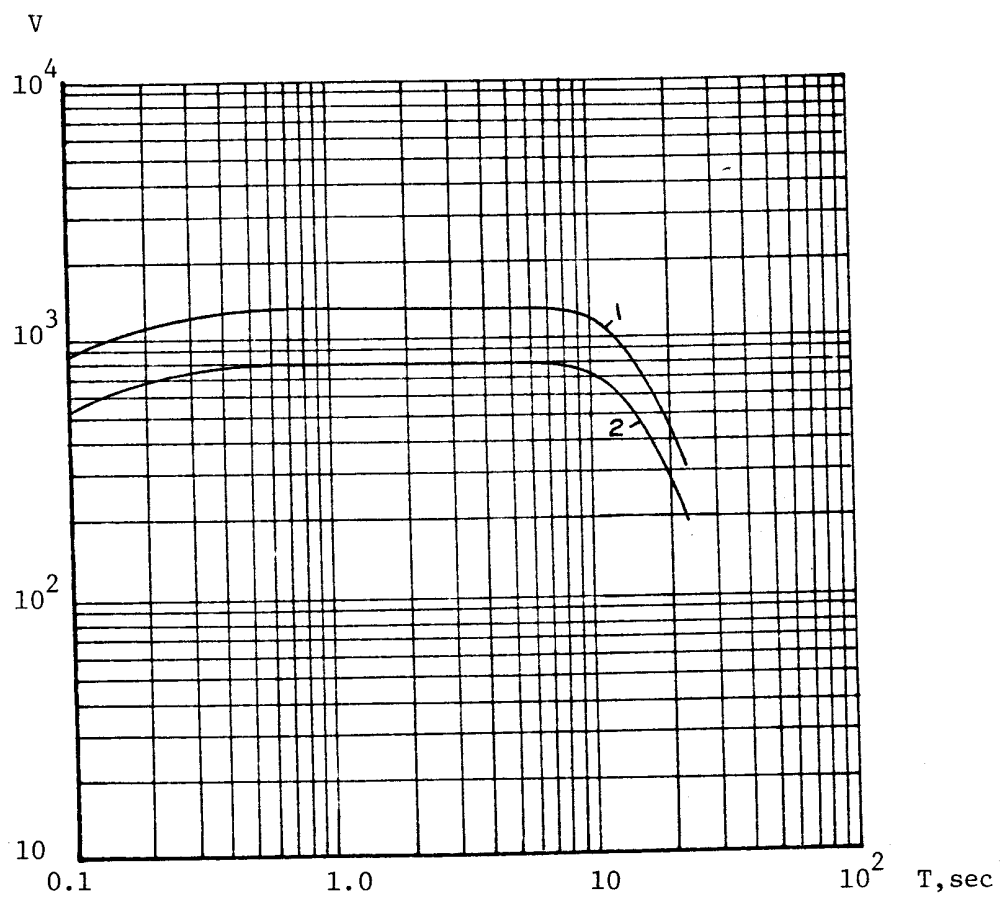


Fig. 93 -- Approximate magnification curves of seismographs at the Nakhichevan' station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SK (N-S, E-W)
- 2 -- SK (Z)

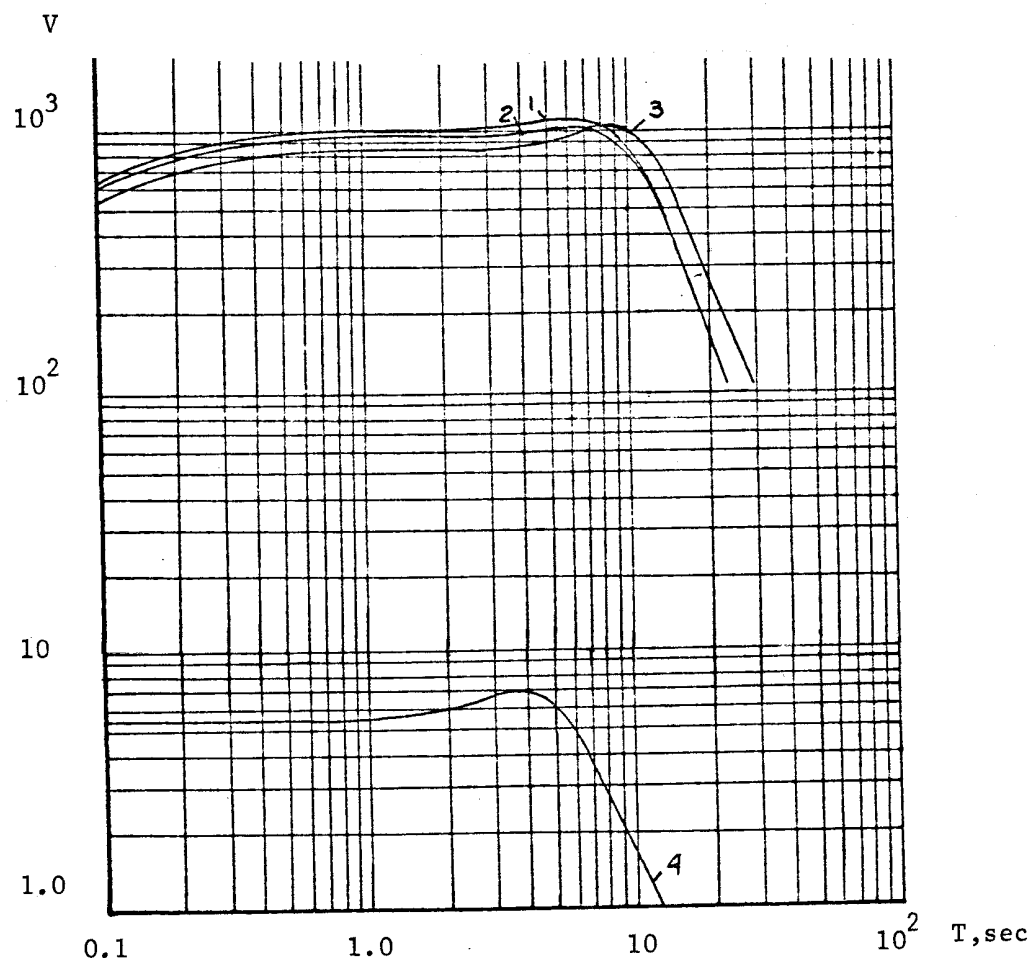


Fig. 94 -- Approximate magnification curves of seismographs at the Namangan station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SK (N-S)
- 2 -- SK (E-W)
- 3 -- SK (Z)
- 4 -- SMTR (N-S, E-W)

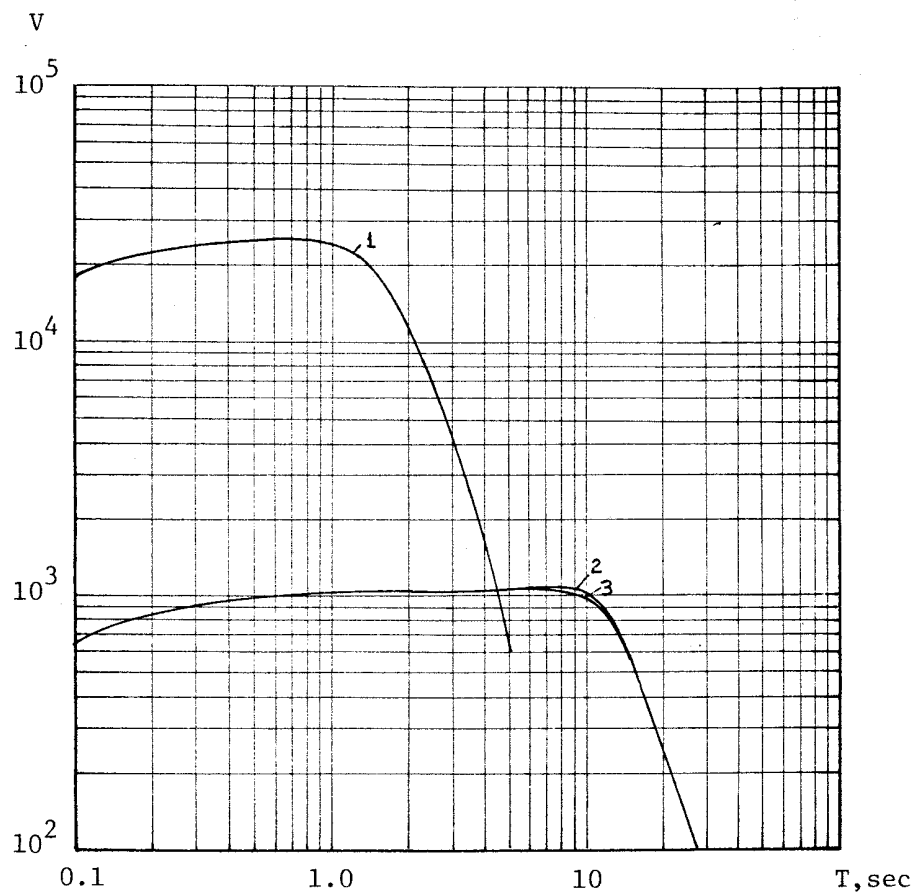


Fig. 95 -- Magnification curves of seismographs at the Naryn station in 1970 [3]

- 1 -- SKM-3 (N-S, E-W, Z)
- 2 -- SK (Z)
- 3 -- SK (N-S, E-W)

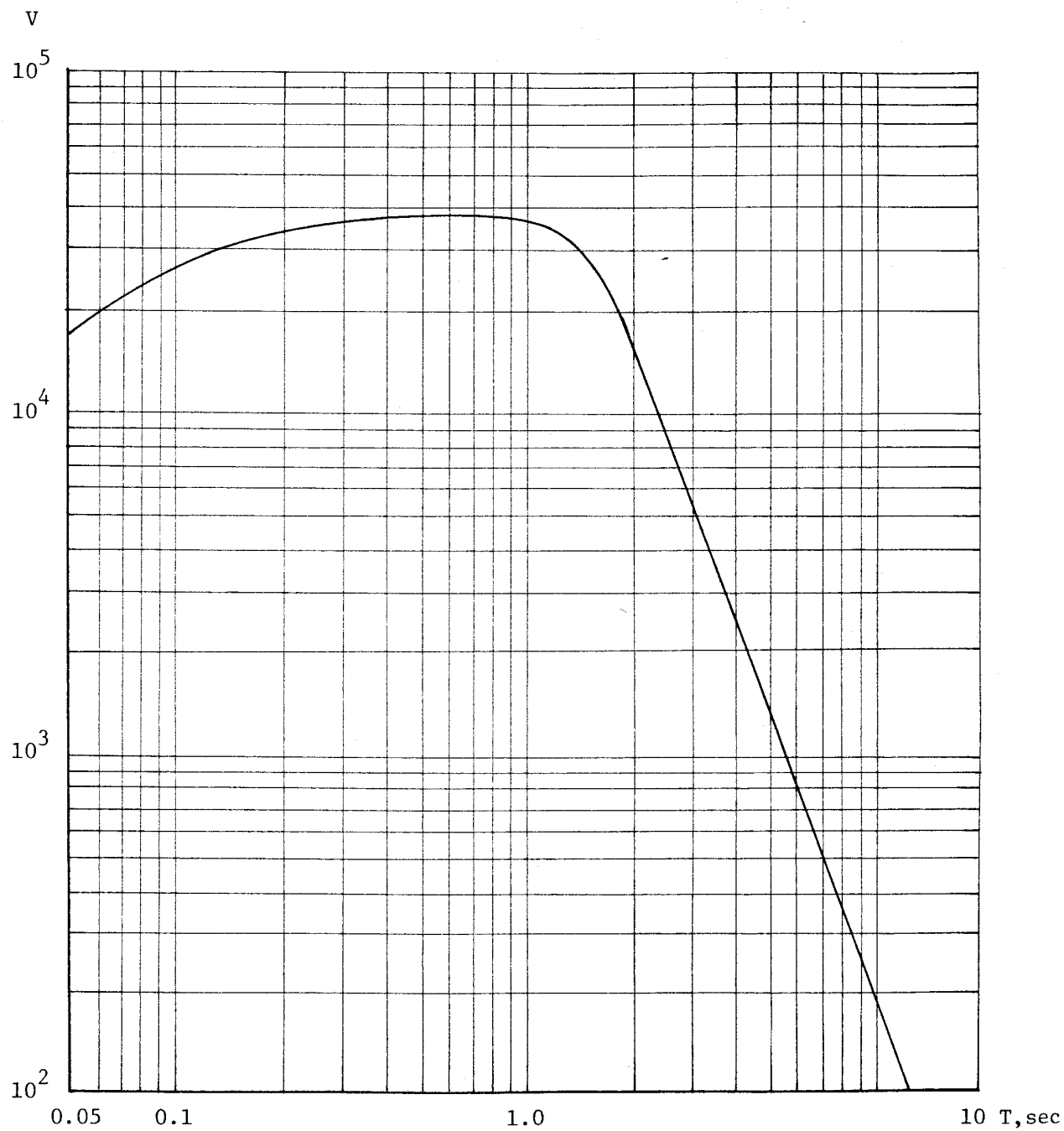


Fig. 96 -- Mean magnification curve of the three-component SKM-3 system at the Nelyaty station in 1969 [5]

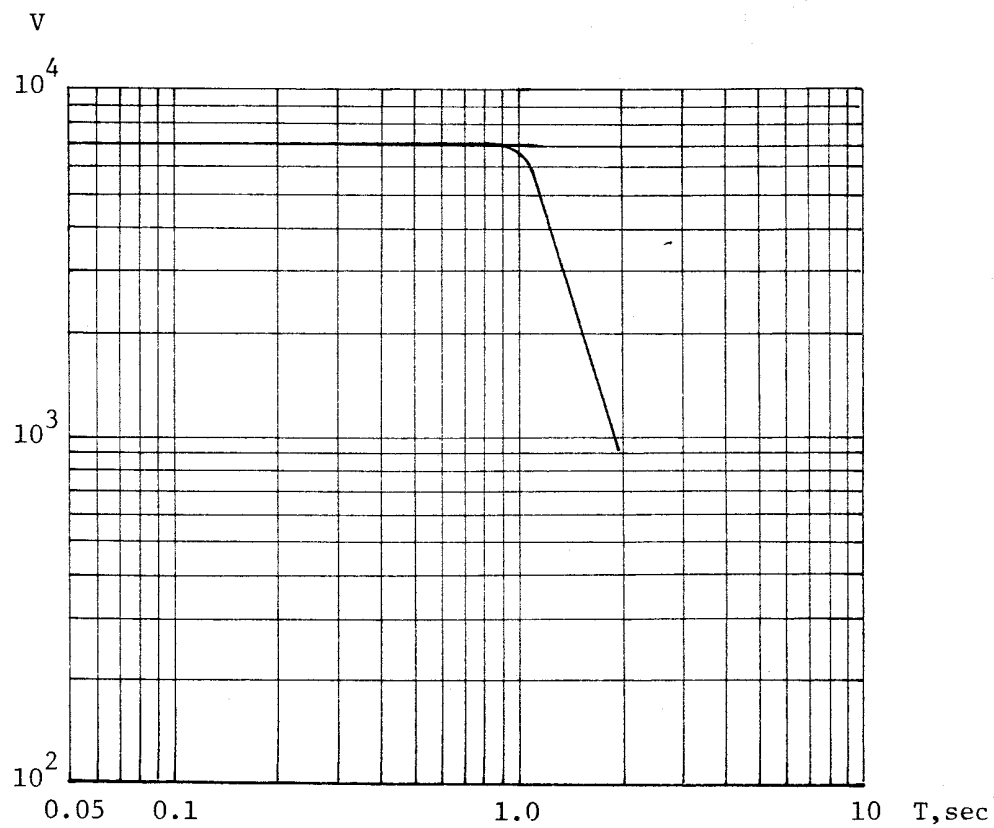


Fig. 97 -- Magnification curves of seismographs at the Nikol'skoye station in 1969 [8]

VEGIK (N-S, E-W, Z)

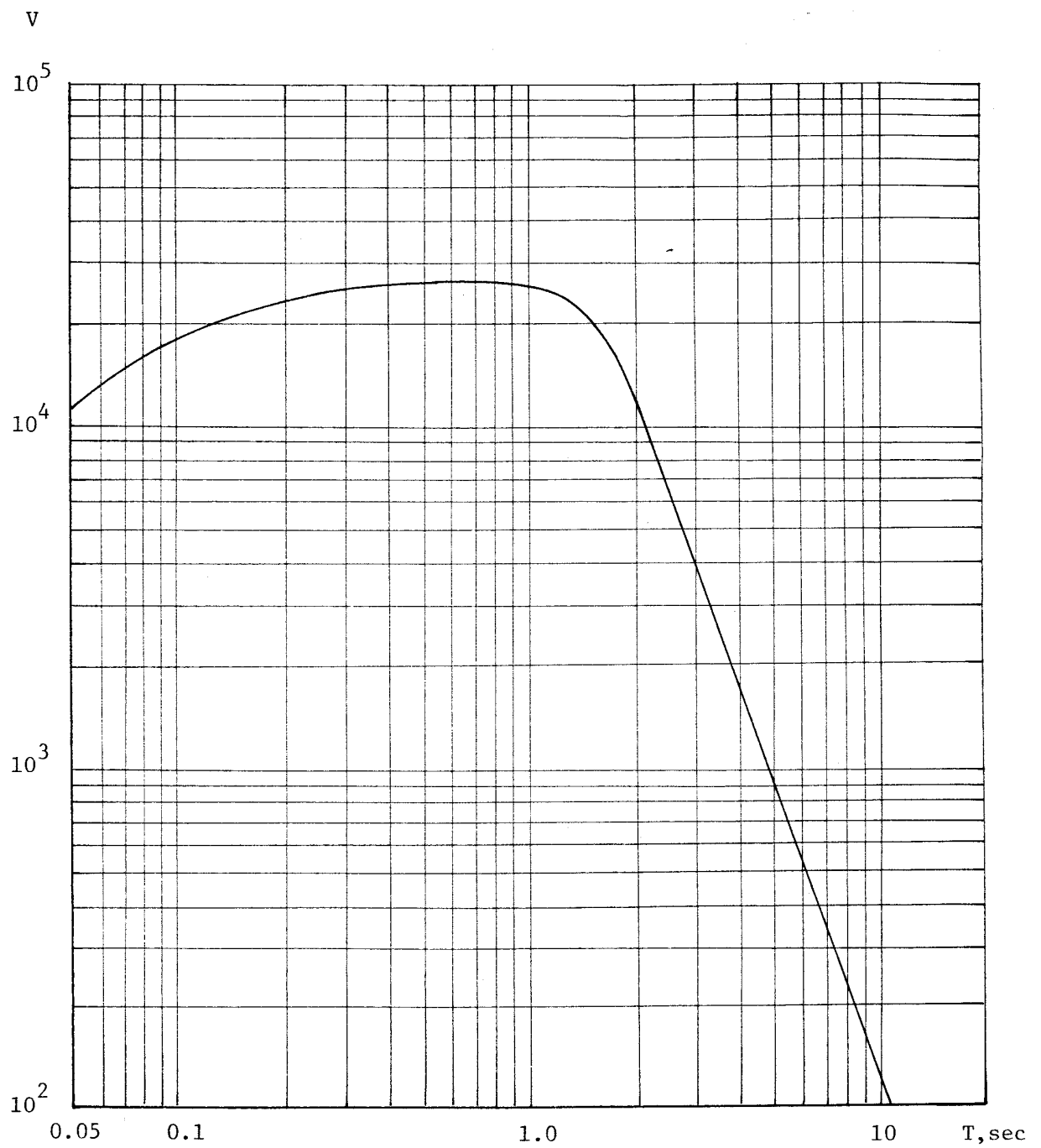


Fig. 98 -- Mean magnification curve of the three-component SKM system at the Nizhneangarsk station in 1969 [5]

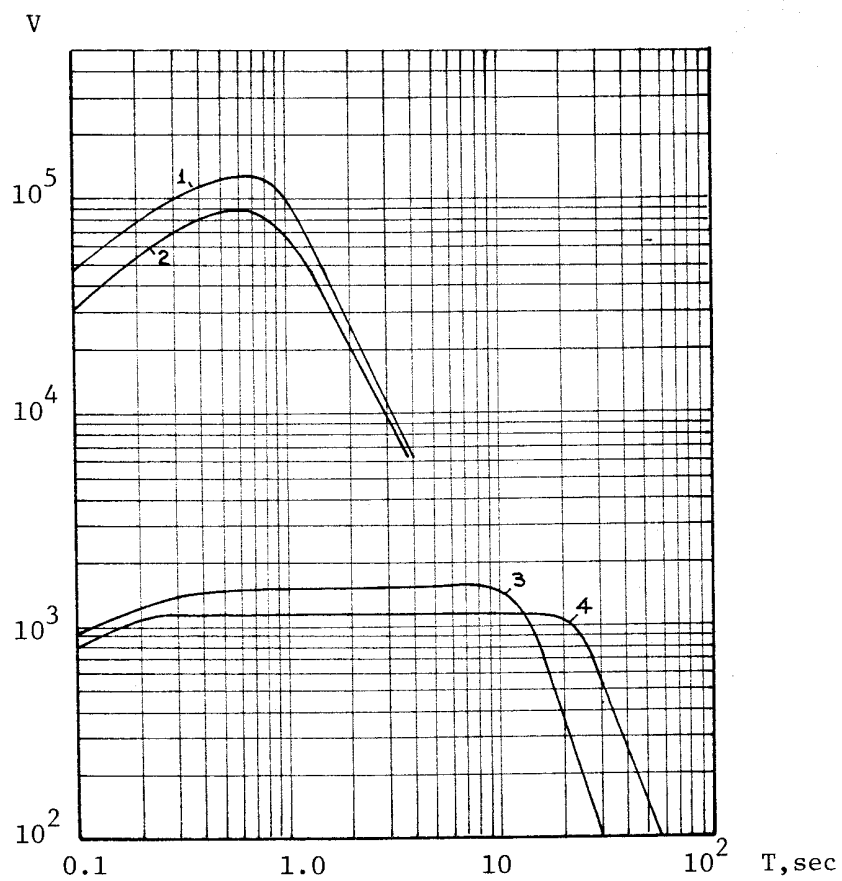


Fig. 99 -- Magnification curves of seismographs at the Novolazarevskaya station in 1969 and 1970 [2]

- 1 -- USF (N-S, E-W)
- 2 -- USF (Z)
- 3 -- SK (N-S, E-W)
- 4 -- SKD (Z)

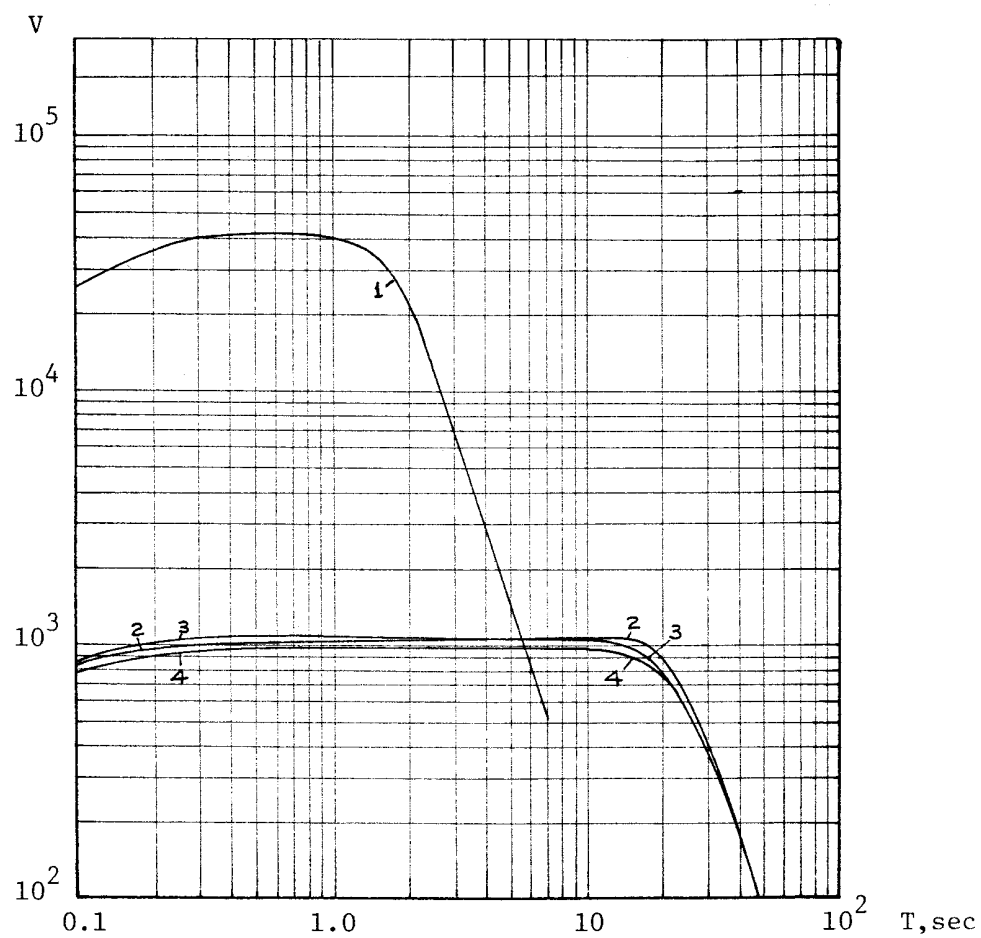


Fig. 100 -- Magnification curves of seismographs at the Novosibirsk station in 1970 [3]

- 1 -- SKM-3 (N-S,E-W,Z)
- 2 -- SKD (Z)
- 3 -- SKD (E-W)
- 4 -- SKD (N-S)

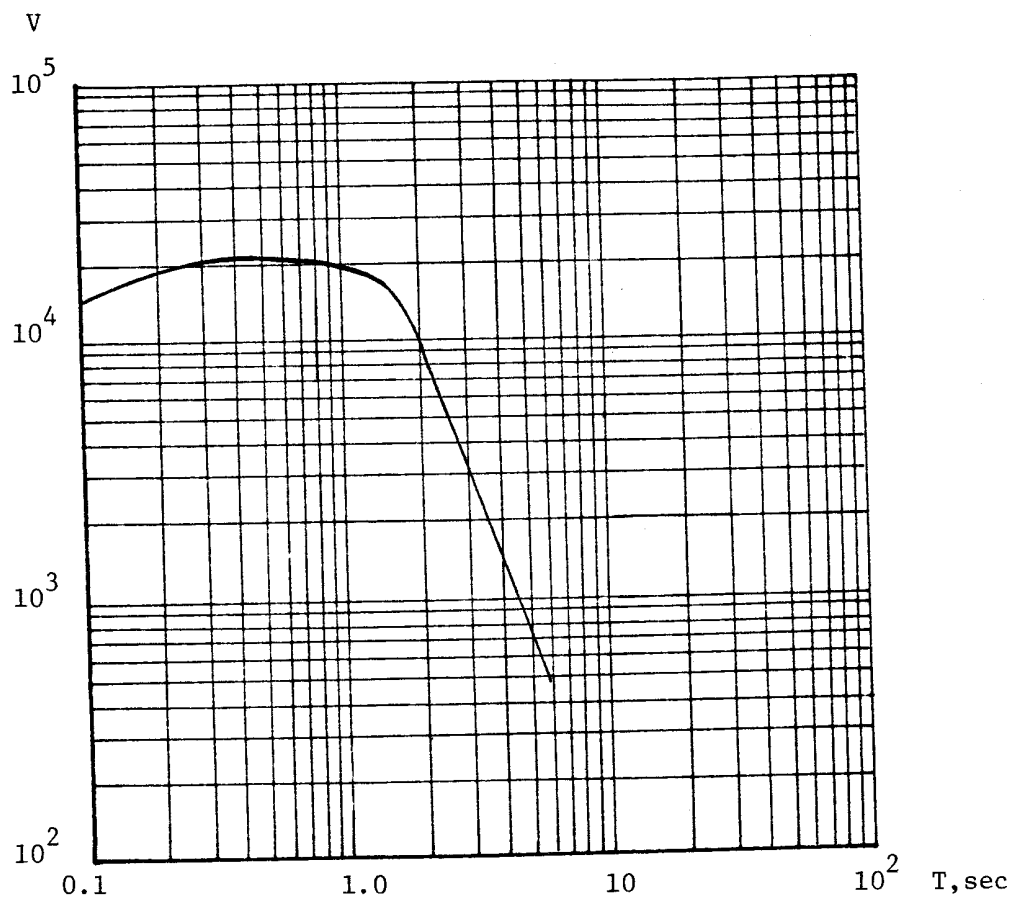


Fig. 101 -- Approximate magnification curves of seismographs at the Nurata station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (N-S, E-W, Z)

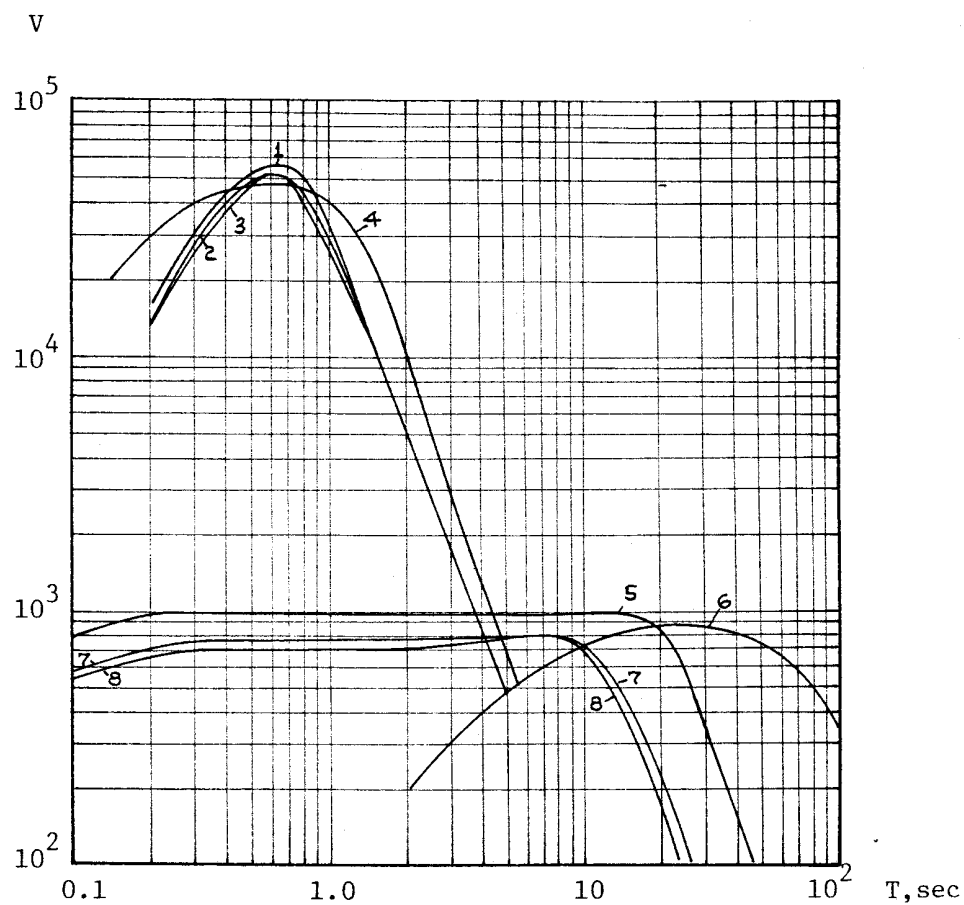


Fig. 102 -- Magnification curves of seismographs at the Obninsk station in 1970 [3]

- 1 -- Benioff (N-S)
- 2 -- Benioff (E-W)
- 3 -- Benioff (Z)
- 4 -- SKM-3 (N-S, E-W, Z)
- 5 -- SKD (N-S, E-W, Z)
- 6 -- Press-Ewing (N-S, E-W, Z)
- 7 -- SK (N-S, E-W)
- 8 -- SK (Z)

NOTE: Instrumental constants are not given for the three-component Benioff system.

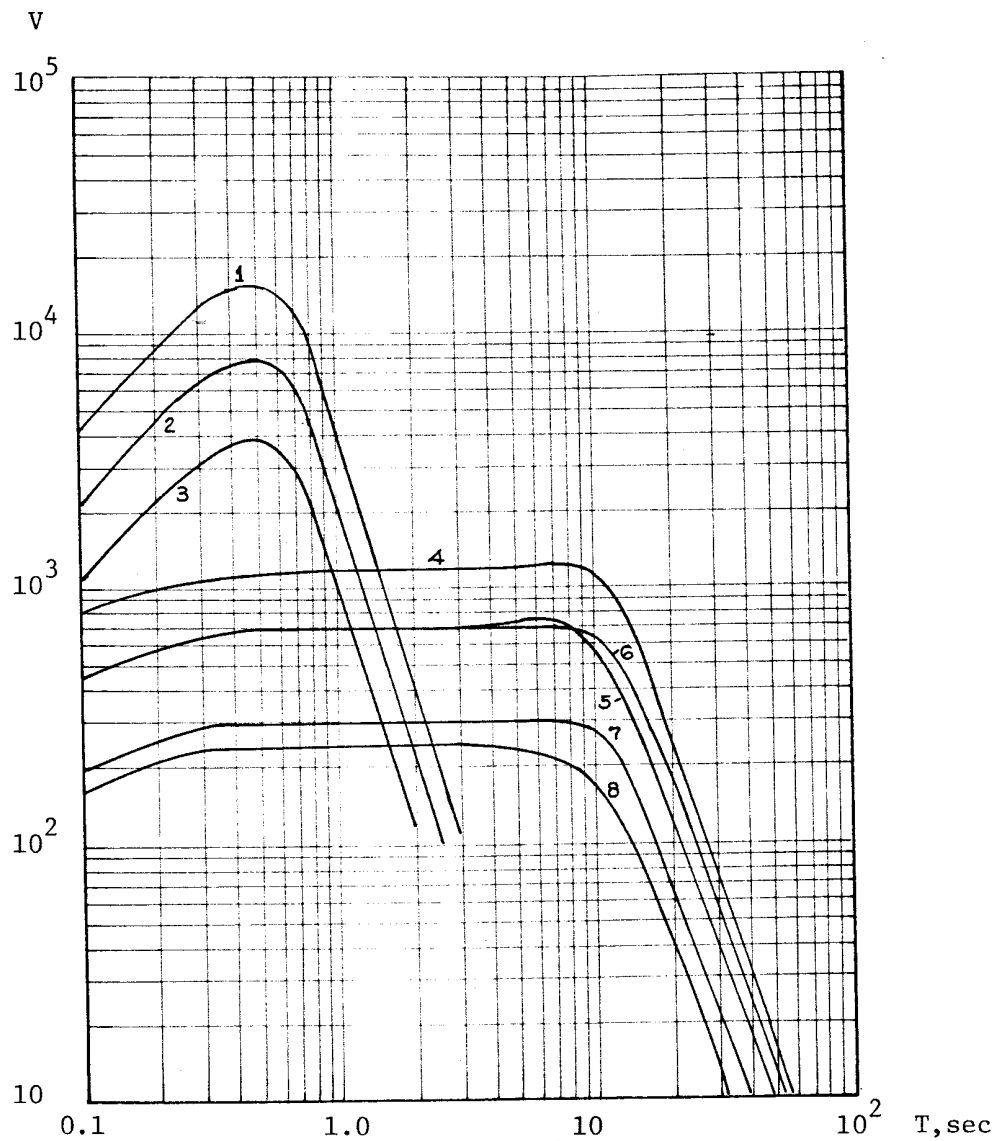


Fig. 103 -- Magnification curves of seismographs at the Okha station in 1970 [3]

- 1 -- VEGIK (N-S, E-W, Z)
- 2 -- VEGIK (N-S, E-W, Z)
- 3 -- VEGIK (N-S, E-W, Z)
- 4 -- SK (N-S, E-W)
- 5 -- SK (Z)
- 6 -- SK (N-S, E-W)
- 7 -- SK (N-S, E-W)
- 8 -- SK (Z)

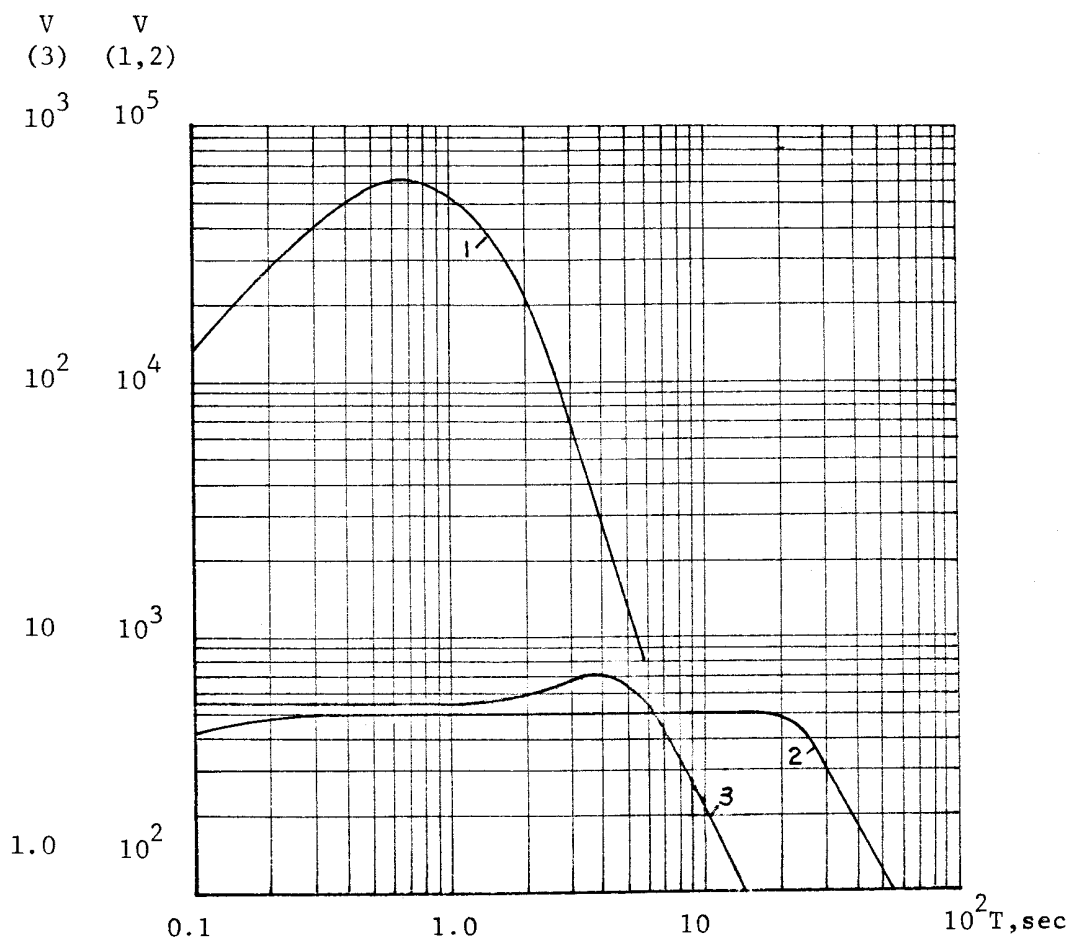


Fig. 104 -- Approximate magnification curves of seismographs at the Oni station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (Z,N-S,E-W)
- 2 -- SKD (Z)
- 3 -- SMTR (N-S,E-W)

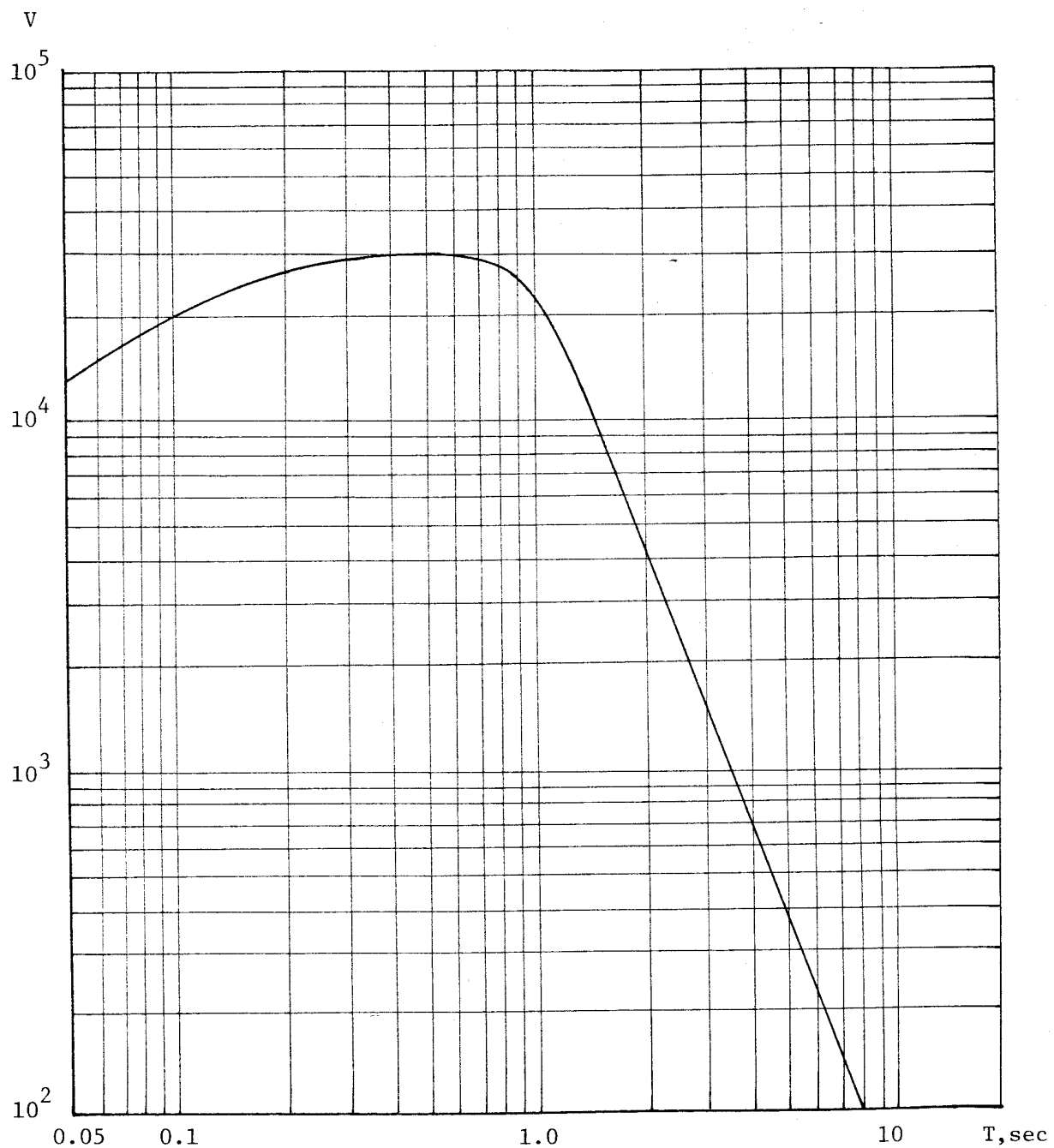


Fig. 105 -- Mean magnification curve of the three-component SKM-3 system at the Orlik station in 1969 [5]

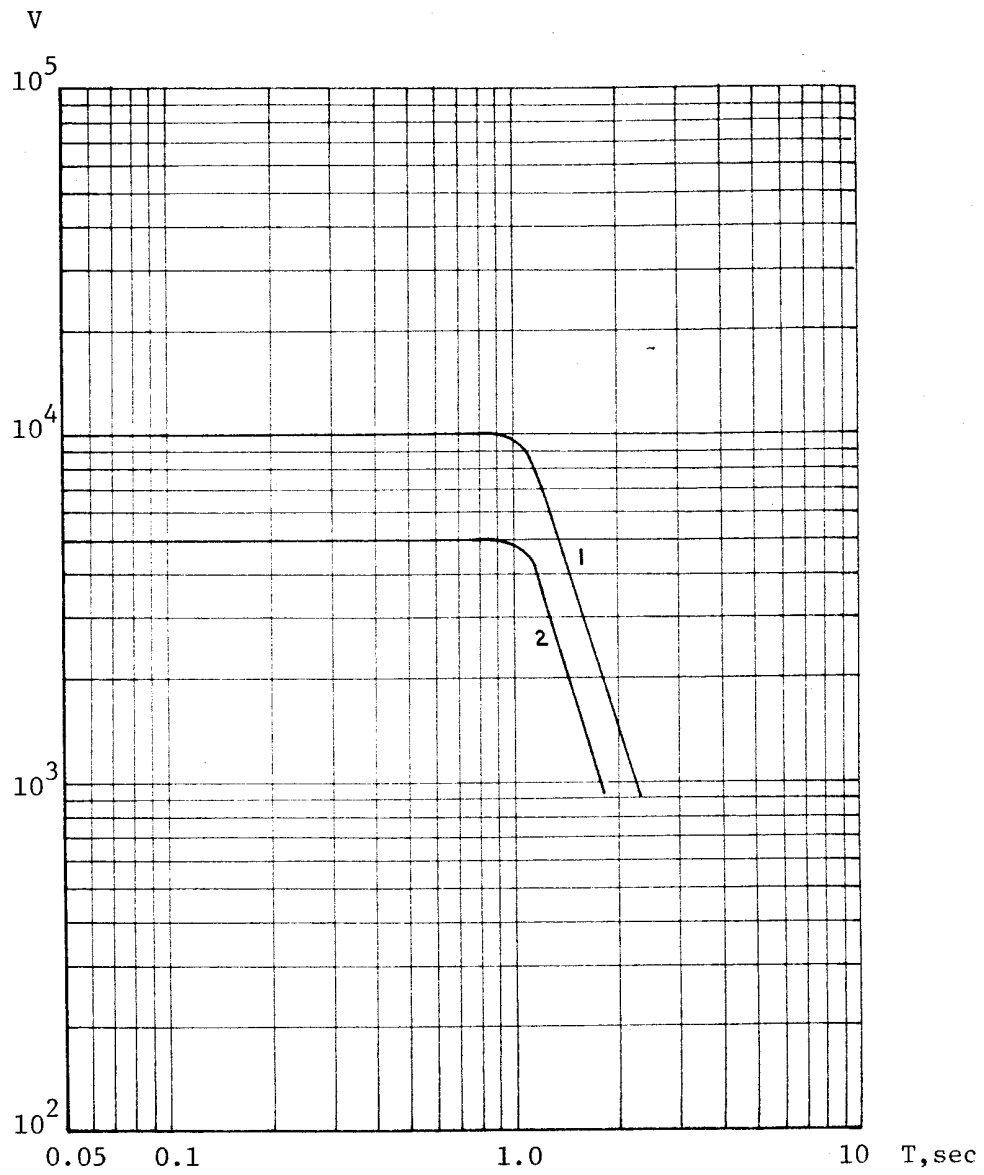


Fig. 106 -- Magnification curves of seismographs at the Ozero station in 1969 [8]

- 1 -- VEGIK (Z)
- 2 -- VEGIK (N-S, E-W)

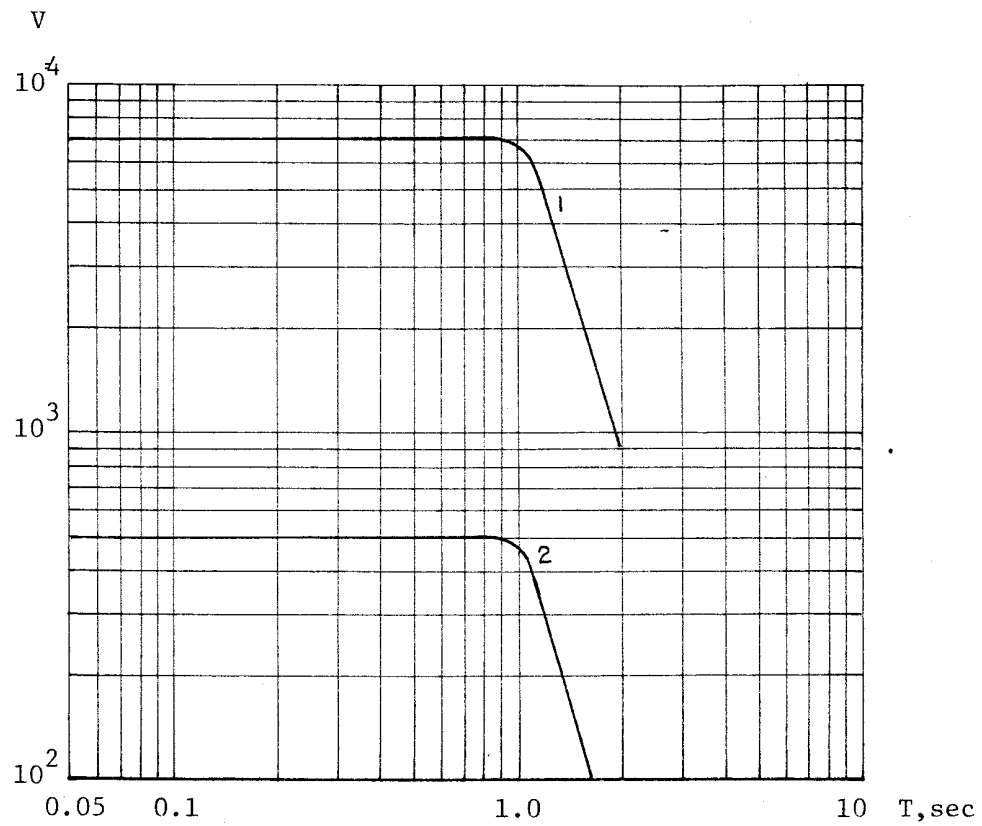


Fig. 107 -- Magnification curves of seismographs at the Puzhetka station in 1969 [8]

- 1 -- VEGIK (N-S,Z)
- 2 -- VEGIK (E-W)

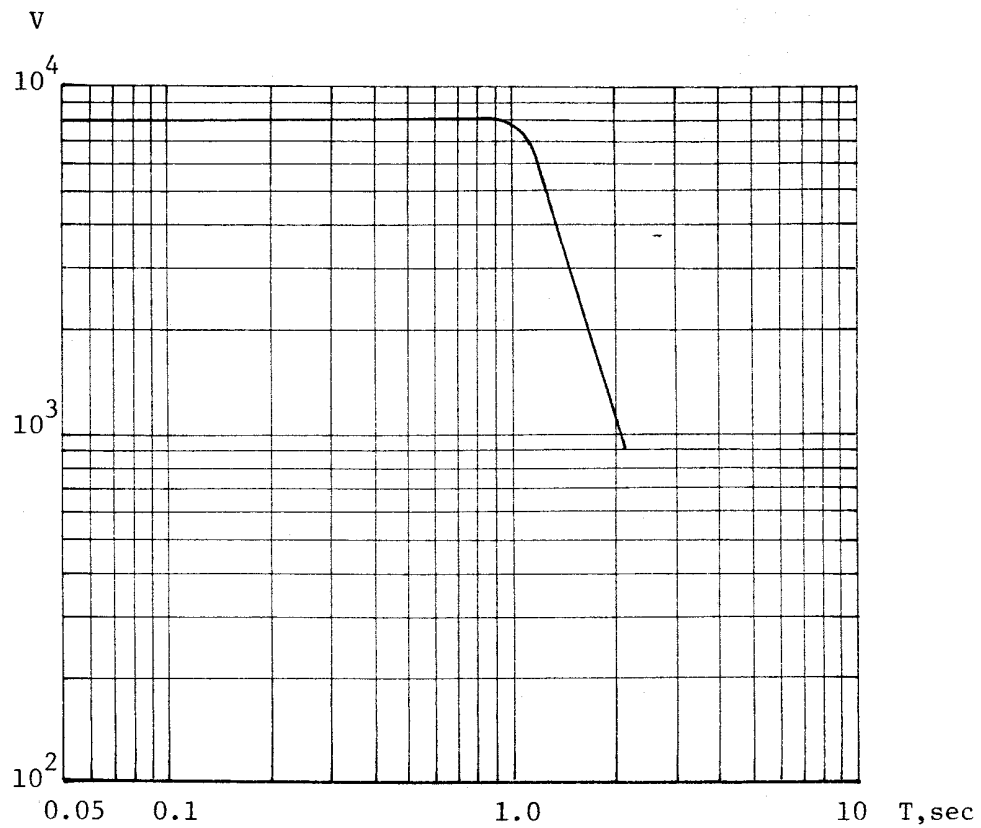


Fig. 108 -- Magnification curves of seismographs at the Petropavlovsk station in 1969 [8]

VEGIK (N-S,E-W,Z)

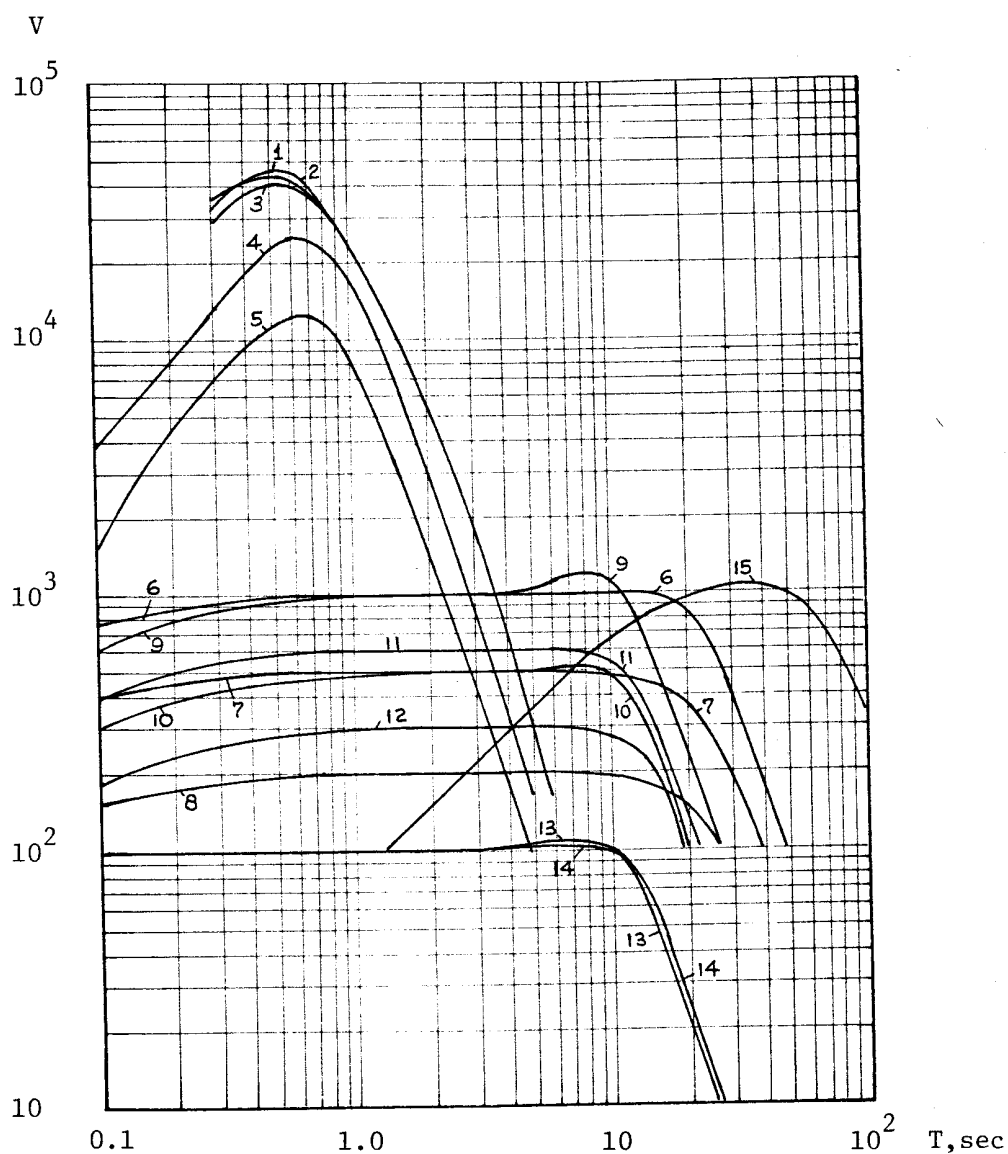


Fig. 109 -- Magnification curves of seismographs at the Petropavlovsk-Kamchatskiy station in 1970 [3]

- | | |
|--------------------------|--------------------------|
| 1 -- SKM-3 (E-W) | 9 -- SK (Z) |
| 2 -- SKM-3 (Z) | 10 -- SK (Z) |
| 3 -- SKM-3 (N-S) | 11 -- SK (N-S, E-W) |
| 4 -- SKM-3 (N-S, E-W, Z) | 12 -- SK (N-S, E-W) |
| 5 -- SKM-3 (N-S, E-W, Z) | 13 -- SK-KPCh (Z) |
| 6 -- SKD (N-S, E-W, Z) | 14 -- SK-KPCh (N-S, E-W) |
| 7 -- SKD (N-S, E-W, Z) | 15 -- SD-1 (N-S, E-W, Z) |
| 8 -- SKD (N-S, E-W, Z) | |

NOTE: Instrumental constants are not given for the three-component SKM-3 system equipped with a hot-pen recorder.

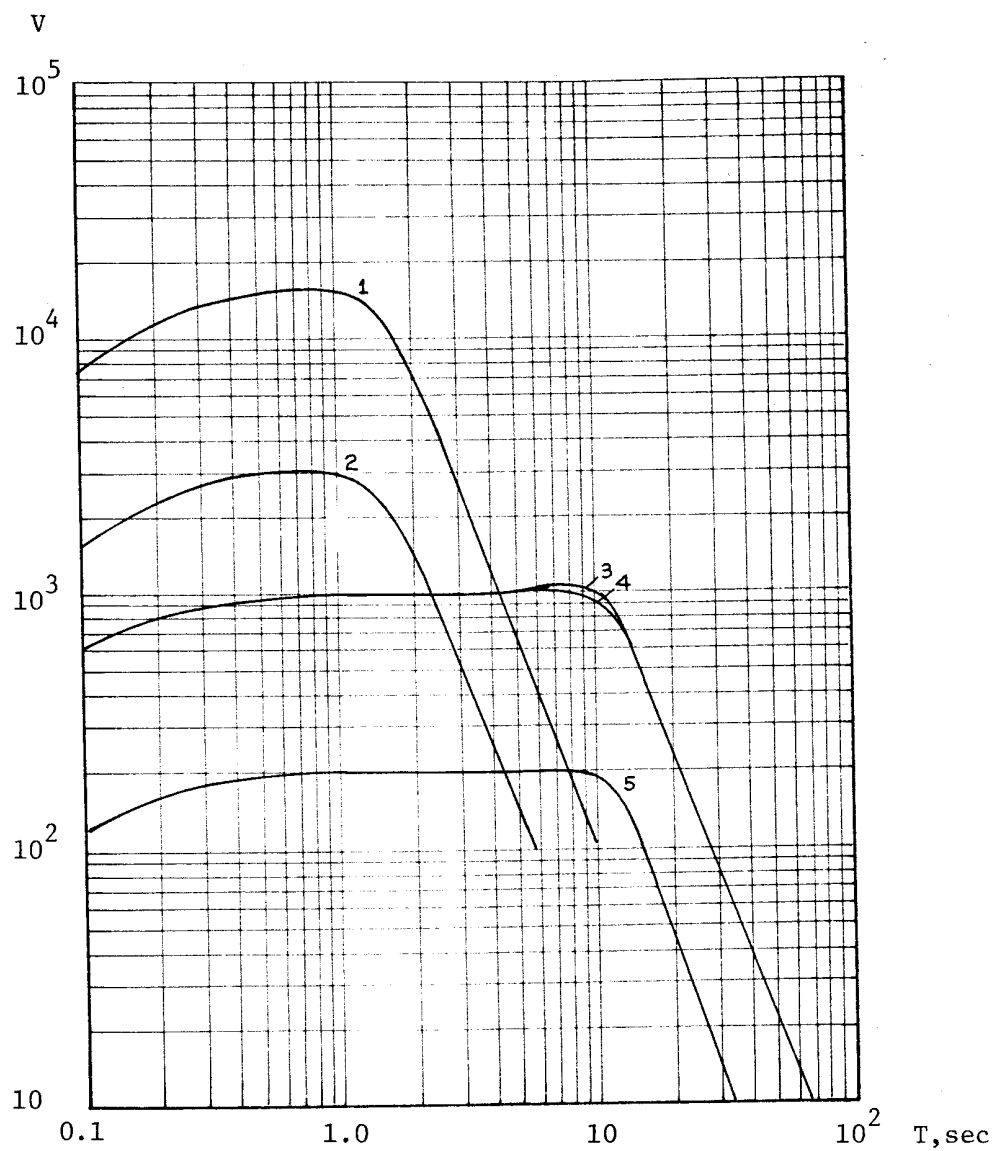


Fig. 110 -- Magnification curves of seismographs at the Przhival'sk station in 1970 [3]

- 1 -- SKM-3 (N-S, E-W, Z)
- 2 -- SKM-3 (N-S, E-W, Z)
- 3 -- SK (N-S, E-W)
- 4 -- SK (Z)
- 5 -- SK-KPCh (E-W)

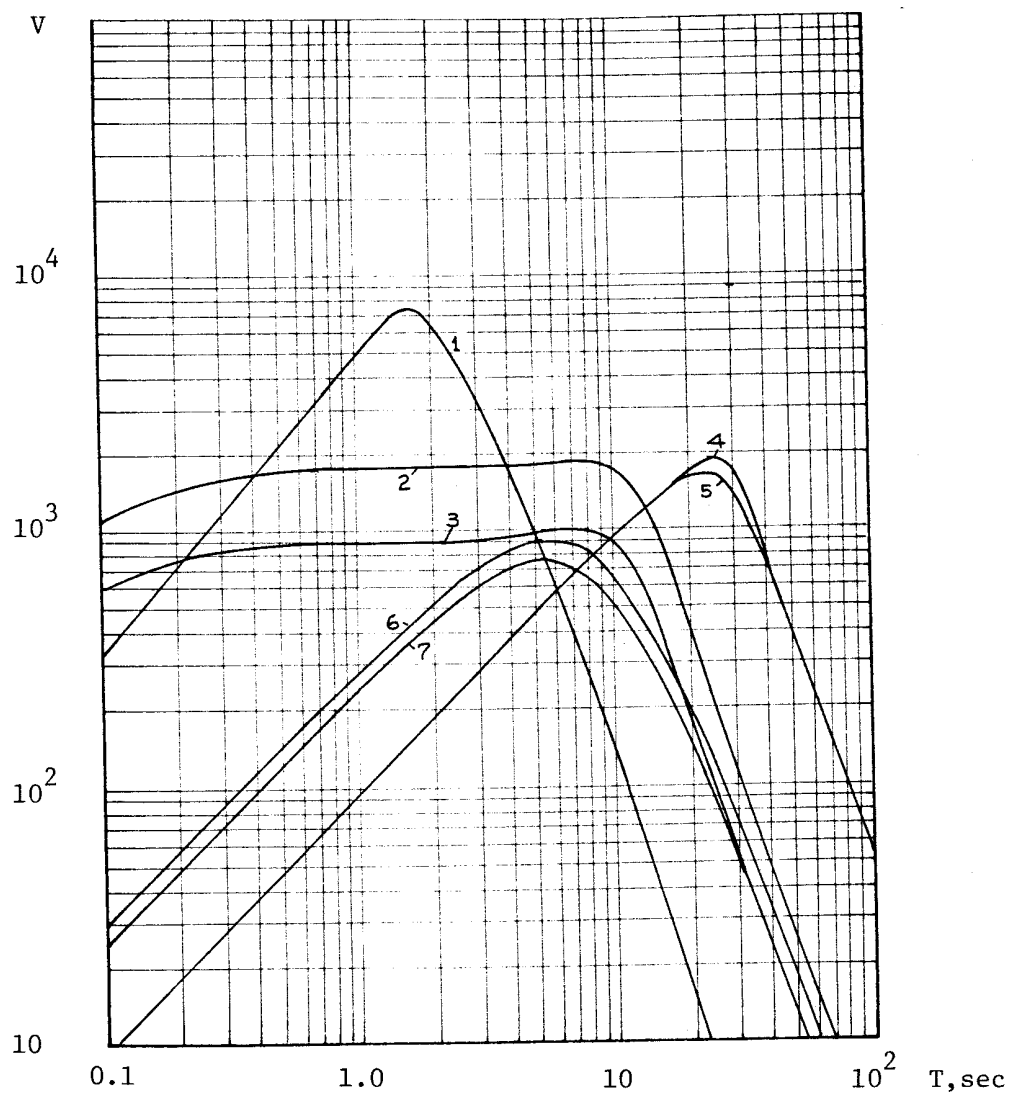


Fig. 111 -- Magnification curves of seismographs at the Pulkovo station in 1970 [3]

- 1 -- VEGIK (Z)
- 2 -- SK (N-S, E-W)
- 3 -- SK (Z)
- 4 -- SKD + M21/3 (Z)
- 5 -- SKD + M21/3 (N-S, E-W)
- 6 -- SG (Z)
- 7 -- SG (N-S, E-W)

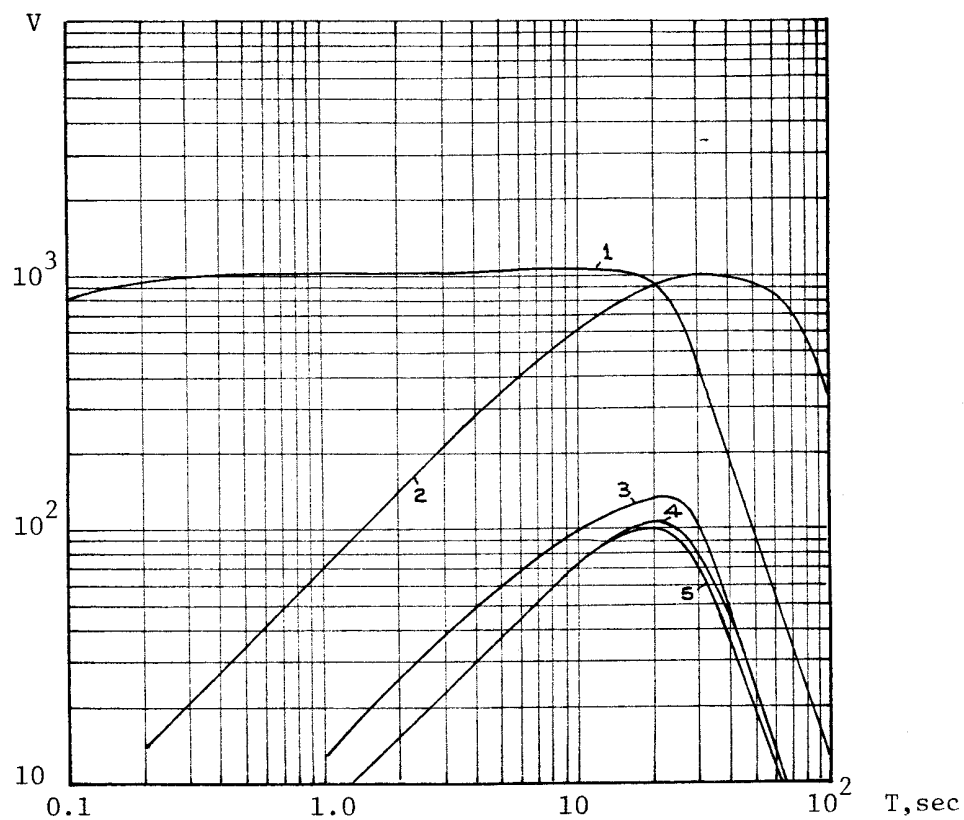


Fig. 112 -- Magnification curves of seismographs at the Pulkovo station in 1970 [3]

- 1 -- SKD (N-S, E-W)
- 2 -- SD-1 (Z)
- 3 -- SKD + M21/3-KPCh (Z)
- 4 -- SKD + M21/3-KPCh (E-W)
- 5 -- SKD + M21/3-KPCh (N-S)

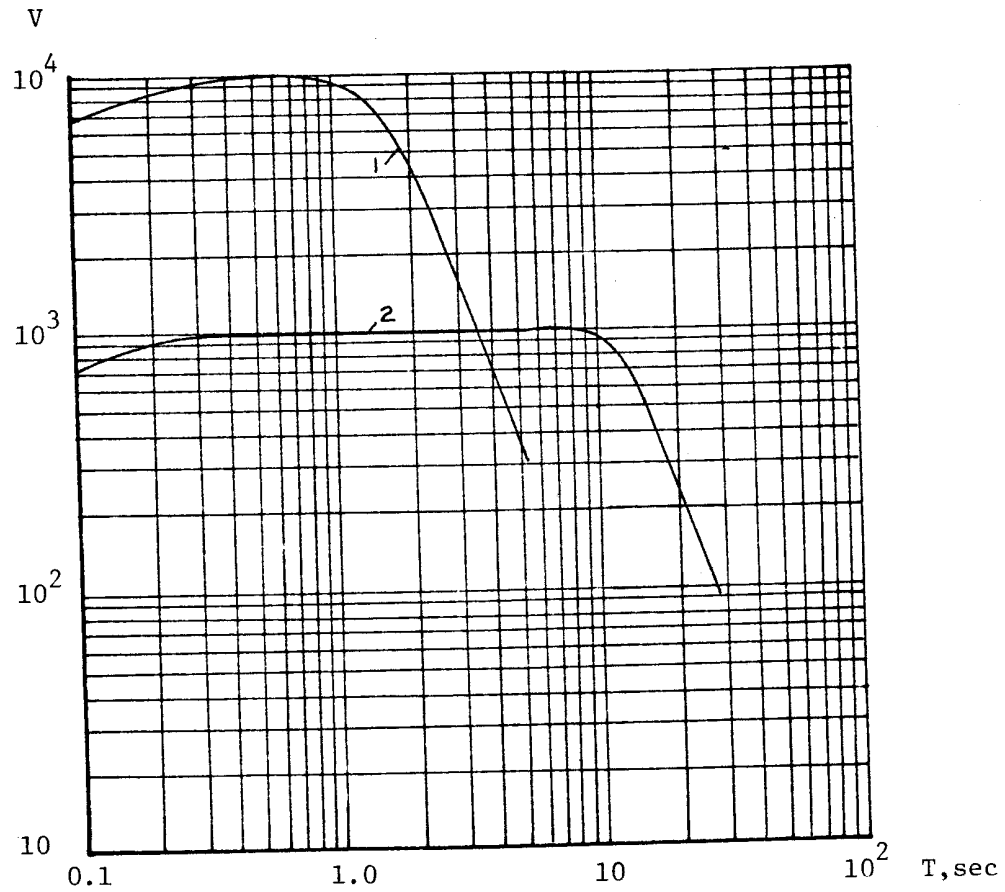


Fig. 113 -- Approximate magnification curves of seismographs at the Pyatigorsk station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (N-S, E-W, Z)
- 2 -- SK (N-S, E-W, Z)

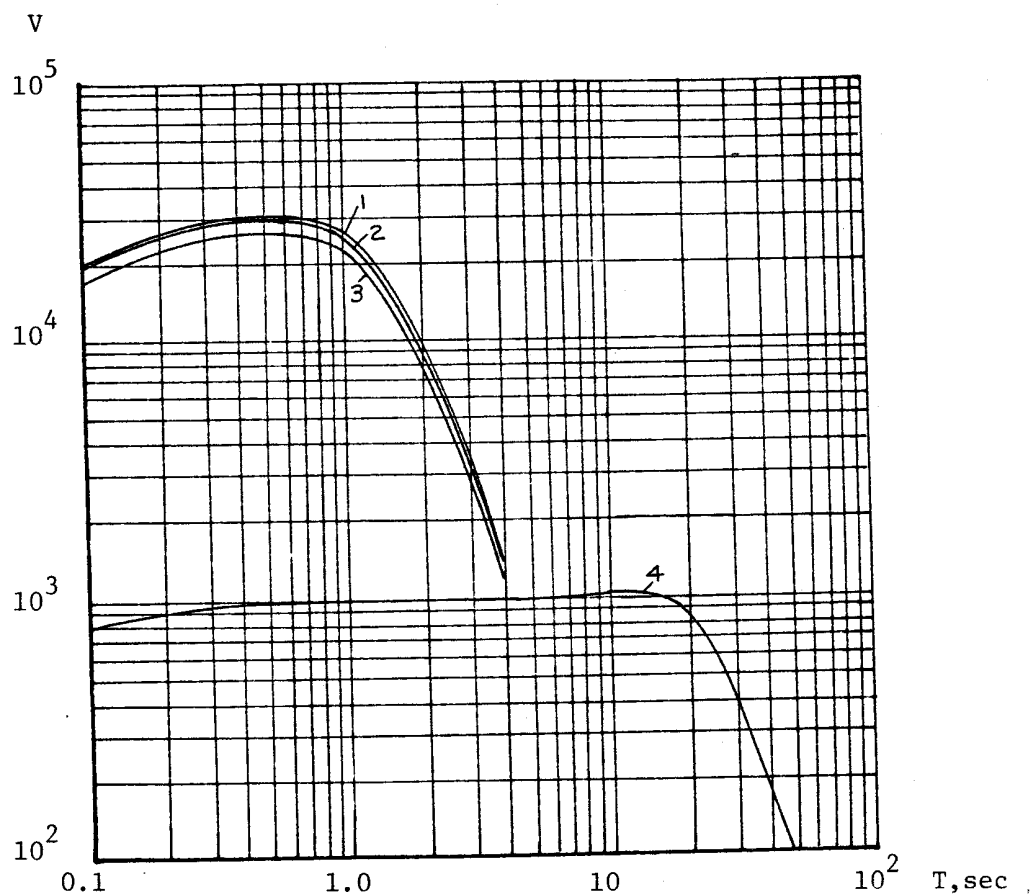


Fig. 114 -- Approximate magnification curves of seismographs at the Rakhov station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (E-W)
- 2 -- SKM-3 (N-S)
- 3 -- SKM-3 (Z)
- 4 -- SKD (N-S, E-W, Z)

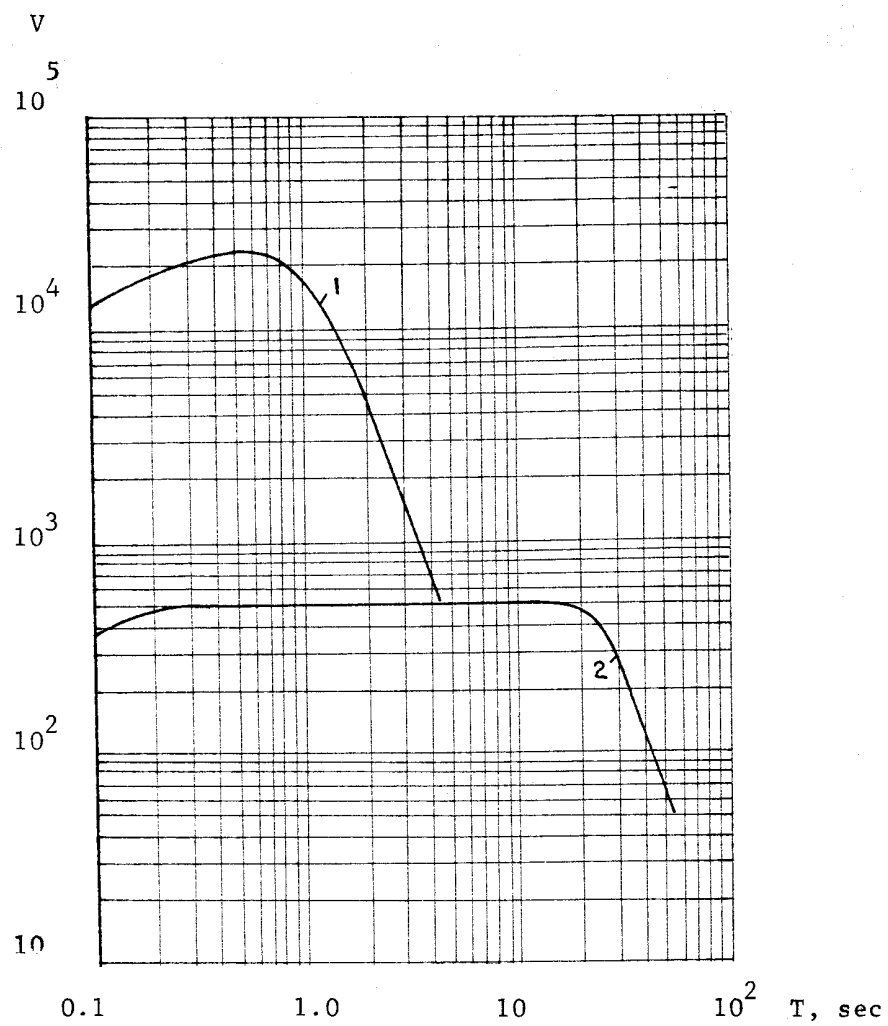


Fig. 115 -- Approximate magnification curves of seismographs at the Saberio station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (Z)
- 2 -- SKD (Z)

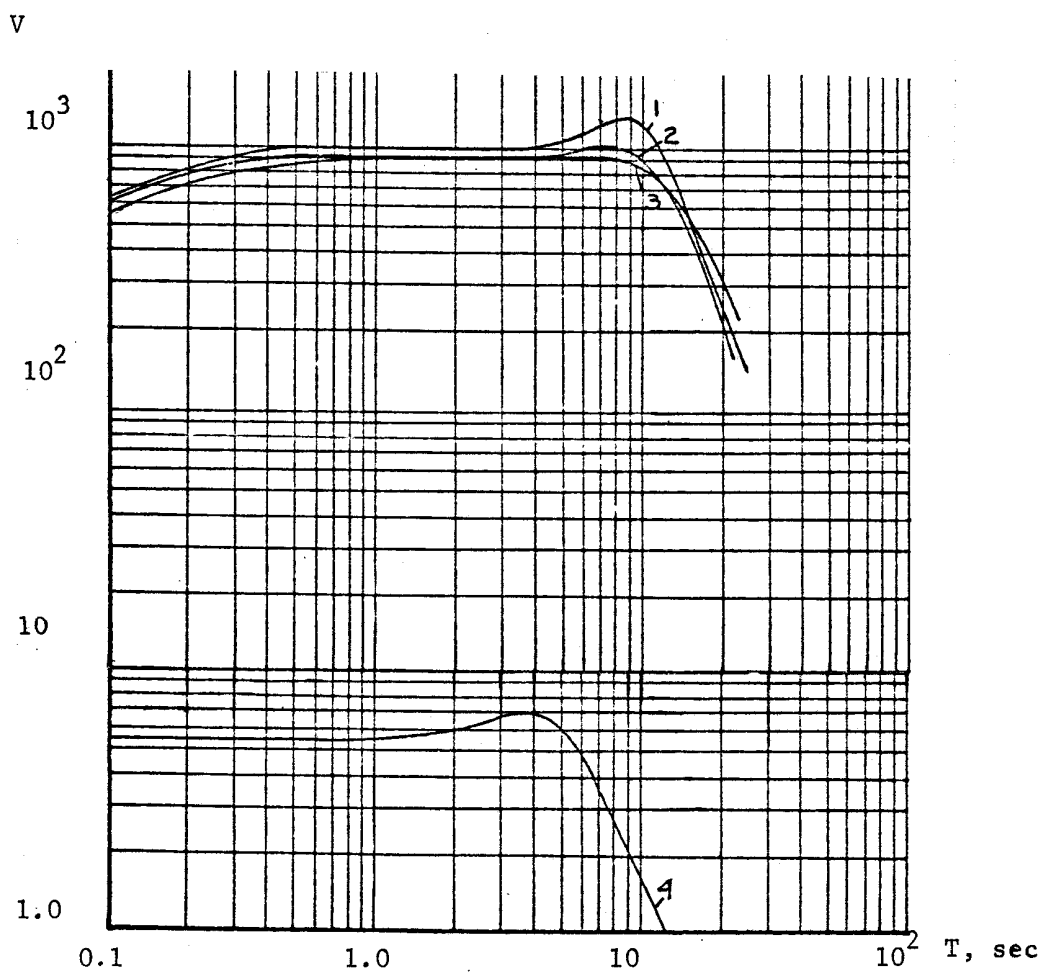


Fig. 116 -- Approximate magnification curves of seismographs at the Samarkand station in 1968 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SK (N-S)
- 2 -- SK (E-W)
- 3 -- SK (Z)
- 4 -- SMR-2 (N-S, E-W)

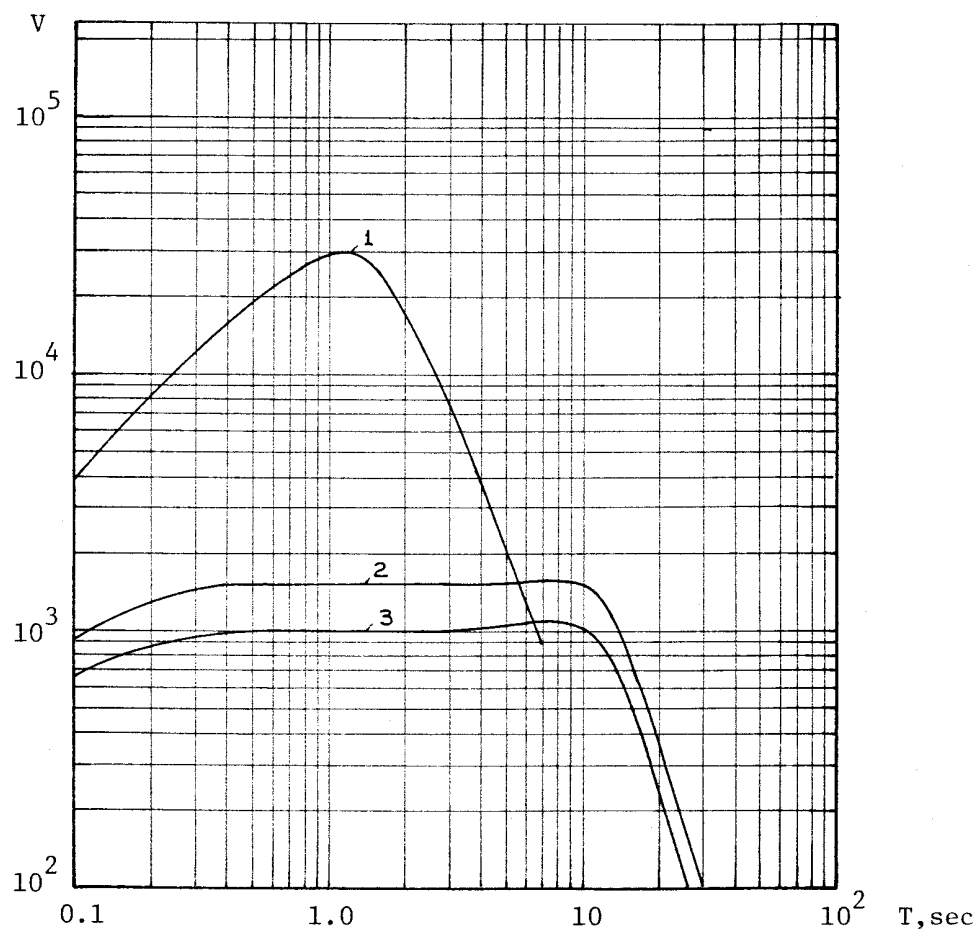


Fig. 117 -- Magnification curves of seismographs at the Semipalatinsk station in 1970 [3]

- 1 -- SKM-3 (N-S,E-W,Z)
- 2 -- SK (N-S,E-W)
- 3 -- SK (Z)

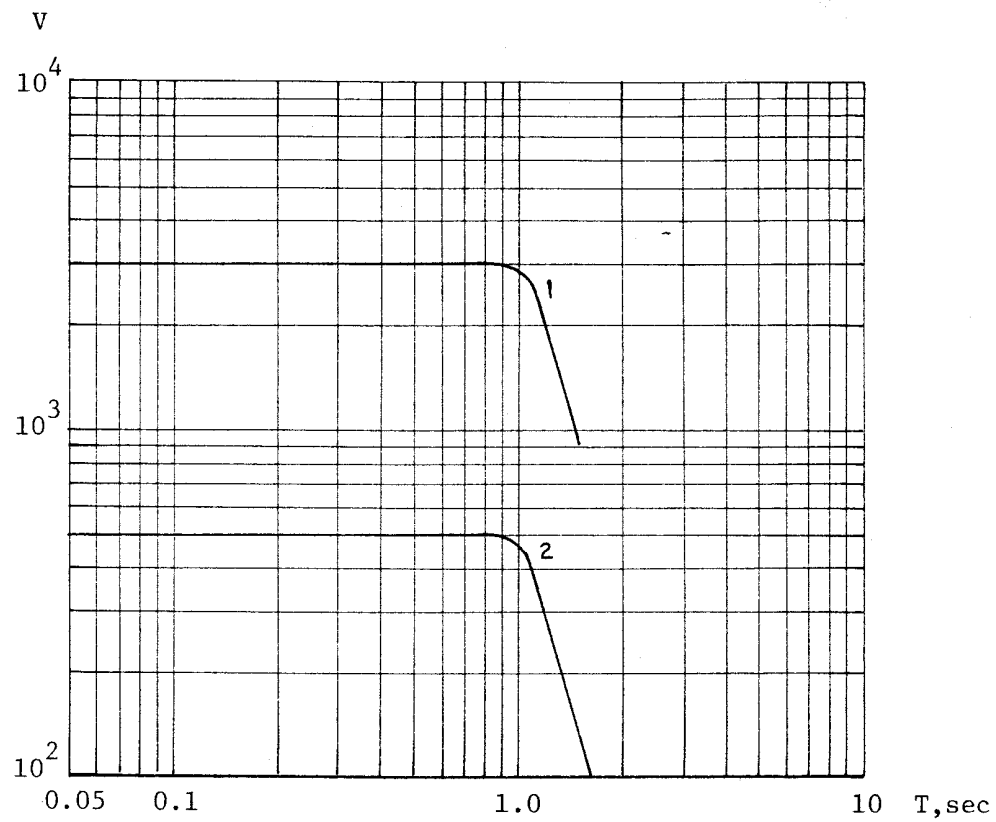


Fig. 118 -- Magnification curves of seismographs at the Semlyachik station in 1969 [8]

- 1 -- VEGIK (N-S,Z)
- 2 -- VEGIK (E-W)

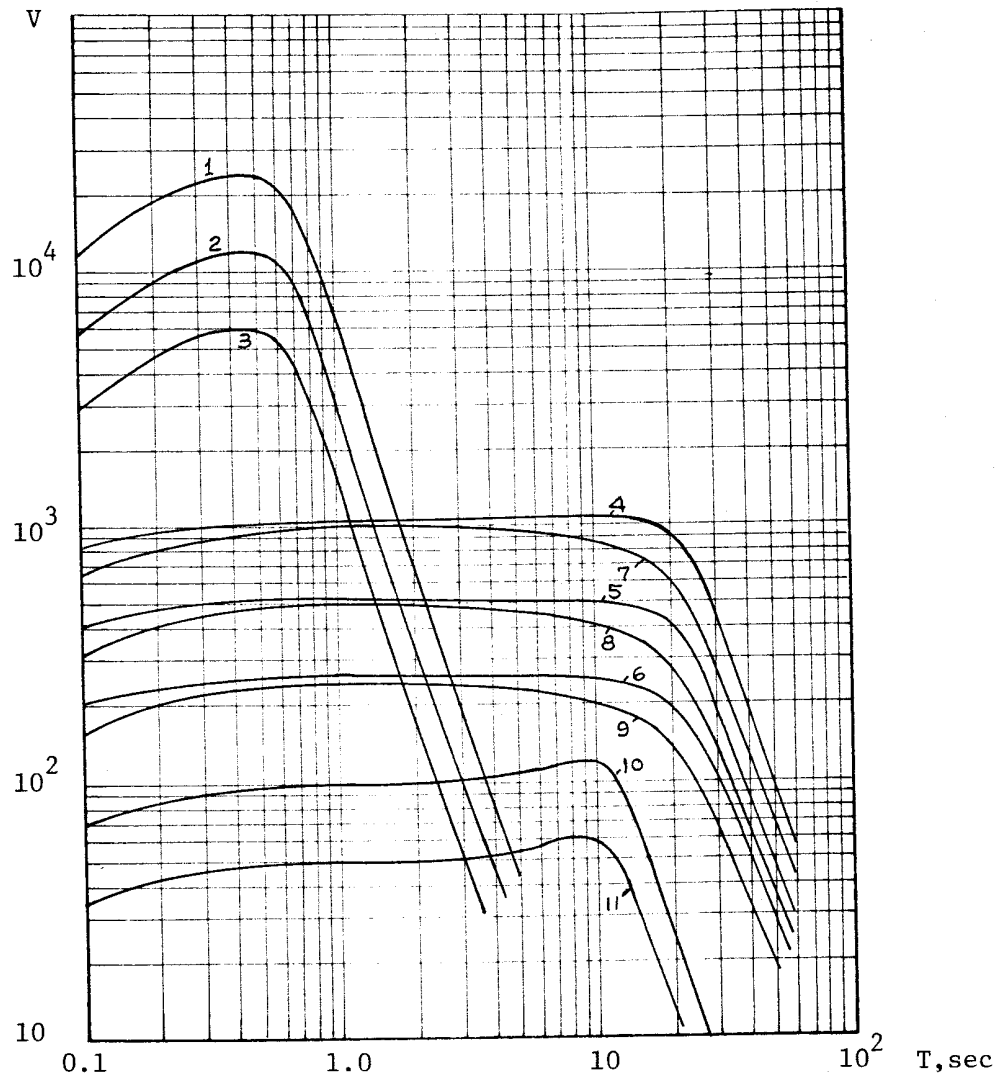


Fig. 119 -- Magnification curves of seismographs at the Severo-Kuril'sk station in 1970 [3]

- | | |
|------------------------|---------------------------|
| 1 -- SKM-3 (N-S,E-W,Z) | 7 -- SKD (Z) |
| 2 -- SKM-3 (N-S,E-W,Z) | 8 -- SKD (Z) |
| 3 -- SKM-3 (N-S,E-W,Z) | 9 -- SKD (Z) |
| 4 -- SKD (N-S,E-W) | 10 -- SK-KPCh (N-S,E-W,Z) |
| 5 -- SKD (N-S,E-W) | 11 -- SK-KPCh (N-S,E-W,Z) |
| 6 -- SKD (N-S,E-W) | |

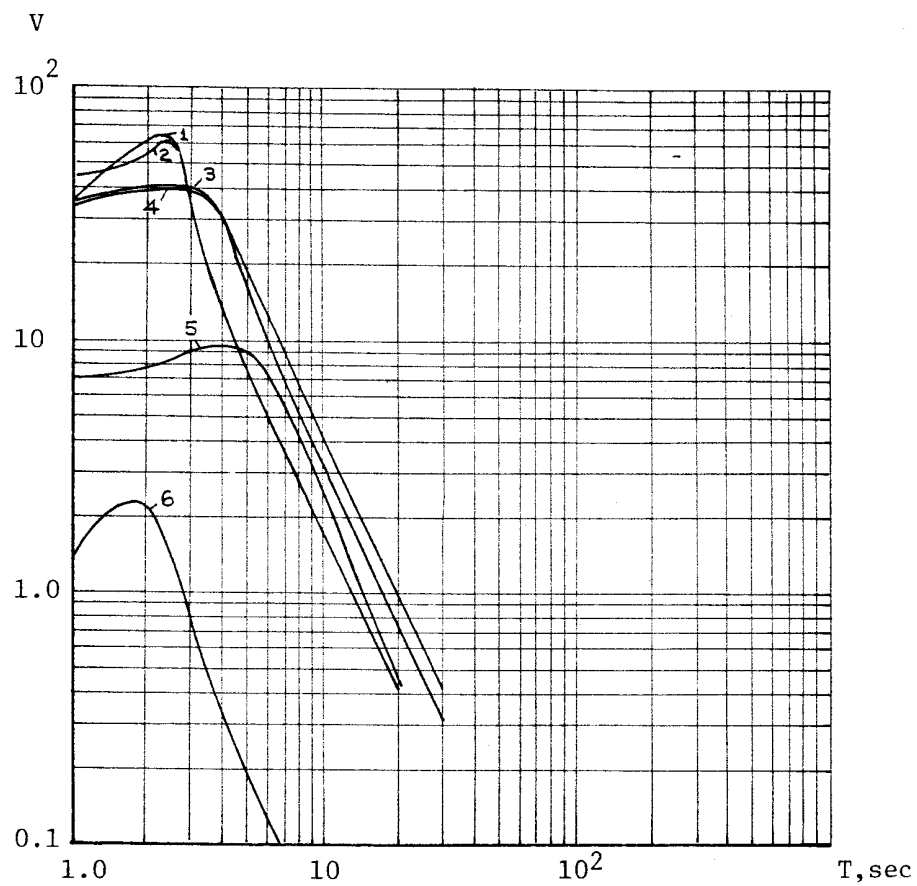


Fig. 120 -- Magnification curves of seismographs at the Severo-Kuril'sk station in 1970 [3]

- 1 -- Wiechert (N-S, E-W)
- 2 -- Wiechert (Z)
- 3 -- UBOPE-2 (N-S, E-W)
- 4 -- UBOPE-2 (N-S, E-W)
- 5 -- SMTR (N-S, E-W)
- 6 -- UBOPE-0 (E-W)

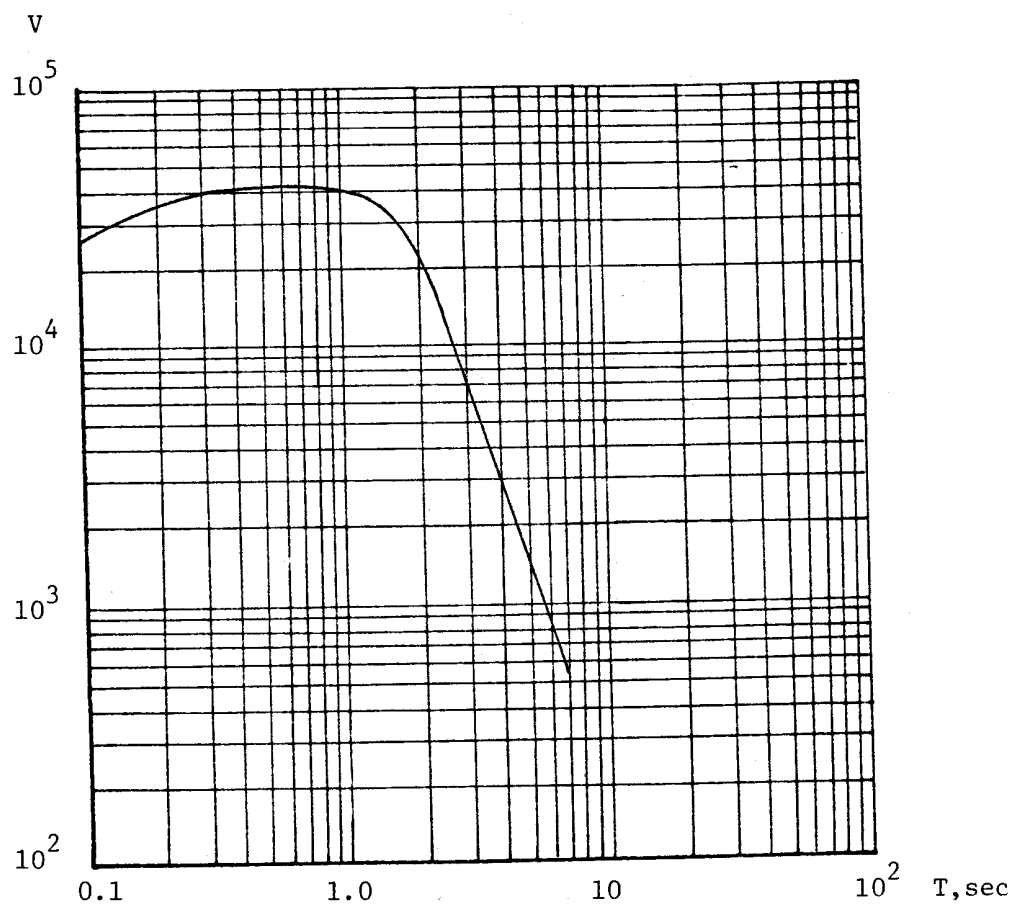


Fig. 121 -- Approximate magnification curve of seismographs at the Shuy station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (N-S, E-W, Z)

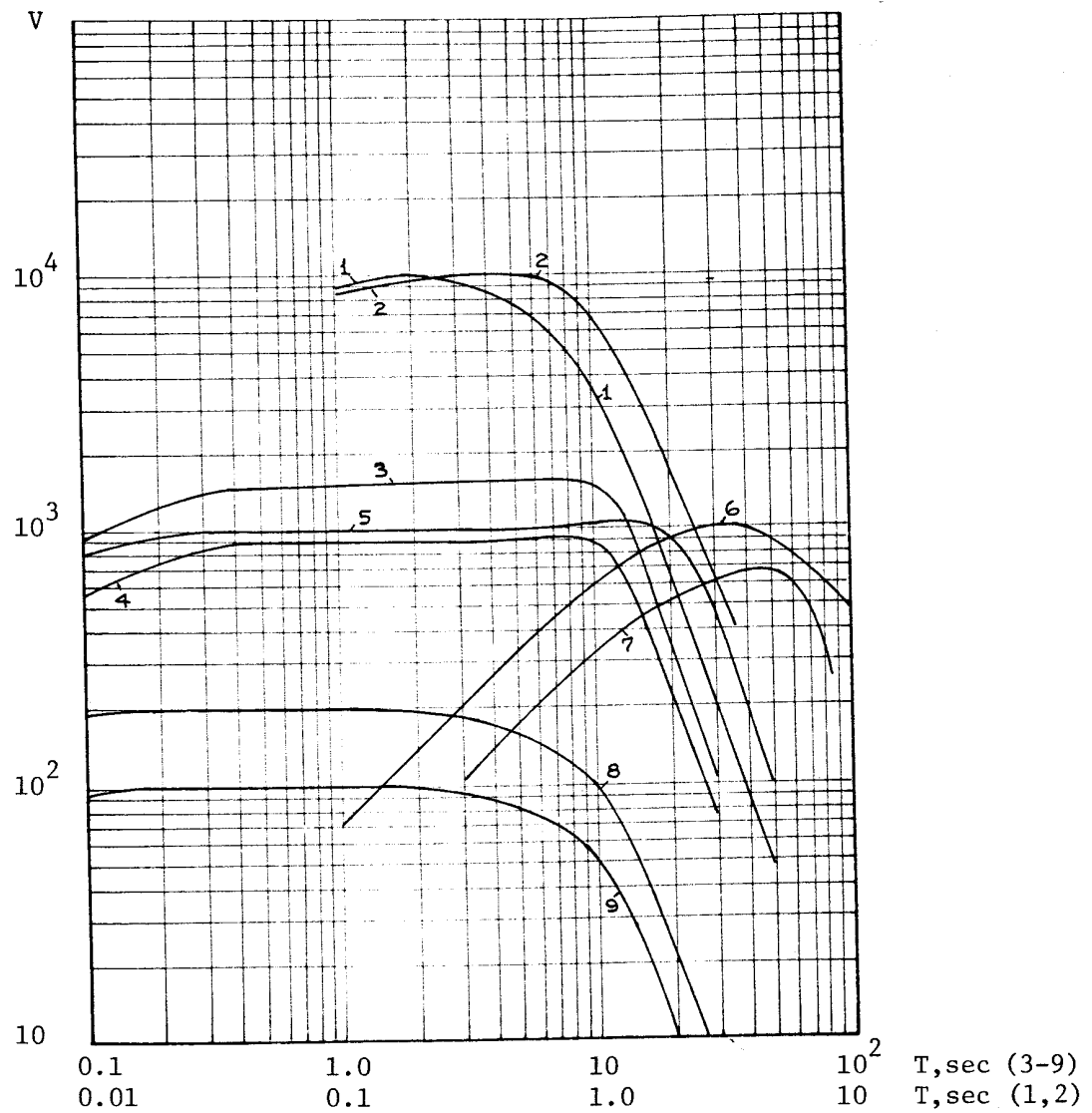


Fig. 122 -- Magnification curves of seismographs at the Simferopol' station in 1970 [3]

- 1 -- SKh (Z)
- 2 -- SKh (N-S, E-W)
- 3 -- SK (N-S, E-W)
- 4 -- SK (Z)
- 5 -- SKD (N-S, E-W, Z)
- 6 -- SD-1 (N-S)
- 7 -- SD-1 (E-W)
- 8 -- SK-KPCh (N-S, E-W)
- 9 -- SK-KPCh (Z)

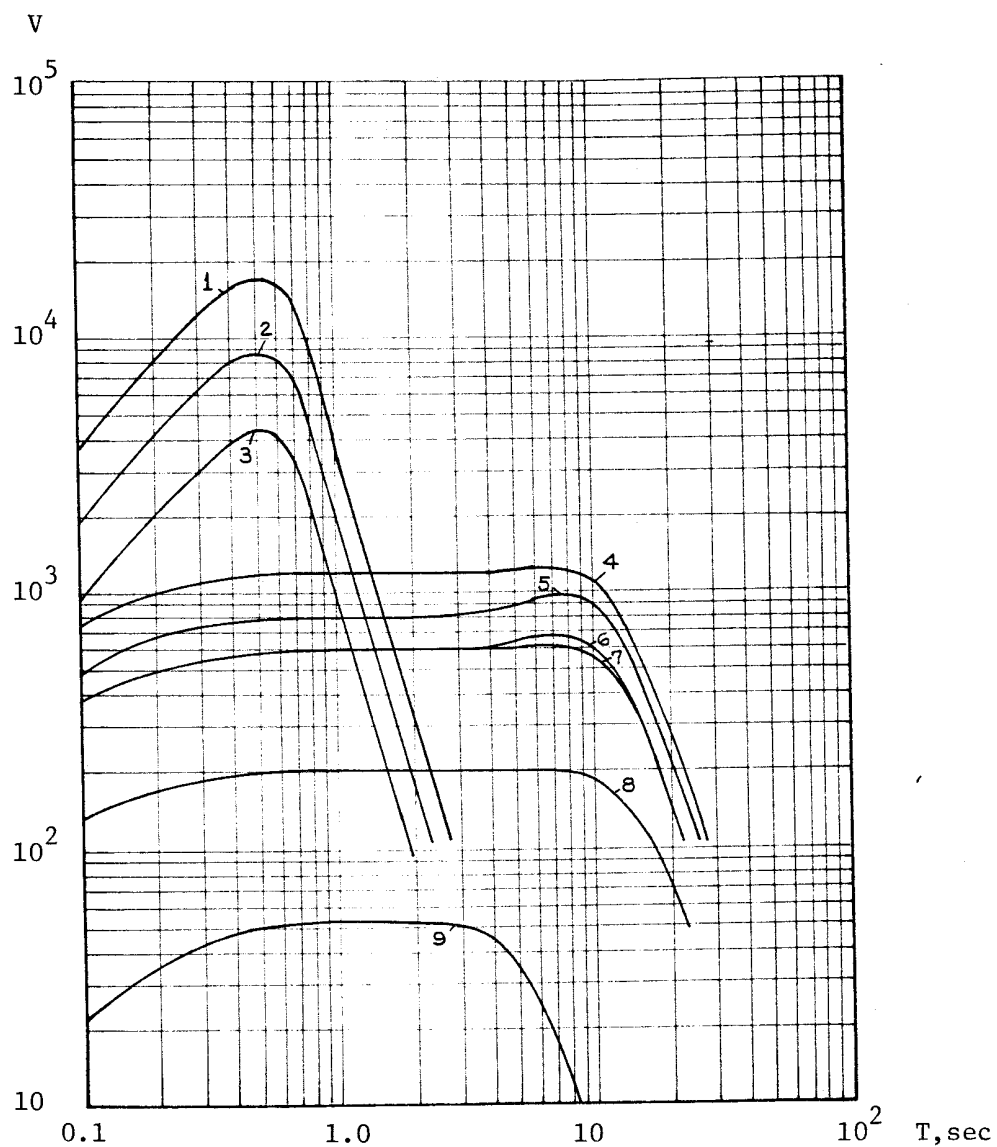


Fig. 123 -- Magnification curves of seismographs at the Simushir station in 1970 [3]

- 1 -- VEGIK (N-S,E-W,Z)
- 2 -- VEGIK (N-S,E-W,Z)
- 3 -- VEGIK (N-S,E-W,Z)
- 4 -- SK (N-S,E-W)
- 5 -- SK (Z)
- 6 -- SK (Z)
- 7 -- SK (N-S,E-W)
- 8 -- SK (N-S,E-W,Z)
- 9 -- S5S (E-W)

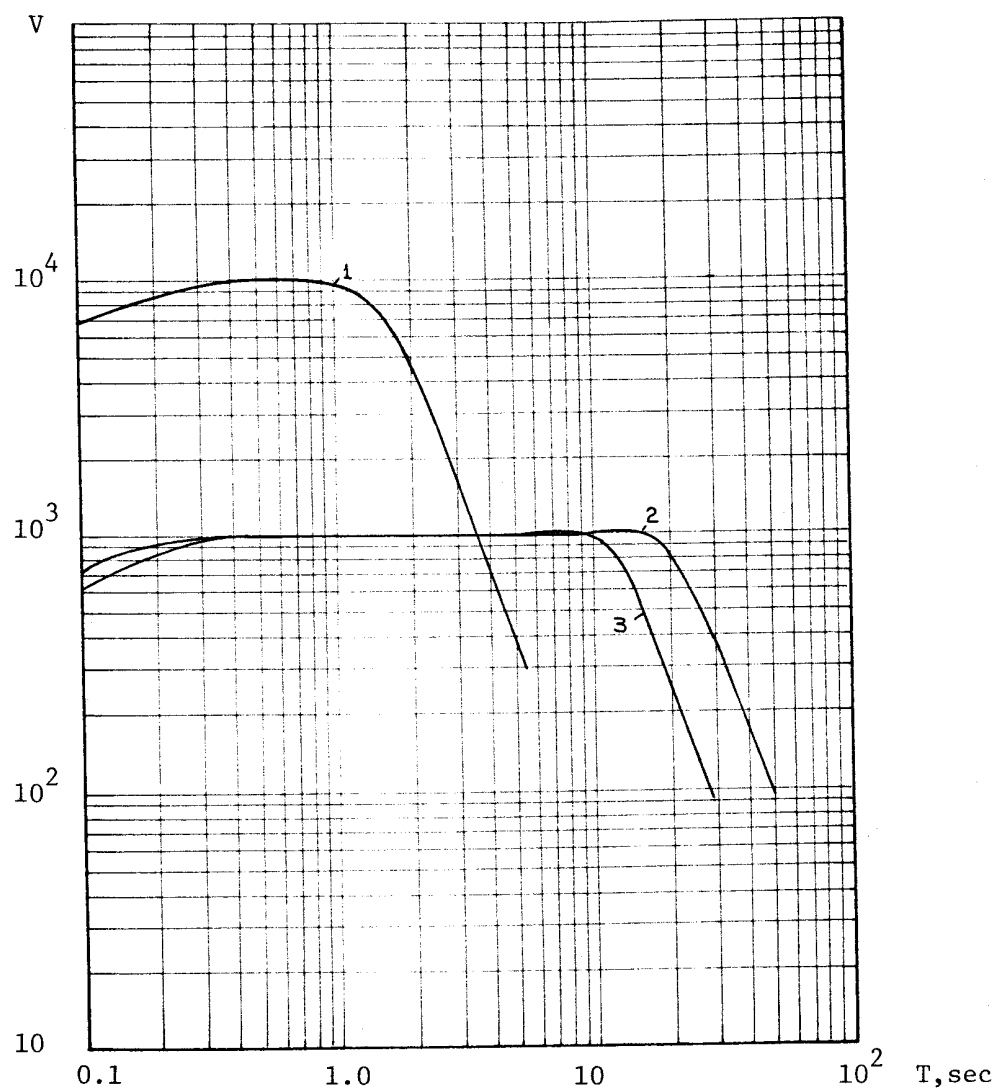


Fig. 124 -- Magnification curves of seismographs at the Sochi station in 1970 [3]

- 1 -- SKM-3 (N-S,E-W,Z)
- 2 -- SKD (N-S,E-W,Z)
- 3 -- SK (N-S,E-W,Z)

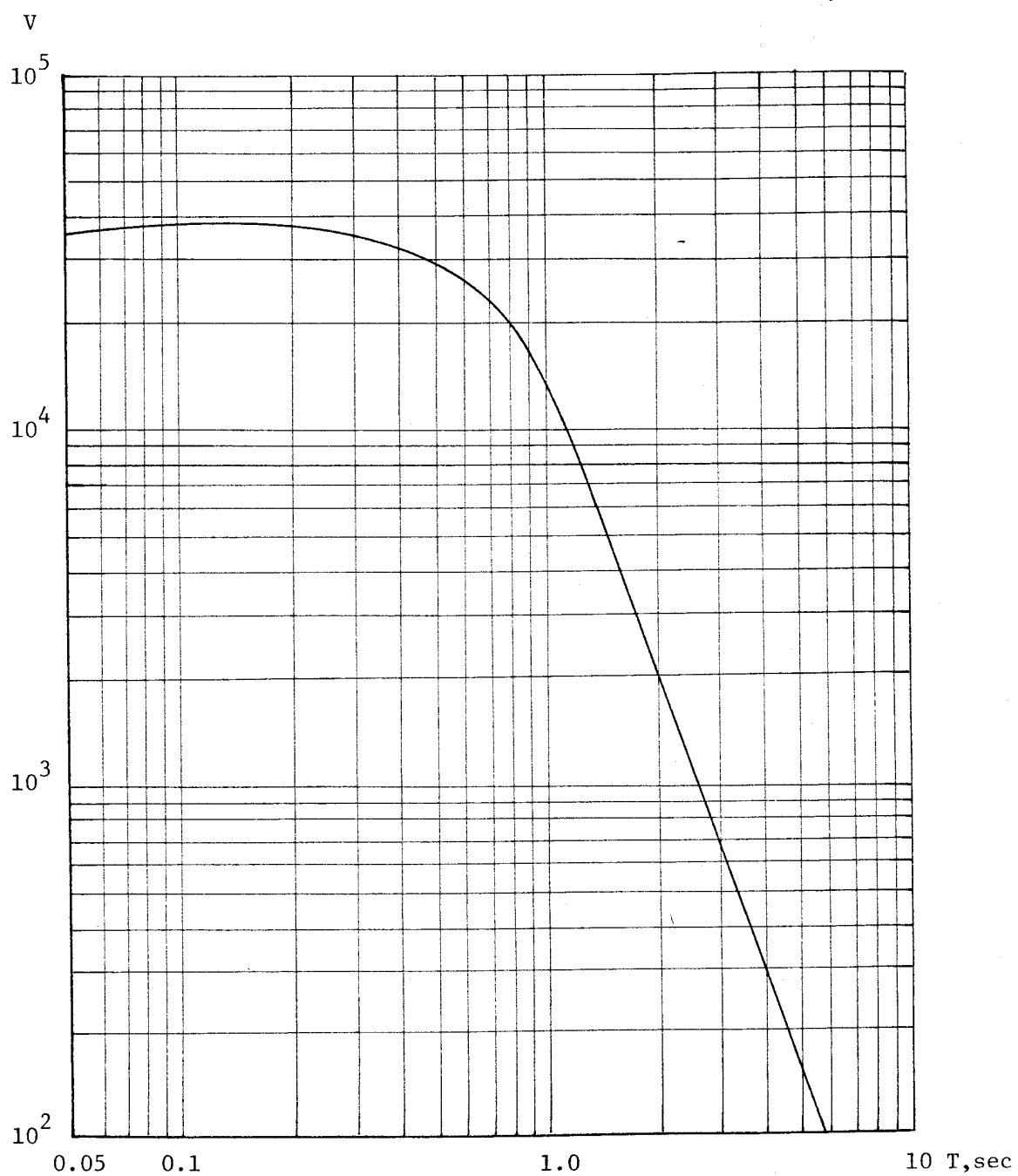


Fig. 125 -- Mean magnification curve of the three-component SKM-3 system at the Sredniy Kalar station in 1969 [5]

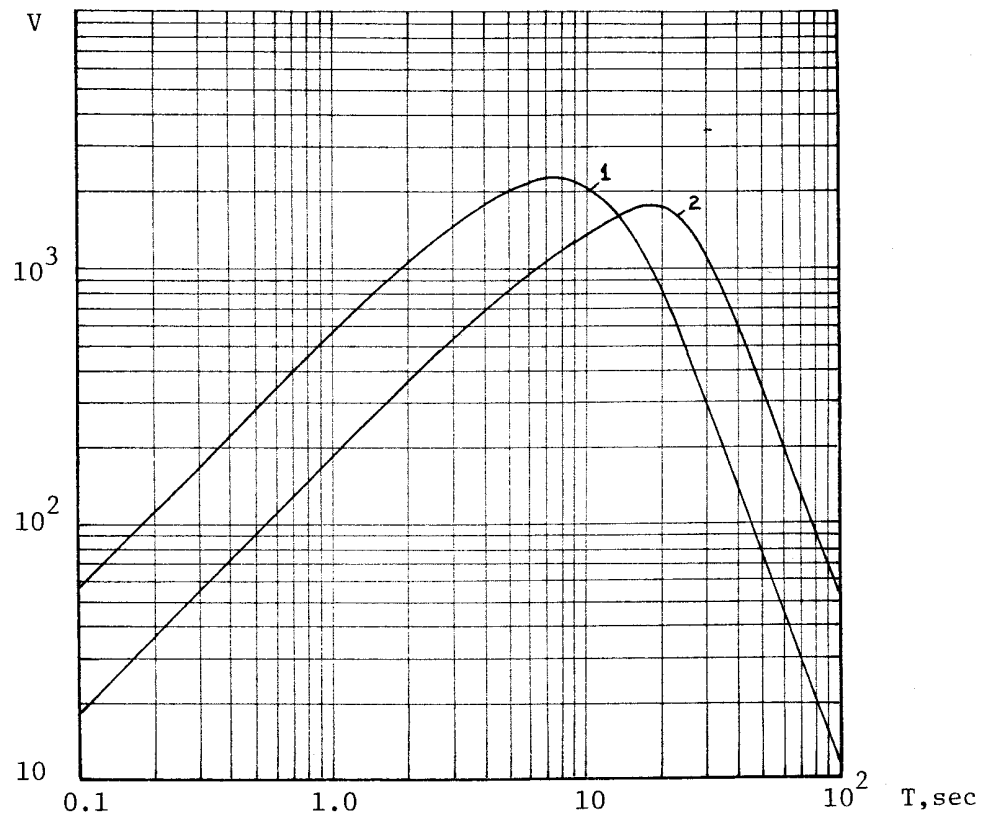


Fig. 126 -- Magnification curves of seismographs at the Sverdlovsk station in 1970 [3]

- 1 -- SG (Z)
- 2 -- SG (N-S, E-W)

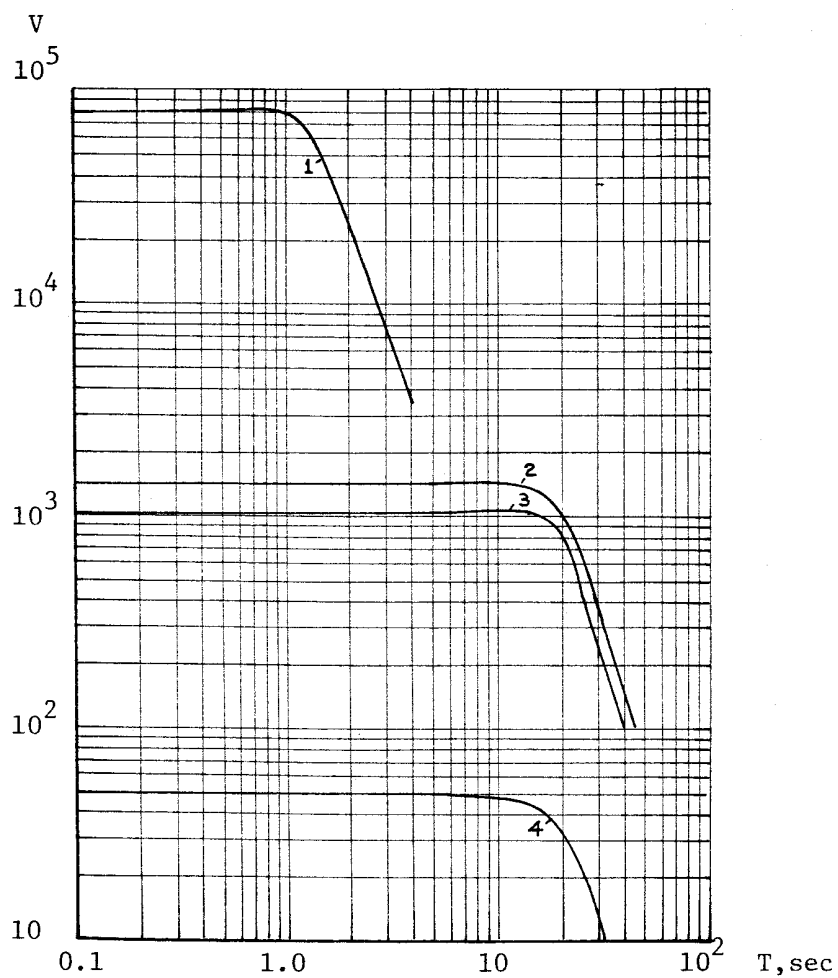


Fig. 127 -- Magnification curves of seismographs at the Talgar station in 1969 and 1970 [2]

- 1 -- SKM-3 (N-S,E-W,Z)
- 2 -- SKD (N-S,E-W)
- 3 -- SKD (Z)
- 4 -- SKD-KPCh (Z)

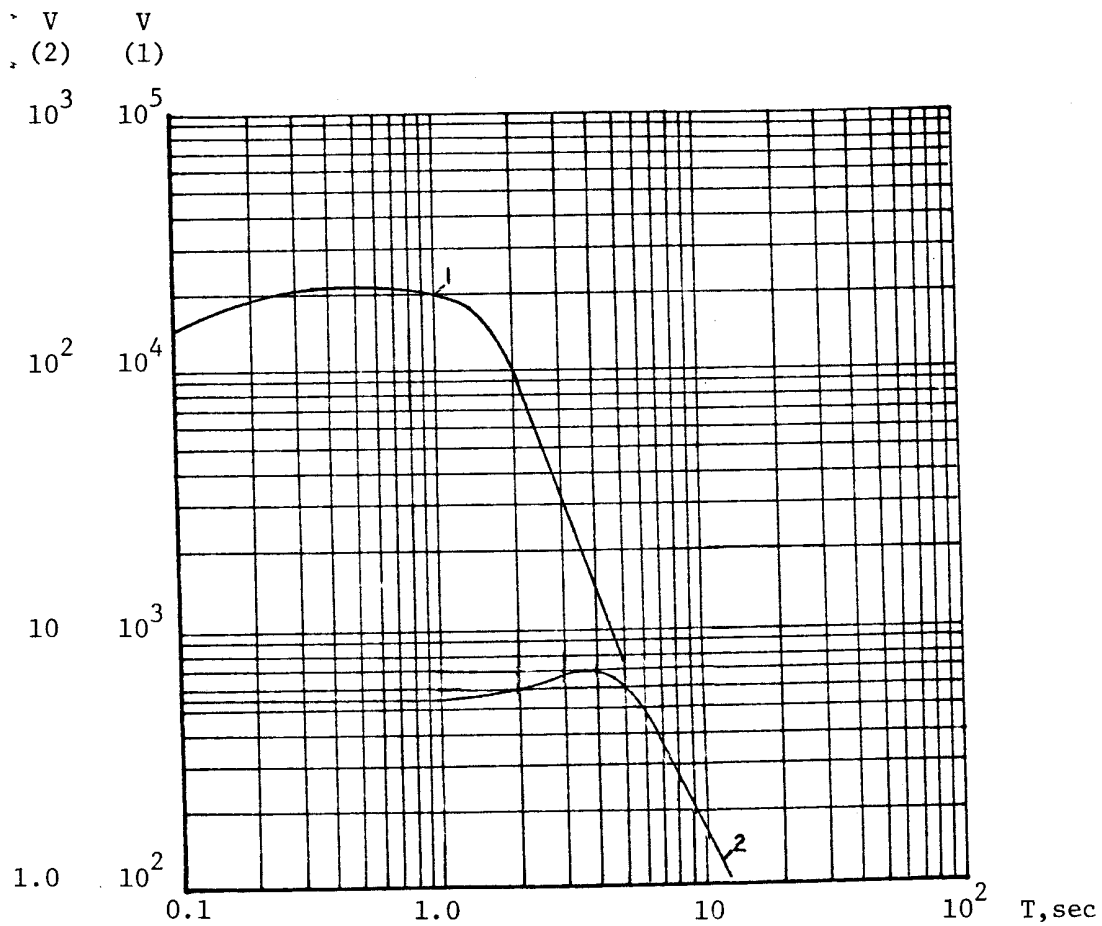


Fig. 128 -- Approximate magnification curve of seismographs at the Tamdybulak station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (N-S, E-W, Z)
- 2 -- SMTR (N-S, E-W)

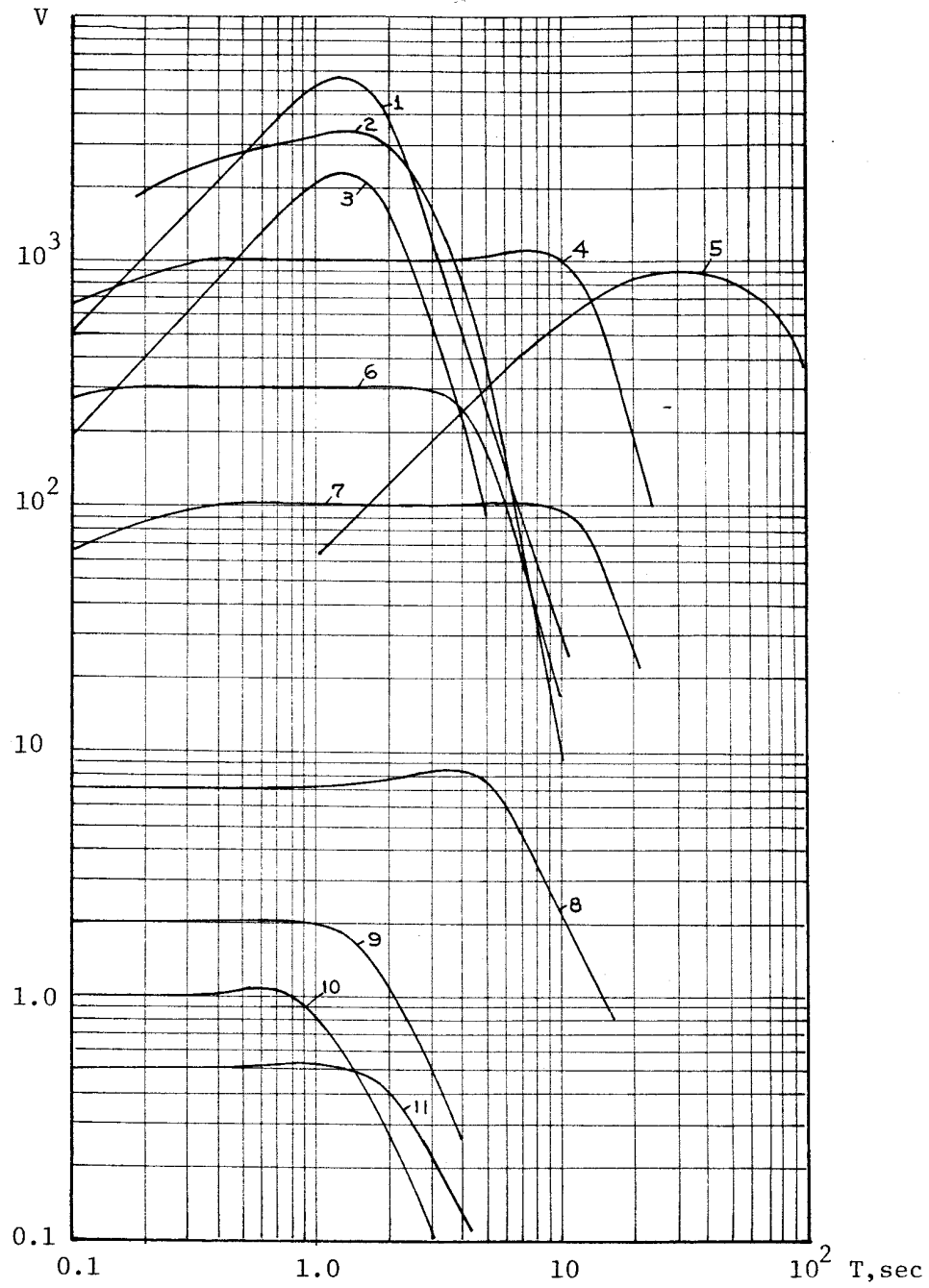


Fig. 129 -- Magnification curves of seismographs at the Tashkent station in 1970 [3]

- | | |
|-------------------------|----------------------|
| 1 -- SKM-3 (Z) | 7 -- SKD-KPCh (Z) |
| 2 -- SKM-3 (Z) | 8 -- SMTR (N-S, E-W) |
| 3 -- SKM-3 (N-S, E-W) | 9 -- ESS-1 (N-S) |
| 4 -- SK (N-S, E-W, Z) | 10 -- ESS-1 (Z) |
| 5 -- SD-1 (N-S, E-W, Z) | 11 -- ESS-1 (E-W) |
| 6 -- SKM-3--KPCh (Z) | |

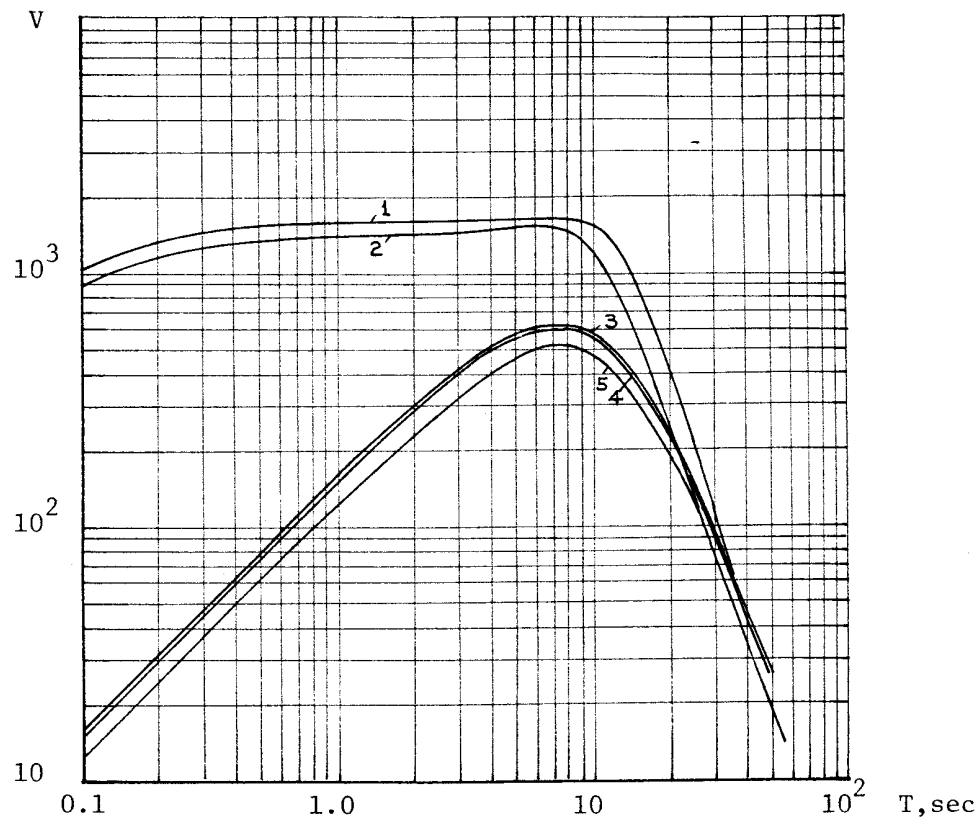


Fig. 130 -- Magnification curves of seismographs at the Tbilisi station in 1970 [3]

- 1 -- SK (N-S, E-W)
- 2 -- SK (Z)
- 3 -- SG (E-W)
- 4 -- SG (N-S)
- 5 -- SG (Z)

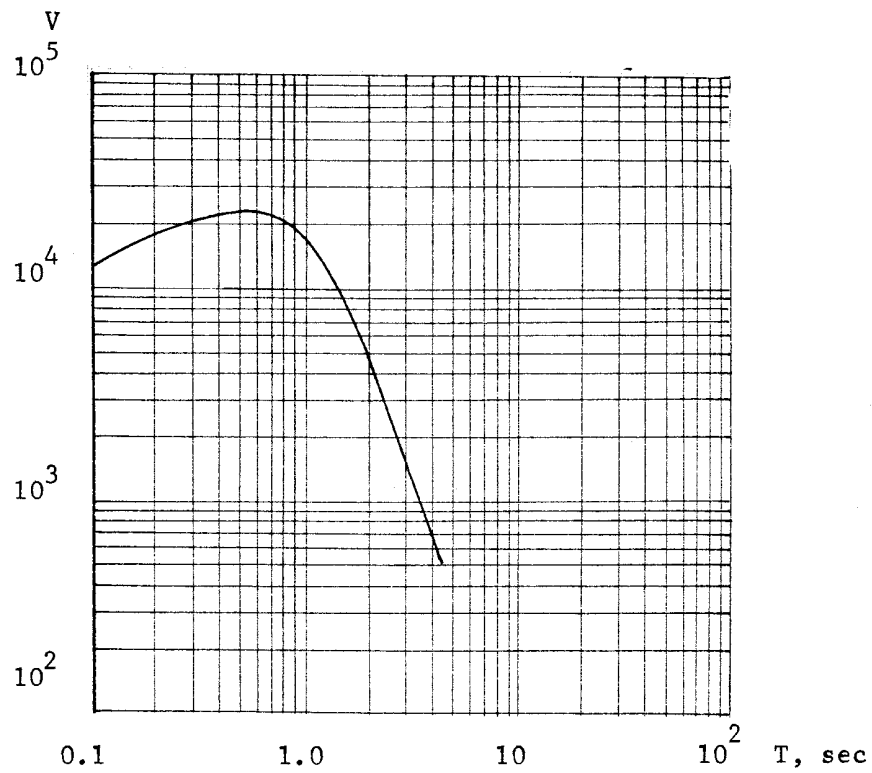


Fig. 131 -- Approximate magnification curve of seismographs at the Tbilisi II station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3

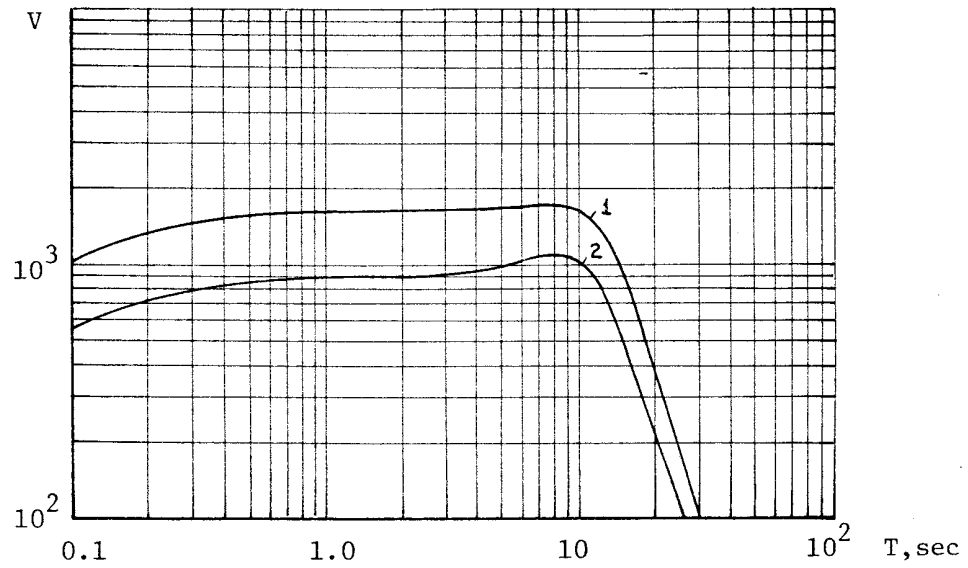


Fig. 132 -- Magnification curves of seismographs at the Tiksi station in 1970 [3]

- 1 -- SK (N-S, E-W)
- 2 -- SK (Z)

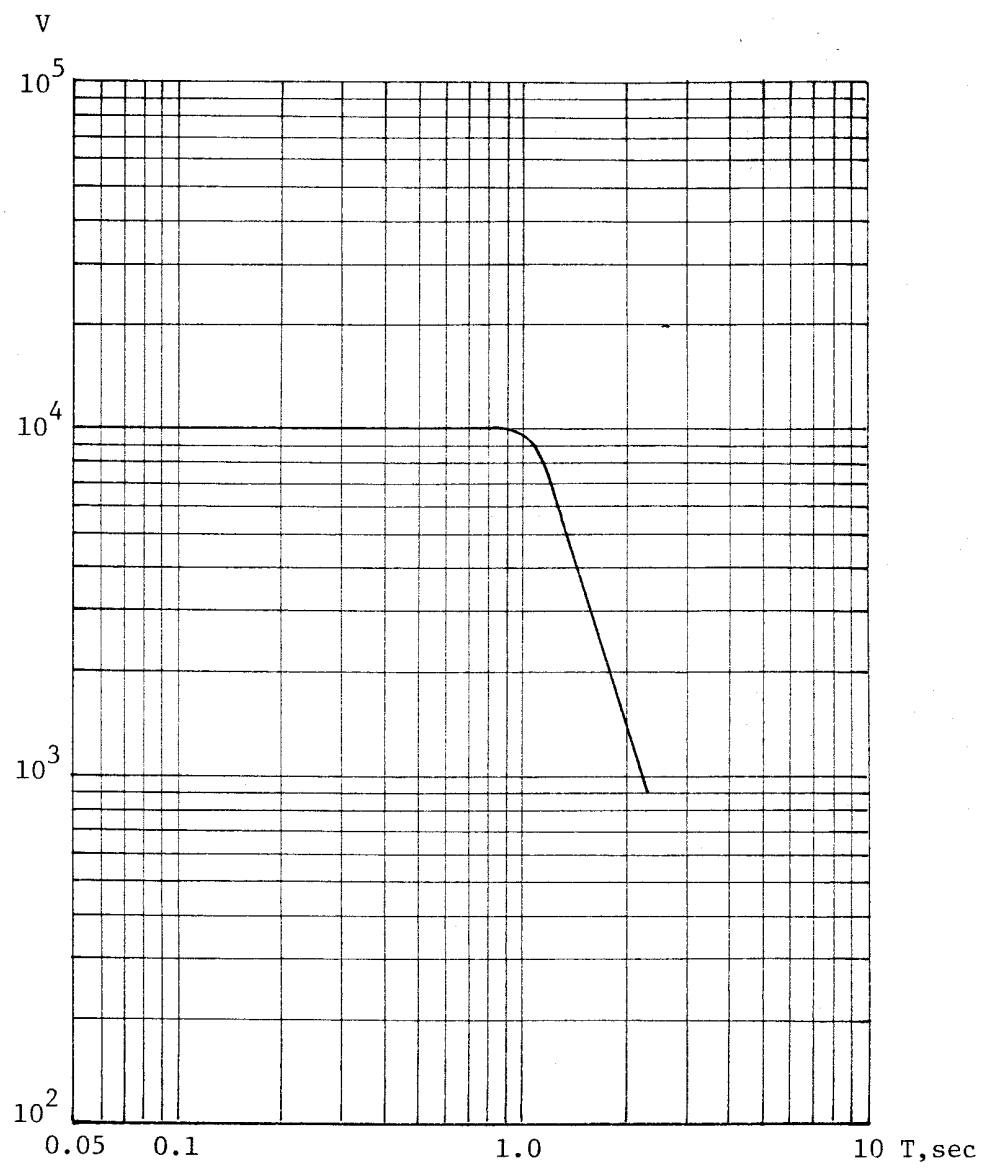


Fig. 133 -- Magnification curves of seismographs at the Topolovo station in 1969 [8]

VEGIK (N-S,E-W,Z)

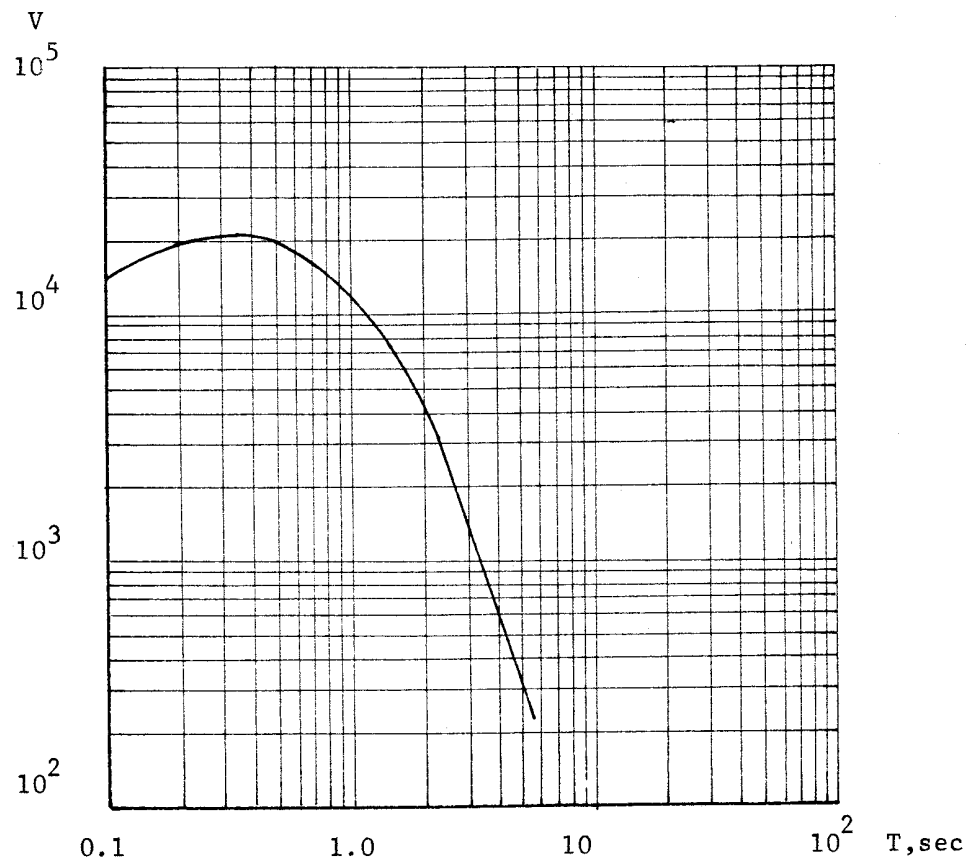


Fig. 134 -- Approximate magnification curve of seismographs at the Tsebel'da station in 1969 plotted on the basis of instrumental constants listed in Table 5

SKM-3 (Z)

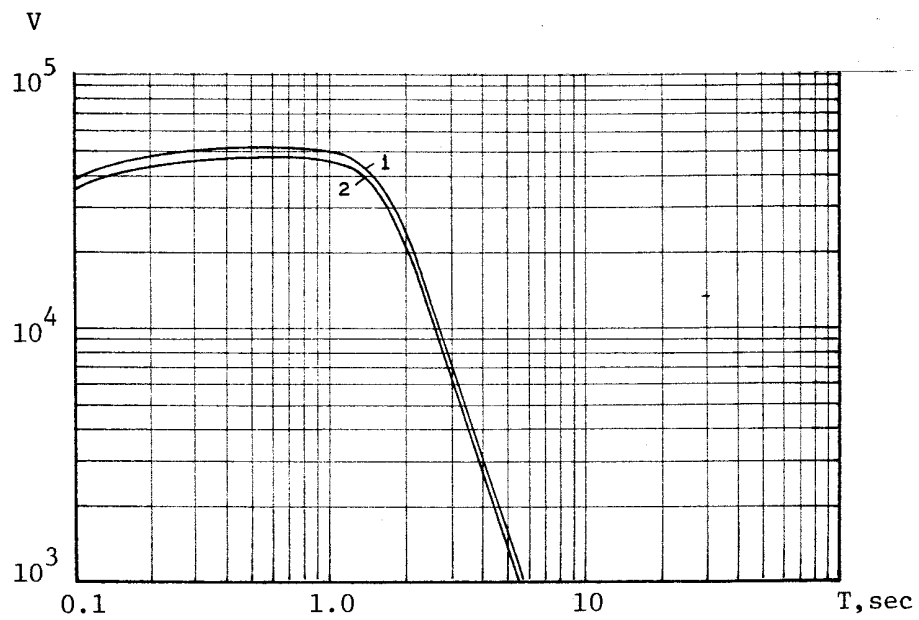


Fig. 135 -- Magnification curves of seismographs at the Tupik station in 1970 [3]

- 1 -- SKM-3 (N-S, E-W)
- 2 -- SKM-3 (Z)

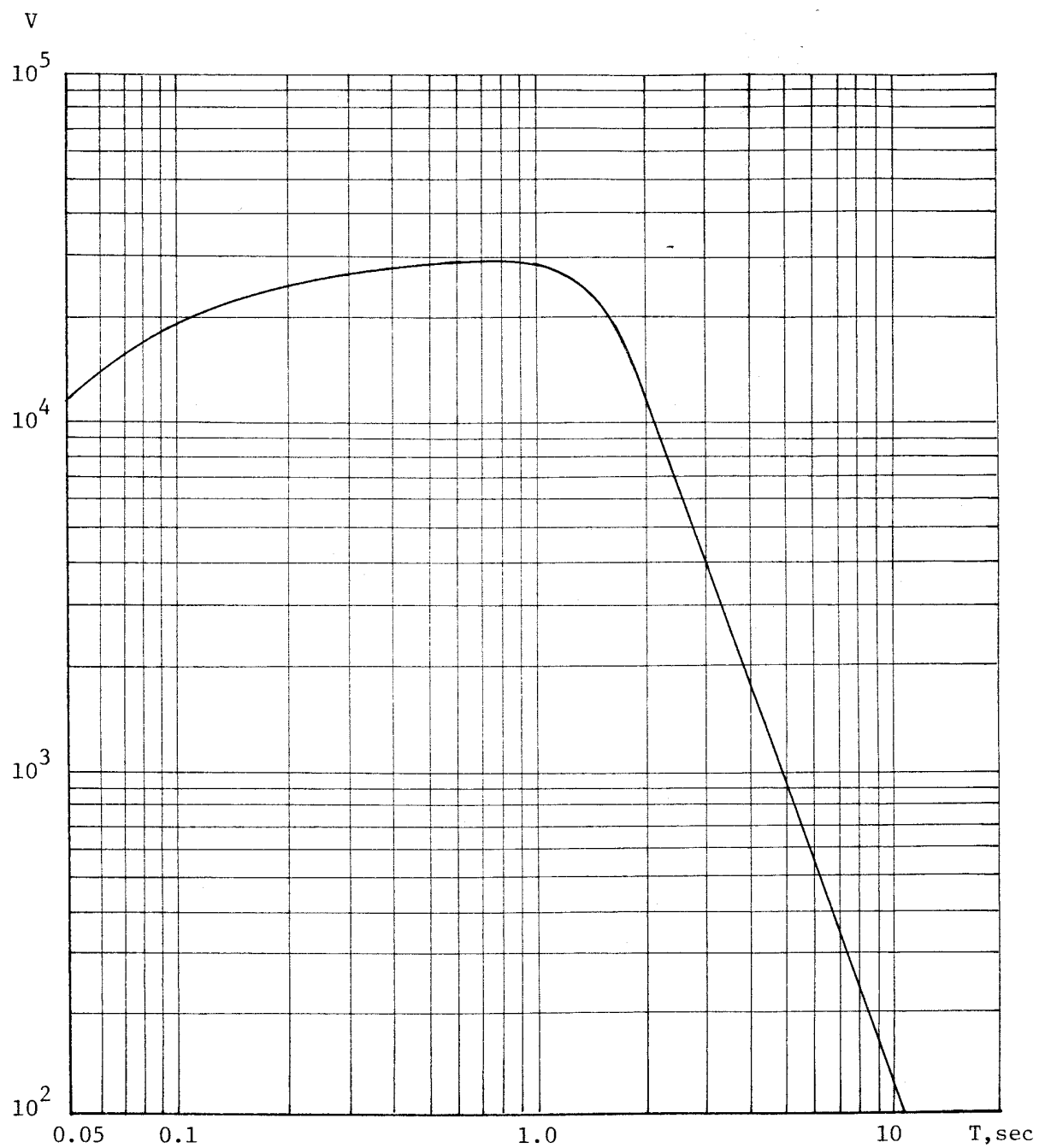


Fig. 136 -- Mean magnification curve of the three-component SKM-3 system at the Tyrgan station in 1969 [5]

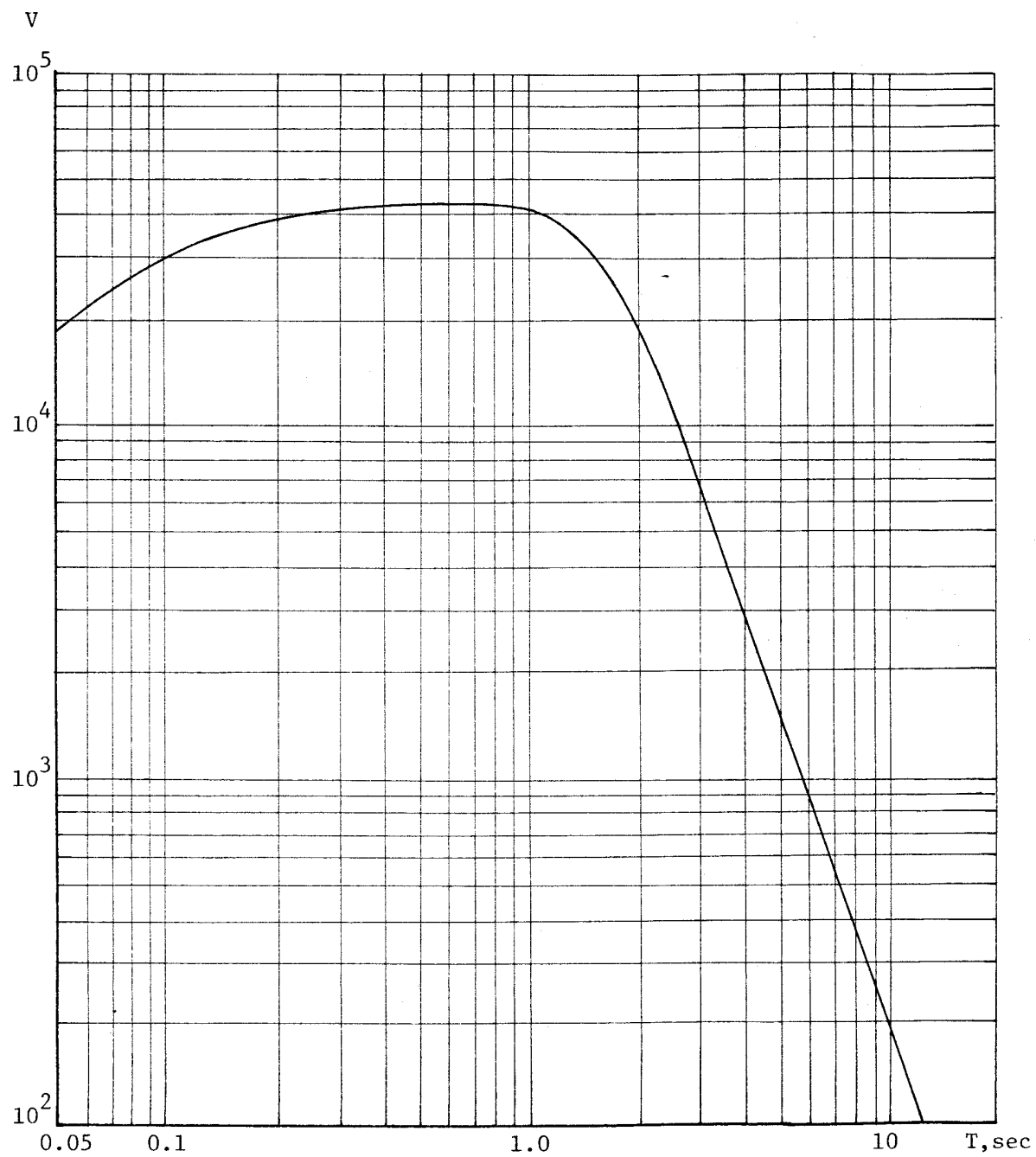


Fig. 137 -- Mean magnification curve of the three-component SKM-3 system at the Uakit station in 1969 [5]

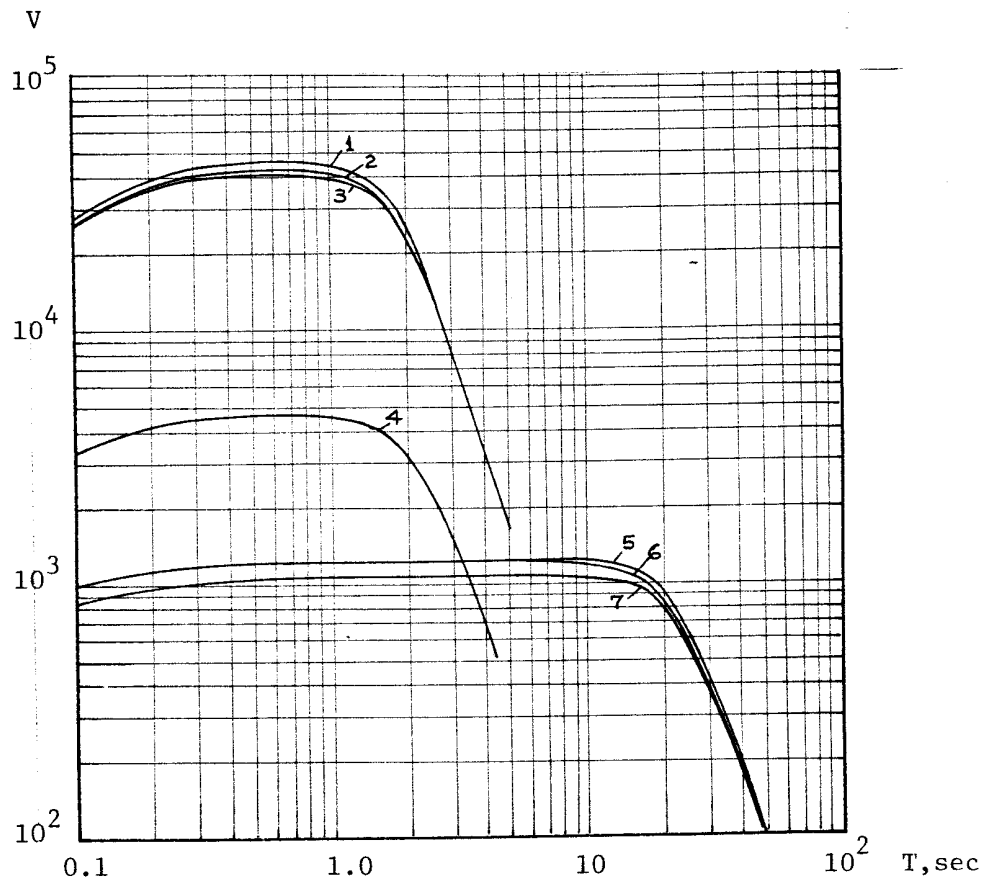


Fig. 138 -- Magnification curves of seismographs at the Ust'-Elegest station in 1970 [3]

- 1 -- SKM-3 (Z)
- 2 -- SKM-3 (N-S)
- 3 -- SKM-3 (E-W)
- 4 -- SKM-3--KPCh (E-W)
- 5 -- SKD (N-S)
- 6 -- SKD (Z)
- 7 -- SKD (E-W)

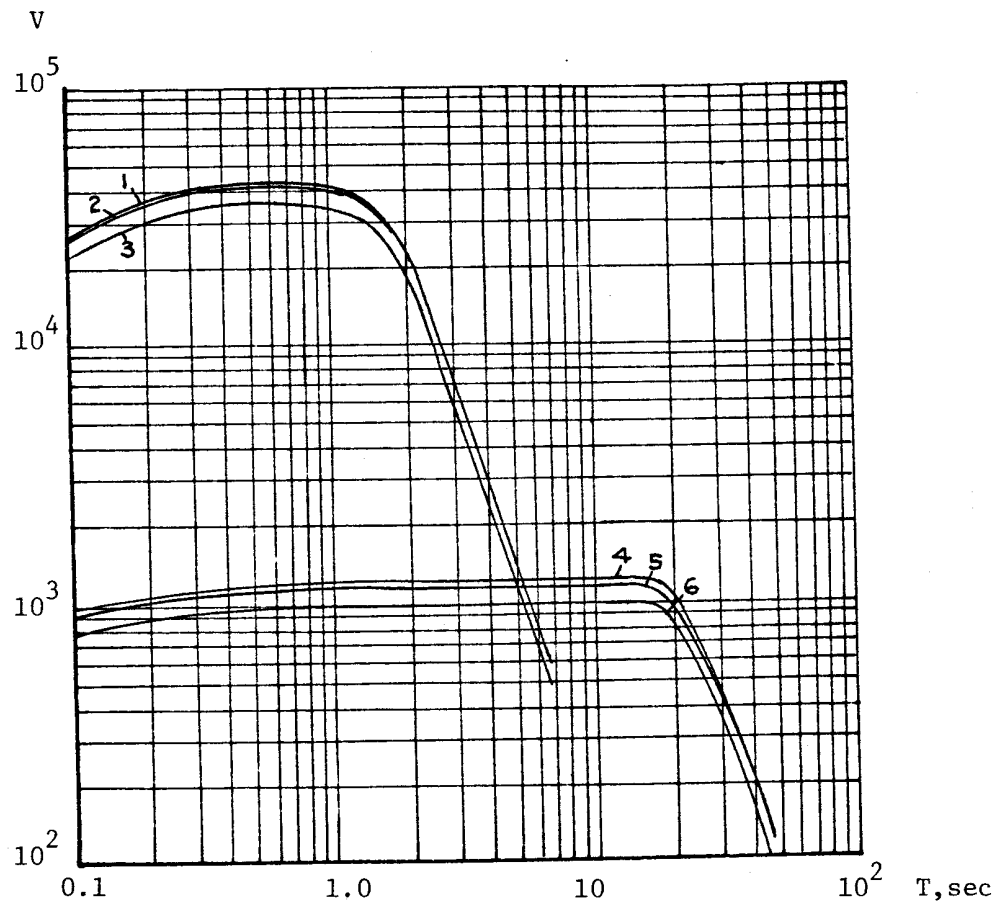


Fig. 139 -- Approximate curves of seismographs at the Ust'-Kan station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (Z)
- 2 -- SKM-3 (N-S)
- 3 -- SKM-3 (E-W)
- 4 -- SKD (N-S)
- 5 -- SKD (E-W)
- 6 -- SKD (Z)

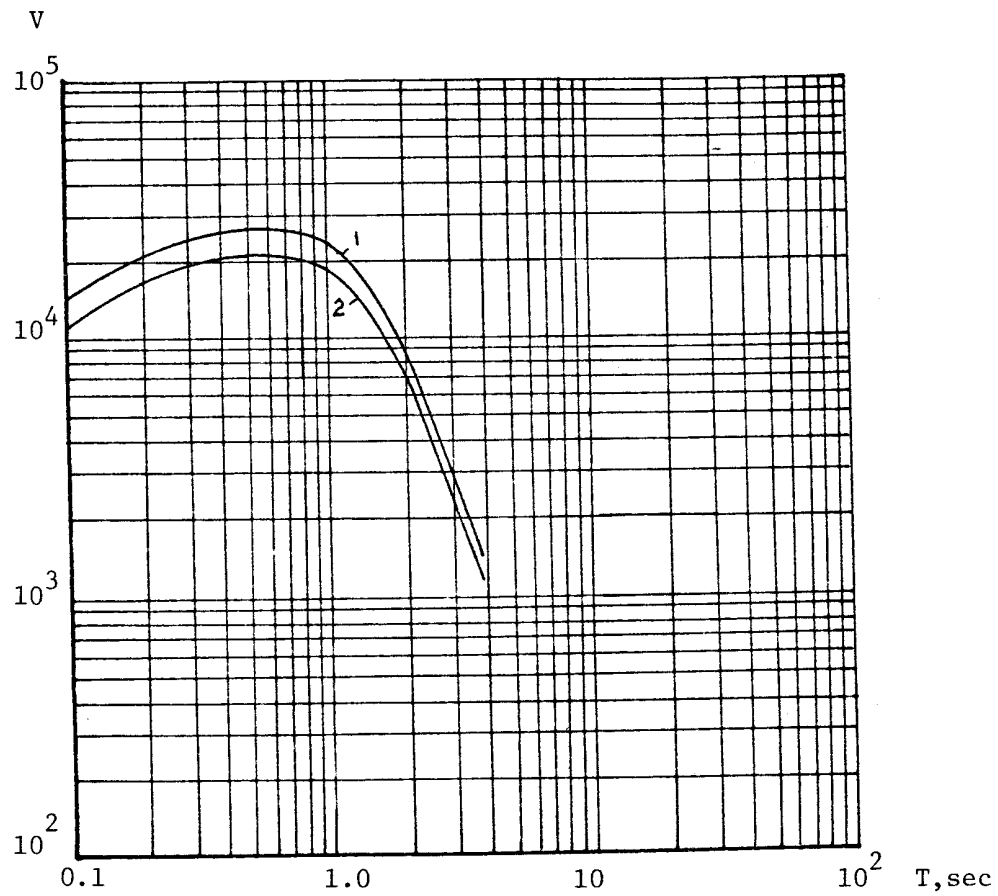


Fig. 140 -- Approximate magnification curves of seismographs at the Ust'-Nyukzha station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (N-S, E-W)
- 2 -- SKM-3 (Z)

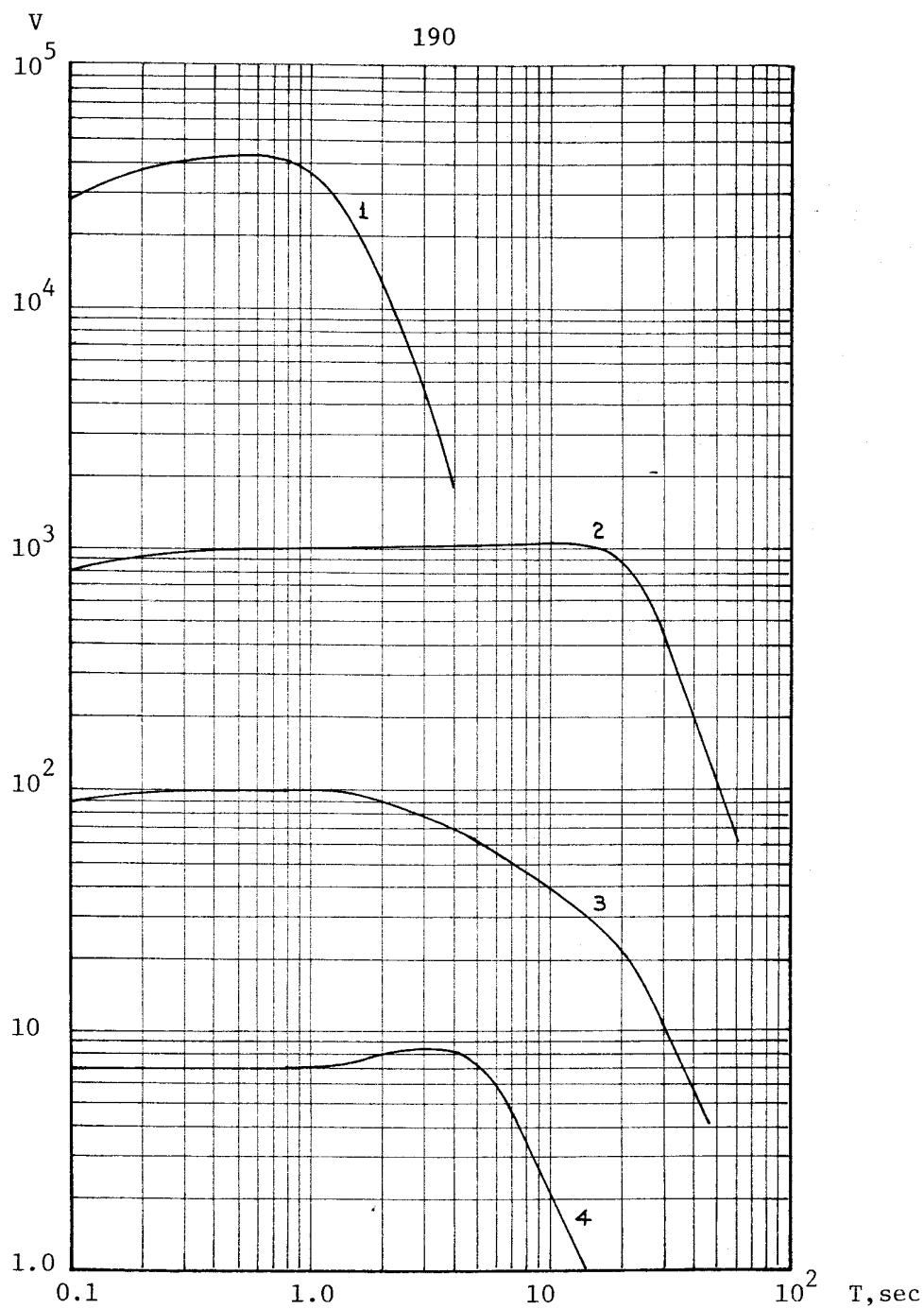


Fig. 141 -- Magnification curves of seismographs at the Uzhgorod station in 1970 [3]

- 1 -- SKM-3 (N-S,E-W,Z)
- 2 -- SKD (N-S,E-W,Z)
- 3 -- SKD-KPCh (N-S,E-W,Z)
- 4 -- SMR-2 (N-S,E-W)

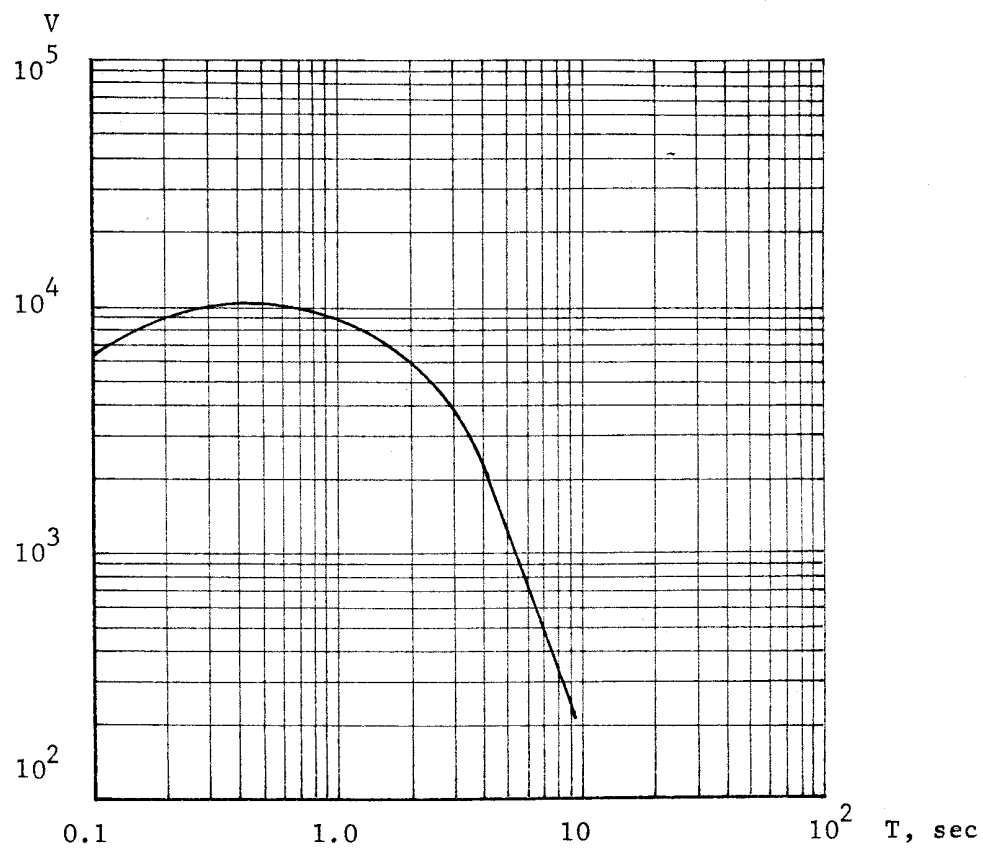


Fig. 142 -- Approximate magnification curve of seismographs at the Vardenis station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (Z)
- 2 -- SKM-3 (N-S,E-W)

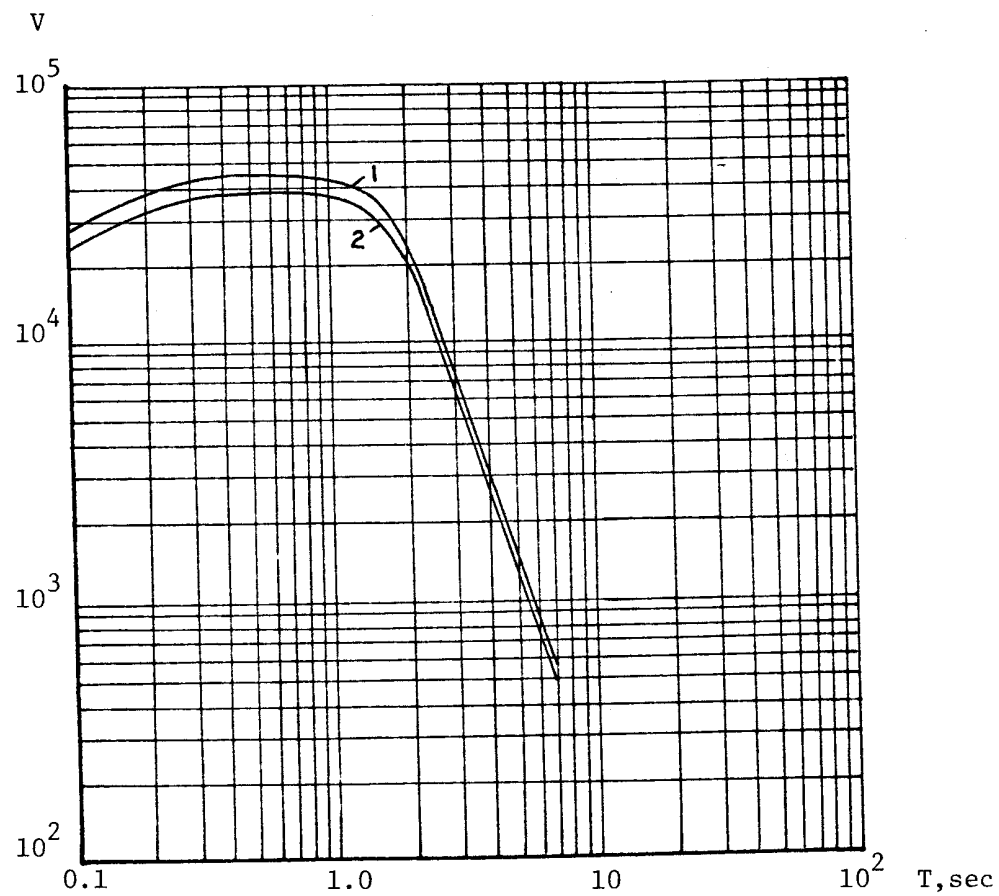


Fig. 143 -- Approximate magnification curves of seismographs at the Verkh-Baza station in 1969 plotted on the basis of instrumental constants listed in Table 5

- 1 -- SKM-3 (E-W,Z)
- 2 -- SKM-3 (N-S)

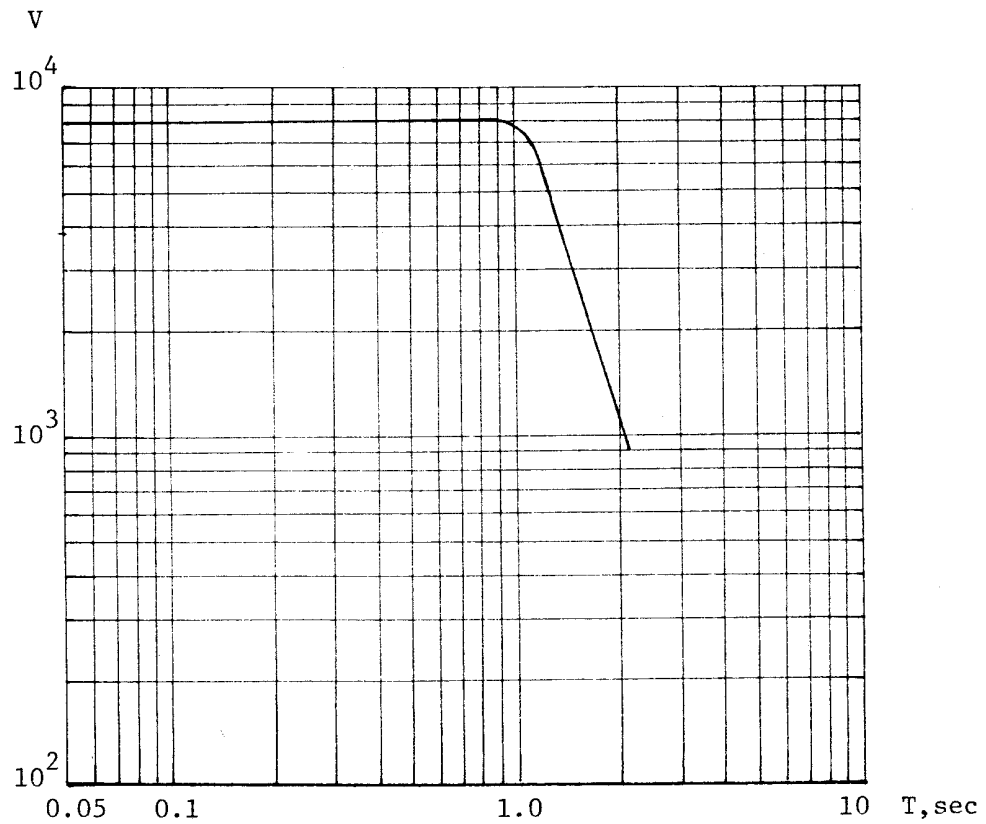


Fig. 144 -- Magnification curve of seismographs at the Verkhne-Kamchatsk station in 1969 [8]

VEGIK (N-S, E-W, Z)

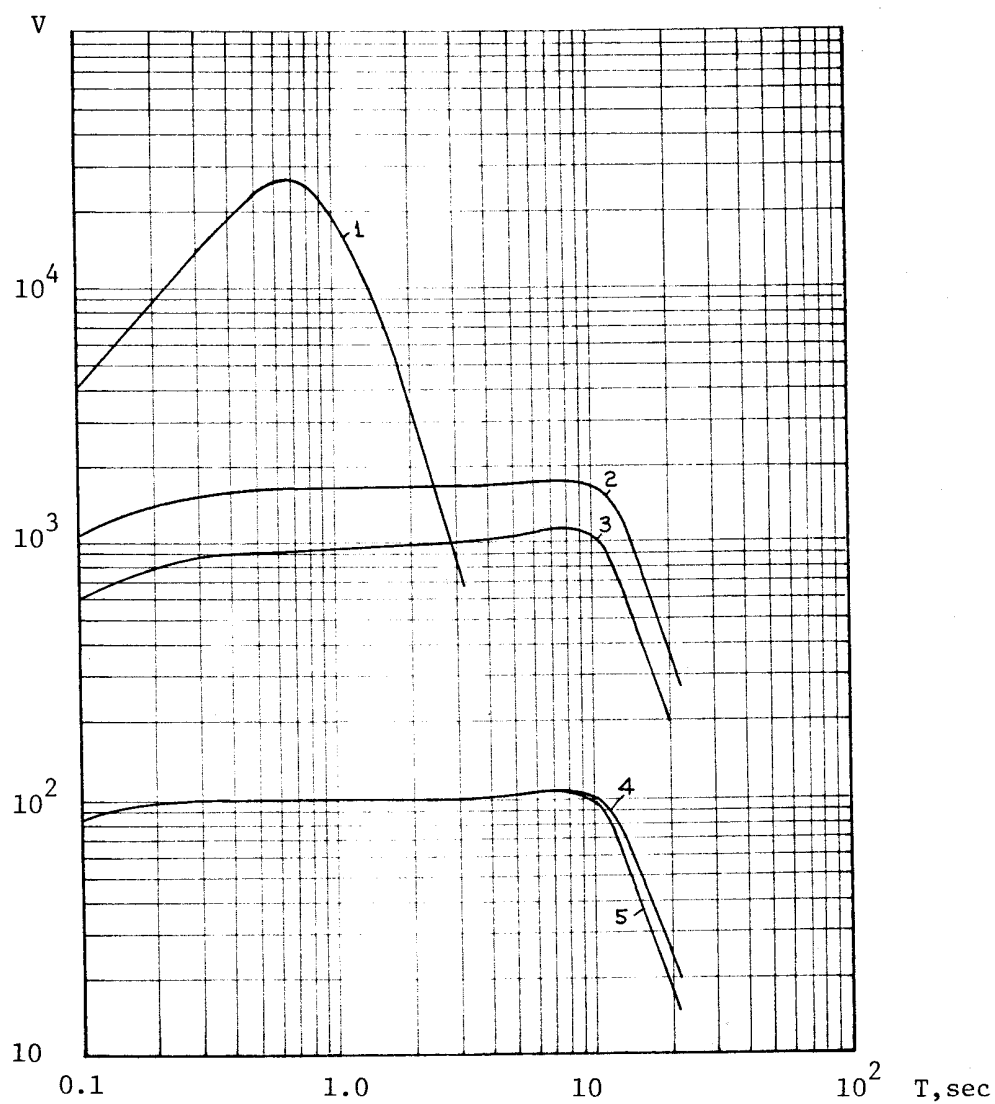


Fig. 145 -- Magnification curves of seismographs at the Vladivostok station in 1970 [3]

- 1 -- SKM-3 (Z)
- 2 -- SK (N-S, E-W)
- 3 -- SK (Z)
- 4 -- SK-KPCh (N-S, E-W)
- 5 -- SK-KPCh (Z)

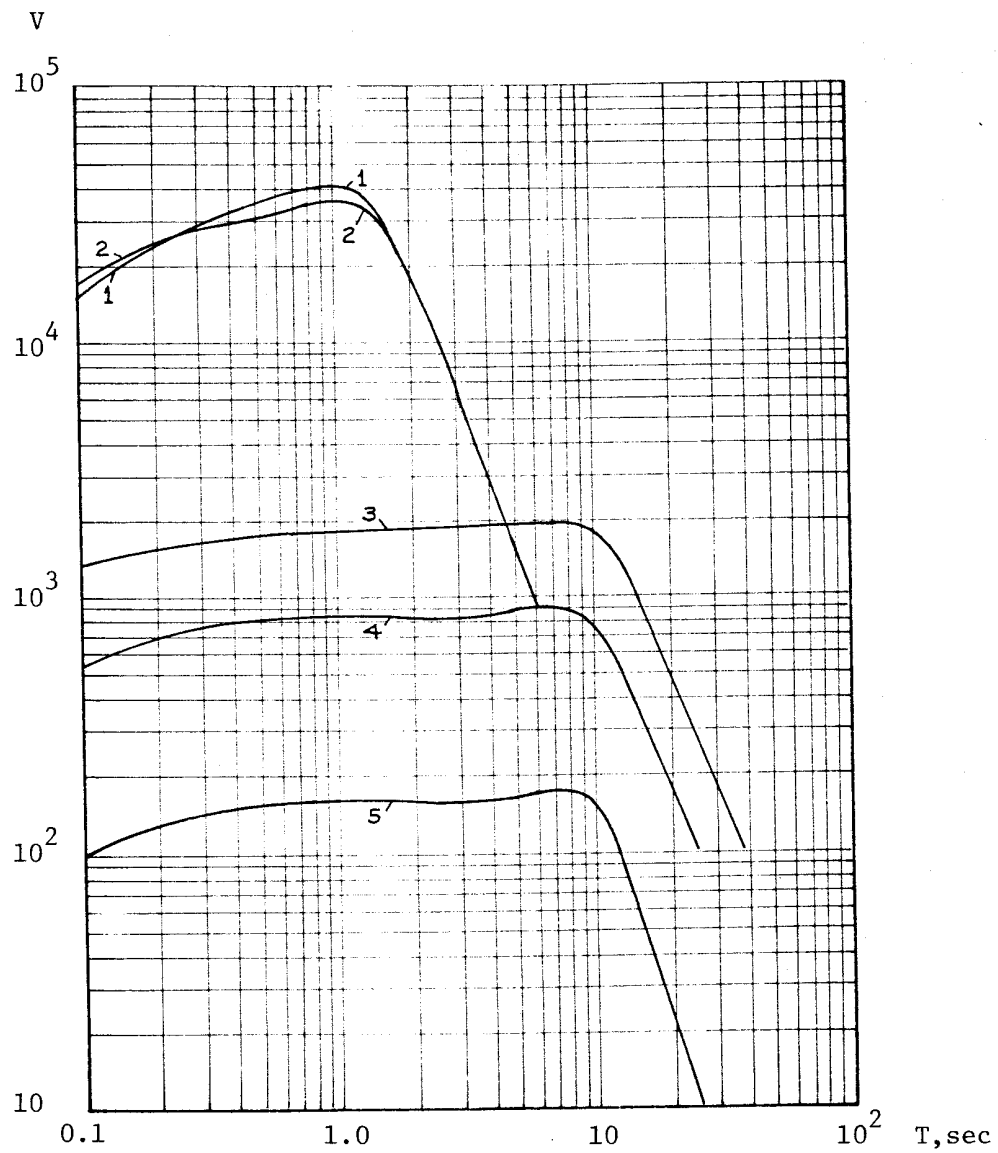


Fig. 146 -- Magnification curves of seismographs at the Yakutsk station in 1970 [3]

- 1 -- SKM-3 (E-W)
- 2 -- SKM-3 (N-S)
- 3 -- SK (N-S, E-W)
- 4 -- SK (Z)
- 5 -- SK-KPCh (N-S)

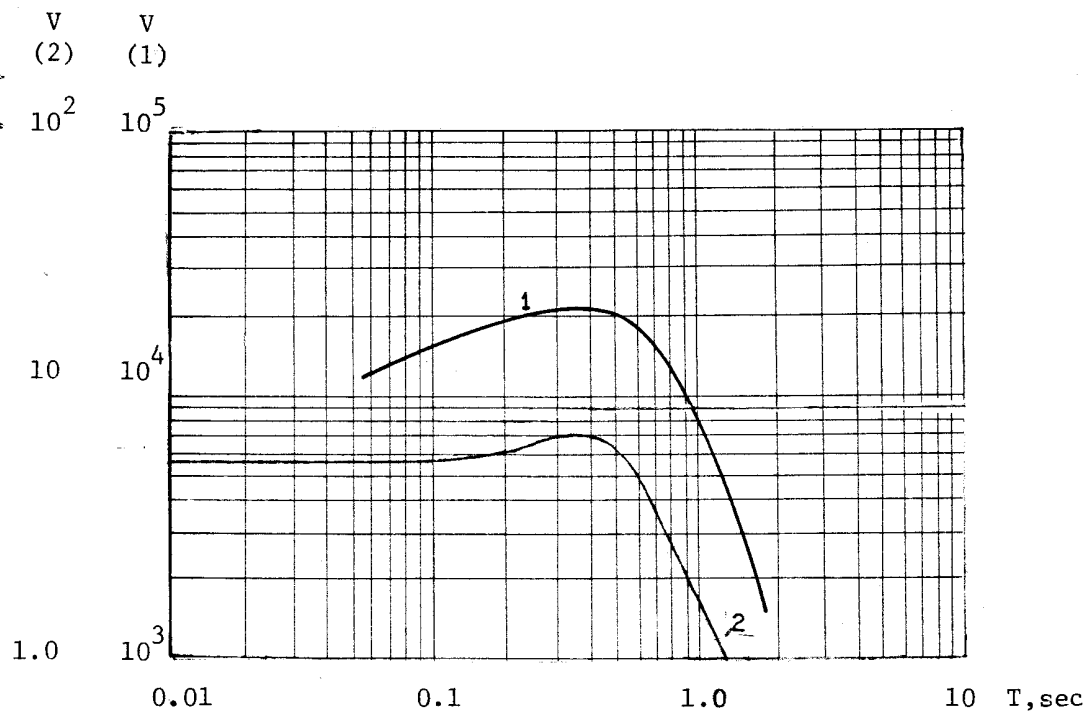


Fig. 147 -- Magnification curves of seismographs operating at the Yalta station in 1969 plotted on the basis of instrumental constants listed in Table 5 and the magnification curves given in [9]

- 1 -- SKh (N-S, E-W)
- 2 -- SMR-2 (N-S, E-W)

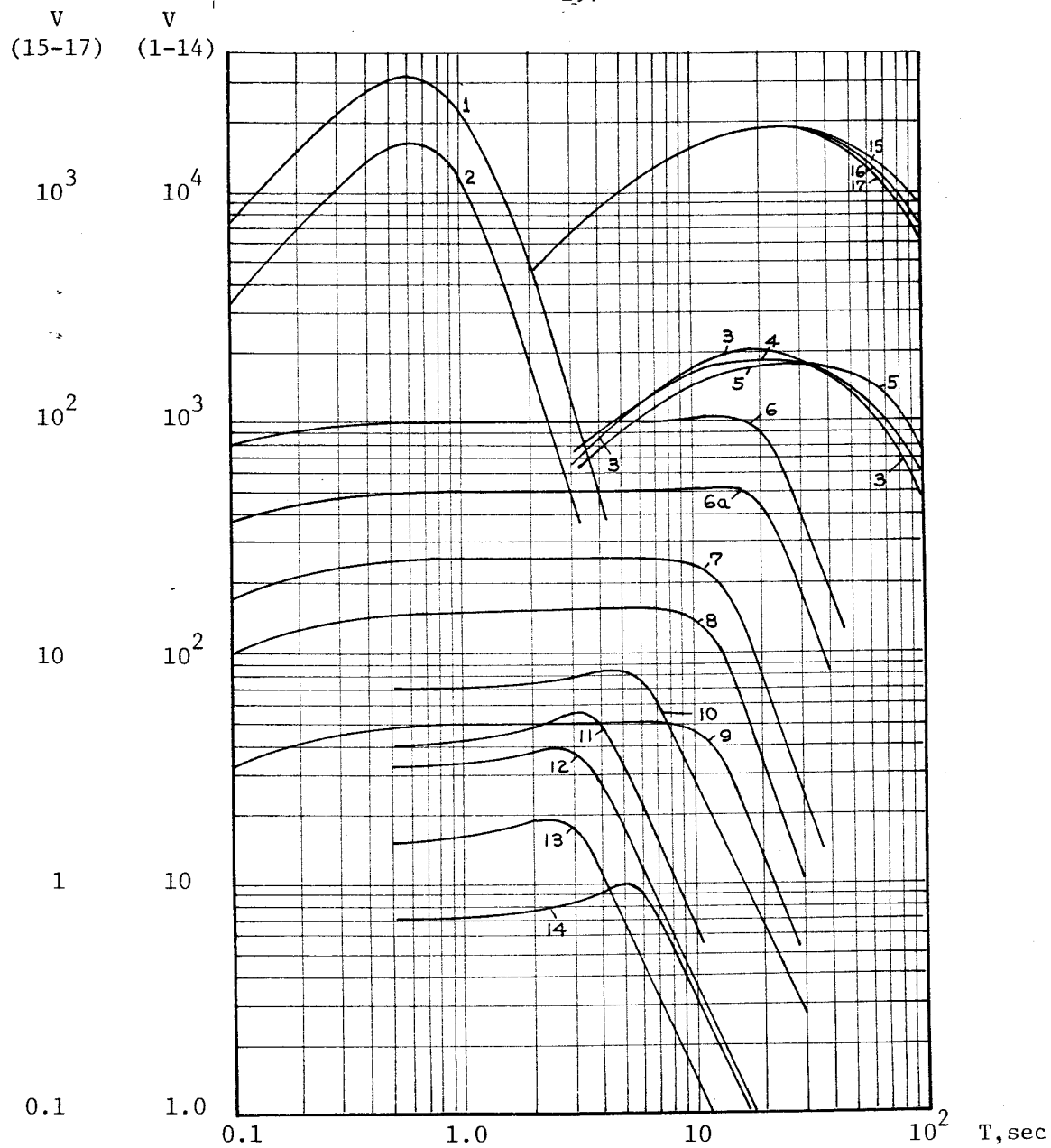


Fig. 148 -- Magnification curves of seismographs at the Yuzhno-Sakhalinsk station in 1970 [3]

- | | |
|------------------------|--------------------------|
| 1 -- SKM-3 (N-S,E-W,Z) | 10 -- Wiechert (N-S,E-W) |
| 2 -- SKM-3 (N-S,E-W,Z) | 11 -- Wiechert (Z) |
| 3 -- Press-Ewing (N-S) | 12 -- UBOPE-2 (N-S,E-W) |
| 4 -- Press-Ewing (E-W) | 13 -- UBOPE-2 (N-S,E-W) |
| 5 -- Press-Ewing (Z) | 14 -- SMTR (N-S,E-W) |
| 6 -- SKD (N-S,E-W,Z) | 15 -- Press-Ewing (Z) |
| 6a -- SKD (N-S,E-W,Z) | 16 -- Press-Ewing (N-S) |
| 7 -- SK (Z) | 17 -- Press-Ewing (E-W) |
| 8 -- SK (E-W) | |
| 9 -- SK (N-S) | |

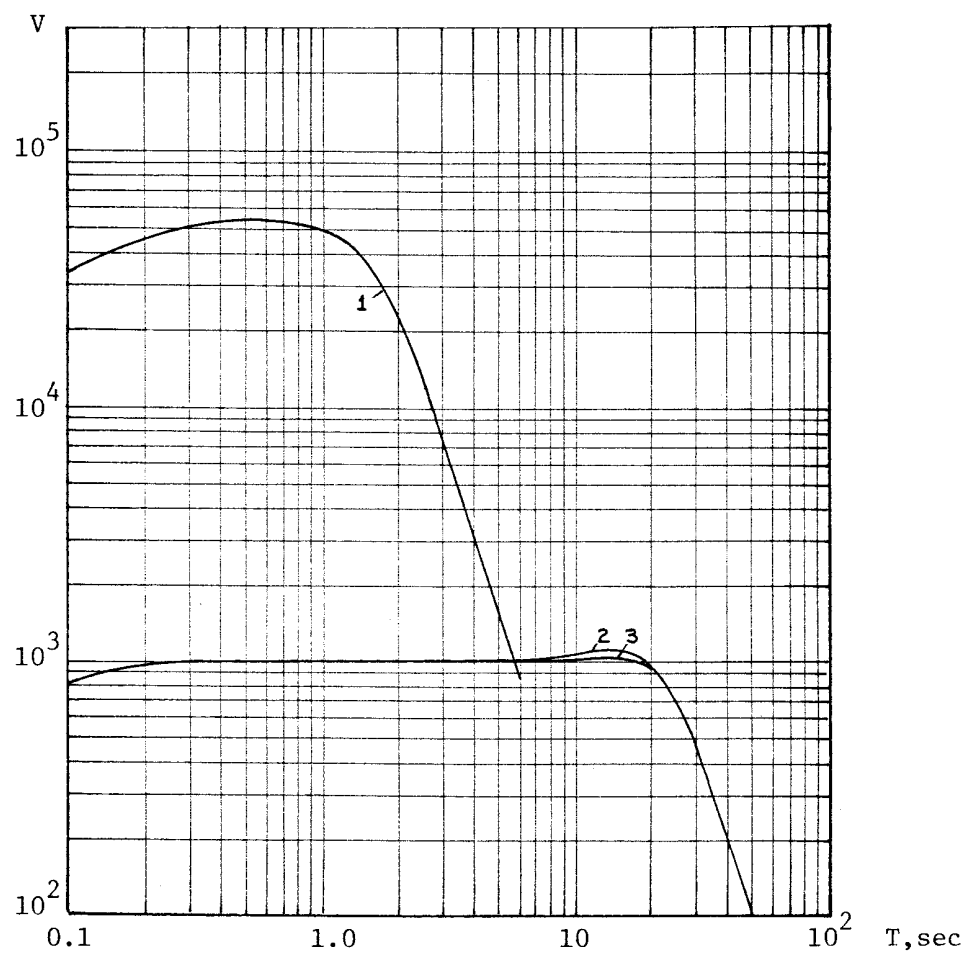


Fig. 149 -- Magnification curves of seismographs at the Zakamensk station in 1970 [3]

- 1 -- SKM-3 (N-S,E-W,Z)
- 2 -- SKD (E-W)
- 3 -- SKD (N-S,Z)

NOTE: Only a single set of constants is available for the three-component SKD system.

REFERENCES

1. Shishkevish, C., *Soviet Seismographic Stations, Geosciences Bulletin*, Series A, Vol. 3, Nos. 10-11, The Rand Corporation, R-1042/10-11-ARPA, October-November 1972.
2. Parametry, amplitudno-chastotnyye i fazovyye kharakteristiki priborov opornykh seysmicheskikh stantsiy SSSR, 1969 (Instrumental Constants and Magnification and Phase Shift Curves of USSR Base Seismographic Stations, 1969), addendum to Seysmologicheskiy byulleten' seti opornykh seysmicheskikh stantsiy SSSR (Seismological Bulletin of the USSR Network of Base Seismographic Stations), AN SSSR, Moscow, 1972.
3. Parametry, amplitudno-chastotnyye i fazovyye kharakteristiki priborov opornykh seysmicheskikh stantsiy SSSR, 1970 (Instrumental Constants and Magnification and Phase Shift Curves of USSR Base Seismographic Stations, 1970), addendum to Seysmologicheskiy byulleten' seti opornykh seysmicheskikh stantsiy SSSR (Seismological Bulletin of the USSR Network of Base Seismographic Stations), AN SSSR, Moscow, 1972.
4. Vvedenskaya, N. A., N. V. Kondorskaya, and N. V. Shebalin, editors, Zemletryaseniya v SSSR v 1968 godu (Earthquakes in the USSR in 1968), AN SSSR, Institut fiziki Zemli imeni O. Yu. Shmidta, Moscow, 1972.
5. Vvedenskaya, N. A., N. V. Kondorskaya, and N. V. Shebalin, Zemletryaseniya v SSSR v 1969 godu (Earthquakes in the USSR in 1969), AN SSSR, Institut fiziki Zemli imeni O. Yu. Shmidta, Moscow, 1972.
6. Urazayev, B. M., A. B. Ospanov, and T. Kh. Duysebayev, "Alma-Ata Central Seismographic Station," AN Kazakh SSR, Vestnik, No. 5, 1973, pp. 3-12.
7. Parametry i chastotno-amplitudnyye kharakteristiki priborov seysmicheskikh stantsiy SSSR, 1963 (Instrumental Constants and Magnification Curves of USSR Base Seismographic Stations, 1963), addendum to Seysmologicheskiy byulleten' seti opornykh seysmicheskikh stantsiy SSSR, AN SSSR, Moscow, 1963.
8. Fedotov, S. A., Energeticheskaya klassifikatsiya Kurilo-Kamchatskikh zemletryaseny i problema magnitud (Energy Classification of Kuril-Kamchatka Earthquakes and the Problem of Determining Magnitudes), AN SSSR, Institut fiziki Zemli imeni O. Yu. Shmidta, Moscow, 1972.

9. Dubinskiy, I. B., A. F. Kostina, and G. Ye. Kharchenko, "The History and Future of Development of the Crimean Network of Seismographic Stations," Seysmologicheskiye dannyye po Ukraine: Katalog zemletryasenyi Krymsko-Chernomorskogo regiona za 1963-1967 goda (Seismic Data on the Ukraine: Catalogue of Earthquakes in the Crimea-Black Sea Region in 1963-1967), AN UkSSR, Institut geofiziki, Kiev, Izdatel'stvo "Naukova dumka," 1969, pp. 5-15.