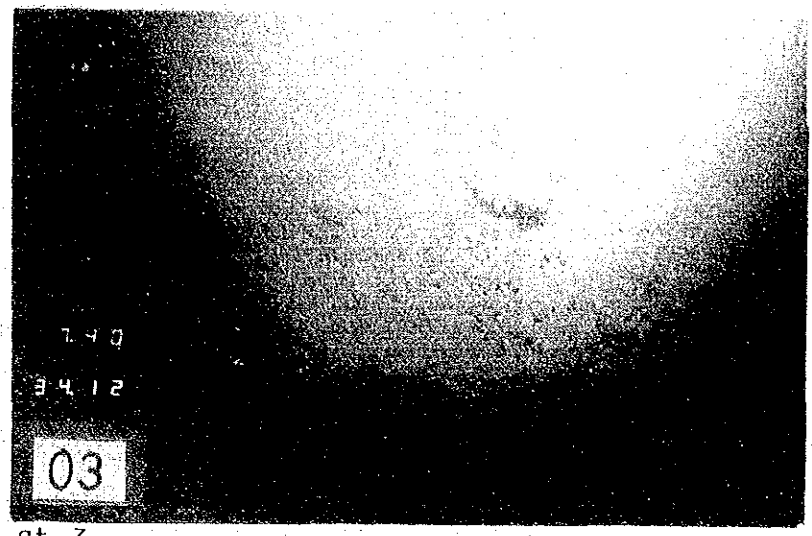
	Gravel (%)	Sand(%)			Mud(%)		Bottom Material
		coarse sand	medium sand	fine sand	silt	clay	
St. 1			23.2		76.8 65.8	11.0	Mud
5			4.3		95.7 34.2	11.5	Mud
8			3.1		96.2 84.9	12.0	Mud
10			4.8		95.2 42.2	53.0	Mud
11			4.4		95.6 77.6	18.0	Mud
14			0.4		99.6 19.6	80.0	Clay
15	14.3	74.7	85.7 8.6	2.4			Coarse sand
16	20.4	56.4	79.6 17.7	5.5	0.1		Cosrse sand
17	0.1	1.3	83.9 4.6	78.4	16.0		Fine sand
20	0.5	24.3	78.6 21.2	33.1	20.9		Sand
21			59.1		40.9		Muddy sand
23			65.3		34.7		Muddy sand
24	0.1		29.8		70.2		Sanddy mud
25	46.4		51.3		4.3		Gravelly sand
26	47.4		52.0		0.5		Gravelly sand
28	8.4		58.1		33.6		Muddy sand
29	9.4	25.8	88.1 38.2	24.0	2.5		Sand
30	2.1		34.5		33.4		Muddy sand

Table. 3.5.2(a) RESULTS OF GRAIN SIZE ANALYSIS (OFFSHORE)

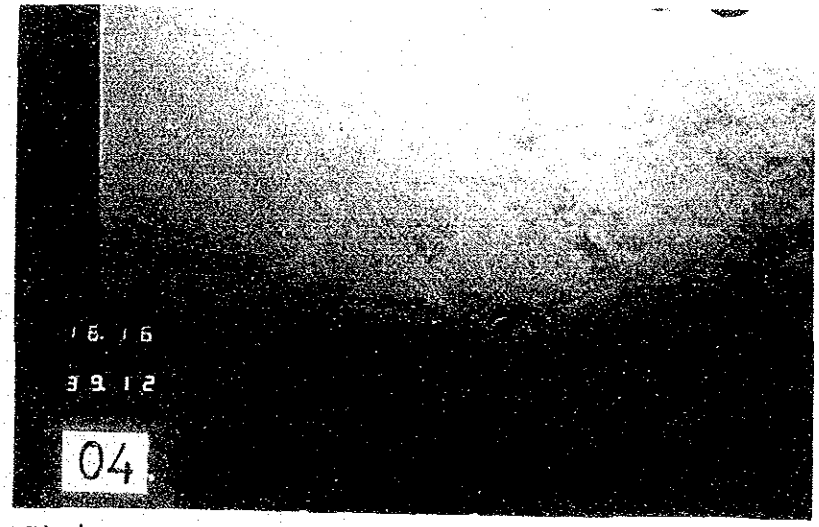
St.	Gravel(%)	Sand(%)			Mud(%)		Bottom Material
		coarse sand	medium sand	fine sand	silt	clay	
P-1			3.0		97.0		Mud
					84.0	13.0	
2	2.7		25.4		71.9		Sandy mud
					48.4	23.5	
7			15.6		84.4		Mud
					57.4	27.0	
9	4.4	49.5	95.6	11.5			Sand
			34.6				
C-1	1.9		63.6		34.5		Muddy sand
2	1.9	72.2	93.3	4.6	4.9		Coarse sand
			16.4				
4	1.3	45.8	98.5	15.3	0.2		Sand
			34.0				
6	0.6	26.5	97.6	22.9	0.7		Sand
			48.2				
7	0.7	15.5	96.3	33.9	3.0		Sand
			47.0				
K-1			7.8		92.2		Mud
					63.2	29.0	
4	0.4		10.2		89.5		Mud
					42.0	47.5	

P; Pechaburi (Ban Hat Chao Samaran) C; Kuantan K; Katong

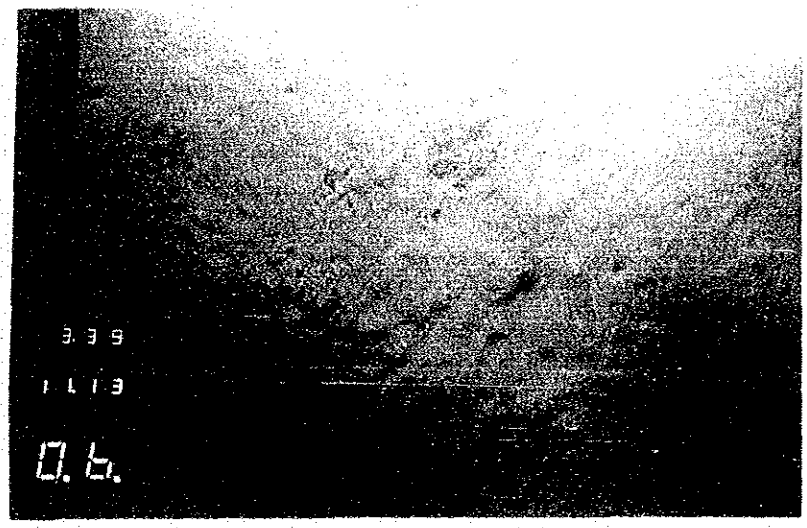
Table.3.5.2(b) RESULTS OF GRAIN SIZE ANALYSIS (SHORE)



St.3

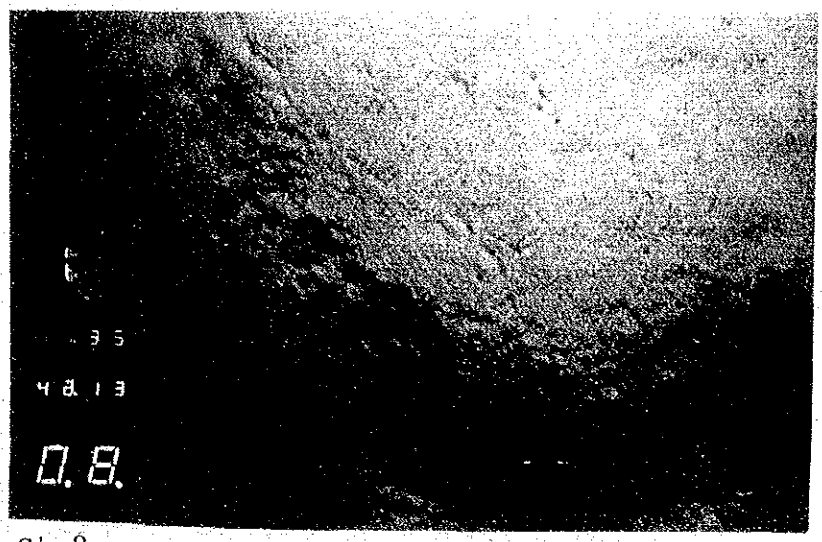


St.4



St.6

Fig.3.5.14(a) BOTTOM FEATURE

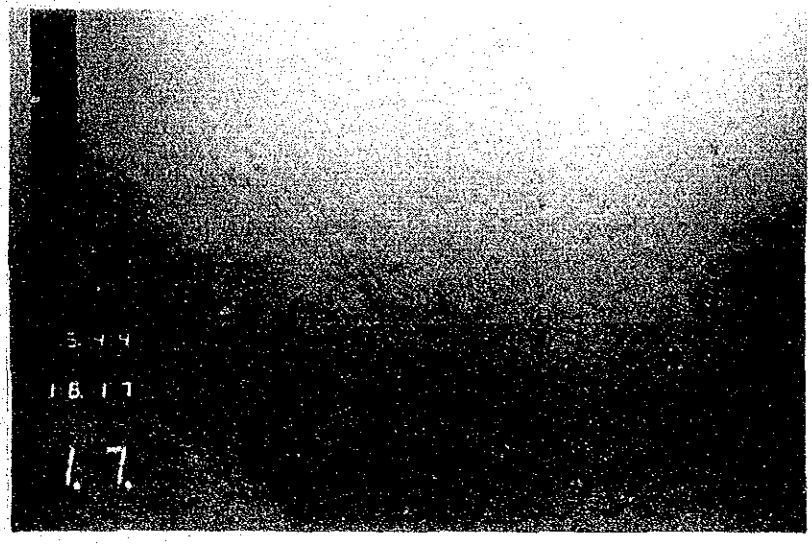


St.8

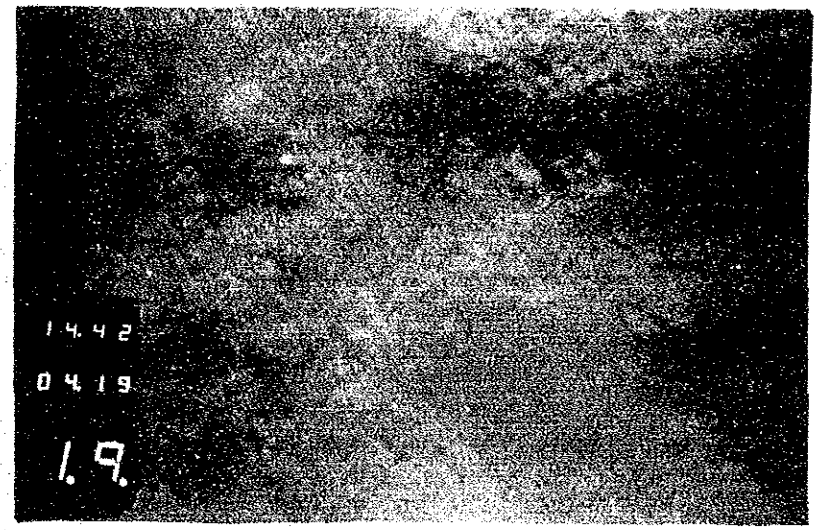
St.9

St.15

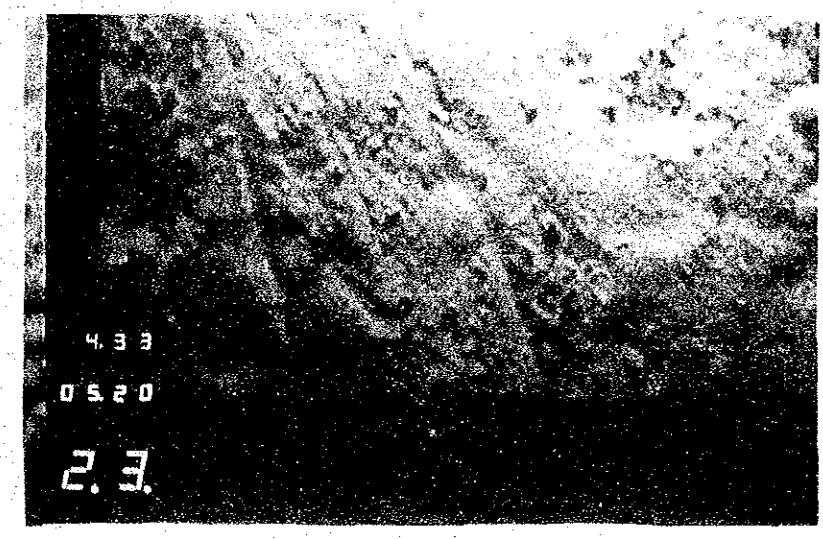
Fig.3.5.14(b) BOTTOM FEATURE



St.17

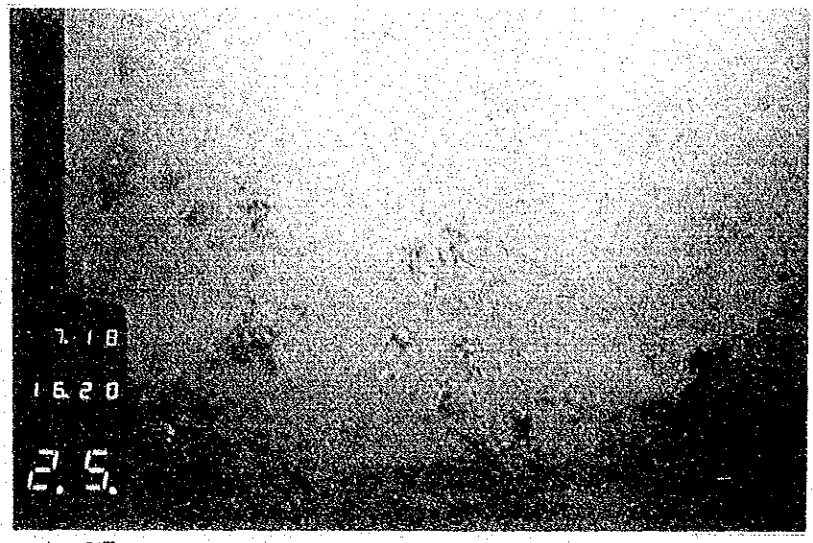


St.19



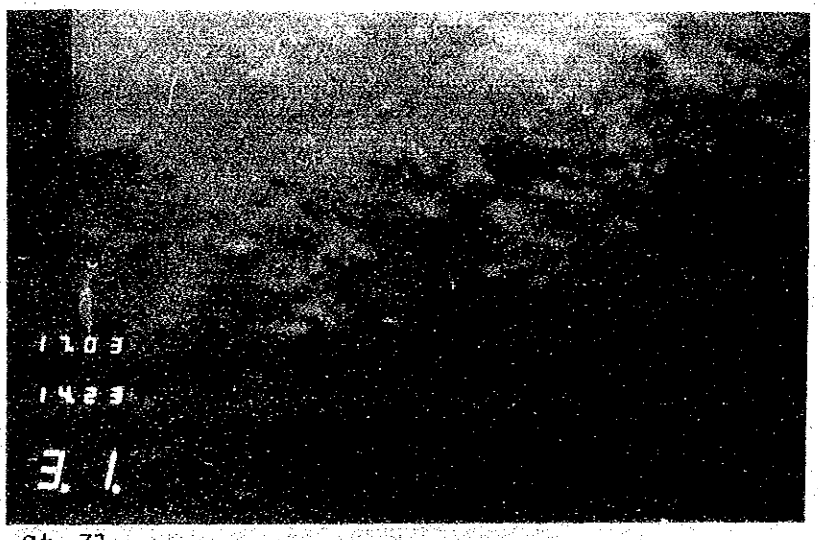
St.23

Fig.3.5.14(c) BOTTOM FEATURE



St.25

St.29



St.31

Fig.3.5.14(d) BOTTOM FEATURE

3.5.5 Subbottom Structure

Subbottom structure was examined by the Sparker (NE-19C) already mentioned. The electrodes and hydrophone of the Sparker were towed at a ship speed of about 5kt at a distance of 100m from the stern. The oscillation was made at intervals of 0.71 seconds with an energy of about 200 joules. The results of analysis achieved with due care for repeated patterns and continuity are shown in Figures 3.5.6∿3.5.8 (in shore) and in Figure 3.5.2 (off shore).

The survey route in the in-shore portion was divided into 8 sections by subbottom structure, each of which is described hereunder. Position numbers appearing hereunder are those shown in Figure 3.3.1-1 and used in the going run.

(a) Pechaburi slope (landing point to Pos. No. 788)

This section was still divided into 2 or 3 layers by recording on the Sparker. The uppermost layer was 2m∿3m in thickness, other layers had a very similar pattern of sonic wave reflection and can be estimated to be of similar material. (See Figure 3.5.15(a).)

Sampled mud shows that the bottom is occupied with solid mud covered with a thin soft sandy mud (about 2cm). It can be then understood that a comparatively solid sandy mud is spread near the bottom surface in this section.

(b) Flat section in the Gulf of Thailand (Pos. Nos. 788 and 696)

This section was still divided into two portions by near Pos. No.725. In the portion between Pos. Nos. 788 and 725 the boundary between the uppermost layer and the lower layer is comparatively not clear. Sampling at St 4 shows that the sampled length in this portion was about 10cm and the bottom consists of a solid clay. It can then be estimated that similar lays are distributed from nearly the surface to lower layers.

In the portion between Pos. No. 725 and 696, 3 or 4 layers are observed, between which boundaries are comparatively clear. (See Figure 3.5.15(b).) In this portion the uppermost layer is estimated to be a comparatively soft layer as sonic waves penetrate it very much (giving transparent patterns in recording) although sampling was not made.

(c) Offing of Samui Island (Pos. Nos. 696 and 620)

In this section, a few layer seem to exists. The uppermost layer is thinnest (less than 2m) at near point 680 and becomes thicker as the distance from this point increases. In some areas, the thickness of the uppermost layer may become larger but this is because of irregularities of the lower layer. Recording on the Sparker shows that this uppermost layer transmits sonic waves in thick layer portions much better than in thin layer portions and is estimated to be softer.

(d) Thailand-Malaysia flat section (Pos. Nos. 620∿ 317)

In this section, 2∿4 layers seem to exist and their boundaries are comparatively clear. The uppermost layer is mostly as thick as about 10m (at least 2m), although the layer thickness off Tenggol Island (Pos. Nos. 330∿350) shown in Figure 3.5.15(c) was exceptinally about 1m. This uppermost layer appears in two kinds: mud on Samui Island's side and muddy sand on the Kuantan's side. Both kinds of layers are extremely soft.

(e) Kuantan slope (Pos. Nos. 317 and 245)

In this section, 2∿4 layers appear to exist. Boundaries between them are not clear, and it is rather difficult to track the boundaries. Recording on the Sparker shows that these layers exhibited similar patterns and can be estimated to consist of similar sediments. (See Figure 3.5.15(d).)

The uppermost layer mainly consists of sand and its thickness varies in a 1m to 20m range depending on the ups and downs on the surface of the lower layer.

(f) Offing southeast coast of Malaysia (Pos. Nos. 245∿43)

In this section a few layers seem to exist. The uppermost layer varies its thickness depending on the ups and downs on the surface of the lower layer. The thickness near the Tioman Island (Pos. Nos. 120∿170) and near Pos. No. 200 was as small as about 1m. (See Figure 3.5.15(e)(f).) The uppermost layer is of muddy sand or sand and is

comparatively soft.

(g) Singapore Strait (Pos. Nos. 43 to 1)

In this section, the base rock and one or 2 sedimentary layers exist. The base rock has marked ups and downs and exposes over the bottom surface or comes up near it. (See Figure 3.5.15(g).) Although the base rock could not be sampled directly, a mixture of quartz grains and clay which can often be observed when granite is weathered. Accordingly, part of the base rock may be granite or the like. The uppermost layer consists of sand, muddy sand, sandy mud, and sandy gravel and differs from place to place.

(h) Katong slope (Pos. No. 1 to landing point)

In this section of the survey route, the subbottom structure rather resembled that of the Singapore Strait. The base rock has marked ups and downs. Although the base rock does not expose over the bottom surface, it can be observed at about 1m beneath the bottom surface at a point 450m from the landing point. The uppermost layer in the offshore portion mixture of mainly silt and clay with less sand and the rate of mixture differs from place to place. (See Figure 3.5.8.)

3.5.6 Water Temperature and Its Predictable Variation

(1) Water temperature

Water temperature observation was conducted by using

ET-5 Thermometer upon sampling bottom materials. The bottom water temperatures at respective observation points on the main survey track are given in Table 3.5.1(a) and (b) and vertical water temperature distributions on the main survey track are shown in Figures 3.5.16(a) ∿ (d). In the in-shore portion, the water temperature at the sea surface and that at the bottom scarcely differ from each other. In the offshore portion, thermocline was observed at about 30m in depth.

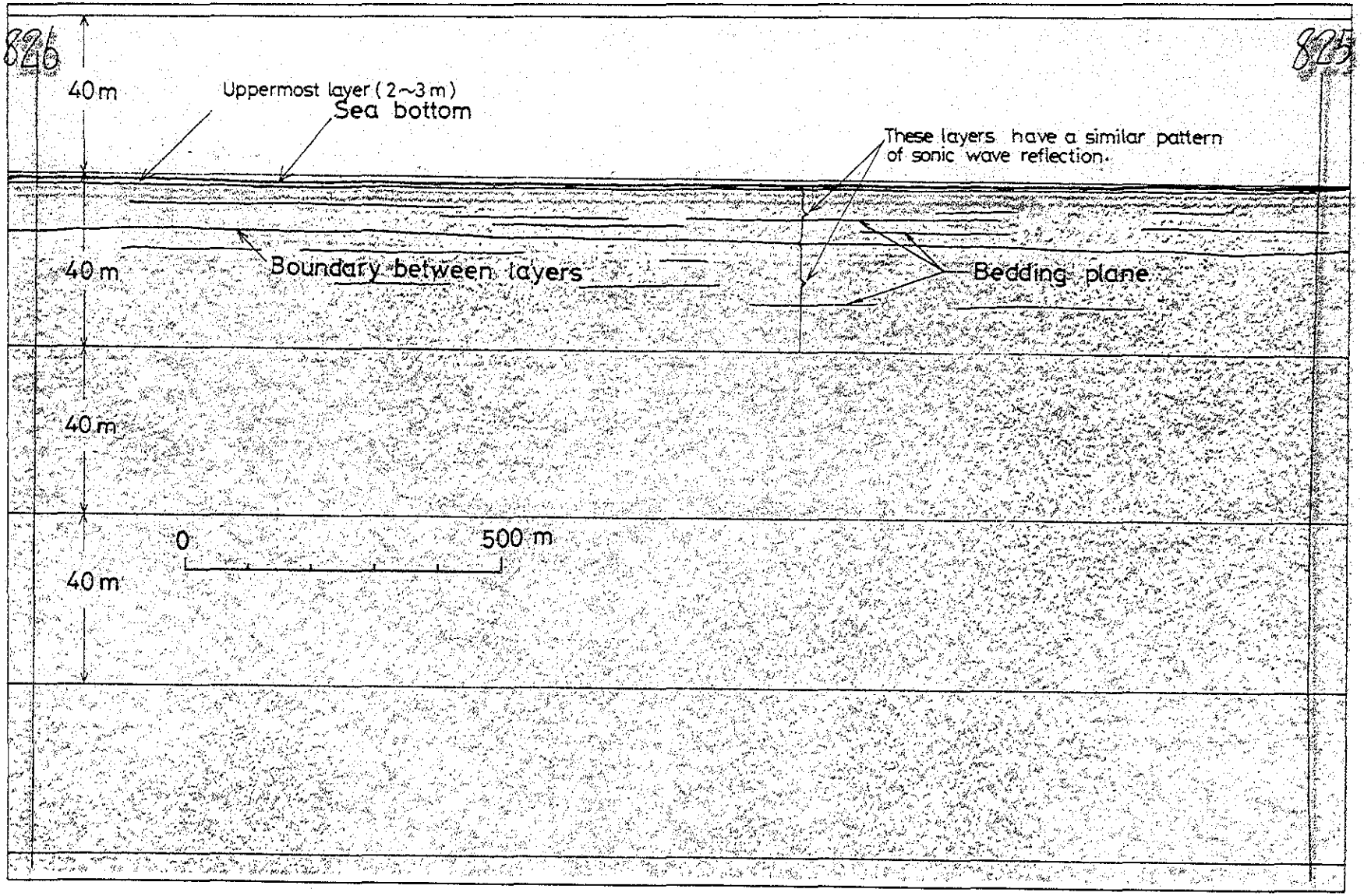


Fig. 3.5.2(a) RECORD ON SEARCH

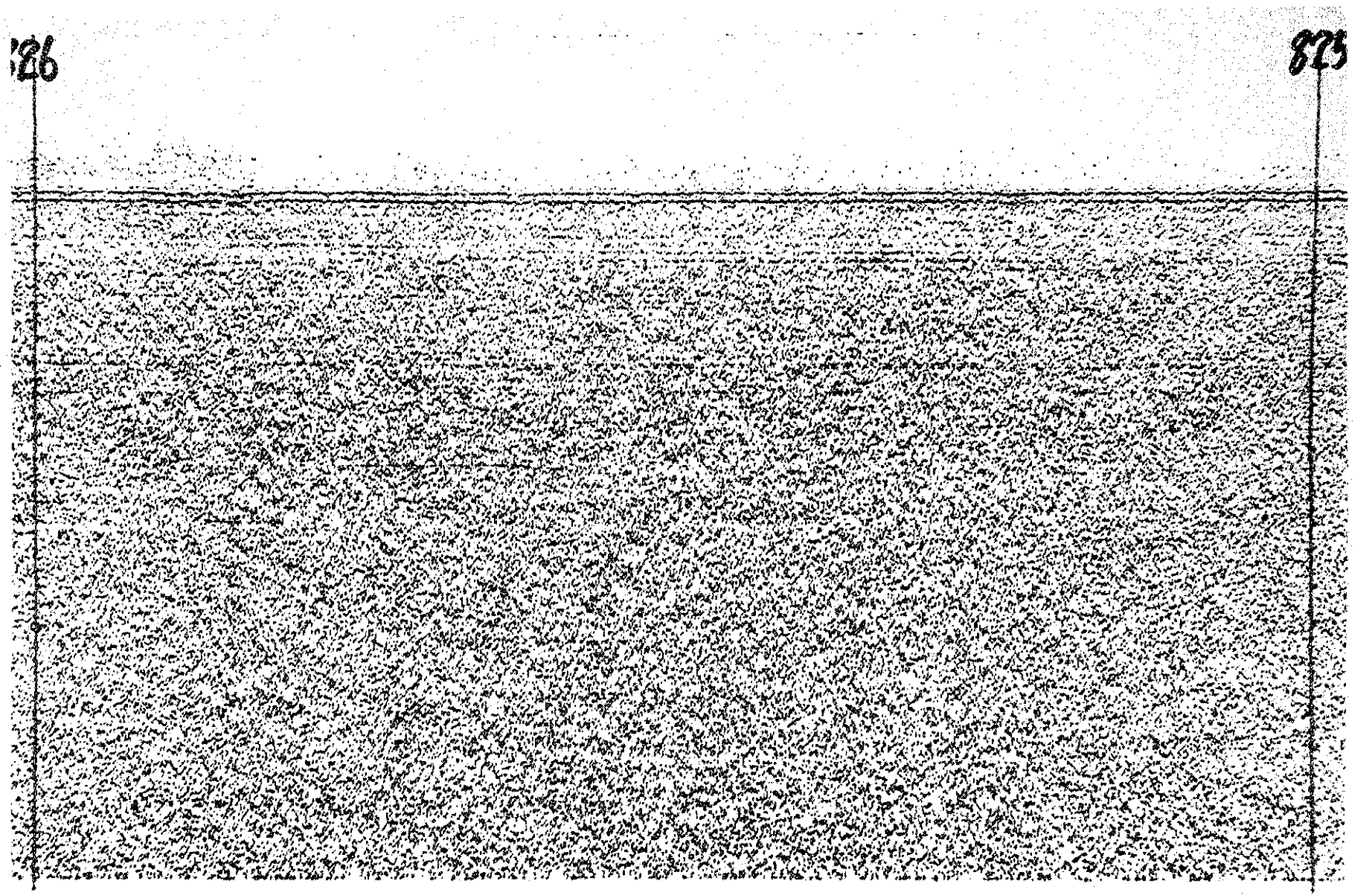


Fig.3.5.15(a) RECORD ON SPARKER

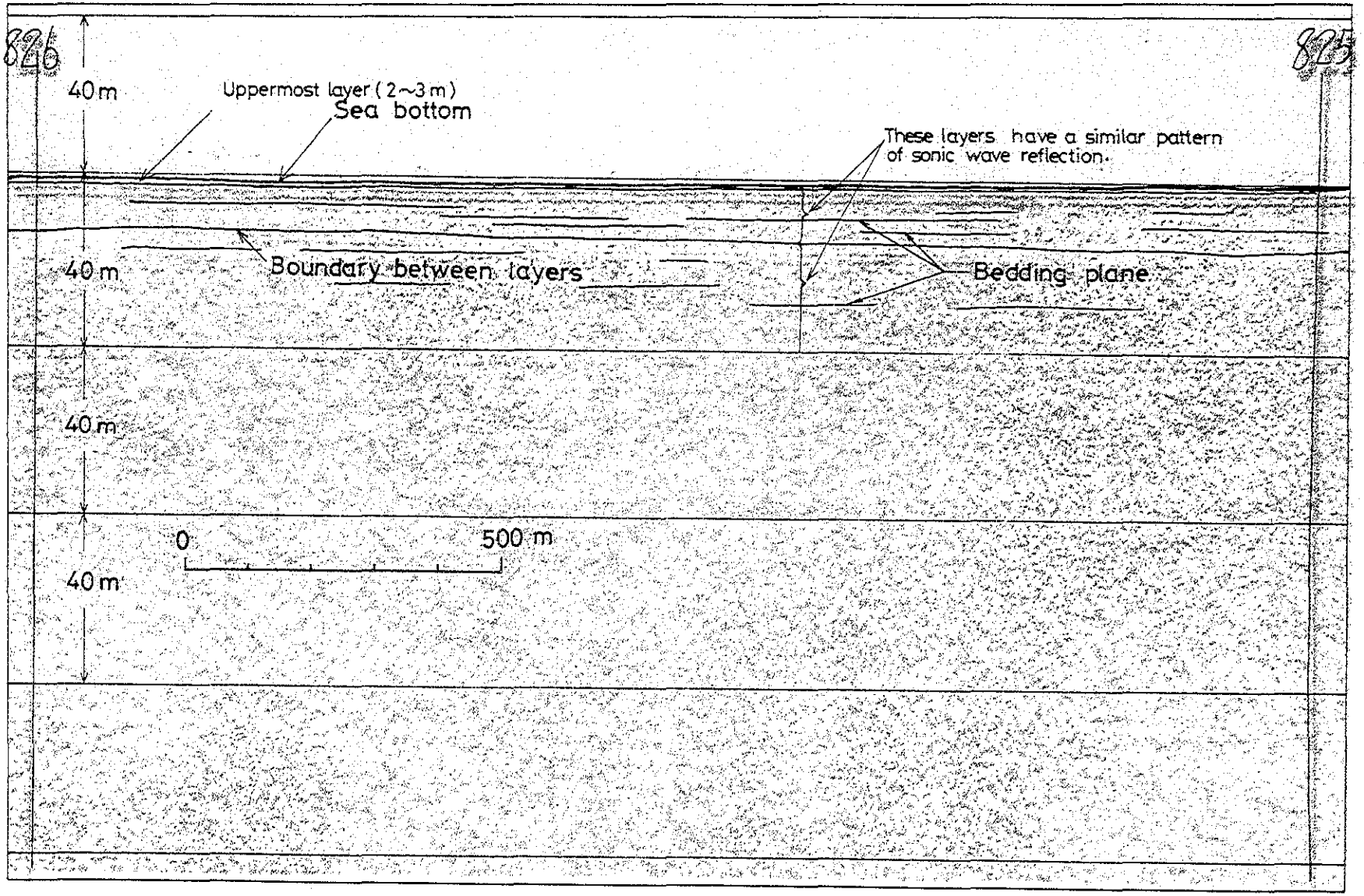


Fig. 3.5.2(a) RECORD ON SEA-CH

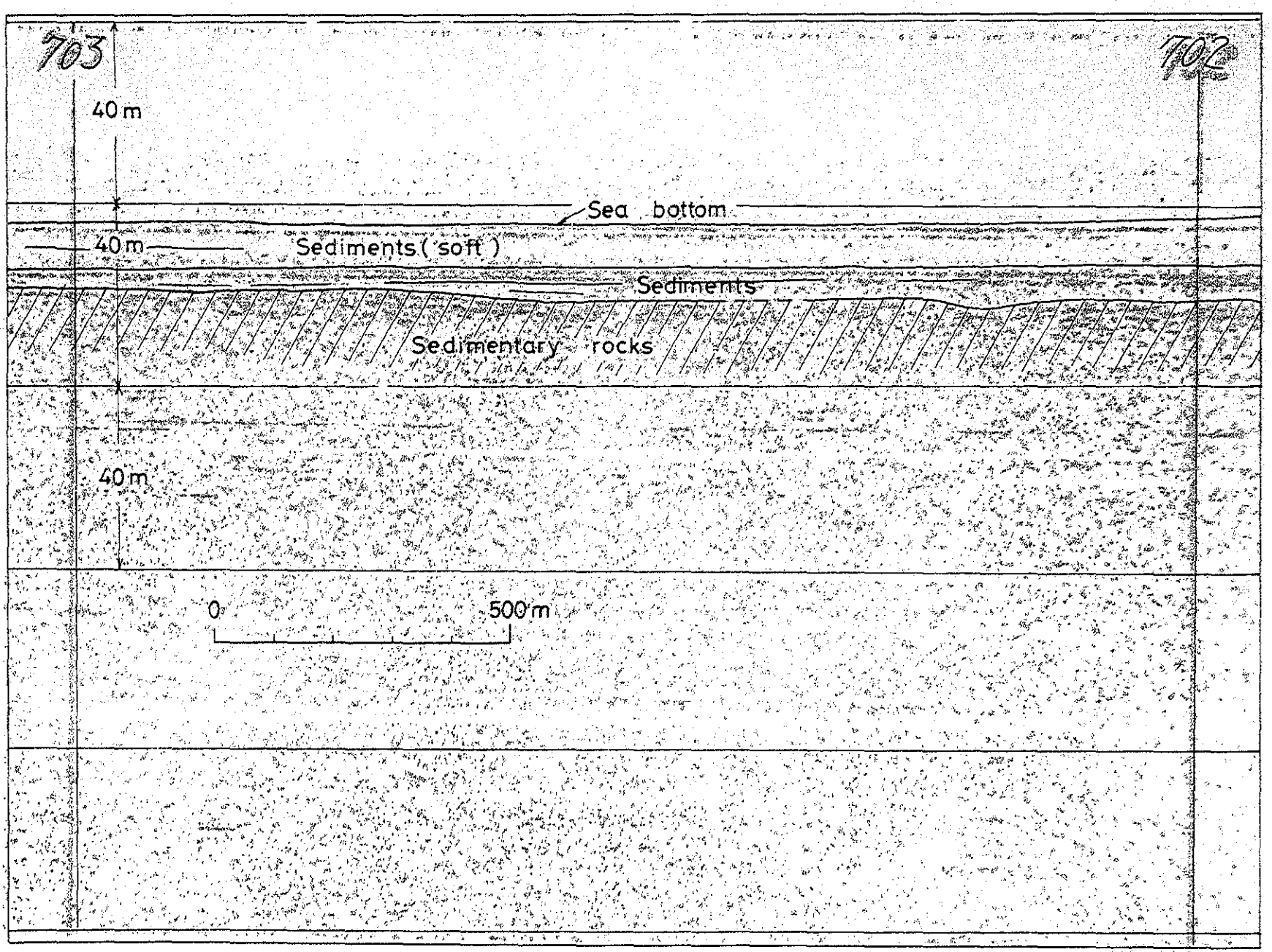


Fig. 3.5.1 (b) RECORD ON SPARKER

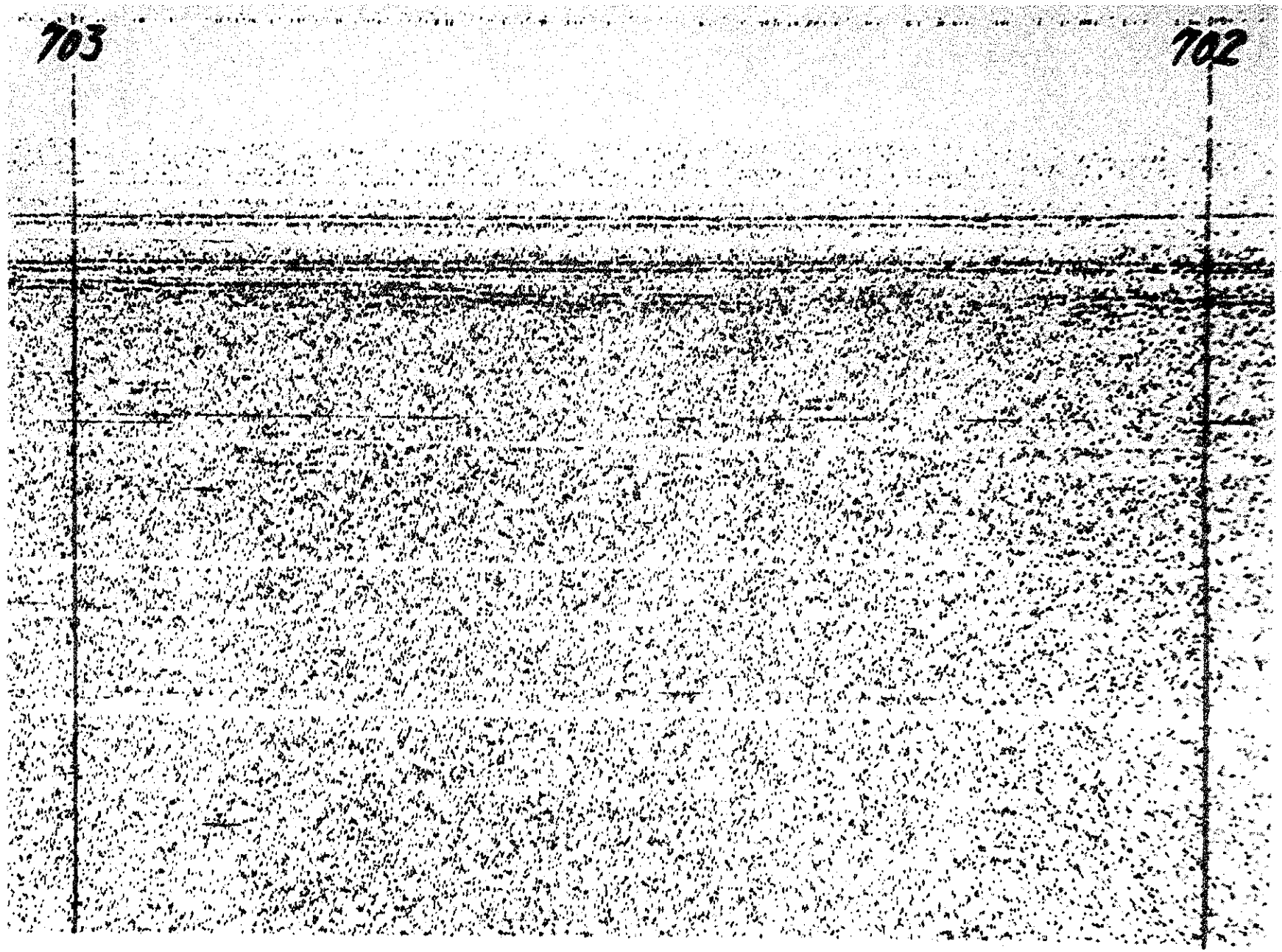


Fig.3.5.15(b) RECORD ON SPARKER

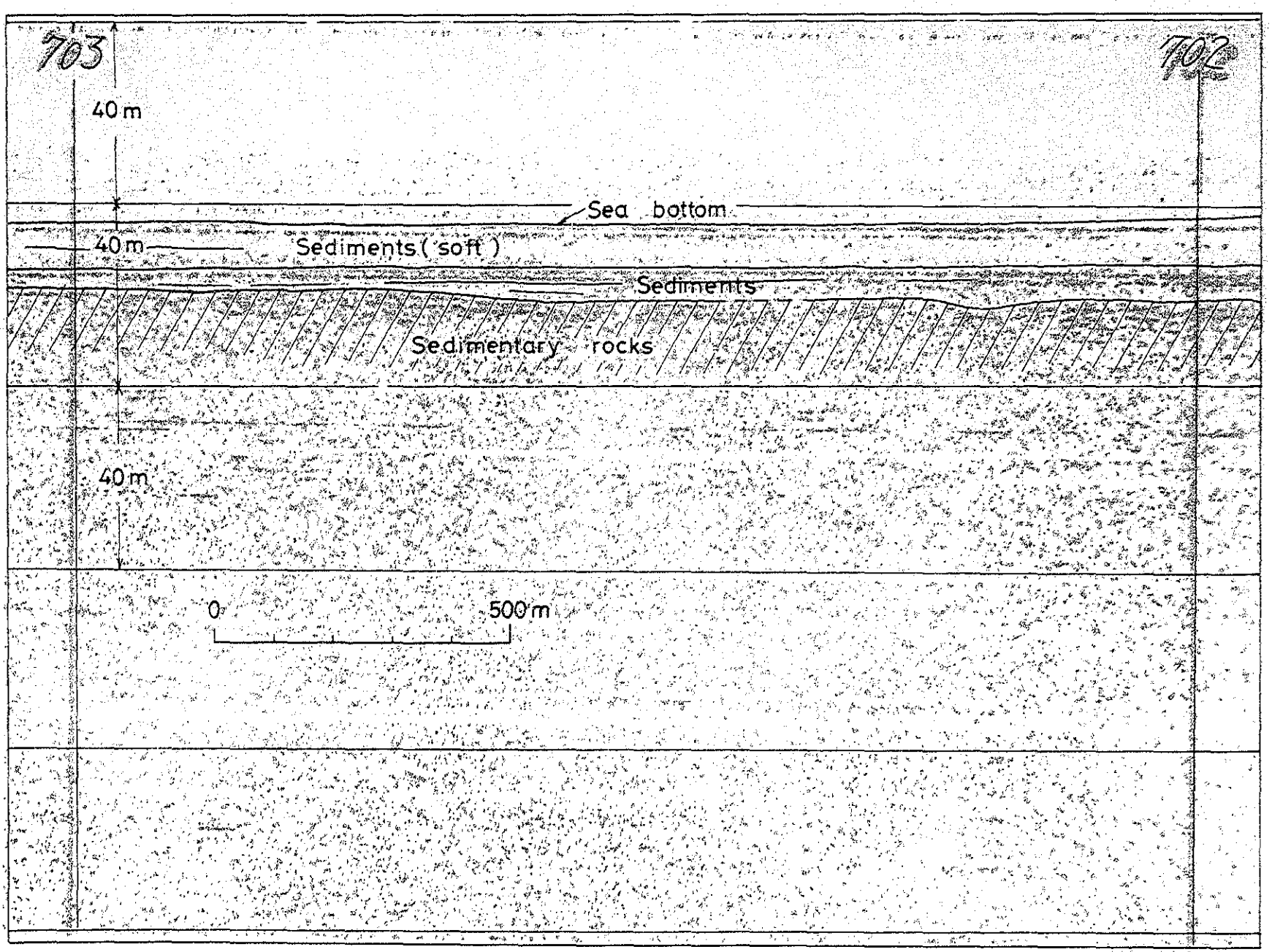


Fig. 3.5.1 (b) RECORD ON SPARKER

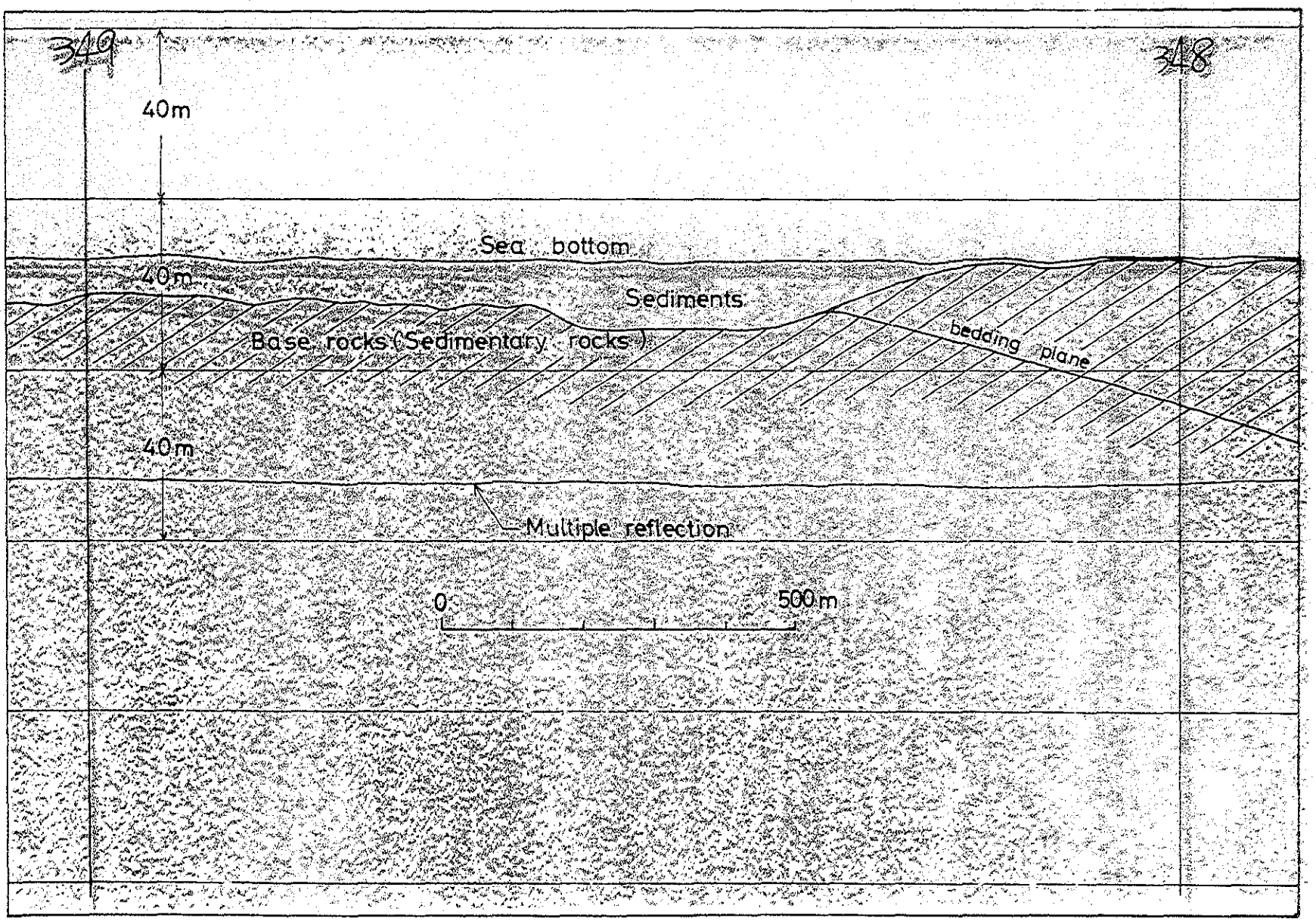


Fig. 3.5.15(c) RECORD ON SPARKER

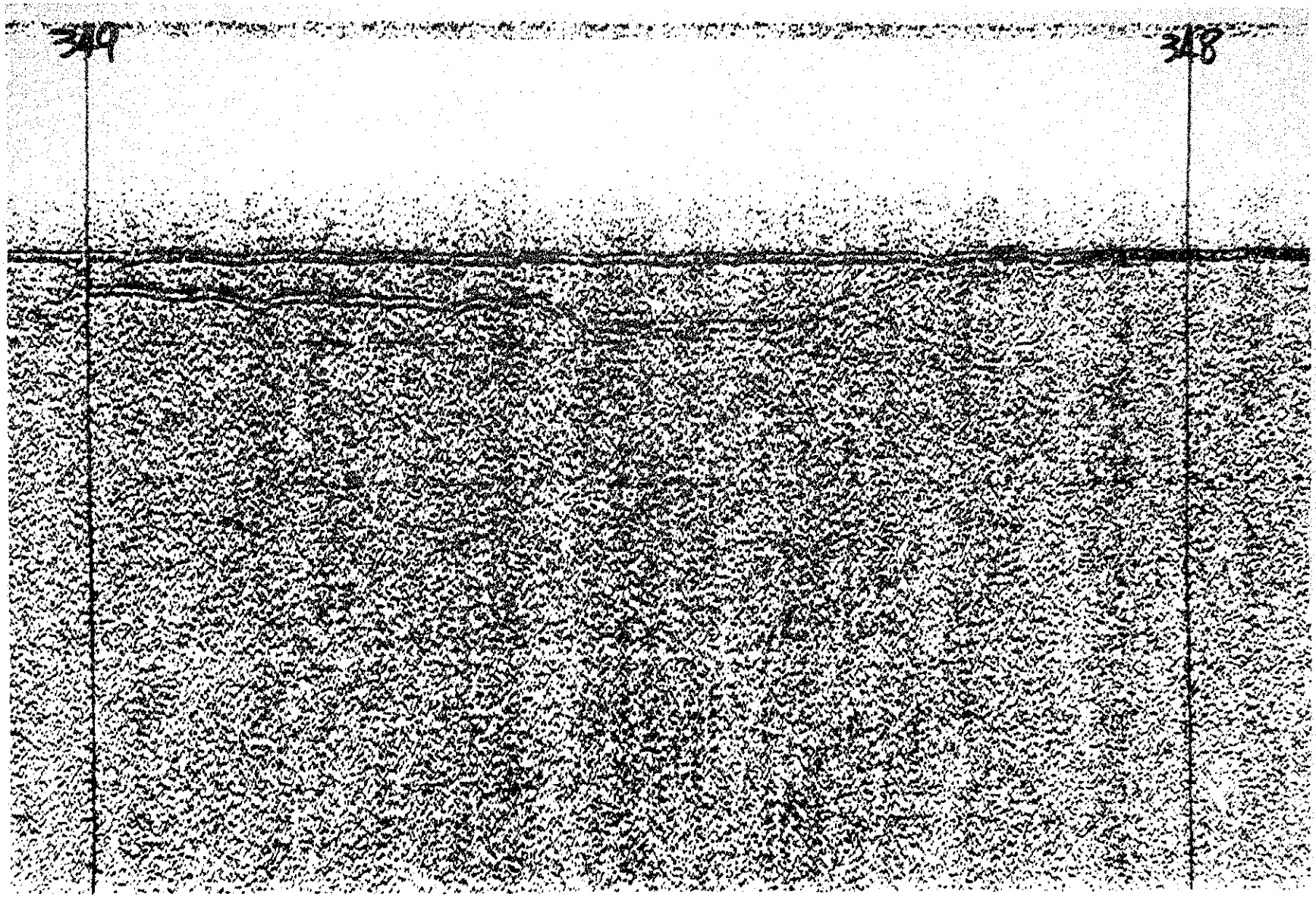


Fig.3.5.15(c) RECORD ON SPARKER

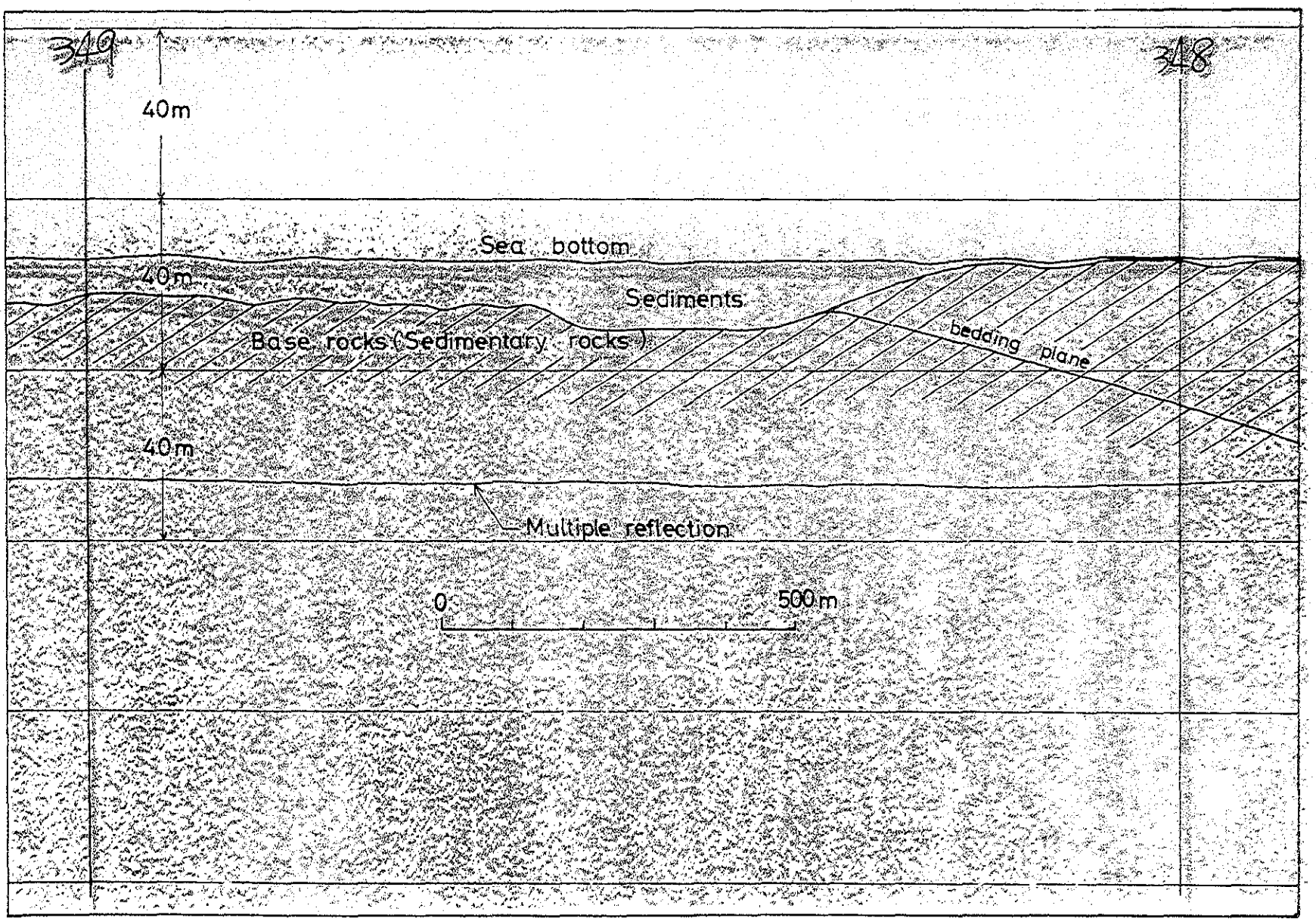


Fig. 3.5.15(c) RECORD ON SPARKER

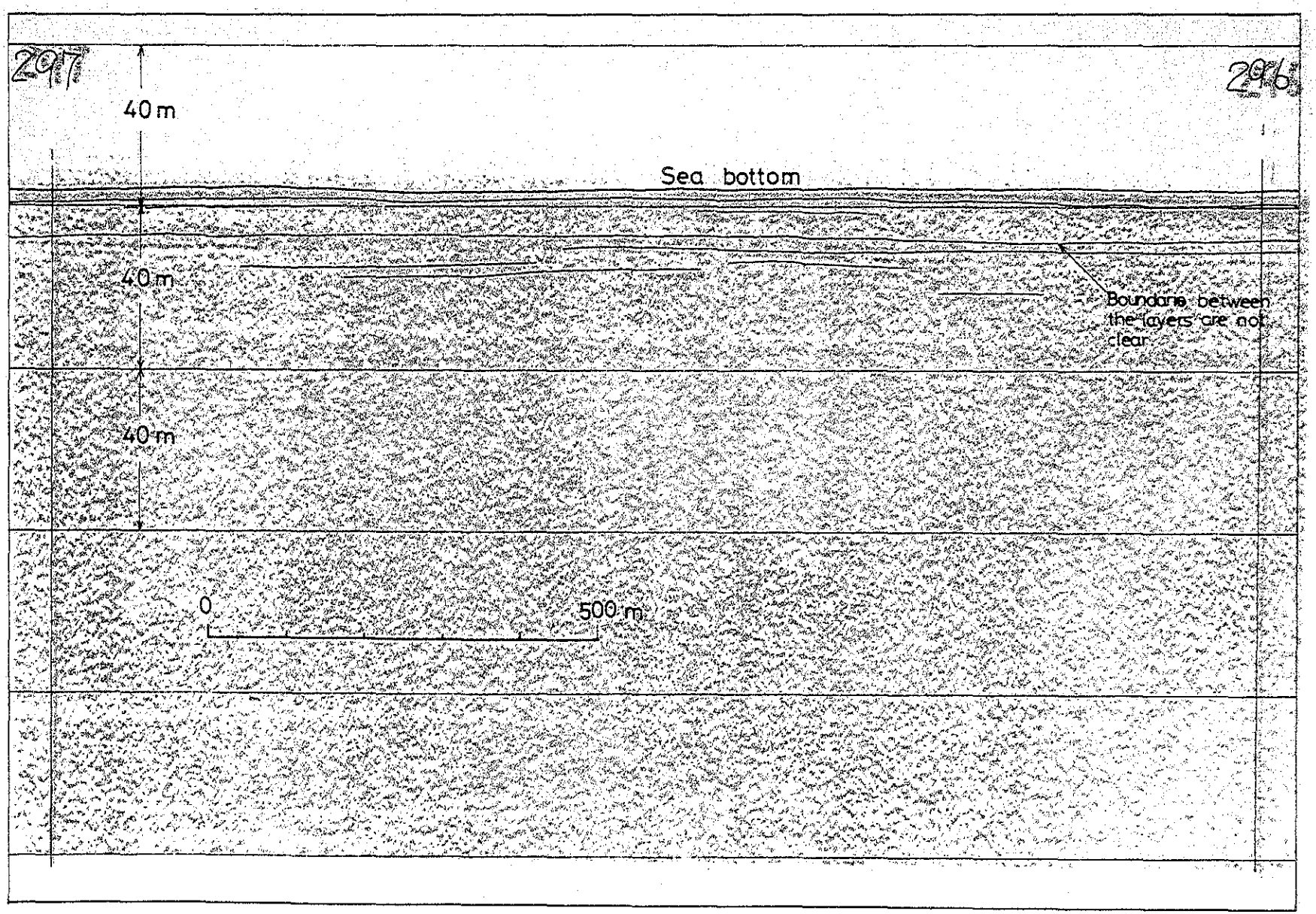


Fig. 4.5.15(d) [illegible] SPARKER

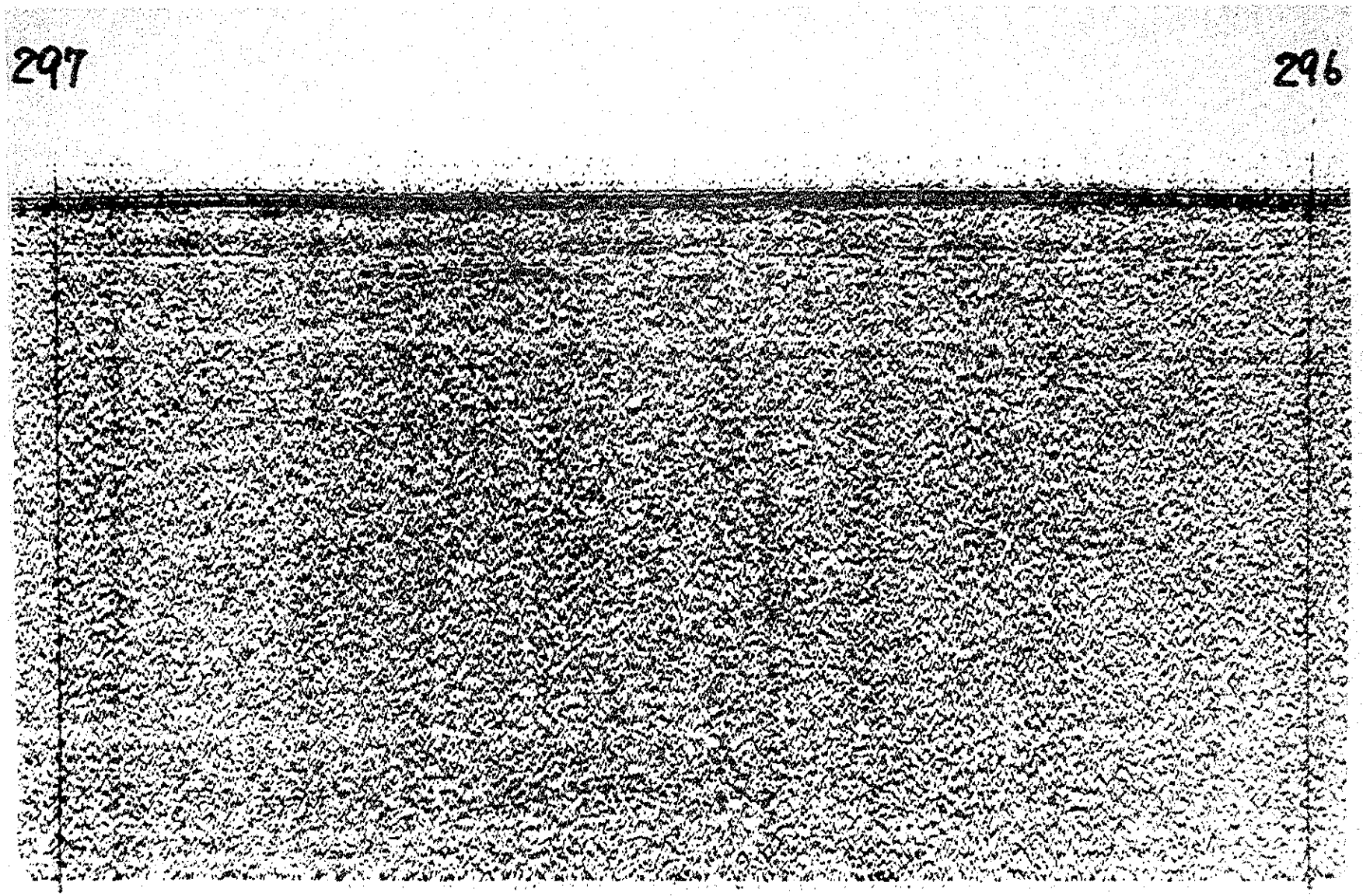


Fig.3.5.15(d) RECORD ON SPARKER

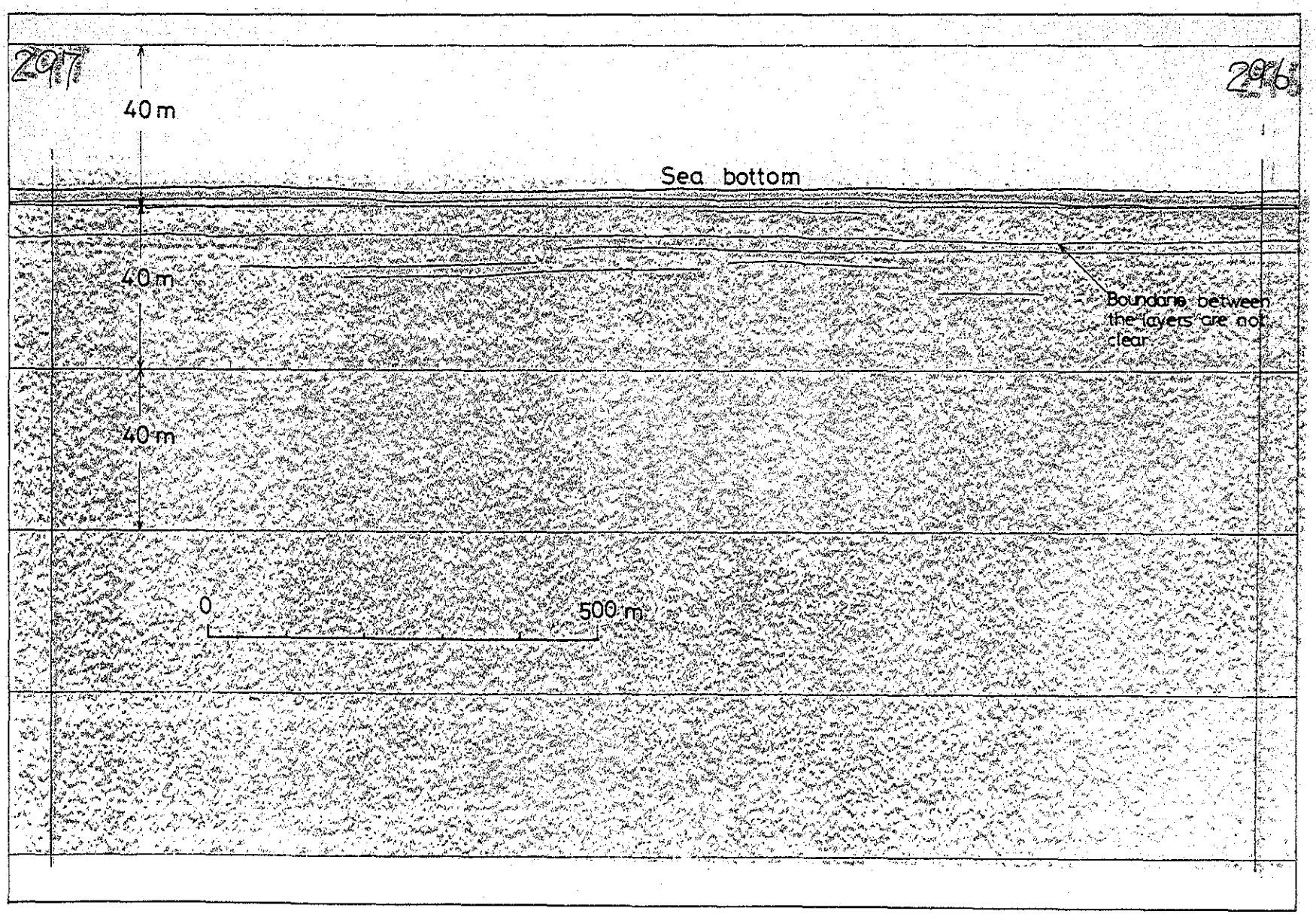


Fig. 4.5.15(d) [illegible] SPARKER

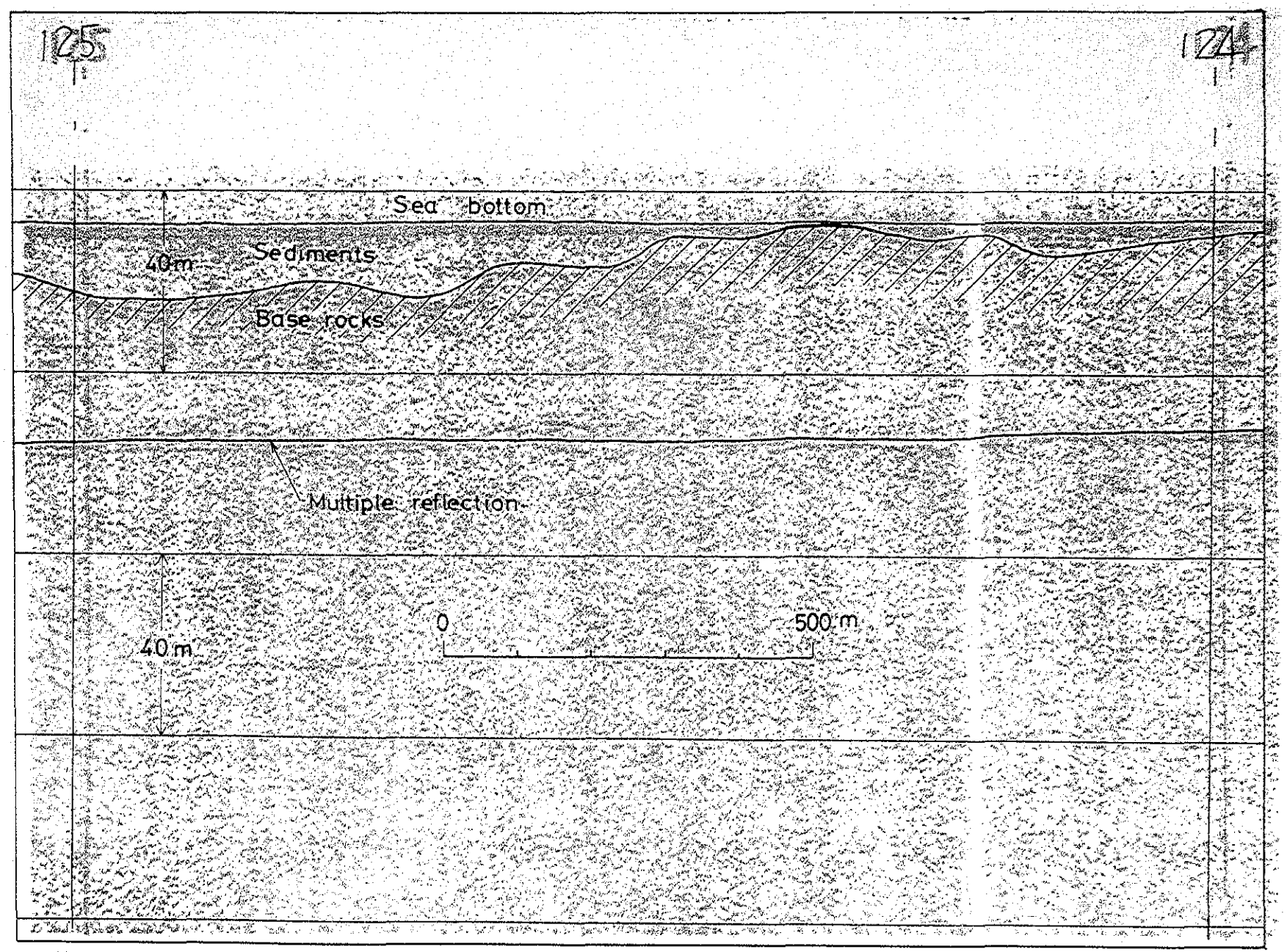


Fig. 5.15(e) RECORD ON BARKER

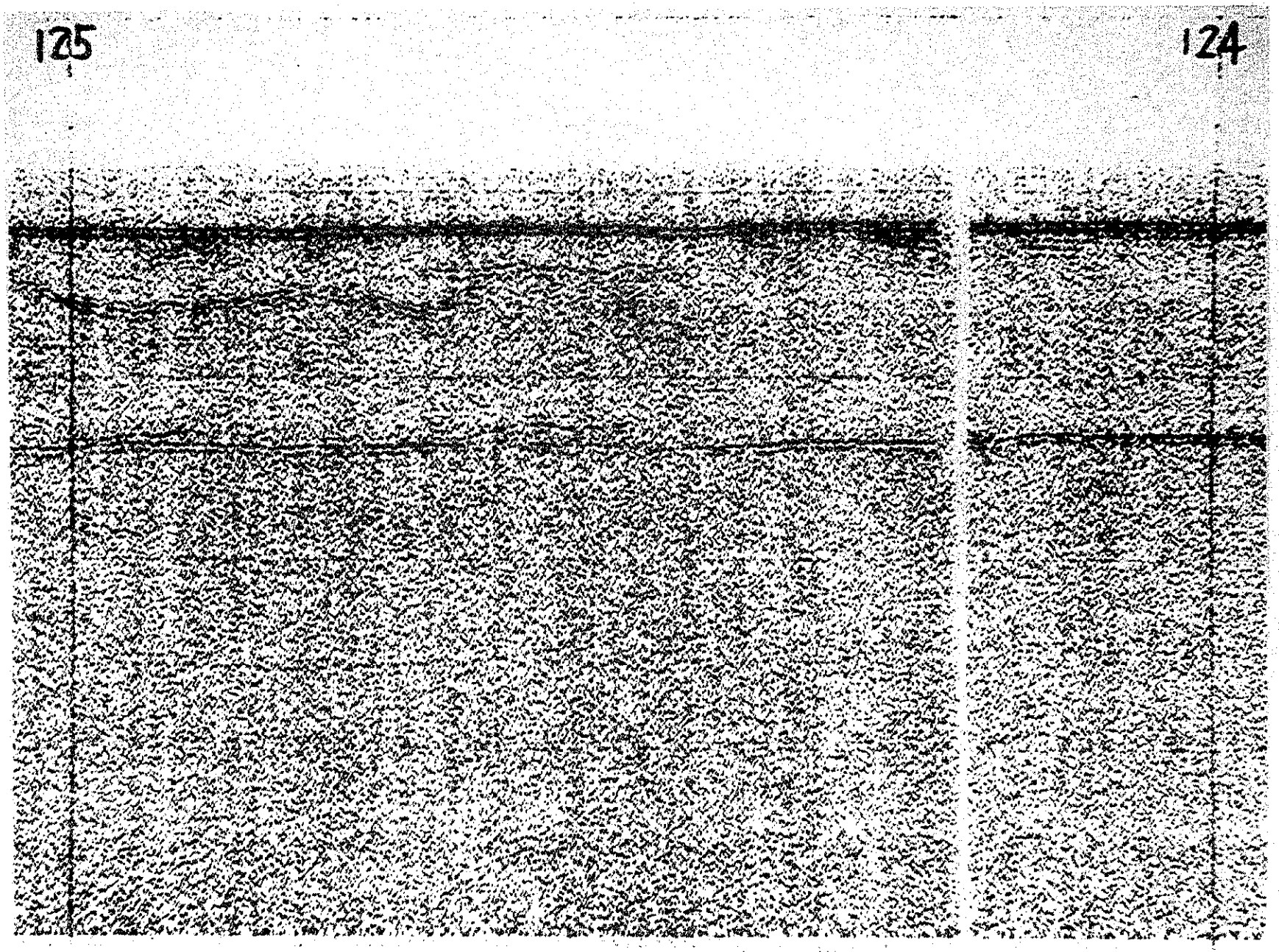


Fig.3.5.15(e) RECORD ON SPARKER

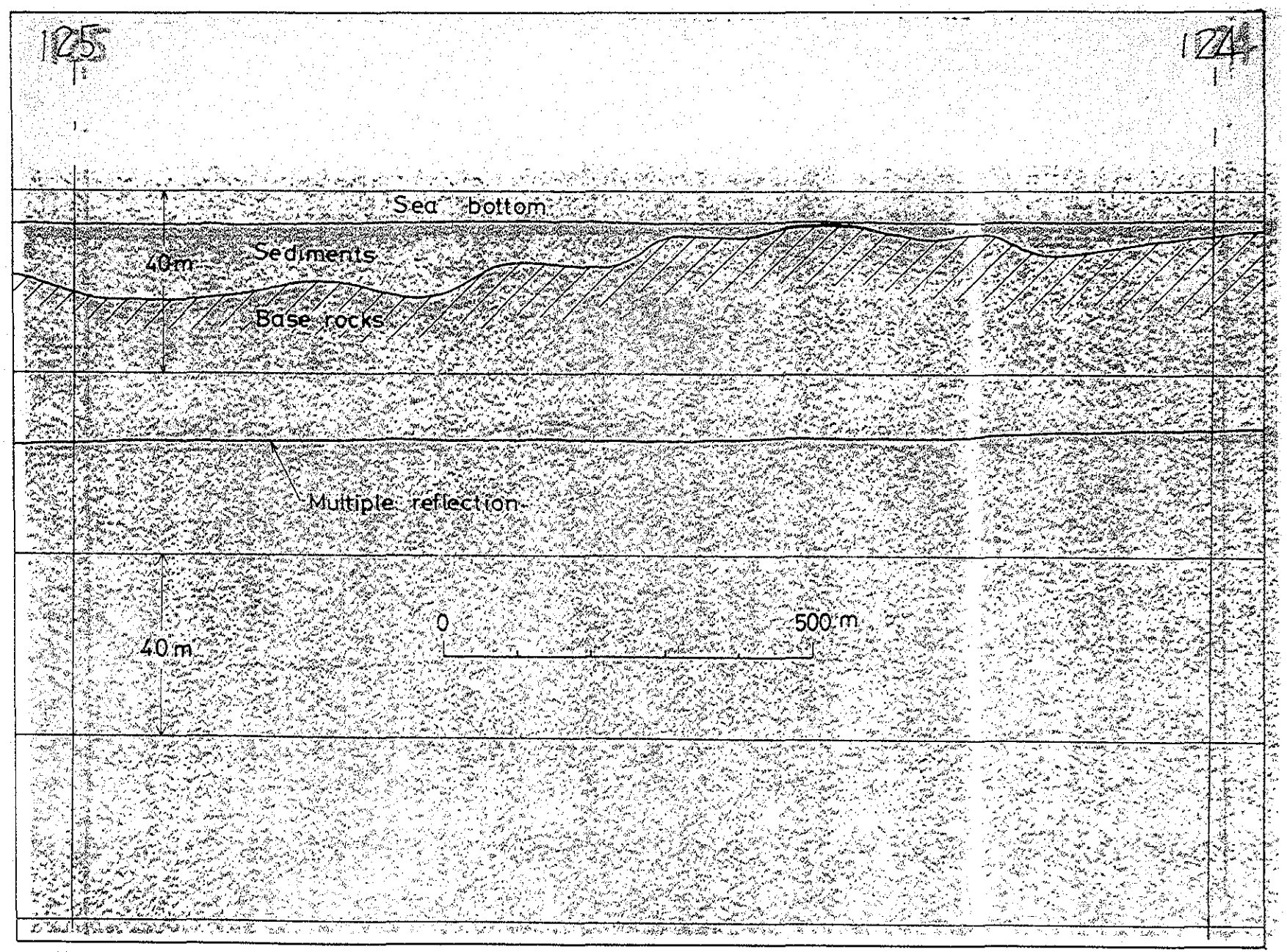


Fig. 5.15(e) RECORD ON BARKER

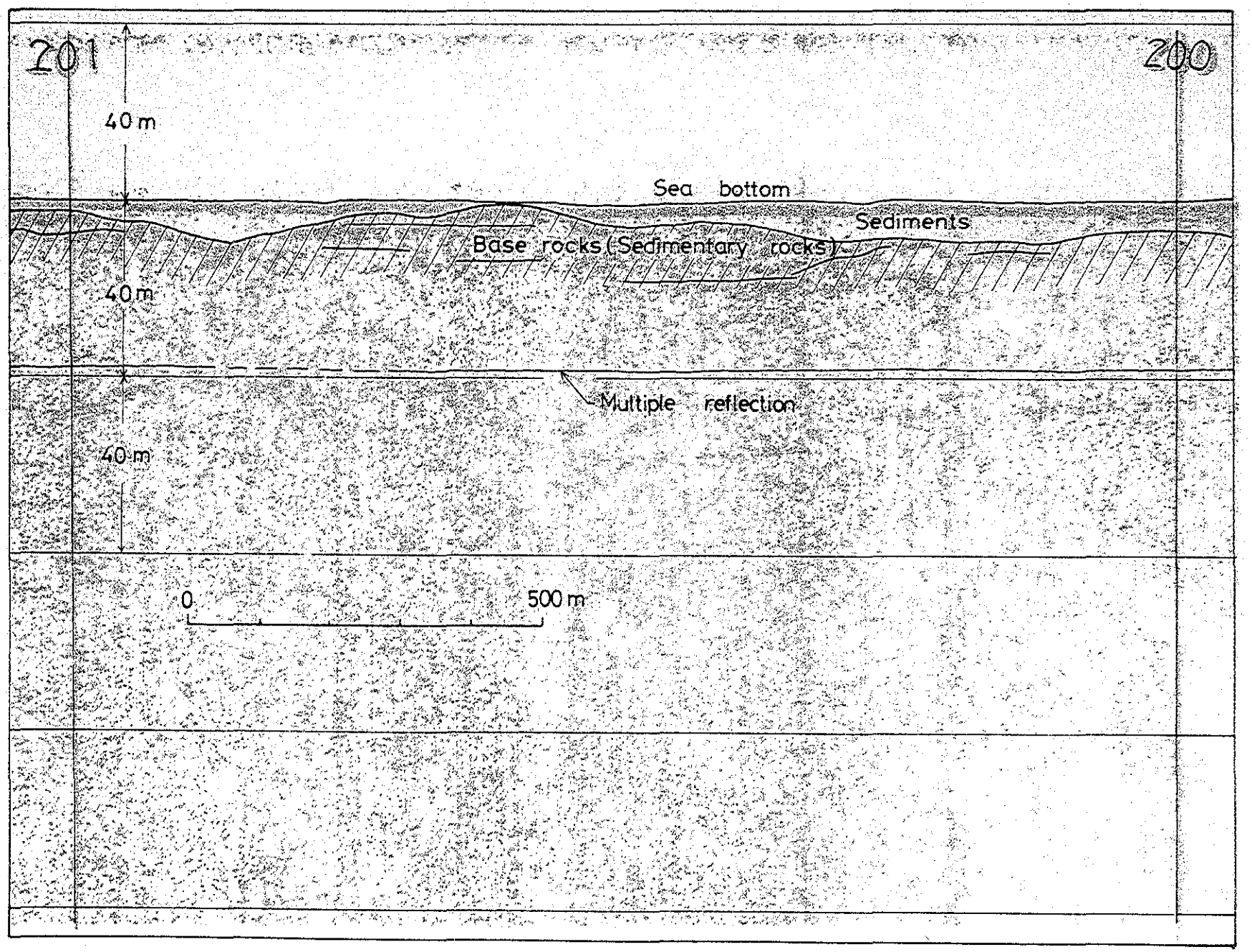


Fig. 5-2-25(c) RECORD ON SPARKER