81-1637.

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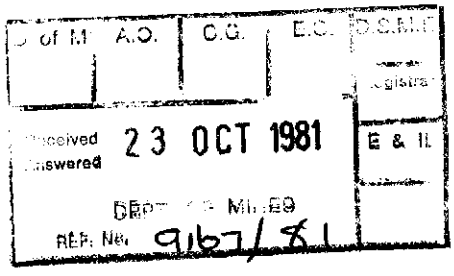
GEOPEKO

A DIVISION OF PEKO-WALLSEND OPERATIONS LIMITED



MACKINTOSH EAST E.L. 2/70, TASMANIA

TECHNICAL REPORT ON DIGHEM ANOMALY 13

by

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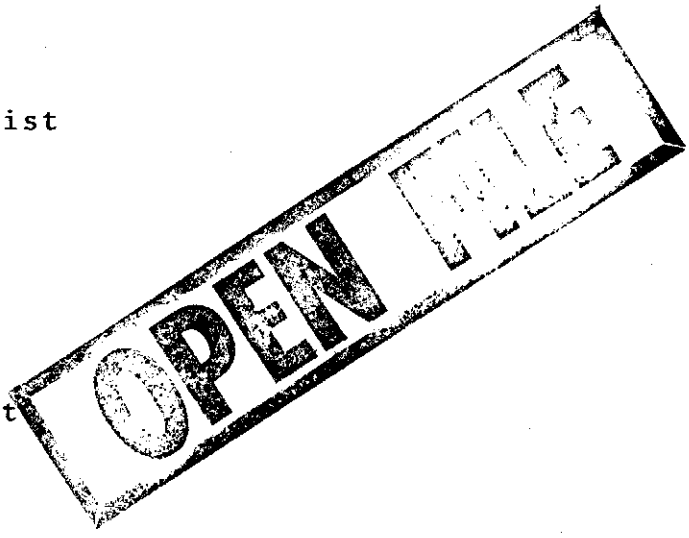

July, 1981

Dighem profiles at end of compactus

For 81-1637
81-1581
84-2147

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1. INTRODUCTION

Dighem Ltd., a Canadian geophysical service company, flew an airborne electromagnetic survey under contract to Geopeko in E.L. 2/70 in Tasmania in February and March, 1980.

The exploration licence flown abuts the Cradle Mountain-Lake St. Clair National Park. The area of prospective rocks within the licence extends to, and across, the licence - park boundary. The airborne survey was planned so that complete coverage within the licence area would be obtained. Following normal practice, the flight lines were extended over the licence boundary into the park by a kilometre or so.

A significant electromagnetic and coincident magnetic anomaly was recorded in this "turnaround" area about 800m inside the National Park. (see figure 1 and plan 1.) This anomaly, which has subsequently come to be known as anomaly 13, is the subject of this report.

2. GEOLOGICAL ENVIRONMENT

Anomaly 13 is situated close to the unconformity between the Cambrian rhyolitic volcanics of the Mt. Read Arc and the underlying Precambrian meta-sediments of the Tyennan Block. Because the anomaly has not been accurately pin pointed on the ground then it is not possible to say on which side of the unconformity it lies.

Mapping by Mines Department geologists on the Mackintosh 1 inch to 1 mile sheet (Barton et. al., 1966) indicates that a number of quartz-feldspar porphyries intrude the Precambrian chloritic and micaceous schists in the vicinity of Anomaly 13 (see plan 2). Mapping by Aberfoyle and Geopeko within E.L. 2/70 has defined an horizon of siliceous rhyolitic tuffs and sediments carrying minor mineralization (disseminated pyrite, sphalerite and galena) which form the basal portion of the Cambrian Volcanics (Herrmann, 1980). This weakly mineralized unit represents a favourable host rock for massive volcanogenic sulphide mineralization. Anomaly 13 is roughly on strike from this mineralization.

In summary, because no detailed ground mapping has been carried out at the anomaly site the geological evidence is equivocal. Two possibilities exist;

1. The anomaly lies in the Cambrian volcanics and may relate to volcanogenic Cu-Pb-Zn-Ag mineralization similar to the Que River deposit.

2. The anomaly lies in the Precambrian meta-sediments and may relate to Sn-W-Mo mineralization such as Renison Bell or Mount Bischoff.

3. AIRBORNE GEOPHYSICS

3.1. The Dighem System

The Dighem system has been widely described elsewhere (Fraser, 1972, Fraser, 1979, Duffin, 1981) and will be only briefly described here.

The system consists of a 9m bird towed below and behind a helicopter. In the bird there are two orthogonal transmitter and two orthogonal receiver coils. The coaxial coil pair is referred to as the standard pair. The horizontal coplanar coil pair is referred to as the whaletail coil pair. The standard and whaletail transmitter coils are energised with currents at 918 and 882 Hz respectively. The frequency separation of 36Hz is sufficiently large to allow the various E.M. secondary fields to be separated electronically, but sufficiently small to be treated as both equal to 900 Hz in the mathematical treatment of the received signals.

The helicopter is equipped with a digital data recording system which records the in-phase and quadrature components of the received secondary E.M. signal in both the standard and whaletail receiver coils. The system also records the terrain clearance of the bird as indicated by a radar altimeter, and continuously monitors the background (sferic) E.M. signals in both coils about 50 Hz off the transmitted frequencies. The helicopter is also equipped with a proton magnetometer mounted in its own bird which flies midway between the E.M. bird and the helicopter. Navigation and flight path recovery is by conventional photographic techniques.

From the observed four E.M. channels, the two ambient noise monitoring channels, the terrain clearance and magnetics, several additional parameters are computed and profiled. These channel numbers, parameters and vertical plot scales are shown in table 1.

TABLE 1. Channel numbers and scales of multicoil II profile records.

CHANNEL NUMBER	PARAMETER	SCALE UNITS/DIV.
20	Magnetics	10 nT
21	Altitude	3 m
22	Standard coil-pair in-phase	1 ppm
23	Standard coil-pair quadrature	1 ppm
24	Whaletail coil-pair in-phase	1 ppm
25	Whaletail coil-pair quadrature	1 ppm
28	Ambient noise monitor (standard receiver)	1 ppm
29	Ambient noise monitor (whaletail receiver)	1 ppm
33	Difference function in-phase	1 ppm
34	Difference function quadrature	1 ppm
35	First anomaly recognition function	1 ppm
36	Second anomaly recognition function	1 ppm
37	Conductance for vertical half plane model	1 mho
40	Log resistivity (at 900 Hz) for half space model.	.03 decade
41	Depth to pseudo-layer half space model	

Airborne EM surveys have not been highly successful in the search for massive sulphide mineralization in Australia. However, the near-surface regime in parts of Tasmania is closer to the Canadian model, where airborne EM surveys have a fine track record, than any other area on the mainland. This observation, together with the ability of the Dighem system to discriminate against overburden conductors, means that the technique can be applied with confidence in the Mackintosh East area.

3.2 Survey Results

The survey flight path diagram, EM anomaly location map, contours of total magnetic intensity, contours of enhanced magnetics (effectively a one dimensional high pass filtered, or downward continued, version of the magnetics), and contours of apparent resistivity are shown for the anomaly 13 region in Plans 3 to 6 inclusive. Figures 2 and 3 show the computer-generated profiles along lines 334 and 335.

These maps show that the only significant EM and resistivity anomalies on the map sheet occur at anomaly 13. The anomaly has been recognised on two lines 100 m apart, and correlates with a well developed and discrete magnetic anomaly of about 200 nT amplitude.

The profiles shown in figures 2 and 3 show a fairly simple anomaly pattern. On line 335, anomalies of 9ppm in both in-phase and quadrature curves for the coaxial coil pair and 18ppm for the coplanar coil pair were recorded, coincident with a 200 nT sharp magnetic anomaly. No difference channel responses were observed, though a weak anomaly in channels 33 and 34 were observed on the neighbouring line, line 334. Both lines show a weak second anomaly about 150m south east of the main anomaly. This second anomaly occurs mainly in the coaxial coil pair curves, and particularly in the quadrature curves, and is probably a surficial response. The second anomaly has been recognised by the automatic anomaly picking algorithm on line 334 only, but can be seen on line 335 as well.

The main anomaly has been assigned a conductance of 9S on line 335, and 5S on line 334. These are not strong conductors, but the anomalies are real and are well above system noise levels. The computed apparent resistivity profiles show broad lows of about 50 ohm metres, and the profile for the depth to a pseudo layer half space model shows a bicuspid response.

Anomaly 13 has both positive and negative characteristics as a target for follow-up potential. The coplanar/coaxial response ratio of almost exactly 2, the relatively low δt computed for its source, and the bicuspid nature of the channel 41 response indicate a relatively broad, sub-horizonal or surficial zone as its likely source - i.e. a weathered overburden response. The positive aspects of the anomaly are its discrete shape in both profile and plan presentation, the strong resistivity low, and particularly the clear association with a very discrete magnetic anomaly.

3.3 Case Histories From Similar Environments

If anomaly 13 had been recorded within E.L. 2/70, it would have been recommended for immediate ground follow-up. As it occurred inside the National Park, ground inspection is impossible and we are forced to base an evaluation of it on theoretical analysis, which has been done in section 3.2 and on comparison with other case histories. Characteristics of Dighem responses from three Tasmanian, one Victorian and one Canadian massive sulphide ore deposit are given below for comparison with Anomaly 13.

a. Que River - Tasmania:

The Que River ore deposit was discovered by Aberfoyle in 1972 by an airborne EM survey similar to the Dighem System. A few lines of Dighem were flown in 1980 over the deposit to test the method. The profile recorded on line 5121 over the main ore lens is shown in figure 4.

On line 5121, the standard coil pair anomalies are 13 and 21ppm for the inphase and quadrature components respectively. The corresponding figures are 10 and 23ppm for the whaletail coil pair. The inphase to quadrature ratio is therefore much less than unity, while the whaletail to standard ratio is about one. The computed conductance for the verical half plane model is about 6S. There is a well developed resistivity low over the body of about 80 ohm. The difference channels have clearly identified the anomaly as not being due to a horizontal surficial zone. Both anomaly recognition functions have been triggered.

b. Mt Lyell - Tasmania:

Figure 5 shows the profiles recorded on one line flown over the Mt. Lyell open cut. The open cut exposed the Prince Lyell orebody, a steeply dipping body of copper mineralization about 360m long, between 10 and 95m wide, and extending to about 500m in depth. There are other orebodies in the area.

The profiles show a clear anomaly over the mineralization (the open cut limits are roughly delineated by the large terrain clearance shown west of fiducial 2031 and east of 2030). The coplanar to coaxial anomaly ratios are 2.5 (inphase) and 2.1 (quadrature), consistent with figures predicted by theory for bodies of finite strike length. There is an apparent resistivity low of about 15 ohm metres associated with this anomaly. There is no magnetic response. The conductance is 11S.

There is a subsidiary anomaly observed about 300m east of the main anomaly. Its EM anomaly amplitude is highly attenuated relative to the main anomaly, but its conductance is only marginally lower. As it occurs within the open cut area, this anomaly is also probably due to mineralization.

c. Mt Bishoff - Tasmania:

The Dighem profiles over the stratiform cassiterite - pyrite - pyrrhotite lode at Mt. Bishcoff are shown in figure 6.

There are two strong EM anomalies shown, marked B and C. Both have strong inphase/quadrature ratios, reflected in the large conductances of 26S and 49S computed. The coplanar/ coaxial ratio is 3.5, consistent with the known short strike length and limited depth extent of the mineralization. The anomalies are associated with a 350 nT magnetic anomaly. Apparent resistivities of less than 10 ohm metres are associated with the larger anomaly.

d. Wilga - Victoria:

The profiles over the Wilga massive sulphide body near Benambra in Victoria are shown in figure 7. The presentation here is in the recently introduced preliminary "quick-plot" format. Only raw data plus the computed resistivity profile is shown.

The coplanar/coaxial ratio is about 2.2. The inphase/quadrature ratio is about 2, indicating that the body is a moderately good conductor. The conductance parameter, channel 37, has not been shown, but using the inphase and quadrature response shown, we can predict a conductance of 8S. An apparent resistivity low of about 20 ohm metres has been computed. The body is associated with a weak magnetic anomaly of 30 nT.

e. Montcalm - Canada:

One of the classic published Dighem responses occurs over the Montcalm massive copper - nickel orebodies in eastern Canada. This profile, taken from Fraser (1978) is shown in figure 8. This time, the inphase/quadrature ratio is extremely large, indicating a body of extremely high conductance, and the coplanar/coaxial response is about 3.3, consistent with a body of finite strike length. A strong and sharp resistivity low of about 20 ohm metres and a coincident magnetic anomaly of about 170 nT are associated with the body.

4. THE MOUNT REMUS PROSPECT

The Mount Remus Prospect is situated on the banks of Anio Creek about 1000m north west of anomaly 13. The prospect was first reported by Nye (1928) with further investigations by Burns (1963) and Threader (1965). A summary of all relevant data on the prospect is given by Collins et. al. (1981).

The mineralization consists of numerous pyrite-quartz-molybdenite veins cutting the Precambrian schists in proximity to a system of quartz-porphyry dykes. In addition to molybdenum the veins carry cobalt and vanadium. A table showing various analyses of Mount Remus ore samples, compiled by Collins et. al. (1981) is reproduced on the following page. The values of molybdenum and Cobalt are very encouraging and indicate economic grades, if sufficient tonnage could be defined.

A stream geochemical survey was carried out in the immediate vicinity of the prospect by Threader (1965). The results for molybdenum are shown on plan 2. Collins et. al. (1981) point out that the geochemical results indicate that other lodes probably occur to the south and east of the Mount Remus Prospect.

Burns (1963) reports that a major system of dykes intrude both the Precambrian and Cambrian sequences south of Mount Remus, which he refers to as the Mount Remus Dyke Swarm. He considers the majority of dykes to be of Cambrian age although he notes that some are of granite texture and maybe Devonian in age. Burns concludes "the occurrence of dykes of the Mount Remus Swarm intruding basement is evidence for a quartz-porphyry magma". This statement enhances the potential of the area for Sn-W-Mo mineralization when it is considered in light of the evidence that the orebodies at Mount Bischoff and Renison are also associated with quartz-porphyry magma systems.

The recent Dighem survey flown for Geopeko defined a magnetic anomaly roughly coincident with the Mt Remus Prospect and of similar shape to the magnetic component of Anomaly 13. This suggests the probability of a mineralized body, of pyrrhotite or magnetite, buried below the surface prospecting pits at Mount Remus.

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Table 1. ANALYSES OF PYRITE - MOLYBDENITE ORE, MT REMUS PROSPECT (from Collins et. al. 1981)

Analysis		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mo	(%)	1.57	0.20	1.33	0.65	45.67	0.47	0.48	0.48	0.43	0.49	0.48			
V	(%)	0.33	0.22	0.39	0.19	4.38	0.35	0.49	1.57	Tr	Tr	Tr			
Co	(%)	0.33	0.30	0.31	0.18	0.63	0.54	1.49	0.50	0.26	0.18	0.29			
Cu	(%)	0.00	0.00	0.00	0.00				0.00						
Fe	(%)					8.20			39.08						
S	(%)					38.24			49.70	47.1	46.5	36.8			
Co	(ppm)												3030	3034	3042
Ni	(ppm)												19	21	19

1, 2, 3 — 150 mm pyrite vein (Nye, 1928*b*).

4 — Stockwork ore in schist (Nye, 1928*b*).

5 — Molybdenite, hand picked (Nye, 1928*b*).

6, 7 — Pyritic ore, collected by Nye (Stillwell, 1932).

8 — Bulk sample, collected by Nye (Stillwell, 1932). Also contains traces of As, Ni, Zn.

9, 10 — 150 mm and 200 mm pyrite veins respectively (Burns, 1963).

11 — Molybdenite, hand picked(?) (Burns, 1963).

12-14 — Pyrite (Loftus-Hills, 1968).

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5. DISCUSSION

By itself E.M. Anomaly 13 could have a number of geological causes, however the coincident strong magnetic response makes the anomaly a far more attractive exploration target. In this respect it is similar to the anomaly developed over the massive pyrrhotite-cassiterite lode at Mount Bischoff (compare the Dighem profiles in figure 2 and figure 6).

It should be noted that very few geological features give coincident and discrete magnetic and E.M. anomalies. The only possibilities are;

a) A basic magnetic intrusive with an oxidized conducting top.

b) A pyrite-magnetite lode.

c) A pyrrhotite lode.

The second two alternatives are positive exploration targets and in Tasmania are likely to be associated with Sn-W-Mo mineralization.

6. CONCLUSIONS

Anomaly 13 occurs about 800m inside the Cradle Mountain Lake St. Clair National Park. It was mapped geophysically by an airborne electromagnetic survey of the neighbouring E.L. 2/70 conducted by Dighem Ltd on behalf of Geopeko - early in 1980.

The anomaly has many of the characteristics expected theoretically from and observed experimentally in case history studies of commercially - viable orebodies. It represents an attractive exploration target.

Molybdenum, cobalt and vanadium mineralization has been reported 1000m north west of anomaly 13 at the Mount Remus Prospect. A second aeromagnetic anomaly, similar to Anomaly 13 is located adjacent to this mineralization. These factors considered together suggest that the area encompassing Anomaly 13 and the Mount Remus Prospect may be a major mineralized zone of considerable economic importance.

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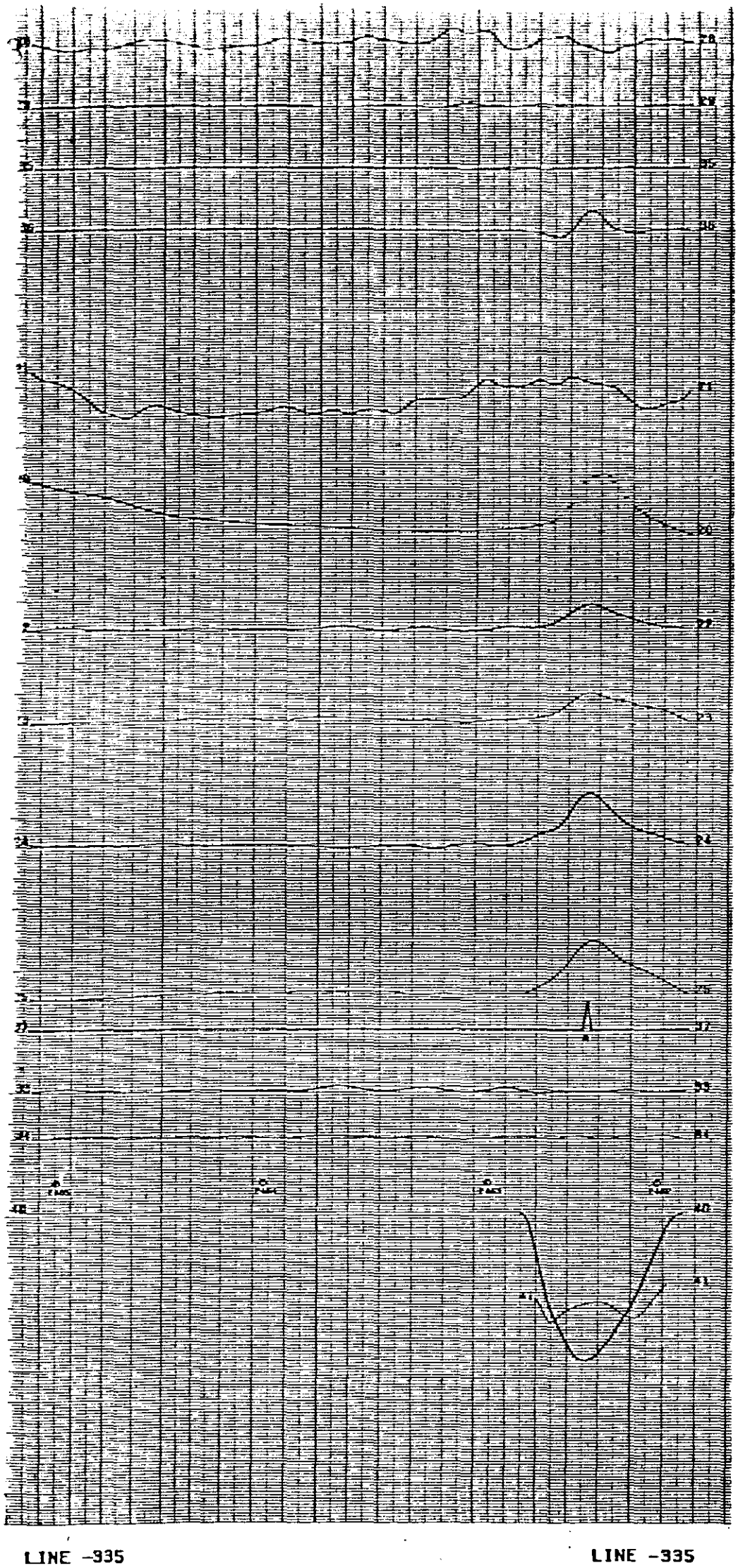


5 cm

Fig. 2
MACKINTOSH EAS
TASMANIA

0 200 m

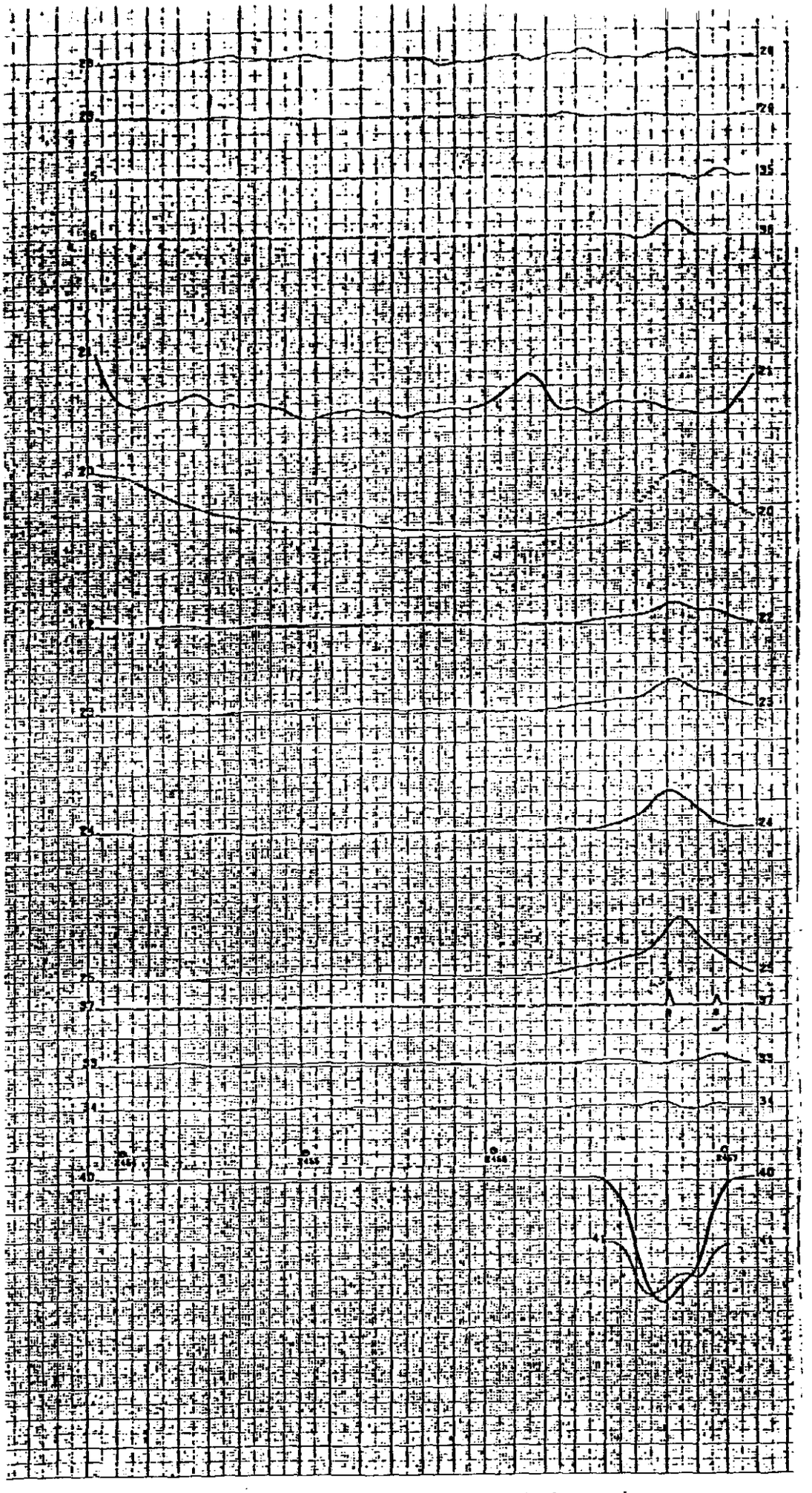


Fig. 3 MACKINTOSH EAST
TASMANIA

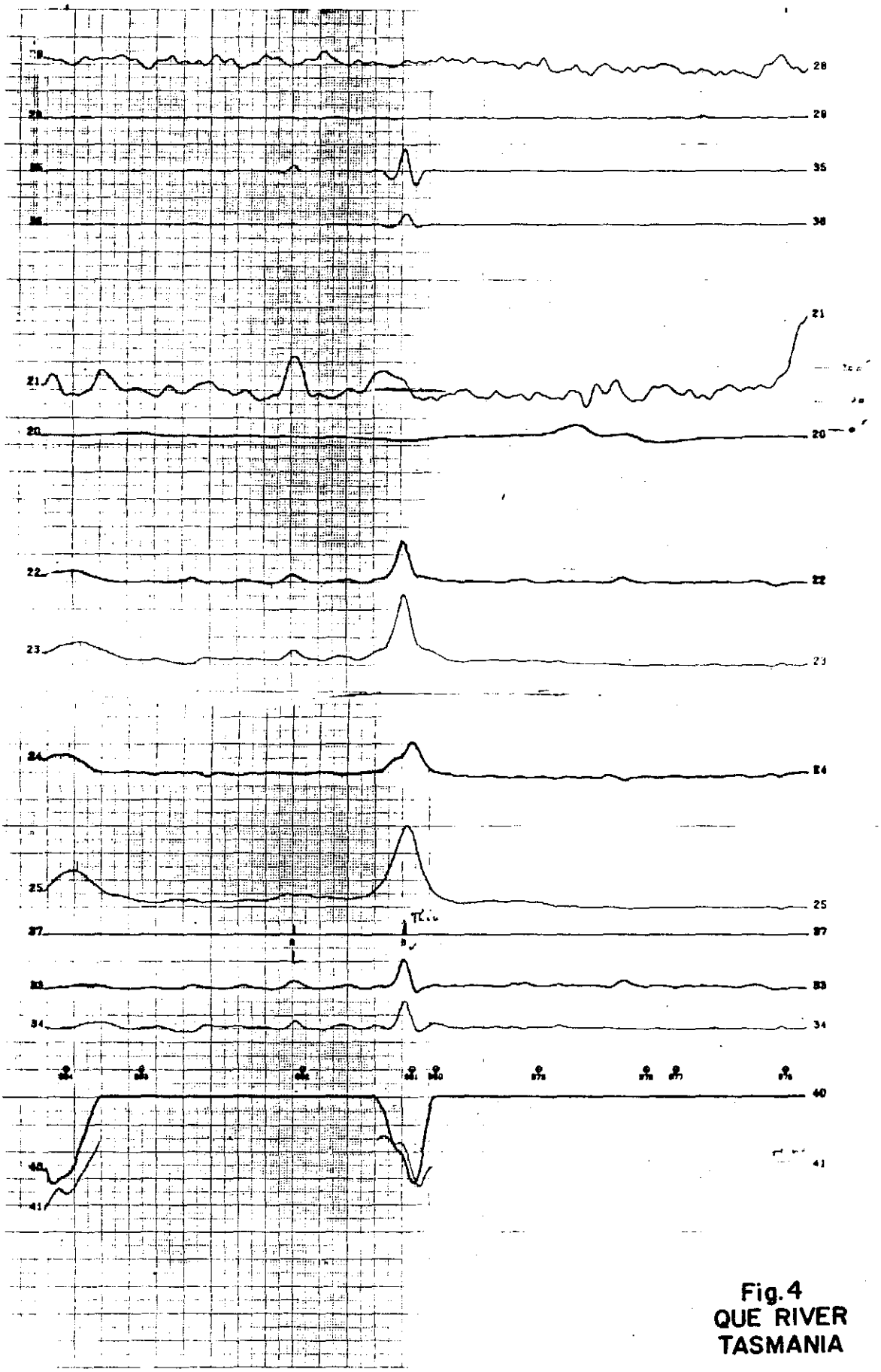


Fig. 4
QUE RIVER
TASMANIA

LINE -5121

LINE -5121

016 865017

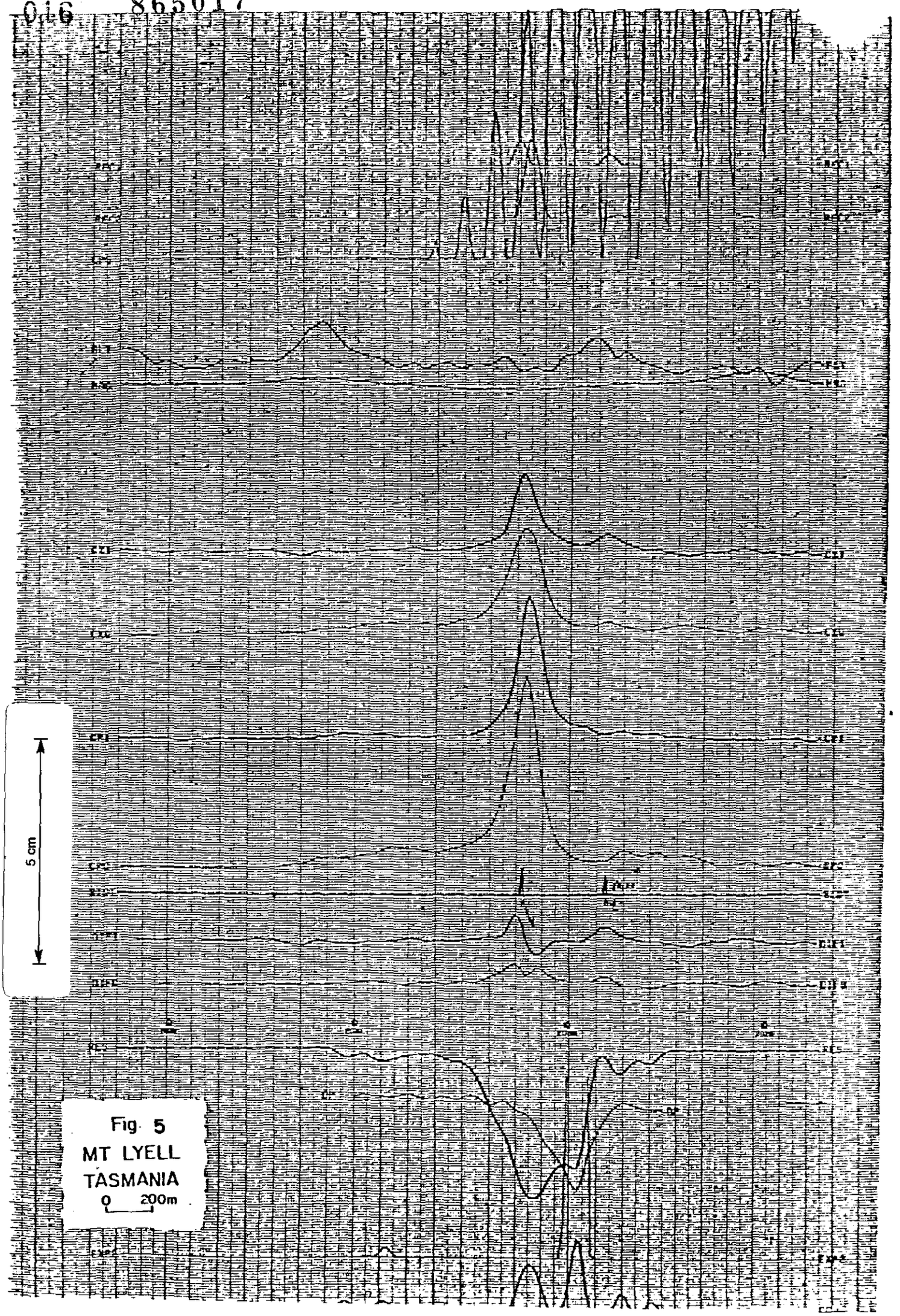


Fig. 5
MT LYELL
TASMANIA
0 200m

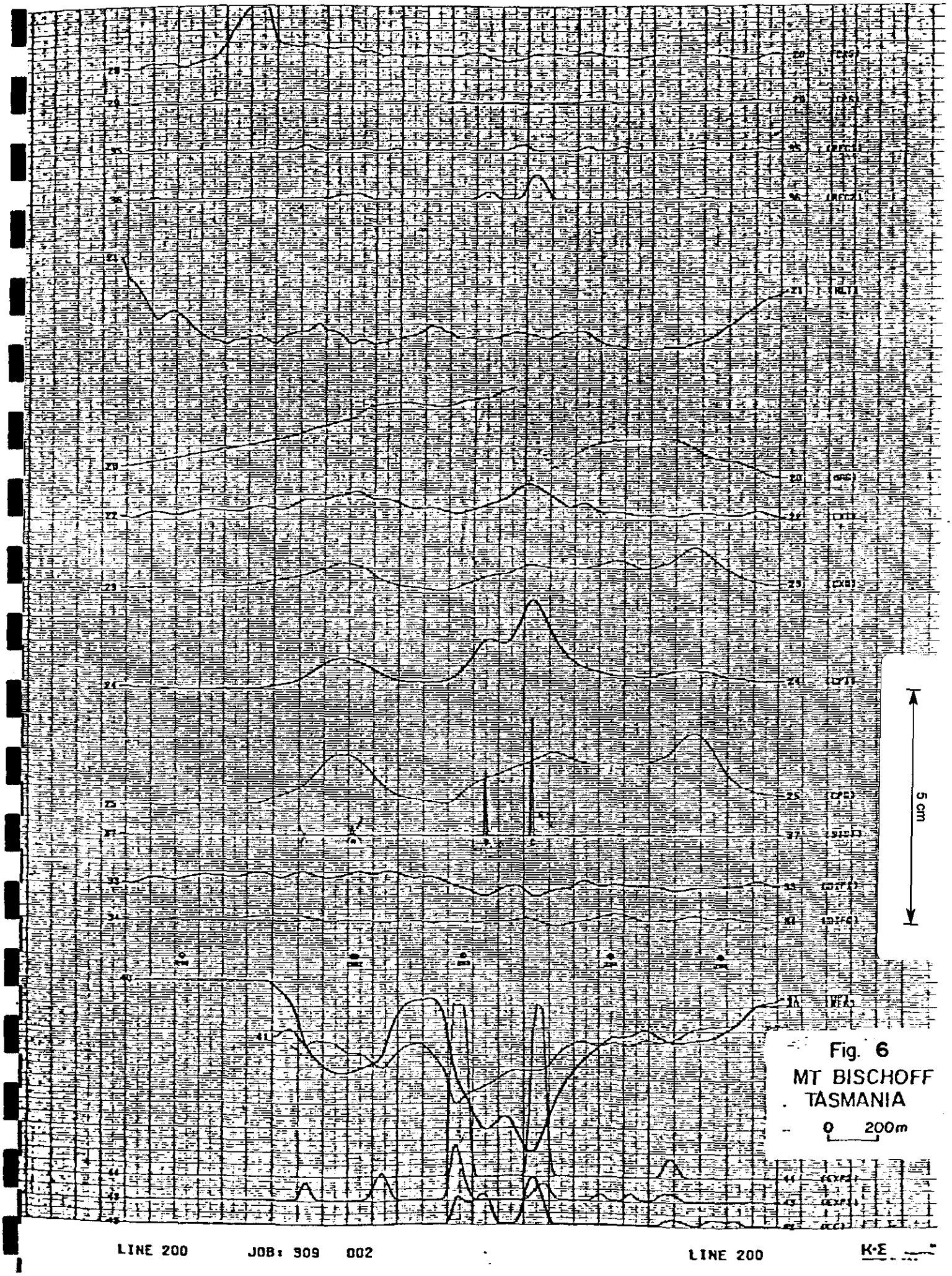
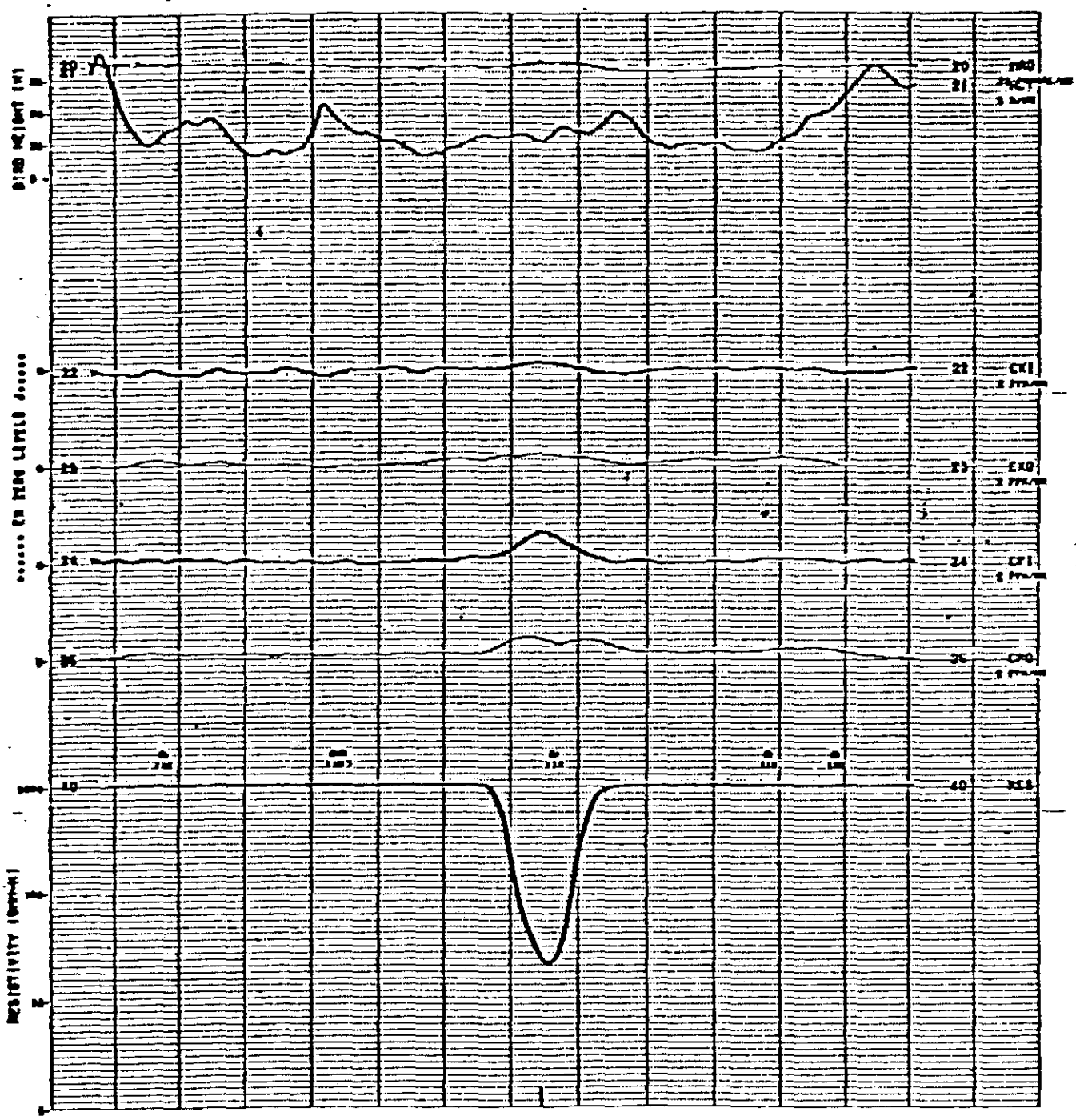


Fig. 6
MT BISCHOFF
TASMANIA
0 200m



5 cm

Fig. 7

WILGA VIC.

0 200m

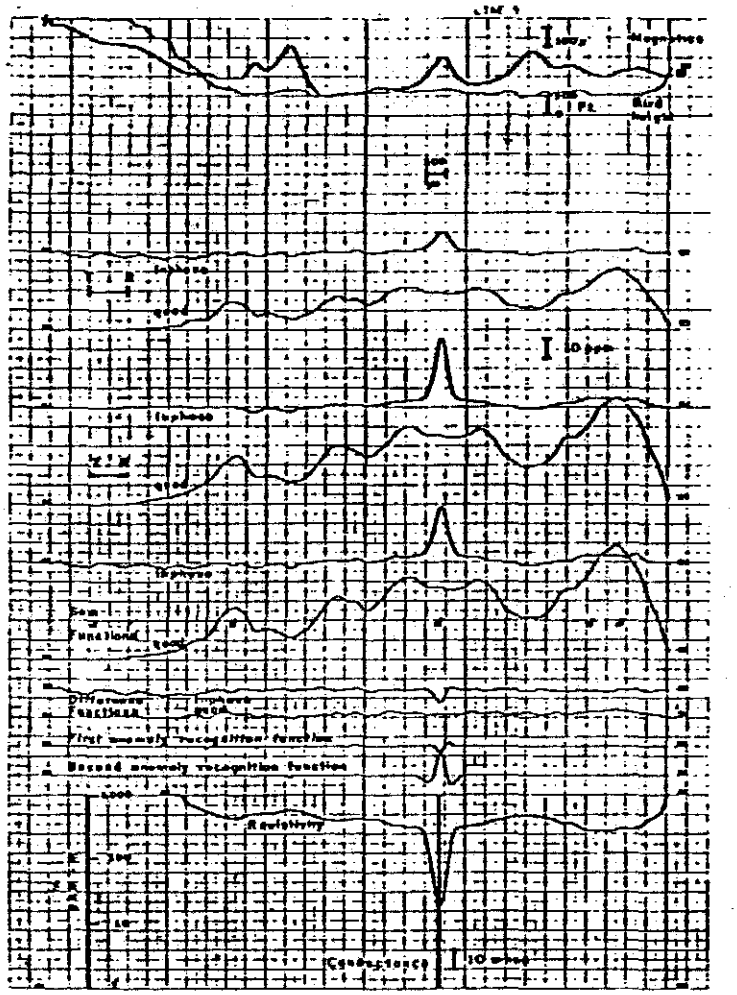


Fig. 8 MONTCALM

0 200m

5 cm

8322

865021

DEVONPORT TO CRADLE VALLEY 85 km

DELORAINE TO CRADLE VALLEY 108 km

E.L.2/70

ANOMALY 13

CRADLE MTN-LAKE ST CLAIR NATIONAL PARK

PLAN. I

SCALE 1 : 100000

Kilometres 2 1 0 2 4 6 8 10 12 Kilometres

TO ASSIST IN CORRECTING FUTURE EDITIONS OF THIS MAP, USERS NOTING ERRORS AND OMISSIONS ARE INVITED TO WRITE TO THE DIRECTOR OF MAPPING, G.P.O. BOX 44A, HOBART, TASMANIA, 7001.

GRID VALUES ARE AT 10 000 METRE INTERVALS OF THE AUSTRALIAN MAP GRID ZONE 55

Highway with National route marker
Formed road
Vehicular track
Foot track
Hut; Campsite
Private hut; Building
Lookout; Cave; Power station
Timber
Contours (40 metre interval)
Depression contour; Cliff
Trig station; Spot elevation (metres)
Approximate height (metres)
Waterfall; Swamp
Power transmission line

GN TN MN

GRID CONVERGENCE 0.7°

GRID / MAGNETIC ANGLE 12.1°

TRUE NORTH, GRID NORTH AND MAGNETIC NORTH ARE SHOWN DIAGRAMMATICALLY FOR THE CENTRE OF THIS MAP. MAGNETIC NORTH IS CORRECT FOR 1979 AND MOVES EASTERLY BY 0.1° IN ABOUT THREE YEARS.

5 cm

LOCALITY MAP

Devonport Launceston Deloraine Queenstown Hobart

Produced by the Mapping Division, Lands Department, Hobart, for the National Parks and Wildlife Service 1975
With limited revision in 1977 and 1979

GOVERNMENT PRINTER TASMANIA
REPRINTED 1979

CRADLE MOUNTAIN–LAKE ST CLAIR NATIONAL PARK

'This must be a national park for all time. It is magnificent. Everyone should know about it, and come and enjoy it.' (Gustav Weindorfer on the top of Cradle Mountain.)

Although not the first to enter the area now incorporated in the Cradle Mountain-Lake St Clair National Park, Weindorfer could be considered the 'founder' of the park. Austrian by birth, Weindorfer married a Tasmanian and settled on a farm on the North-West Coast. He visited the Cradle Mountain area several times before finally deciding to build Waldheim Chalet (Waldheim meaning forest home) in 1912. The chalet was built of King Billy Pine from the forest nearby, all the splitting and construction work being done by Weindorfer himself.

Weindorfer had for many years urged that a road be built to the Cradle Valley. Although this was not done until after the Austrian's death, he did live to hear in 1922 that an area of 64 000 hectares was proclaimed a scenic reserve. The area of the Park is now 126 205 hectares.

Both the Cradle Mountain and Lake St Clair areas seem to have been first visited in about 1826 by the Van Diemen's Land Company explorers. This English grazing company had its original local headquarters in the Stanley area in North-Western Tasmania from where it sent men to explore and trace road routes and to find new grazing lands. Jorgen Jorgenson, the 'Convict-King' is generally accepted to have been the first white man to set eyes upon Lake St Clair and Joseph Fossey the first to visit the Cradle Mountain area. W. S. Sharland, Surveyor-General in V.D.L. also claims to have discovered Lake St Clair in 1832.

During the next fifty years visits to both ends of the Park and to the more accessible mountains were made by prospectors, hunters and walkers.

GENERAL DESCRIPTION

Situated in Central Western Tasmania, Cradle Mountain-Lake St Clair National Park is the most famous of Tasmania's National Parks. Its rugged mountain peaks and alpine moorlands offer some of the finest scenery in Australia making the Park an ideal choice for a bushwalking holiday. It exhibits a wide representative range of the State's montane flora and fauna in largely untouched conditions. The Park can be divided into four main regions.

The Cradle Mountain Region in the north is a country of wild open moorland and heath, broken by deep gorges and forested valleys, with numerous lakes and tarns, the whole scene being dominated by Cradle Mountain and Barn Bluff.

The Pelion Region at the centre of the Park can be reached by foot tracks from the Arm River Road and the Wolfram Mines to the east, as well as by the Overland Track. It consists of a central plain surrounded by the mountains Oakleigh, Pelion East, Ossa (the highest peak in the State 1 617 m), Thetis, Achilles and Pelion West. Flowing across the Pelion Plains is Douglas Creek. The Forth River rises from the slopes of Pelion West and flows north through the Forth Gorge which is famous for its beautiful forest.

The Du Cane Range is a rugged series of peaks at an average height of nearly 1 500 metres. It extends in a south-westerly direction from Falling Mountain and Castle Crag, to Mount Gould and The Guardians. The eastern streams of the range flow into the Narcissus River and thence to Lake St Clair, the source of the River Derwent. On the west the range falls away into the Murchison Valley. To the north-east are the headwaters of the Mersey River.

Lake St Clair is the main feature of the southern end of the park. It is a deep lake (approximately 200 m) of glacial origin, 14 km in length. To the west are the rain-forest clad slopes of Mt Rufus and Mt Olympus while to the east are Mt Ida and the Traveller Range.

HOW TO REACH THE PARK

Lake St Clair, at the southern end of the park, is 173 km from Hobart via the Lyell Highway, and about the same distance from Launceston via Deloraine or Poatina and the Lyell Highway. It is reached by a 5.5 km road branching off the Lyell Highway at Derwent Bridge.

Cradle Valley, at the northern end of the park, is 85 km from Devonport via Forth or Gowrie Park, the last 32 km being a narrow, winding gravel road.

N.B. Both access roads are subject to temporary blockage by snow, especially in winter.

WHEN TO COME

Summer is the most advisable time to visit the Park due to it being the period of most reliable weather (blizzards can still occur). This also coincides with flowering of most of the Park's native plants.

Throughout Autumn, berries abound in a multitude of colours and leaves of the deciduous beech turn copper in colour prior to dropping before the winter snow.

With extensive experience and suitable equipment a winter trip can be undertaken, but in bad weather, conditions can be very severe especially on the exposed plateau sections.

ACCOMMODATION

Lake St Clair

Rangers are located at Cynthia Bay, southern end of Lake St Clair 5.5 km from Derwent Bridge.

Accommodation is available in huts at Cynthia Bay. Hut fees vary according to facilities provided. The more expensive ones are equipped with electric lighting, stove, frypan and radiator, cooking utensils, cutlery and crockery; and bunks with mattresses and blankets. No linen is provided. Alternatively a larger, cheaper hut accommodates sixteen people, providing fewer facilities and is admirably suited for large camping parties.

Amenities blocks contain showers, wash basins, toilets and basic laundry facilities.

Caravan and tent sites are available although there are a limited number of power sites. A day visitors hut and basic picnic facilities are provided. Bookings—by arrangement with:—The Ranger, Lake St Clair, via Derwent Bridge, Tasmania 7465. Phone 002-89 1115, during normal business hours.

Petrol and food can be bought at Derwent Bridge and a mini bus operates between Cynthia Bay and Derwent Bridge. Food is available at the kiosk at Cynthia Bay. A passenger launch runs on the lake.

Cradle Valley

Rangers are located at Cradle Valley.

The Waldheim Chalet is no longer available for visitors. Eight huts are available for hire. Facilities are similar to those at Cynthia Bay. Amenities blocks contain hot and cold showers, toilets and limited laundry facilities. A day visitors hut and basic picnic facilities are provided.

Food or petrol can be purchased only at Pencil Pine Lodge.

Bookings — by arrangement with — The Ranger, Cradle Mountain, Tasmania 7306. Phone 003 63 5187

Within the Park

	Huts	Bunks	Camping	Water
Scott-Kilvert Memorial Hut (Lake Rodway)	..	Open floor space	Poor	40m
Waterfall Valley	..	8	Good	10m
Cirque	..	25	Poor	30m
Windermere	..	25	Good	50m
Pelion, Old	..	8	Poor	75m
Pelion, New	..	12	Good	75m
Kia Ora	..	20	Poor	30m
Du Cane (Emergency Shelter Only)	..	16	Good	50m
Windy Ridge	..	24	Poor	50m
Pine Valley	..	12	Poor	50m
Narcissus	..	28	Good	15m
Echo Point	..	8	Poor	5m

Pot-bellied Stoves

A number of the huts have cast-iron pot-bellied stoves. These are designed for heating only, and cooking should be done on portable stoves. Supplies of coal or coke are provided for the stoves in an effort to preserve the vegetation around the huts. Detailed instructions on the use of the stoves are posted in each hut.

TRIPS FROM EACH CENTRE

Unless otherwise stated, the walks suggested may be considered day trips.

Waldheim:

- Cradle Mountain
- Barn Bluff
- The various lakes — ½ day to 1 day trips
- Hounslow Heath — ½ day trip
- The Forest, etc. — ½ day trip
- Lake Rodway — Scott-Kilvert Memorial hut

Windermere:

- Lake Will and Innes Falls
- Barn Bluff

Pelion Huts:

- Mt Ossa
- Mt Pelion East
- Mt Pelion West
- Mt Oakleigh
- Mt Achilles, Thetis and Paddys Nut — 1-2 days
- Lake Ayr
- Forth Gorge — ½ day

Du Cane (Emergency Shelter):

- Cathedral Mountain
- Falling Mountain
- Fergusson and other falls — 2 to 3 hours

Pine Valley Hut:

- Mt Geryon
- Mt Gould
- The Guardians
- The Acropolis
- The Labyrinth to Walled and Macs Mountains, Eros and Hyperion — a long day
- The Upper Pine Valley returning via the Labyrinth — 1 or 2 days
- Hyperion and thence to Big Gun Pass and Narcissus Valley — 2 days, or to Kia Ora Valley — 2 days

Narcissus hut:

- Mt Gould
- Mt Byron
- Mt Manfred
- Mt Cuvier
- Lake Marion — ½ day
- Pine Valley
- Mt Olympus

Cynthia Bay:

- Mt Rufus, returning via Hugel Lakes
- Mt Olympus
- Mt Ida — by boat
- Cuvier Valley
- Mt Hugel

THE OVERLAND TRACK

Traversing the 80 km Overland Track between Waldheim and Cynthia Bay, for safety reasons takes a minimum of five days, but six to eight days will permit fuller exploration of the area and also allow for delays due to inclement weather. There are unattended huts at various stages along the track, however availability of huts cannot be relied on, particularly in sudden spells of bad weather in summer when hundreds are on the track. Parties should be equipped and prepared to camp. Extra time should be available in case of bad weather which might delay the party for a day or more. Also diversions from the main track may be desired, to climb one or more of the peaks close at hand, to visit waterfalls or old mining areas or to enjoy the wildlife and scenery.

From the following notes on the tracks, huts and campsites, it should be possible to select a suitable itinerary. As conditions may vary considerably, you are strongly advised to discuss your plans with the Ranger.

Starting in the north, the approximate walking times and distances between huts and major campsites are as follows. These should be regarded as a guide only and do not include any time for stops.

	Distance (km)	Time (hrs)
Waldheim — Waterfall Valley	10·0	3½
Waterfall Valley — Cirque hut	1·25	½
Cirque Hut — Lake Windermere	6·5	2
Lake Windermere — Pelion Creek	8·75	2½
Pelion Creek — Frog Flats	3·5	1
Frog Flats — Pelion Hut	4·5	1½
Pelion Hut — Kia Ora Hut	9·0	3¼
Kia Ora Hut — Du Cane	2·5	¾
Du Cane — Windy Ridge	7·5	2½
Windy Ridge — Narcissus	9·0	3
Narcissus — Echo Point	6·5	2
Echo Point — Cynthia Bay	11·0	3
	80·0	25½

From Cradle Valley, there is a choice of tracks, all of which ultimately join the main Overland Track.

The easiest walking follows the Horse Track, passing the emergency shelter of Kitchen Hut to Waterfall Valley. Two popular alternatives include the tracks along either side of Dove Lake: one leads to Marions Lookout and the other cuts across Hansons Peak. These are more physically demanding walks, but afford spectacular views. From Hansons Peak the walk may either traverse the face of Cradle Mountain and pass along its western slopes (allow about 1 hour if you desire to climb to the summit, 1 545 m), or it takes a route to the east of Cradle Mountain via Lake Rodway and the Scott Kilvert Memorial Hut.

There is little shelter on the 7 km walk from Marions Lookout to Waterfall Valley, especially along the very exposed Cradle Cirque, and great care must be taken on this section in bad weather. The track to Barn Bluff runs off to the right, half way along the cirque.

The side route up Barn Bluff via the Bluff Cirque takes 2½ hours for the return trip. On reaching the lip of the valley the track descends steeply. Waterfall Valley, as its name implies, contains numerous falls, both large and small.

Waterfall Valley Hut was built in the 1950's and sleeps eight people. There are good camping sites around the hut, but wood is scarce.

The Cirque Hut was built in 1974 and sleeps up to twenty-five people. Camping around the hut is poor. The track crosses undulating country before a gradual climb to the moor, where there is a view of Lake Will and numerous small tarns surrounded by Pencil Pines. A 3 kilometre side track leads down to Lake Will where there is a magnificent view of Barn Bluff. At the far side of the lake are the Innes Falls. Windermere Hut is located 5 kilometres beyond the Lake Will turn-off, 200 metres to the south-west of Lake Windermere.

Windermere Hut was built in 1976 to replace the original 1935 hut which was destroyed by fire in 1974. It sleeps twenty-five people. There are good camp sites around Lake Windermere.

Leaving Windermere, the track rises gently through lightly timbered country for a short distance, and then opens out onto Pine Forest Moor where there are numerous tarns. The moor is on a ridge and 50 metres from the track. The view into the Forth Gorge is spectacular. The dolerite columns of Mount Oakleigh are clearly visible to the east, and beyond are the Pelion Plains encircled by Pelion East, Ossa, Thetis, Achilles and Pelion West. Behind these peaks is the outline of Du Cane Range and, in the background, many peaks beyond the park boundaries.

Just before reaching Pine Forest Moor, the track joins the route of the old Innes Track, cut in 1897, which is now followed to the Pelion Plains. The track skirts the west side of a forest of pines and eucalypts and then round the eastern foothills of Mount Pelion West. There are a number of sheltered campsites in the vicinity of Pelion Creek. The track then descends to Frog Flats, where the Forth River is crossed on a log bridge. Crossing the river, the track makes a sharp turn left. There are campsites along the river bank at this point.

There is then a steady climb up the opposite side of the valley, through wooded country, for a further 3½ km before the track begins to fall gradually to the Pelion Plains. There are two huts here, the first, Old Pelion, being reached by a 15 minute detour to the left, and the other, New Pelion, lying on the main track, on the far side of the plain. The Douglas Creek provides a good swimming hole near the latter hut.

The Old Pelion Hut was built in 1895 as accommodation for the nearby copper mine. It has bunks for eight people. New Pelion Hut was built in 1968. It is the third hut on this site, the original, built in 1936, having been destroyed by fire in 1950, and its replacement meeting a similar fate in 1967. It is a galvanized iron hut with bunks for twelve people. There are excellent campsites near New Pelion Hut.

Leaving New Pelion Hut the track enters rain forest and continues through wet eucalypt forest following the Douglas Valley up to Pelion Gap. The climb is nearly 300 metres over a distance of 4 kilometres. Extensive views are obtained from the slopes of Pelion East and a few hundred metres from Pelion Gap. The peak of Pelion East is on the left and can be climbed in 1½ hours (return). On the right is Mount Ossa, Tasmania's highest mountain which can be climed in 2½ hours (return), by a track leading to the south of Mount Doris. Cathedral Mountain (outside the Park boundary) is prominent on the other side of the Mersey Valley, roughly south-east.

The track descends through Pinestone Valley, which contains a number of glacial erratics, and then over a small ridge and down to Kia Ora Creek. Kia Ora Hut, of similar construction to the New Pelion Hut, and built in 1968, will accommodate twenty people. Kia Ora Creek is characterised by many cascades and falls, the most beautiful being the Kia Ora Falls just below the track-crossing. The pool below the falls is a good swimming hole.

From the creek it is a 45 minute walk to Du Cane Hut which is located in a small clearing in the forest beneath Castle Crag. Du Cane Hut, built by Paddy Hartnett around the turn of the century as a trappers hut, is in a poor state of repair, and should only be used for emergency shelter. There are excellent campsites in the vicinity of the hut.

From Du Cane Hut the track falls away through myrtle forest. Half an hour from the hut a track turns off to the D'Alton and Fergusson Falls on the Mersey River. An extension of this track leads to Boulder and Cathedral Falls. Rejoining the Overland Track, it takes 20 minutes through myrtle forest before there is another turn-off to the left leading to Hartnett Falls, which will require a further half hour to visit.

From here the Overland Track climbs steadily for 200 m to the Du Cane Gap, then descends more steeply to Windy Ridge Hut. To the right lies the plain of the upper Narcissus Valley, walled in by the cliffs of Mt Massif, Mt Geryon and The Acropolis.

The Windy Ridge Hut sleeps twenty-four people. It was built in 1974. The original hut was about 200 metres north of the present site, and was burnt in 1972.

The track continues through the fringe of the eucalypt forest, descending gradually to the Narcissus Plains, the sections on either side of the Narcissus Creek being buttongrass plains, which are crossed on duckboards. Narcissus Hut sleeps twenty-eight people. It is a galvanised iron hut. There is good camping around the hut.

Leaving the Narcissus Hut, alongside the river of the same name, the track proceeds westwards a short distance before it divides, one branch going to Nicholls Junction and Pine Valley; the Overland Track going to the south, crossing Hamilton Creek, where it divides again. From here the Overland Track skirts the edge of Lake St Clair passing mostly through rain forest. About 2 hours from Narcissus, on the lake side, is Echo Point Hut which accommodates eight people. Cynthia Bay can be reached from here in 3 hours. The alternative route is not recommended in wet weather. It leads over Byron Gap and then via Lake Petrarch to the west of Mount Olympus. It rejoins the Overland Track about half an hour before Cynthia Bay is reached.

NOMENCLATURE

Many names are either descriptive or from Greek mythology; most of these are not included below.

Ayr, Lake	Noted photographer, the late J. W. Beattie suggested it came from Robbie Burns' 'Toon O' Ayr'.
Barn Bluff	Mentioned by V.D.L. Co. Surveyor Joseph Fossey in 1826, probably named by him descriptively.
Byron, Mount	Named by Surveyor-General George Frankland in 1835 after noted English poet Lord George Gordon Byron.
Cradle Mountain	Mentioned by Joseph Fossey in 1826, probably named by him because of its likeness to a gold miner's cradle.
Cuvier River	Named by George Frankland in 1835 after noted French naturalist, Baron Cuvier; Mt Cuvier followed.
Cynthia Bay	Originally named 'Cove' by George Frankland in 1835; this was one of the many names of Diana, the Greek Goddess of the Moon.
D'Alton Falls	Named in 1935 by noted walker and climber Mr Fred Smithies after the first Minister for Tourists, the Hon. Tom D'Alton.
Dove River & Lake	River named after an official of V.D.L. Company prior to 1832. Gustav Weindorfer or Stephen Spurling named the lake in 1905.
Du Cane Range	Named after Charles Du Cane, Governor of Tasmania 1869-74.
Emmett, Mount	Formerly Mt Brown; renamed by Board in 1950 after E. T. Emmett, Director of T.G. Tourist Bureau and foundation member of the Hobart Walking Club.
Fergies Hill	Recently named by Board in honour of the southern ranger, the late A. D. Fergusson.
Fergusson Falls.	Discovered by A. D. Fergusson in 1934; named by Mr Fred Smithies the following year.
Gould, Mount	Named after Charles Gould, Government Geologist, who visited the area in 1860.
Hansons Peak	After Bert Hanson who died from exposure on a hunting trip in 1905. Names of river and lake followed.
Hartnett Falls	Named by Stephen Spurling in 1913 after Paddy Hartnett who led his party to the falls.
Harnett Rivulet	Originally Brown River; renamed in 1933 in honour of Paddy Hartnett, prospector and investor.
Hugel River	Named by George Frankland in 1835 in honour of Baron Charles Hugel of Vienna; Mt Hugel followed.
Kate, Mount	Named by G. Weindorfer after his wife the former Kate Cowle.
Kathleens Pool	Named by G. Weindorfer in 1911 after Miss S. K. Carruthers of Stowport.
Kia Ora Creek & Falls	Maori word meaning 'be well or happy'.
Knyvet Falls	Named after Knyvet Roberts an early visitor to Cradle Mountain.
Lilla, Lake	Named by Stephen Spurling in 1905, after his sister.
Macs Mountain	Named by walker G. T. F. Chapman in 1935 after a companion Malcolm ('Mac') Urquhart, University Lecturer.
Manfred, Mount	Named by George Frankland in 1835; Manfred was the subject of one of Lord Byron's dramas.
Murchison River	Named by W. A. Tully circa 1859 after Sir Roderick Impey Murchison (1792-1871), an eminent Scottish geologist.
Narcissus River	Thought to have been named by George Frankland in 1835—on his map. Narcissus was the son of Cephissus, the river god in Greek mythology.
Olympus, Mount	Named by George Frankland in 1835; the fabled home of the Greek gods and a mountain in Greece.
Ossa, Mount	Probably named by Charles Gould circa 1860 — on his map; figures in Greek mythology and another mountain in Greece.
Paddys Nut	Named in honour of Paddy Hartnett, prospector and investor.
Pelion, Mount (E. & W.)	Probably named by Charles Gould circa 1860; the home of the centaurs in Greek mythology and a mountain in Greece.
Rufus, Mount	Possibly named by Charles P. Sprent as it appears for the first time on his map dated 1879. Rufus was a Roman poet (74-14 B.C.)
Spurling, Mount	Recently named in commemoration of Stephen Spurling, noted explorer and photographer.
St Clair, Lake	Named by George Frankland in 1835, it is believed after the St Clair family of the Scottish Loch Lomond.
Will, Lake	Named by Joseph Will who was engaged in prospecting the coal seams of Barn Bluff and Mt Pelion in 1893.

ADVICE TO WALKERS

The Cradle Mountain-Lake St Clair National Park is a remote area. Once you have set out from the Cradle Valley or Lake St Clair there is no speedy means of communication with civilisation should the need arise. A few simple precautions will ensure that your visit to this area will be safe.

The Overland Track is well defined and no guide is needed. It provides walking access to very enjoyable country under ideal conditions. However, Tasmania's highland climate is fickle and unpredictable. Very muddy conditions may prevail at any time of the year and heavy rain and snowfalls are common even in summer months. Such weather changes can arrive suddenly, without warning and the risk of death from exposure is therefore an ever present hazard. The most dangerous areas are the exposed sections between Waldheim and Windermere where much of the Overland Track is at the 1 200 metre level. Walkers should consult the Ranger before entering the Park and take his advice.

The duckboards installed on sections of the track are for the protection of the vegetation. Please use them at all times.

BUSHWALKING ETHICS

Natural areas will only remain unspoiled for future generations to enjoy, if they are protected and cared for by those who use them now. We should aim to leave no distinct signs of our visit and to minimise our impact on the environment. There is a deep sense of satisfaction and personal achievement in the knowledge that one has travelled through an area, in harmony with nature and left no perceptible trace of our presence.

The following points are well worth considering:—

Huts:

If there is a hut available, impact on the environment will be lessened if you camp in the hut rather than outside.

Campsites:

Use existing campsites whenever possible. Avoid areas of fragile vegetation. Don't disturb the natural landscape by building windbreaks and fireplaces from rocks. Always carry your own tent poles. Never cut green poles or put nails in trees. Do not dig drains or level out tent and bed sites. Select tent sites where water will drain away naturally. When breaking camp, erase all evidence that you were there.

Stoves:

Use portable stoves rather than light fires. Even dead wood is an important part of nature's cycle.

Fires:

If you must use fires, keep them small to conserve wood. Use small, fallen, dead wood only. Do not cut standing trees, living or dead, or break off branches. Axes, tomahawks and machetes should not be taken into natural areas.

Fireplaces:

Use existing fireplaces whenever possible. Clear all dead vegetation and litter for a distance of 3 metres around your fire. Never build fires near trees or on peat or duff. Don't place a fire against a log or back rock. Never leave a fire unattended. When breaking camp, drown the fire thoroughly, then stir the ashes before dampening again and again until the ashes are cold to the touch. Ensure that you have not left traces of foil or other rubbish amongst the ashes. Except in well established camps, return any rocks used as a fireplace to their natural positions.

Sanitation:

If there is no toilet, go well away from the camp or track, dig only a moderately shallow hole in the top soil. Ensure that you are well away from lakes or streams, and downstream from any water-collection point. Do not leave toilet paper strewn about and make certain that your toilet pit is well covered with soil. Placing a rock over the site is not satisfactory; it is too obvious and may be overturned by curious animals or some unfortunate bushwalker.

Washing:

Swim downstream and away from campsites. Do all bathing, clothes-washing and pot-scrubbing well away from the shores of lakes and streams. Take care to keep soaps and detergents out of all waters.

Rubbish:

Burying rubbish is no longer acceptable. While on the track put sweet wrappers, foil, orange peel, cigarette butts etc. in your pocket or pack for later disposal. If you have a campfire, burn everything that will burn. Carry out everything that won't burn — this includes foil, old clothing and most plastics. Watch out especially for food packages lined with foil. Double check for litter before leaving camp. Leave your campsite cleaner than you found it. Make every trip a clean-up trip!

Tracks:

Stay on the track. Cutting corners is the quickest way to break down track edges and start erosion and gullying. Be careful not to break down the edges of cross drains. If you see a blocked drain, please spare a second to clear it.

Cross-Country:

Do not blaze trees or build cairns. Let the next bushwalker find his own way as you did.

Courtesy:

Be a considerate neighbour. Don't crowd other camps. Noise is not in harmony with that peace in nature that people value. Leave your radio at home.

Party Size:

Large groups create pressures on the environment, particularly at campsites. The ideal party size is four to six people. For safety reasons, a party should not be less than four. For environmental reasons, a party should not exceed twenty.

SAFETY ESSENTIALS

Clothing

Strong waterproof boots and long woollen trousers are essential for survival under adverse weather conditions. Woollen mittens, balaclava or hat, woollen singlet, shirt, socks and jumpers must be carried even in summer. A WATERPROOF PARKA WITH A HOOD IS ALSO ESSENTIAL.

Food

Carry ample food, light in weight, but nourishing; the exercise and altitude both make considerable demands on food and energy supplies. Don't carry water as there is ample en route. Don't carry tinned food as this is heavy and the empty tins have to be carried out.

Personal Equipment

Groundsheet, downfilled or equivalent quality sleeping bag — other sleeping bags are totally unsuitable for mountain areas in Tasmania. First-aid kit, torch, map, compass, matches (in a waterproof container,) candle (this enables a fire to be kindled under adverse weather conditions) and whistle.

Party Equipment

Tent, tent-poles and pegs, campers' primus stove, (considered essential due to the scarcity of firewood).

Fitness

Walkers undertaking the Overland walk should be physically fit and able to carry a full pack for prolonged periods. Average pack weight for six days food and equipment is—

Man, 14-18 kg. Woman, 11-14 kg. Boy or Girl, 11 kg maximum.

Check In and Out

Before setting out, check with the Park Ranger and be guided by his advice. Remember to fill in your proposed schedule in the log book before commencing your walk, and complete a Police registration form. Record your progress in the huts on route and check out with the Ranger or a Police station when leaving the Park.

Party Size

No person should enter the bush on a prolonged walk alone. For reasons of safety it is generally considered that the minimum number in a walking party should be four. At the same time the maximum number must be within reasonable limits especially where children are concerned. There should be one experienced adult to each five children. Huts are not made to cater for large parties, which should always carry tents.

Do Not Separate

The walking pace must be governed by the slowest members of the party, so the party stays together.

Set Out Early Each Day

This allows time for delay and adequate camping time. In adverse conditions it is wiser to spend a day in the shelter of your camp than to risk exposure by proceeding further.

Additional Information

Additional information on safety and equipment is available from the Ranger or obtainable from the National Parks and Wildlife Service Magnet Court, or P.O. Box 210, Sandy Bay, Tasmania 7005. The Hobart Walking Club publishes an excellent book, 'Safety in the Bush'.

EXPOSURE OR HYPOTHERMIA

Exposure is the severe chilling of the body surface leading to progressive fall of body temperature with the risk of death. It is the combination of fatigue, cold and anxiety which is particularly serious. Wet, windy and cold weather is especially dangerous.

A. Symptons

In exposure conditions every member of the party should be alert for the following signs in himself and his fellow members, although the following symptons may not all be present:—.

Weariness, clumsiness, lack of interest, loss of judgment, reluctance to keep moving. The patient may have a false sense of well being and be unaware of any danger to life. The patient may NOT FEEL cold.

B. Treatment

1. DO NOT FORCE THE PARTY ON IN ORDER TO GET TO A HUT.
   DO NOT give alcohol.
   DO NOT re-warm the patient in front of a blazing fire.
   DO NOT move on too soon — re-warming takes at least twenty-four hours.
2. Prevent further heat loss by insulating the body. Put the victim into a sleeping bag, lay him down, have a companion go into the sleeping bag with him. The bag should be covered with windproof and waterproof covering (a plastic 'bivvie bag' is excellent). Provide shelter (windbreak, tent, etc.). Give sugar in easily digested form (condensed milk, etc.). If breathing stops render immediate mouth-to-mouth rescusitation.
3. Even when he appears to recover he must still be treated as a stretcher-case.
4. Give him warm food and drink if possible.

C. Prevention

1. Have a good breakfast and frequent quick-energy snacks during the day.
2. Travel only in reasonable weather.
3. Put on windproof and warm clothing in cold, windy weather.
4. Carry moderate loads.
5. Set reasonable objectives.
6. ACT WHEN EXPOSURE SIGNS FIRST APPEAR, AS DEATH MAY QUICKLY FOLLOW ANY COLLAPSE.

8323

PROVER I PROSPECT

Disseminated Pb-Zn in rhyolitic tuffs

5 392 000 mN

5 391 000 mN

5 390 000 mN

5 389 000 mN

402 000 mE

403 000 mE

404 000 mE

405 000 mE

406 000 mE

E.L. 2/70 BOUNDARY

NATIONAL PARK BOUNDARY

N.P. BOUNDRY

OUTLINE OF AEROMAGNETIC ANOMALY

MT REMUS LODE ZONE

ANOMALY 13
EM CENTRES

Exact position of unconformity not defined

Mo values in stream sediment samples taken by Threader (1965)

LEGEND:

CAMBRIAN — MT READ ARC

- Massive quartz-feldspar-biotite porphyry
- Interbedded rhyolitic crystal tuffs, lavas and volcaniclastic sediments

PRECAMBRIAN

- Micaceous schist and quartzite

INTRUSIVES

- Quartz-feldspar porphyry

- Unconformity
- Bedding
- Cleavage

5 cm

200m 0 200m 400m 600m 800m

865022

GEOPEKO
A DIVISION OF PEKO WALLSEND OPERATIONS LTD

81-1637R

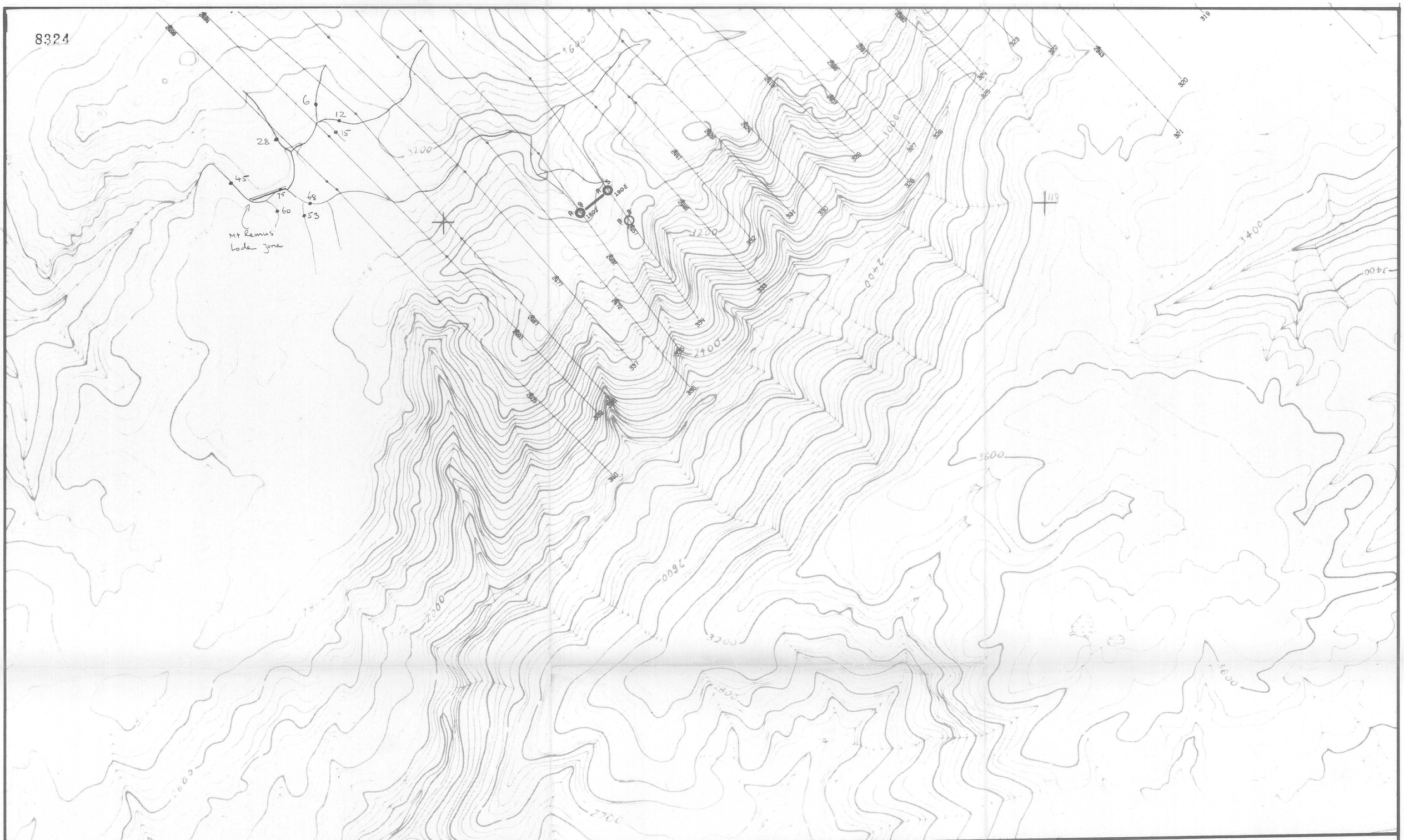
E.L. 2/70 and ANOMALY 13

Compiled from

Herrman (1980) and Barton et al (1966)

SCALE. 1:10 000 | PLAN No. 2

8324


6
12
15
28
45
75
58
60
53
Mt Remus
Lode zone
3200
3400
3600
3800
2400
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3000
2200
2000
1800
1600
1400
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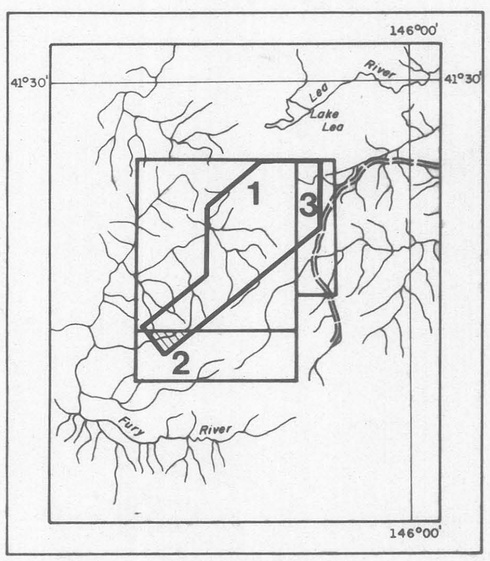
1000
800
600
400
200
0

8325

LOCATION MAP



Scale 1: 250,000

DIGHEM II SURVEY

MACKINTOSH EAST, TASMANIA

MAGNETICS

FOR

GEOPEKO LIMITED

SCALE 1: 10,000

1/2 0 1/2 1 Kilometres

1/4 0 1/4 1/2 Miles

5 cm

REGISTERED PROFESSIONAL ENGINEER
D. C. FRASER
PROVINCE OF ONTARIO

Flight line

1321

Fiducials and numbers

1256

ISOMAGNETIC LINES

(total field)

1000 ..... 1000 gammas

200 ..... 200 gammas

..... 50 gammas

..... 25 gammas

..... magnetic depression

Magnetic Inclination within the survey area: 72°

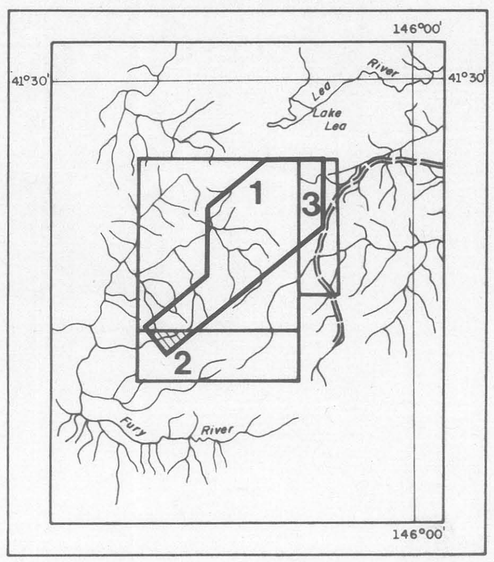
SHEET 2
PLAN. 4
81-1637 R

865024

Plan No. 5581 S/B

8326

LOCATION MAP



Scale 1 : 250,000

REGISTERED PROFESSIONAL ENGINEER
D. C. FRASER
PROVINCE OF ONTARIO

DIGHEM^{II} SURVEY

MACKINTOSH EAST, TASMANIA

ENHANCED MAGNETICS

FOR

GEOPEKO LIMITED

SCALE 1 : 10,000

1/2 0 1/2 1 Kilometres

1/4 0 1/4 1/2 Miles

5 cm

Flight line

1256

Fiducials and numbers

1251

ISOMAGNETIC LINES

(enhanced field)

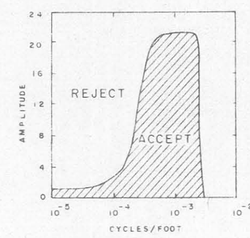
5000 ..... 5000 gammas

1000 ..... 1000 gammas

..... 200 gammas

..... 100 gammas

..... magnetic depression



Frequency response of magnetic operator

SHEET 2

PLAN. 5

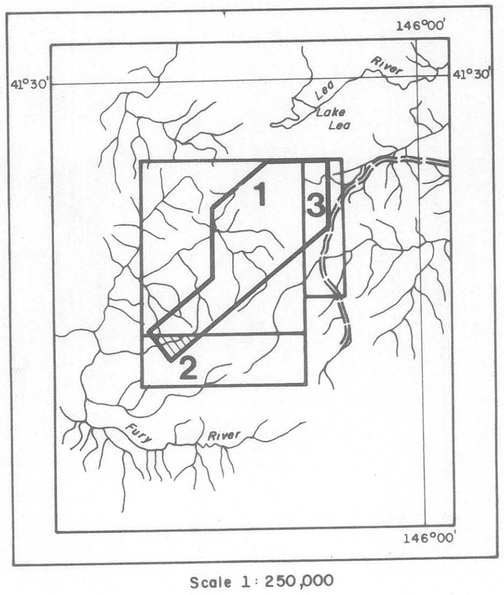
81-1637R

865025

Plan No. 5582 S/B

8327

LOCATION MAP



Scale 1 : 250,000

DIGHEM II SURVEY

MACKINTOSH EAST, TASMANIA

RESISTIVITY

FOR

GEOPEKO LIMITED

SCALE 1 : 10,000

1/2 0 1/2 1 Kilometres

1/4 0 1/4 1/2 Miles

Flight line

1252

Fiducials and numbers

1000

LEGEND

Contours in ohm - m at eight intervals per decade

100
75
56
42
31
23
17
13
10

Note

The numbers face in the direction of increasing value.

865026

5 cm

SHEET 2

PLAN. 6

81-1637 R

REGISTERED PROFESSIONAL ENGINEER
D. C. FRASER
PROVINCE OF ONTARIO

Plan No. 5583 S/B

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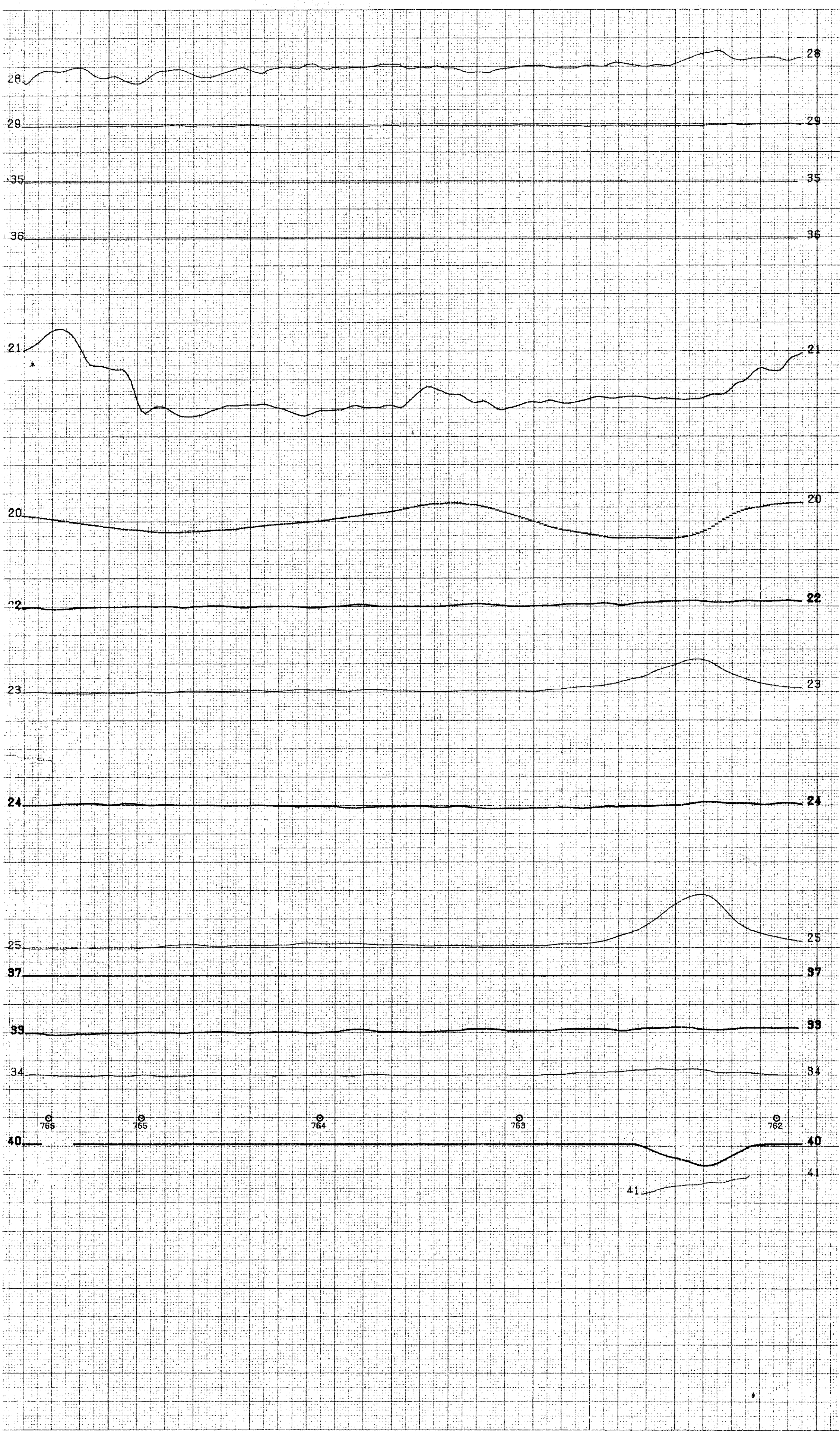

LINE -201

LINE -201

K+E
KEUFFEL & ESSER CO
MILLIMETER
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28
29
35
36
21
20
22
23
24
25
37
33
34
40
41
770
771
772
773
774

LINE 202

LINE 202

28

29

35

36

21

20

22

23

24

25

37

33

34

784 783 782 781 780 779

40

41

LINE -203

LINE -203

MILLIMETER
KEUFFEL & ESSER CO.
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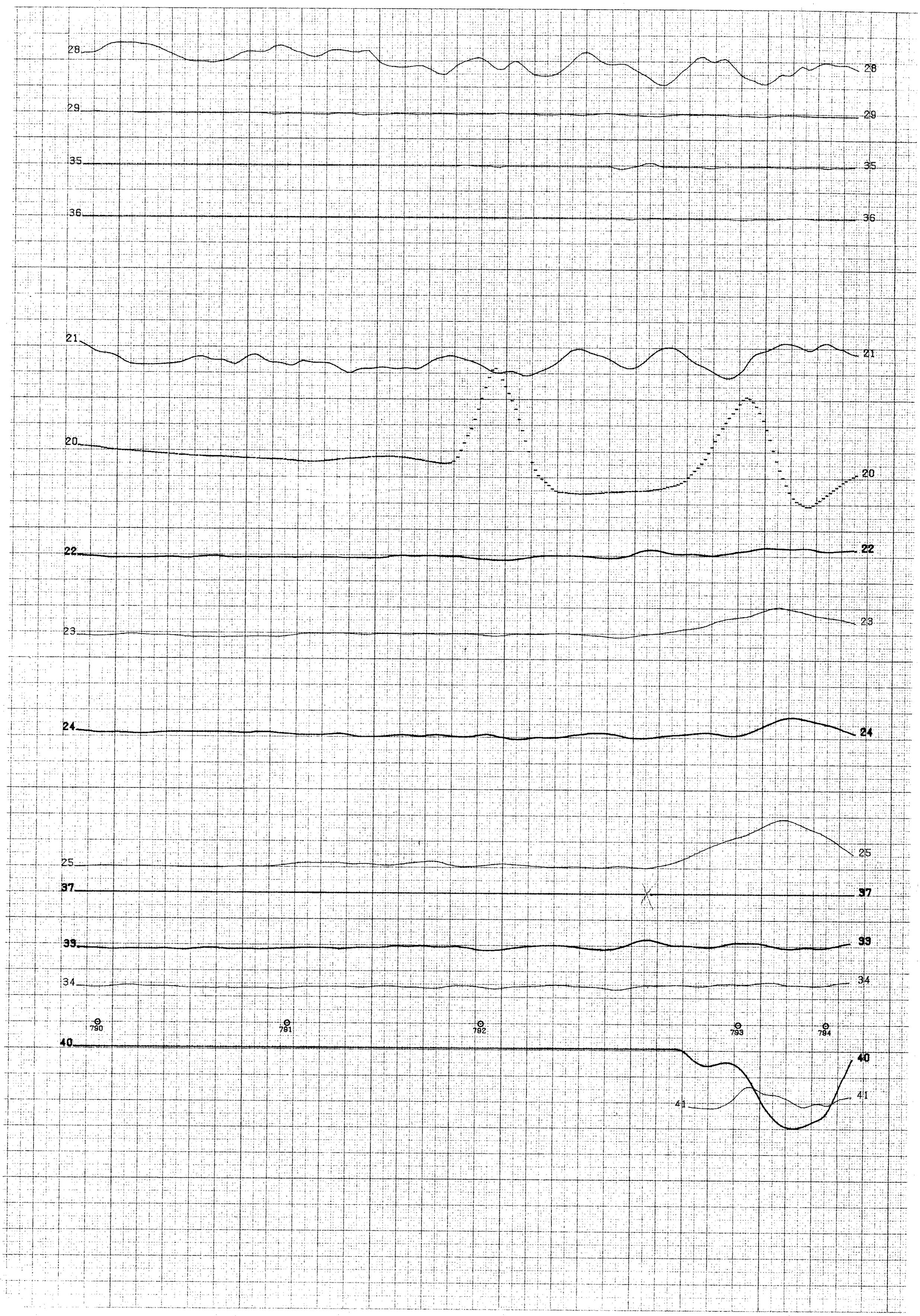

LINE 204

LINE 204



LINE -205

LINE -205

MILLIMETER
KEUFFEL & ESSER C
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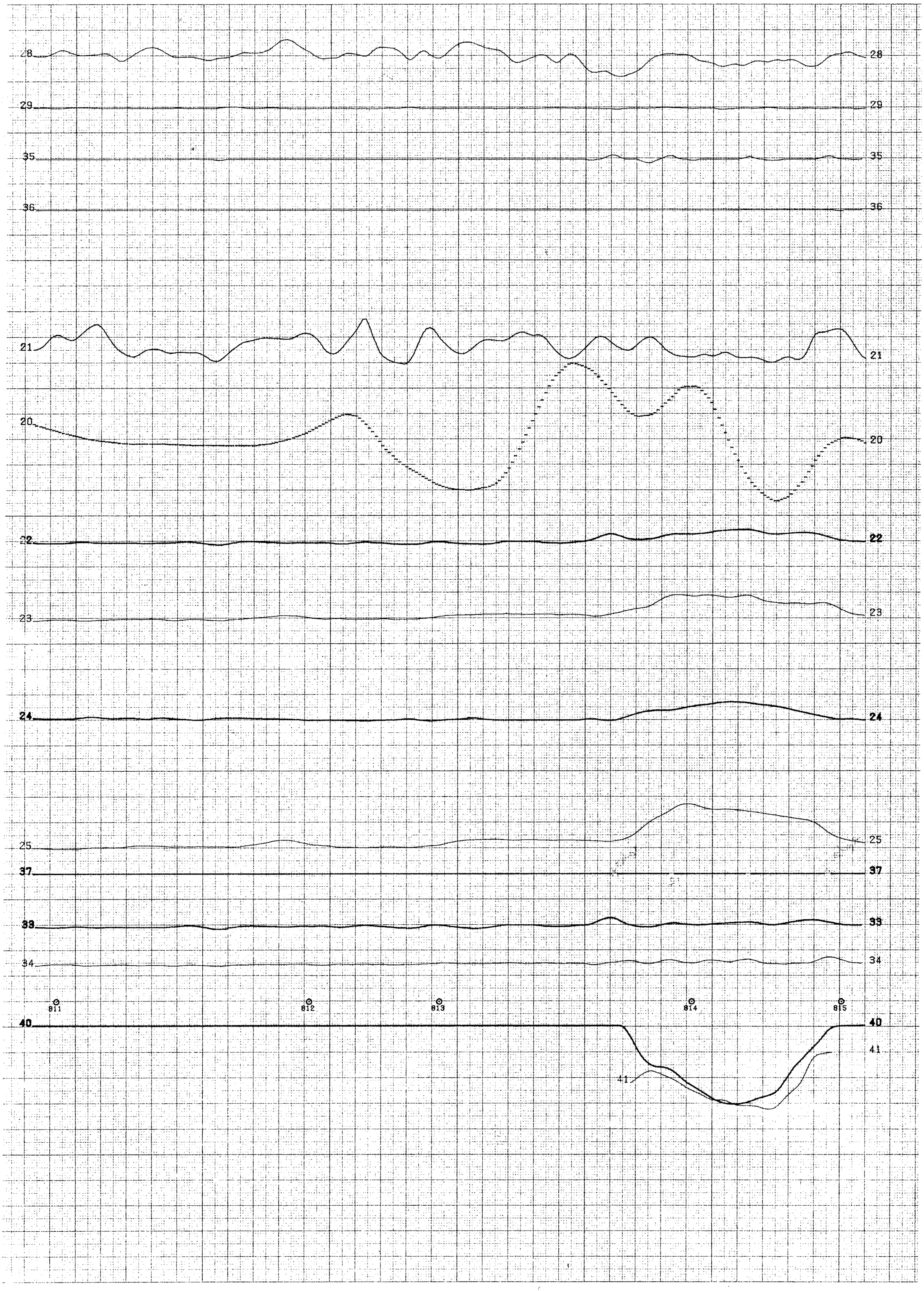

LINE 206

LINE 206

MILLIMETER
KEUFFEL & ESSER CO.
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36
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22
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24
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34
40
41

827826 825 824 822 821 820

LINE -207

LINE -207

MILLIMETER
KEUFFEL & ESSER CO
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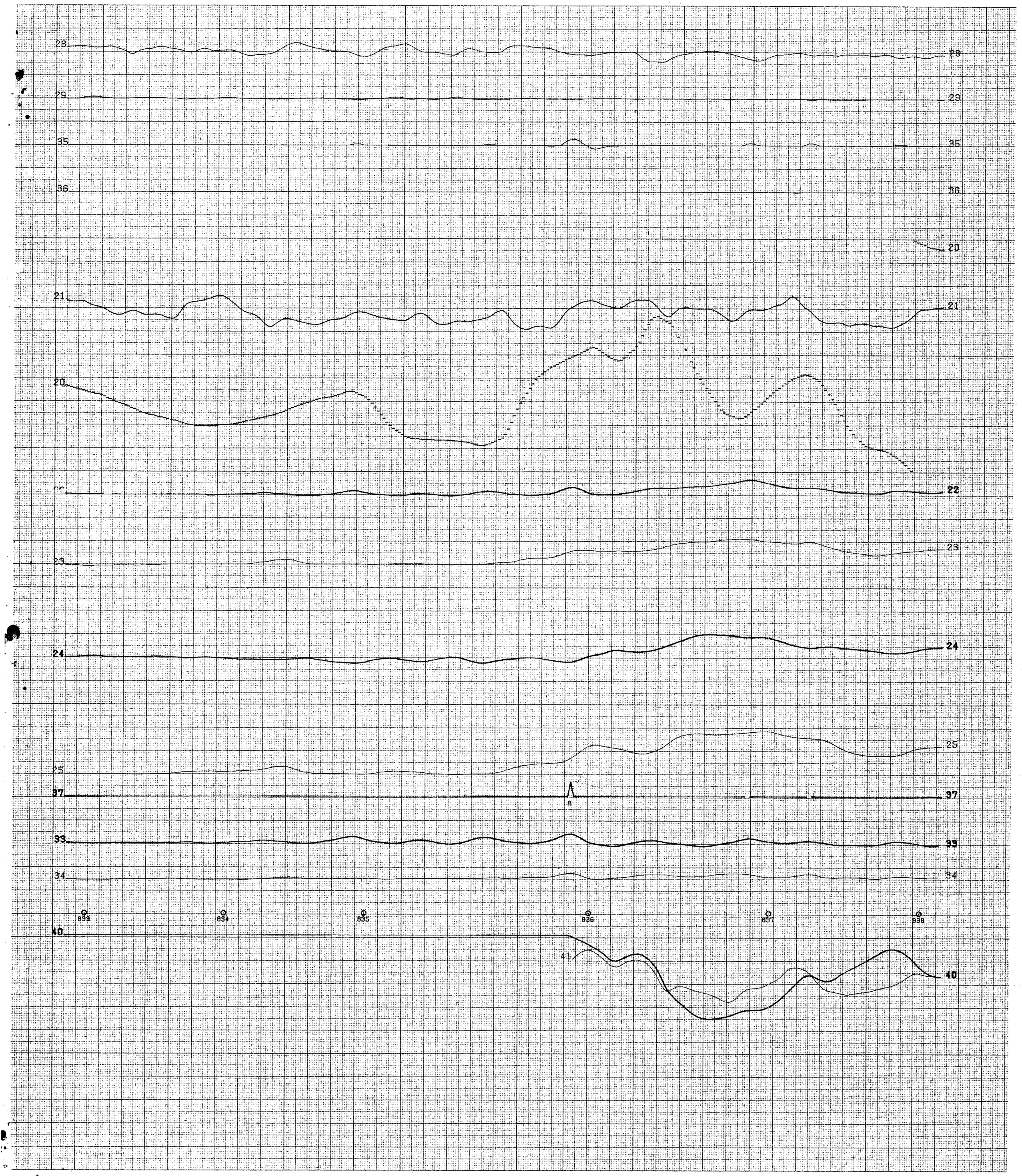


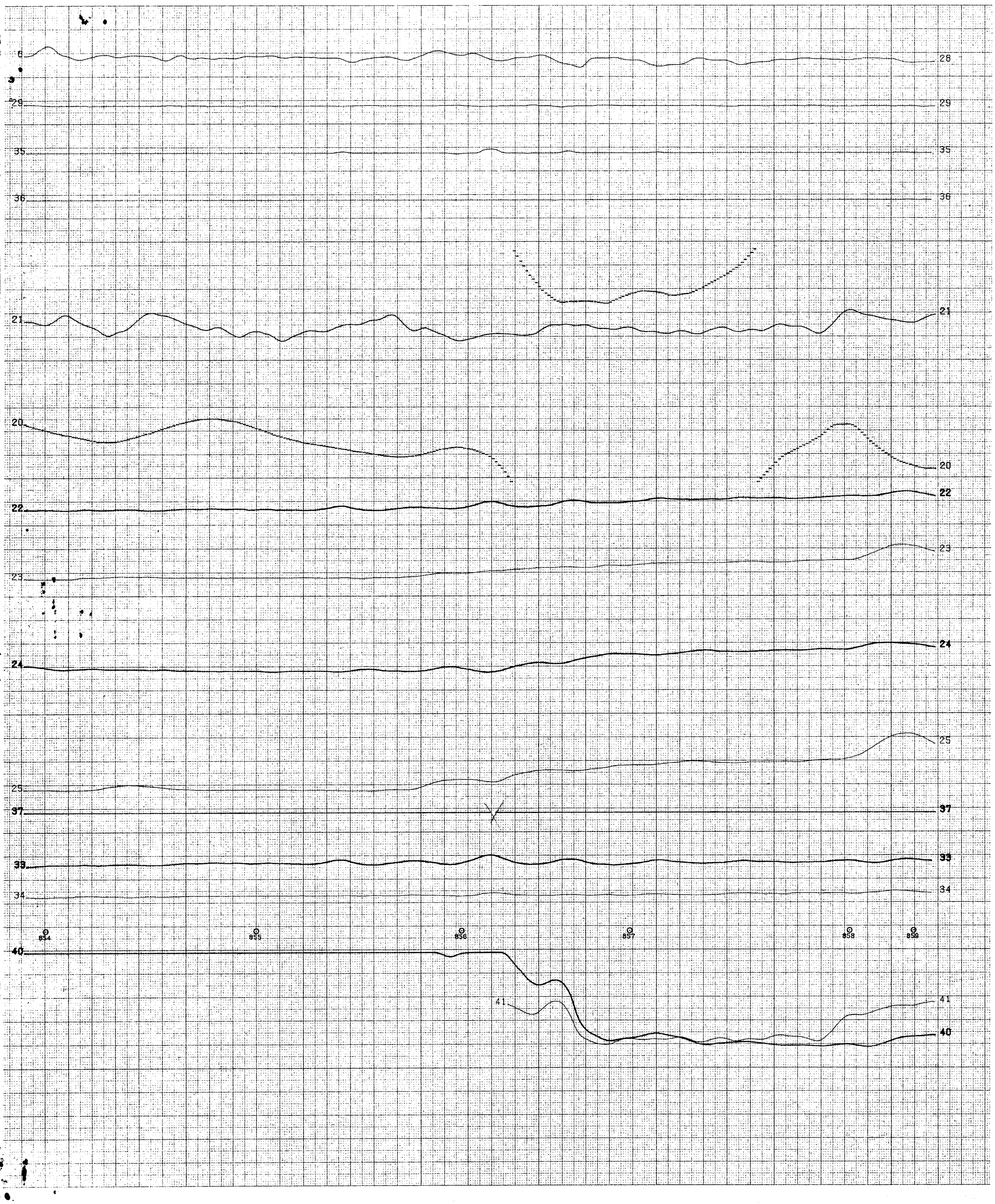
LINE 208

LINE 208

LINE -209

LINE -209

MILLIMETR
KEUFFEL & ESSER C
PRINTED IN U.S.A.



LINE 210

LINE 210

K+E MILLIMETER
KEUFFEL & ESSER CO.
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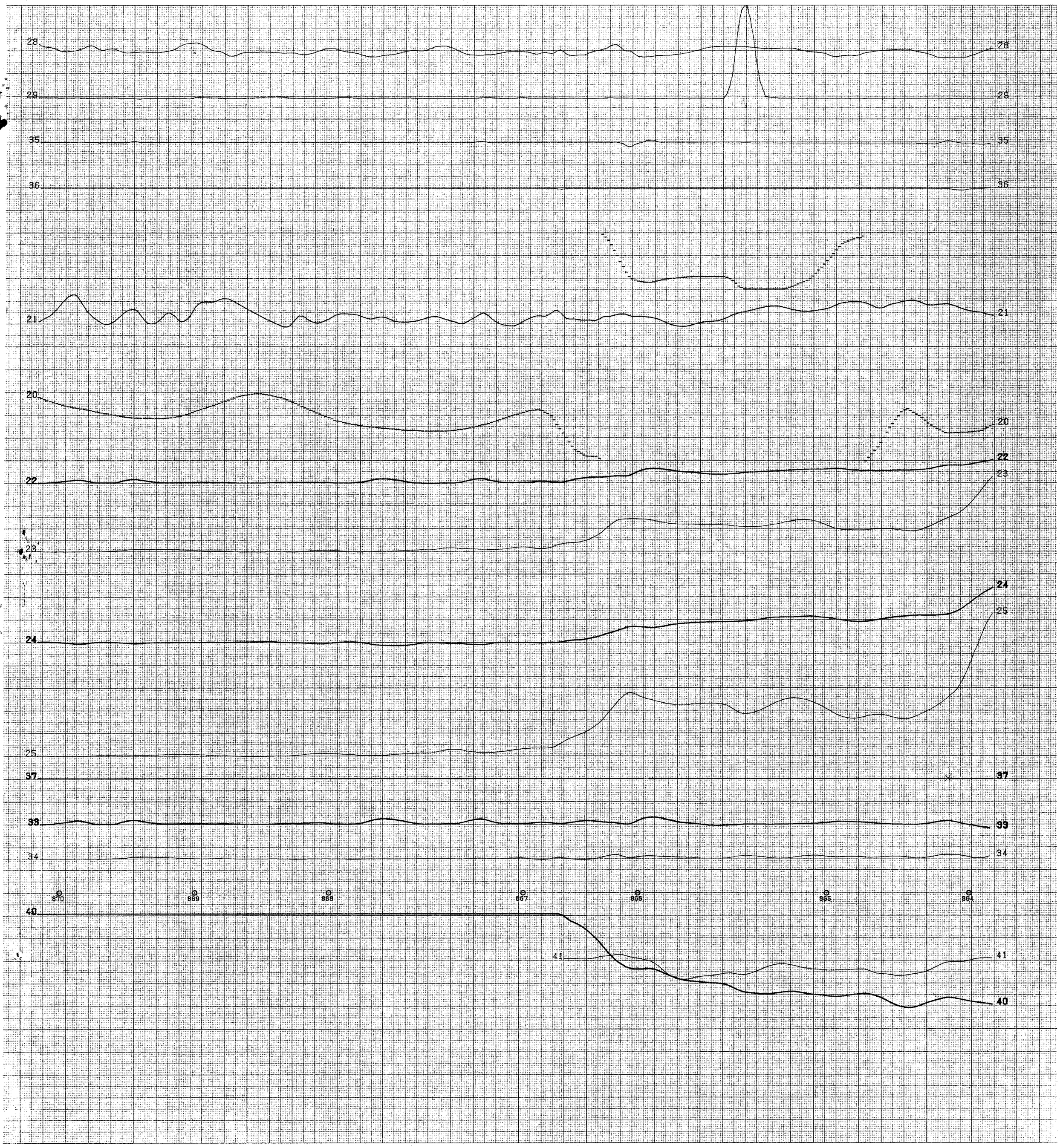
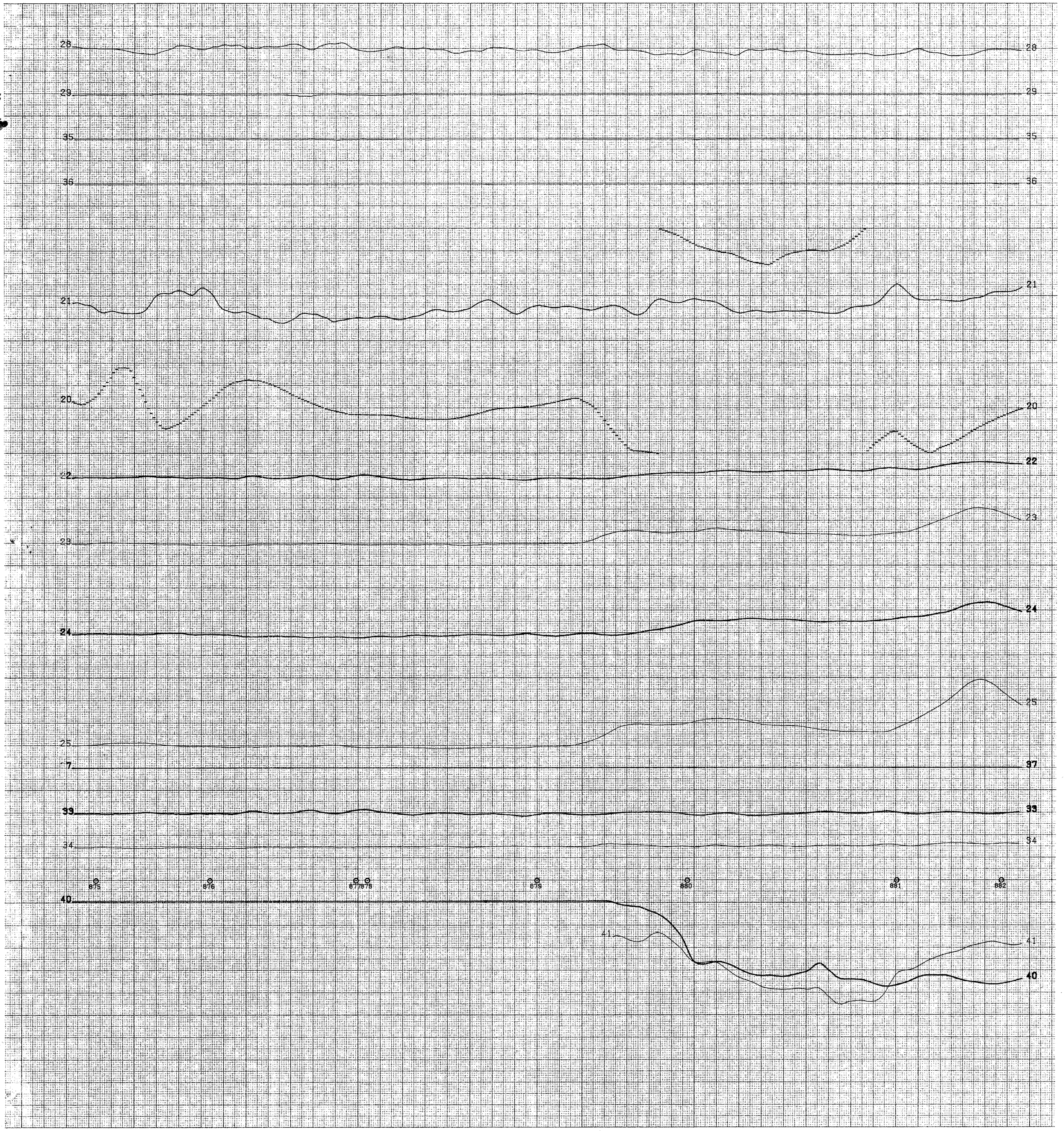


MILLIMETER
KEUFFEL & ESSER CO.
PRINTED IN U.S.A. 751250



LINE 212

LINE 212

MILLIMETER
KEUFFEL & ESSER CO.
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28 29 35 36 21 20 22 23 24 25 37 33 34 40 41

892 891 890 889 888 887 886

LINE -213

LINE -213

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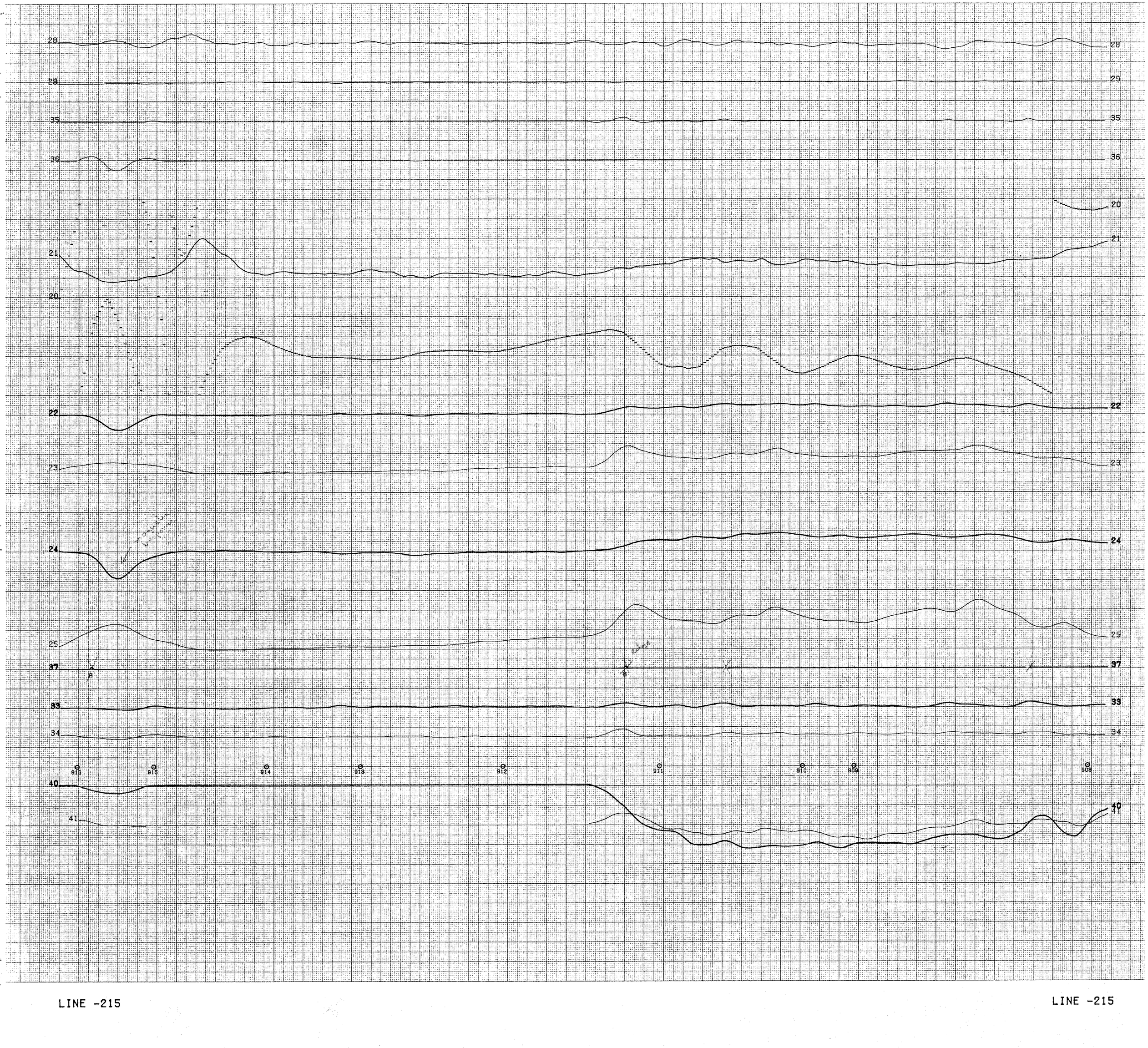
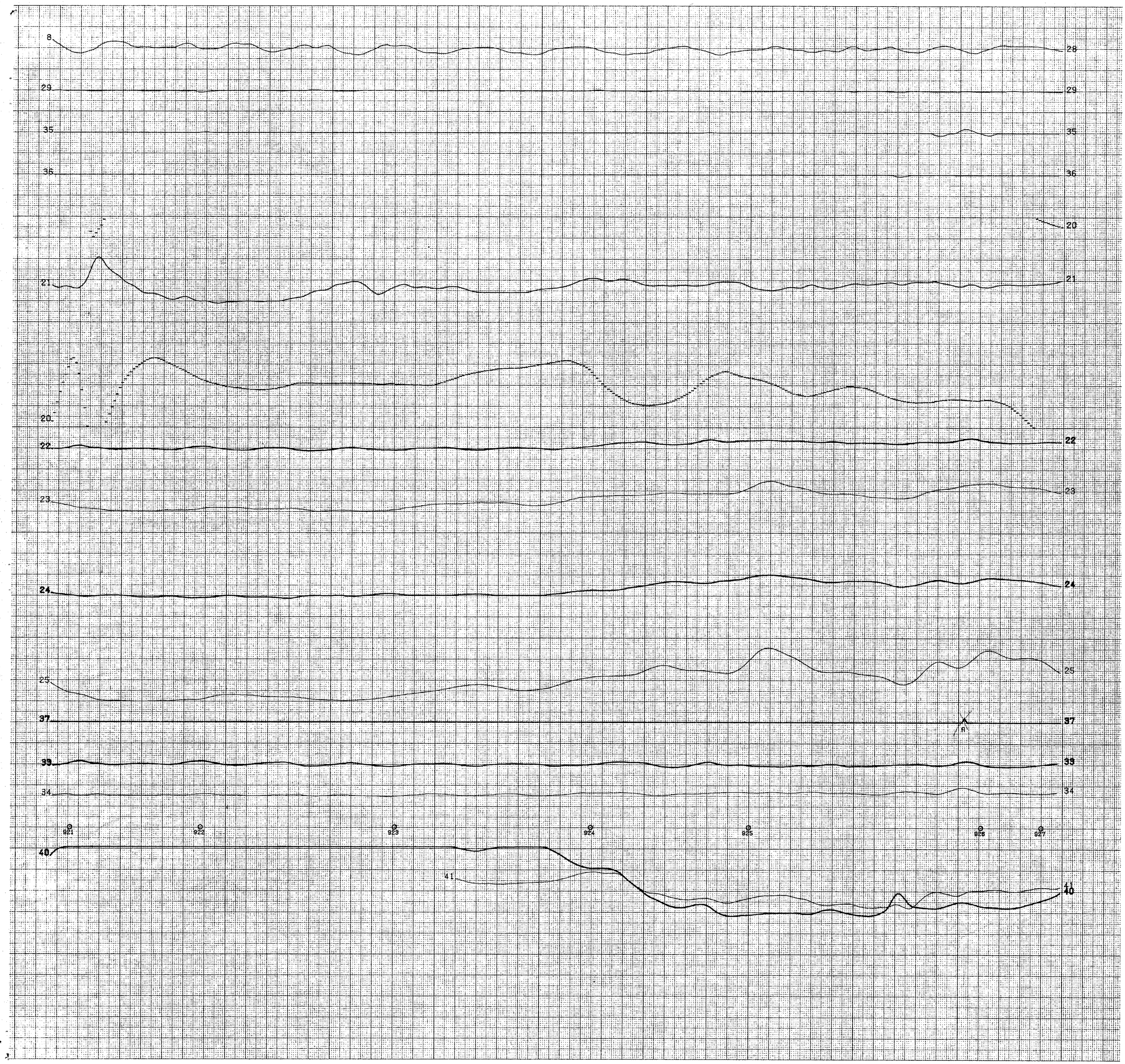
LINE 214

LINE 214



LINE -215

LINE -215



LINE 216

LINE 216

K&E MILLIMETER
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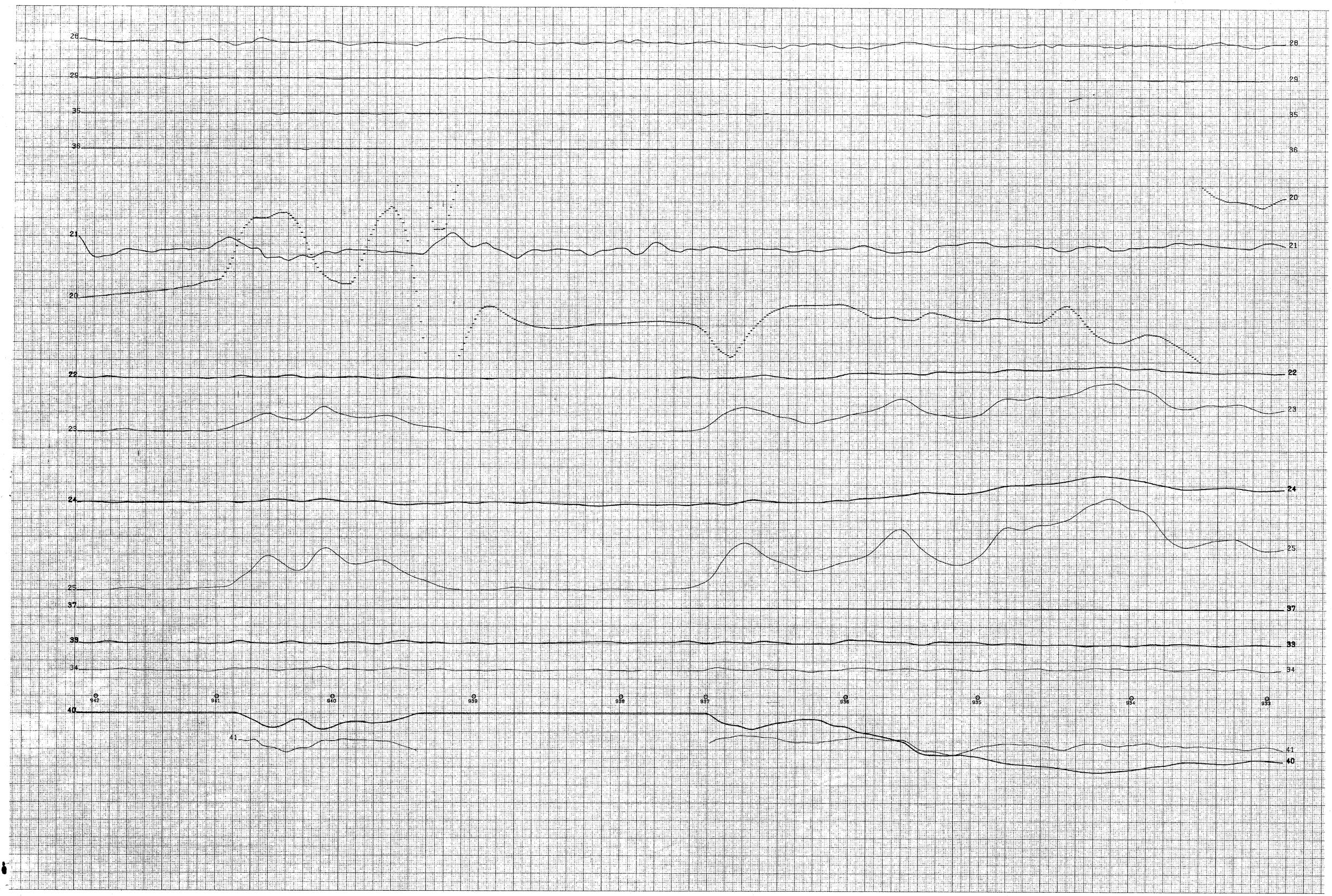
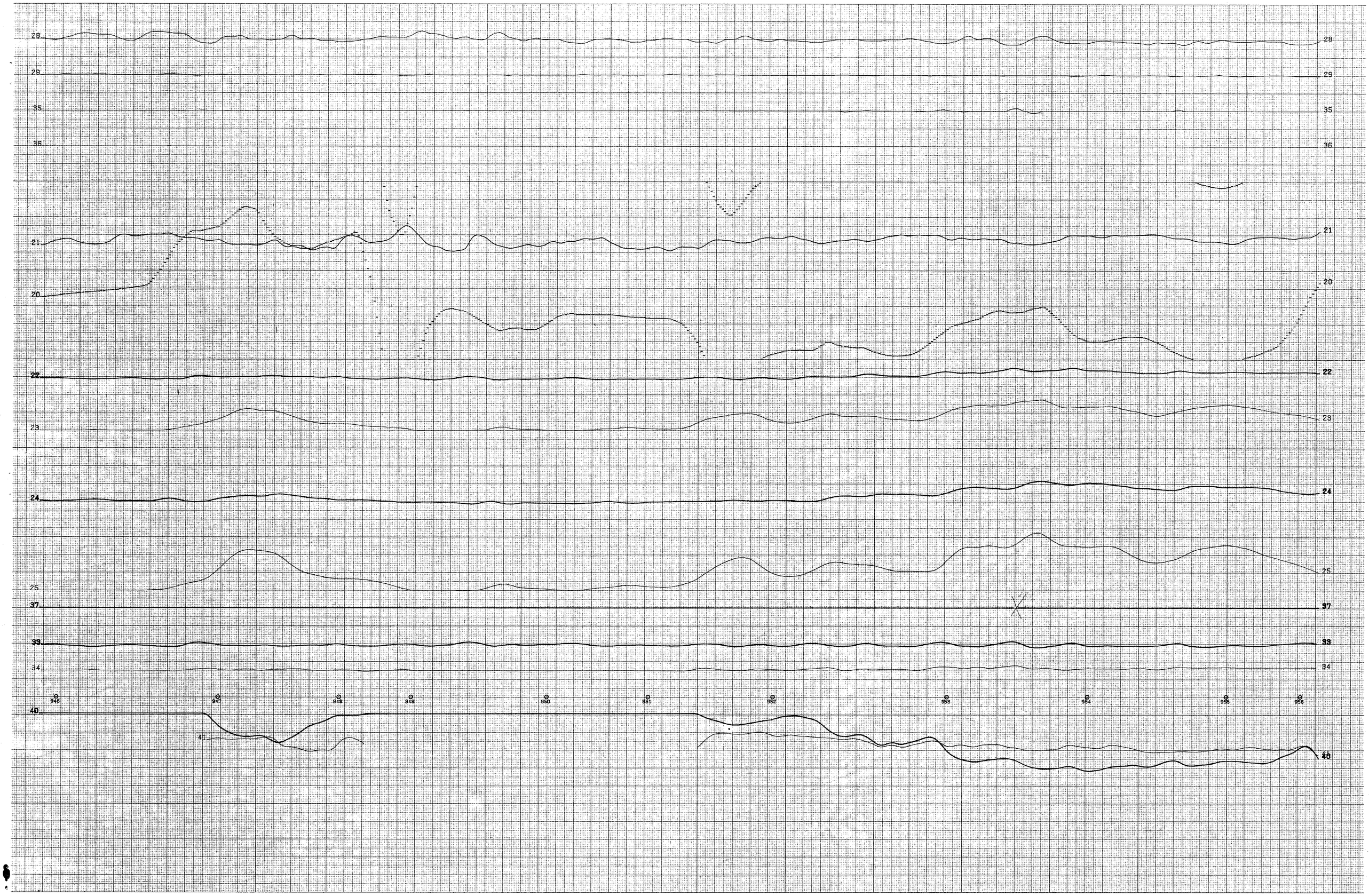


LINE -217

LINE -217

K&E MILLIMETER KEUFFEL & ESSER CO. PRINTED IN U.S.A. 78-1490

K&E MILLIMETER KEUFFEL & ESSER CO. PRINTED IN U.S.A. 78-1490



LINE 218

LINE 218

MILLIMETER
KEUFFEL & ESSER CO.
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37
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41

972 971 970 969 968 967 966 965 964 963 962 961

LINE -219

LINE -219



LINE 220

LINE 220

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm 0
Standard - inphase ch. 22

10 ppm 0
Standard - quadrature ch. 23

10 ppm 0
Whaletail - inphase ch. 24

10 ppm 0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m
0
Apparent depth ch. 41
30m
100 ohm-m
Resistivity ch. 40
10 ohm-m
ohm-m

MILLIMETER
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718290

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718290

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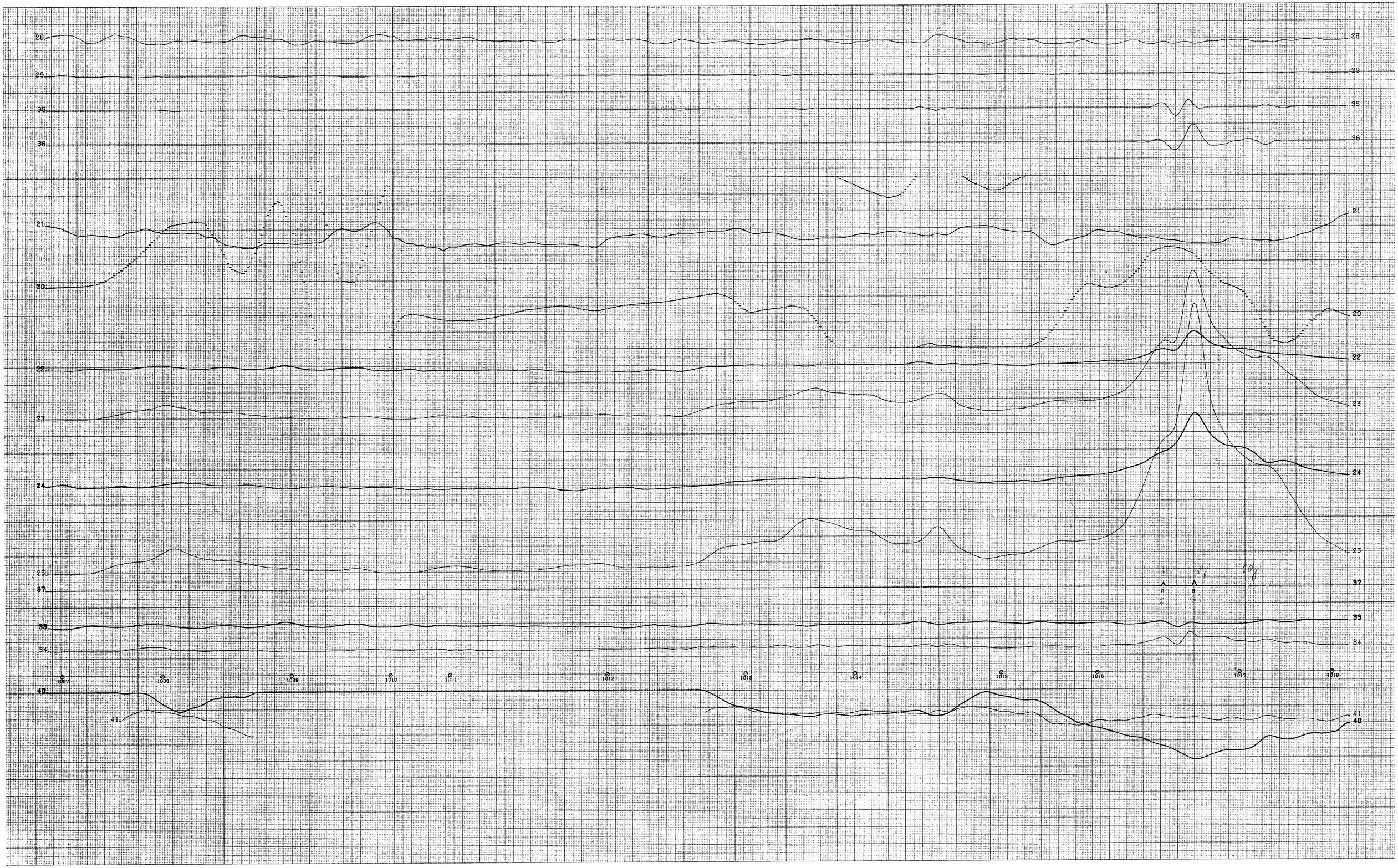
41

1001 1000 999 998 997 996 995 994 993 992 991

LINE -221

LINE -221



LINE 222

LINE 222

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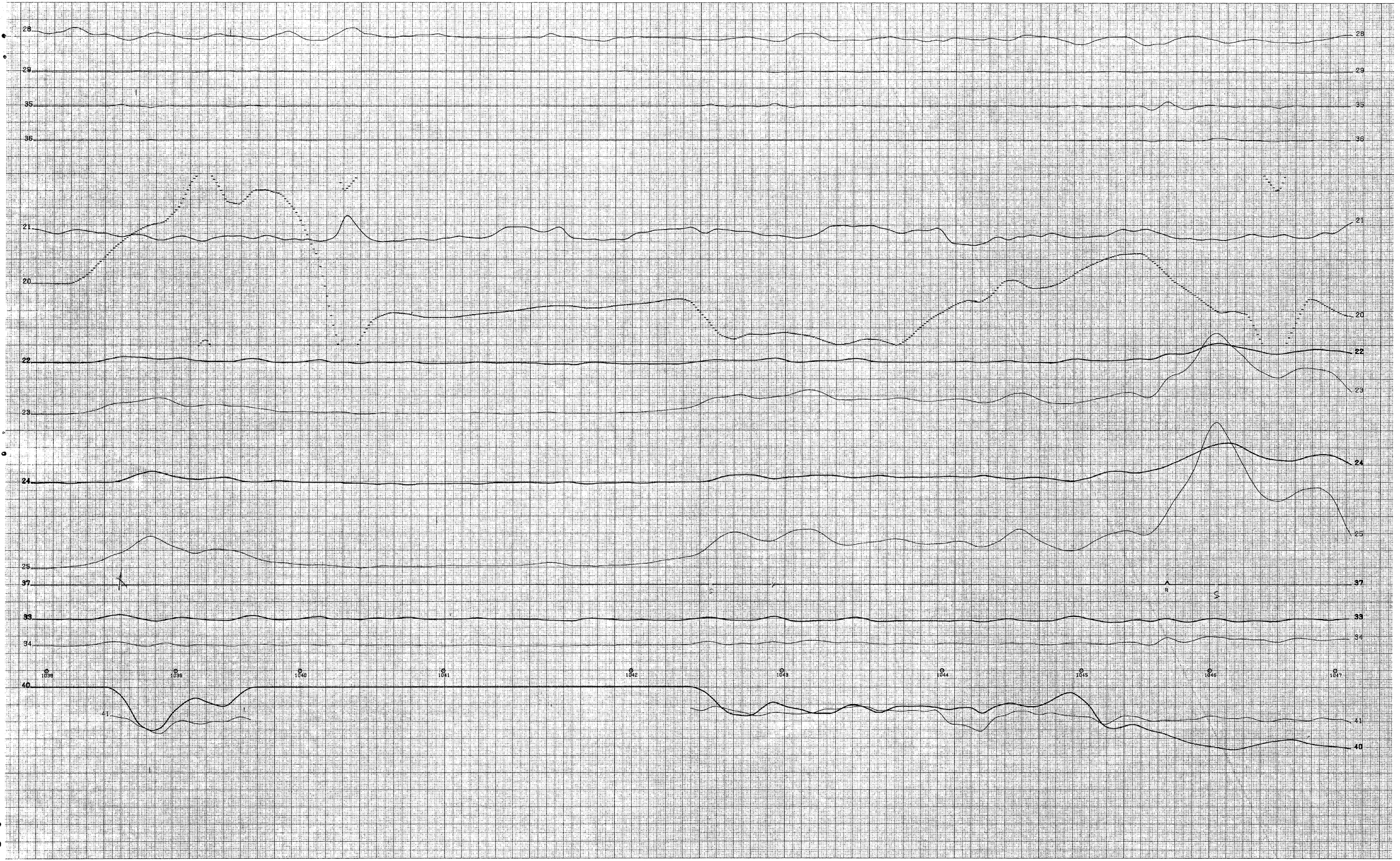
A
B
C
D

1039 1032 1031 1030 1029 1028 1027 1026 1025 1024 1023 1022

LINE -223

LINE -223



LINE 224

LINE 224

MILLIMETER
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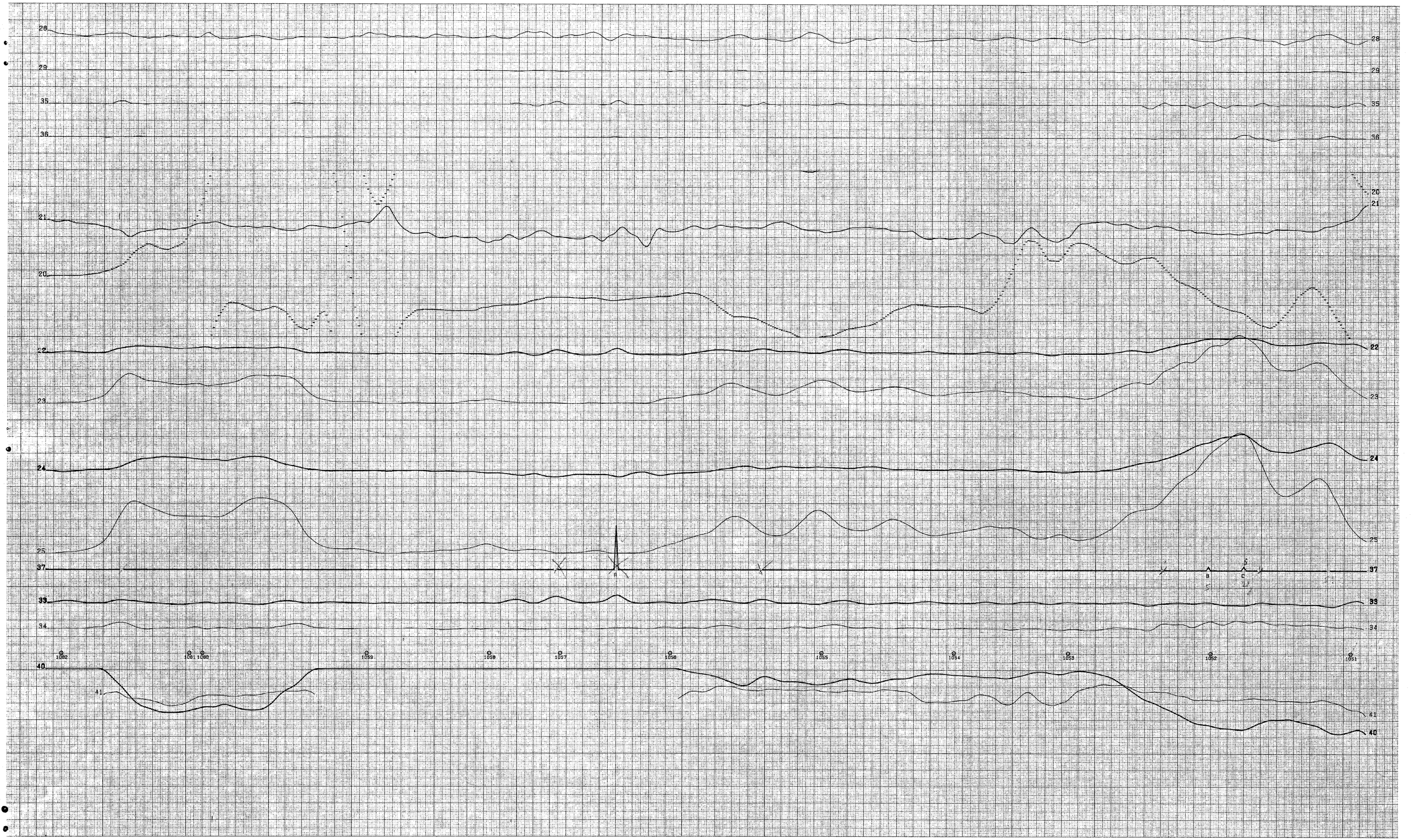

LINE -225

LINE -225

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KEUFFEL & ESSER CO
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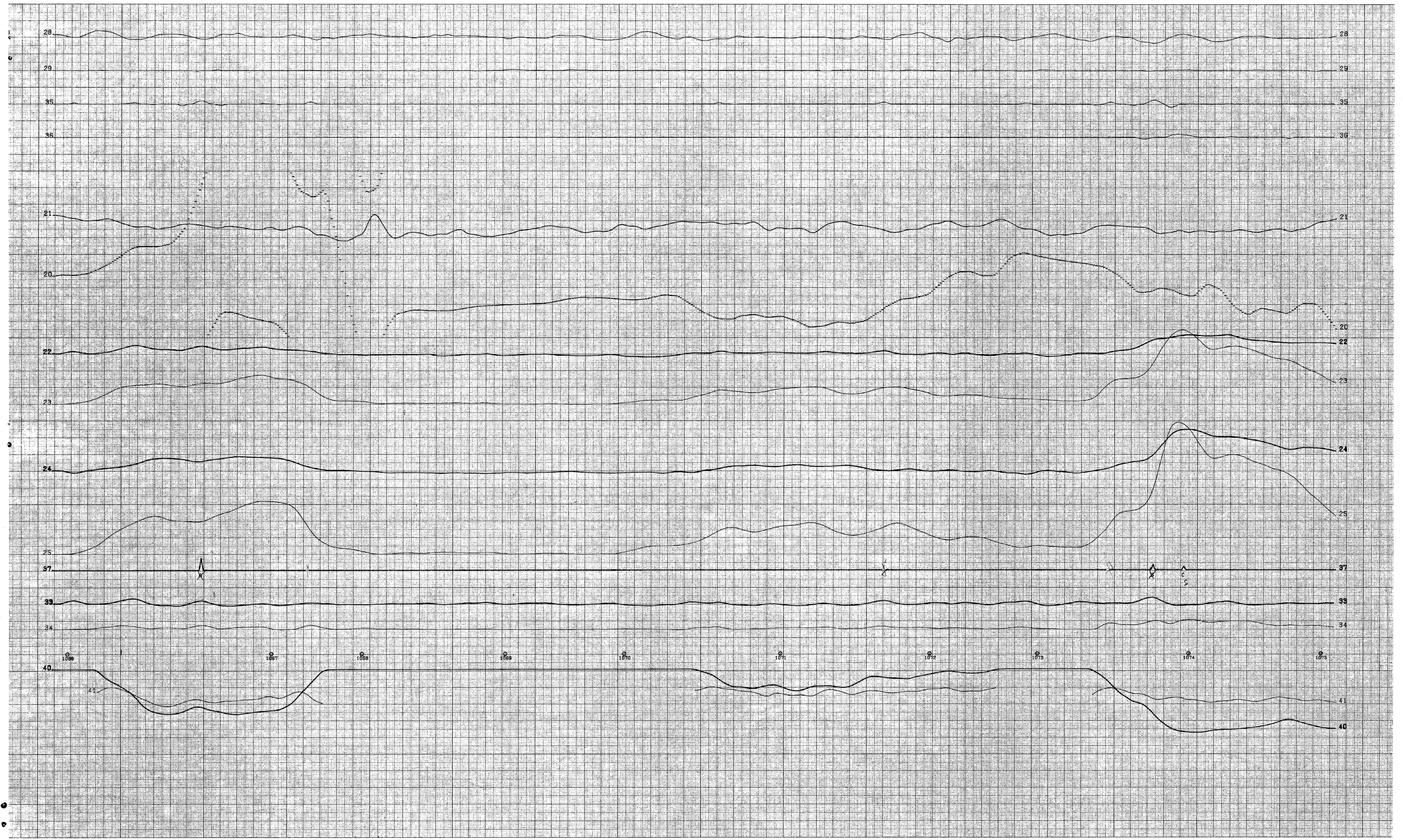

LINE 226

LINE 226

MILLIMETER
KEUFFEL & ESSER CO.
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LINE -227

LINE -227

MILLIMETER
KEUFFEL & ESSER CO
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K&E 78180

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1100
1101
1102
1103
1104
1105
1106
1107
1108
1109
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LINE 228

LINE 228

MILLIMETER
KEUFFEL & ESSER CO.
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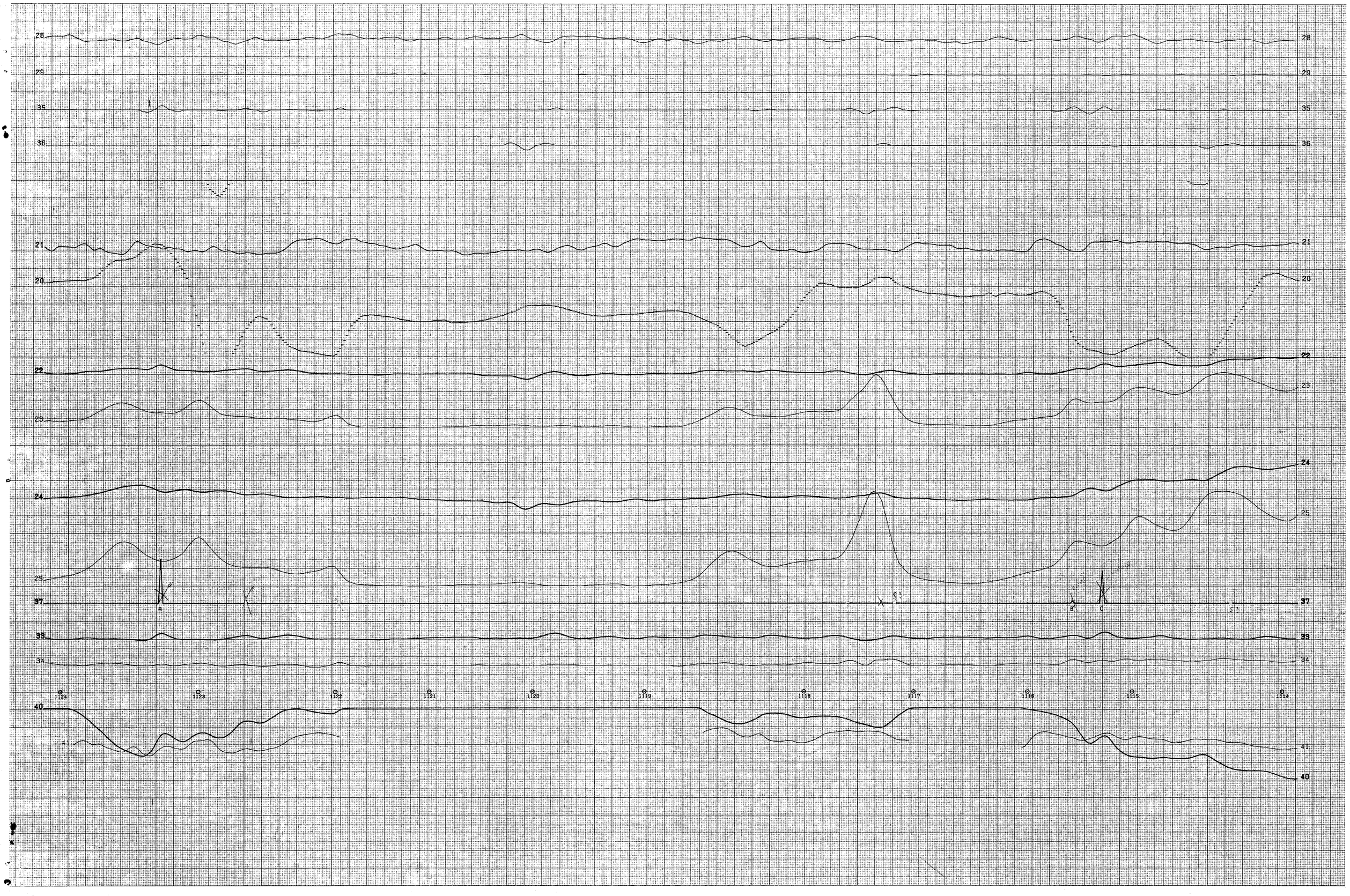

LINE -229

LINE -229

K&E MILLIMETER KEUFFEL & ESSER CO PRINTED IN U.S.A. 78150

K&E MILLIMETER KEUFFEL & ESSER CO PRINTED IN U.S.A. 78150

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1130 1131 1132 1133 1134 1135 1136 1137 1138

NE 230

LINE 230

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm
0
Standard - inphase ch. 22

10 ppm
0
Standard - quadrature ch. 23

10 ppm
0
Whaletail - inphase ch. 24

10 ppm
0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m
0
Apparent depth ch. 41
30m
100 ohm-m
Resistivity ch. 40
10 ohm-m
ohm-m

MILLIMETER
KEUFFEL & ESSER CO
PRINTED IN U.S.A.

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20
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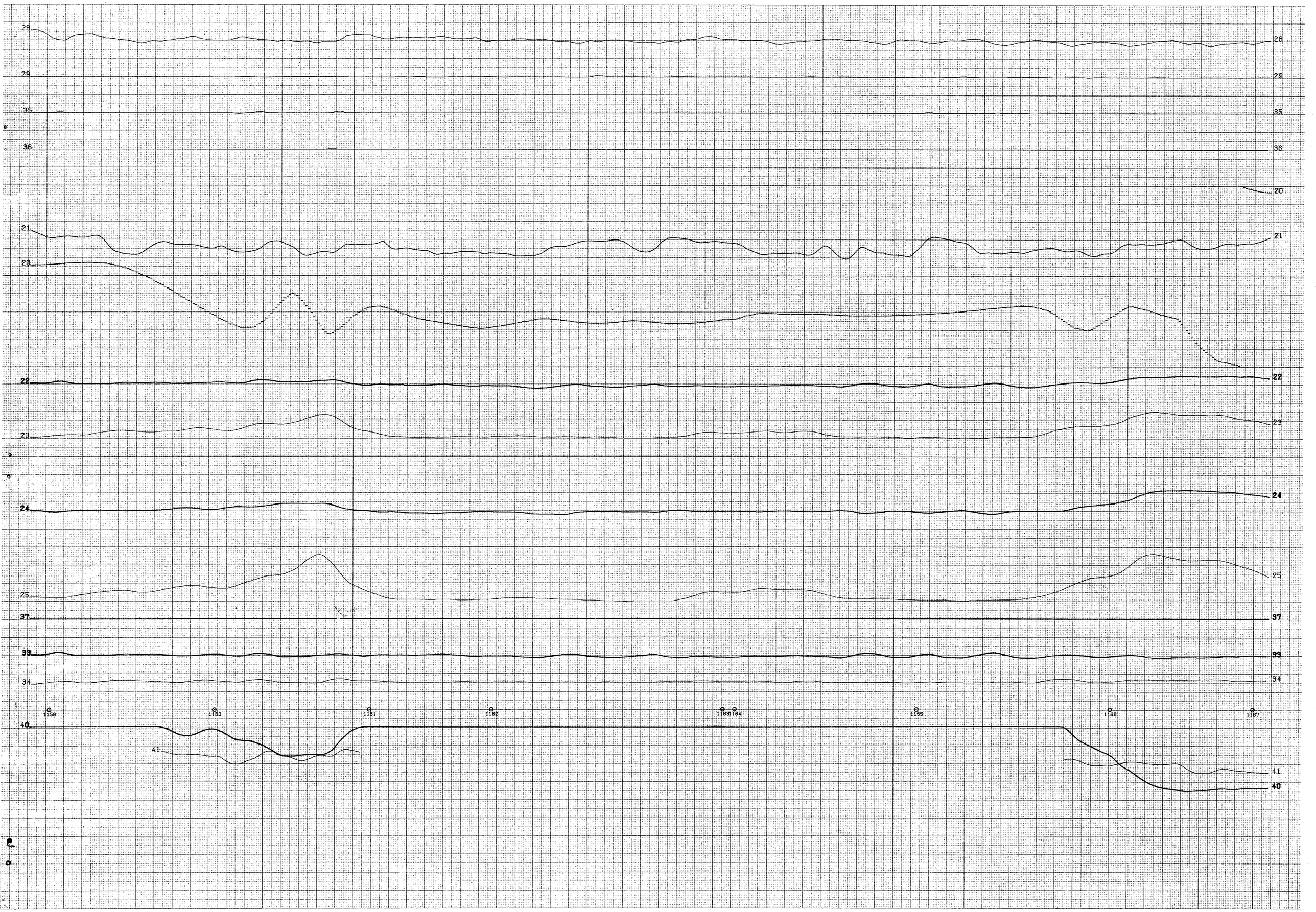
41

1155 1154 1153 1152 1151 1150 1149 1148 1147 1146 1145

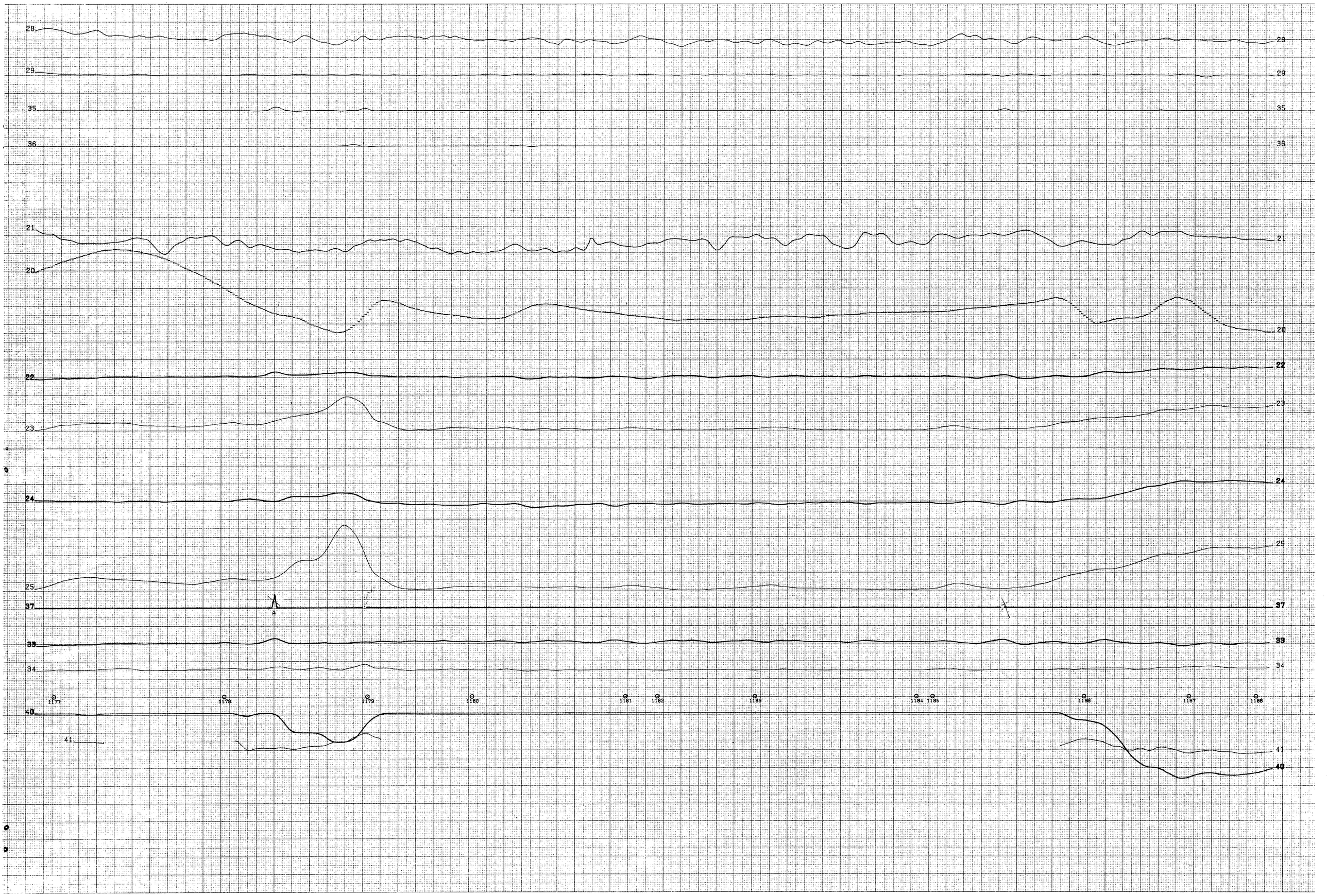
LINE -231

LINE -231

KEUFFEL & ESSER CO
MILLIMETER
PRINTED IN U.S.A.



LINE 232



LINE 233

LINE 233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1205
1204
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1202
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1198
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1194
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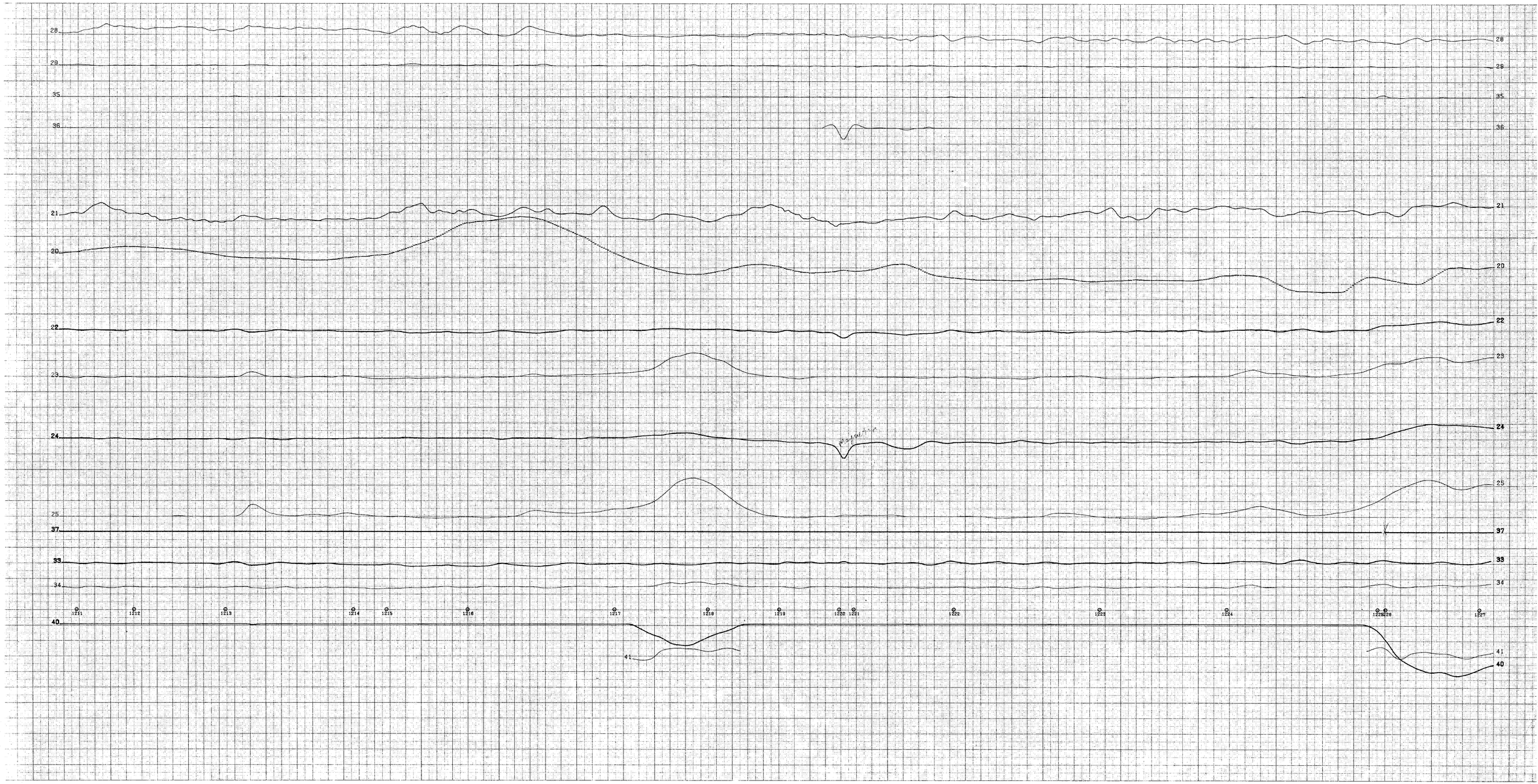
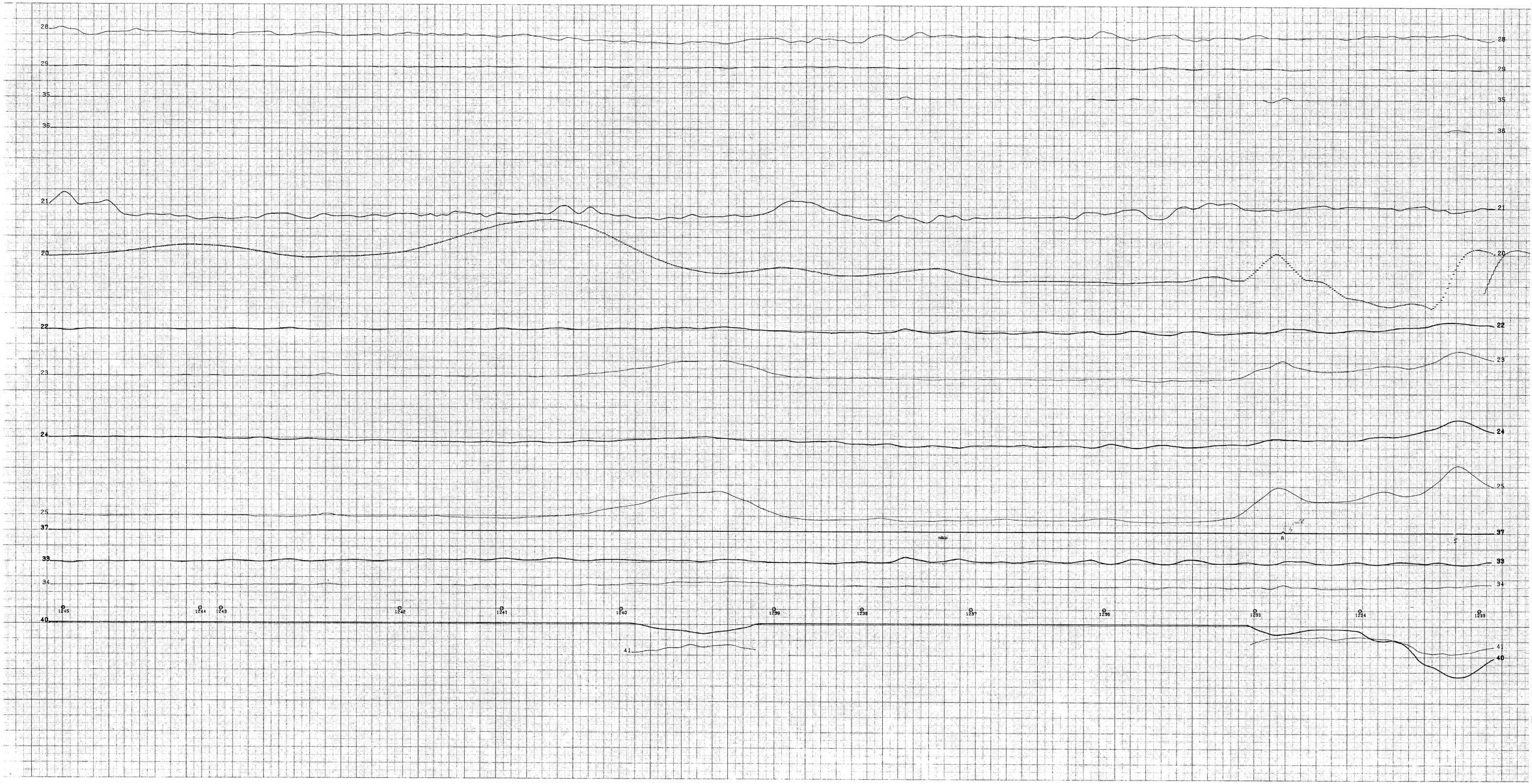
LINE -234
LINE -234



LINE 235

LINE 235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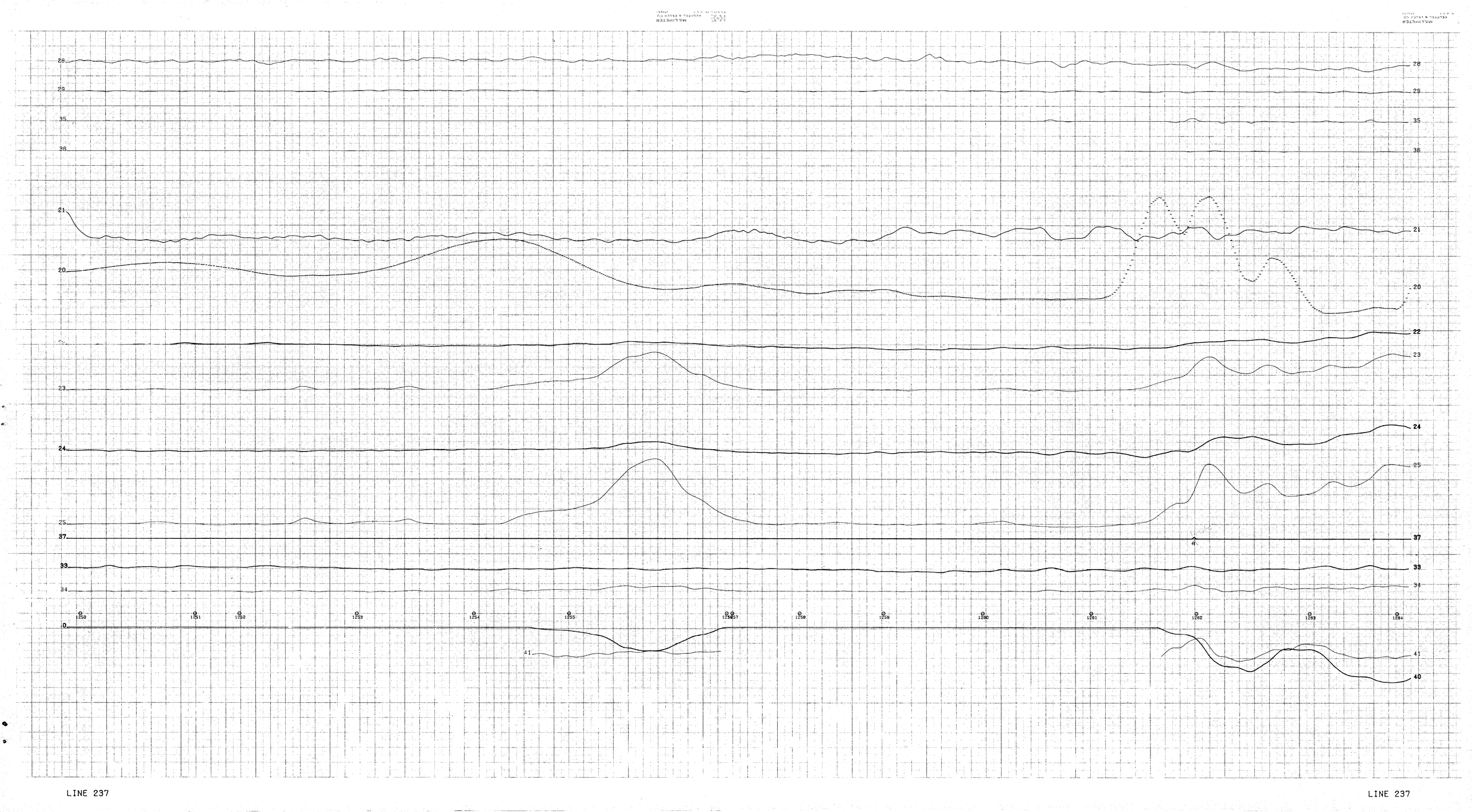
1234
1233
LINE -236
LINE -236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1264
LINE 237
LINE 237

MILLIMETER
KEUFFEL & ESSER CO
MADE IN U.S.A.

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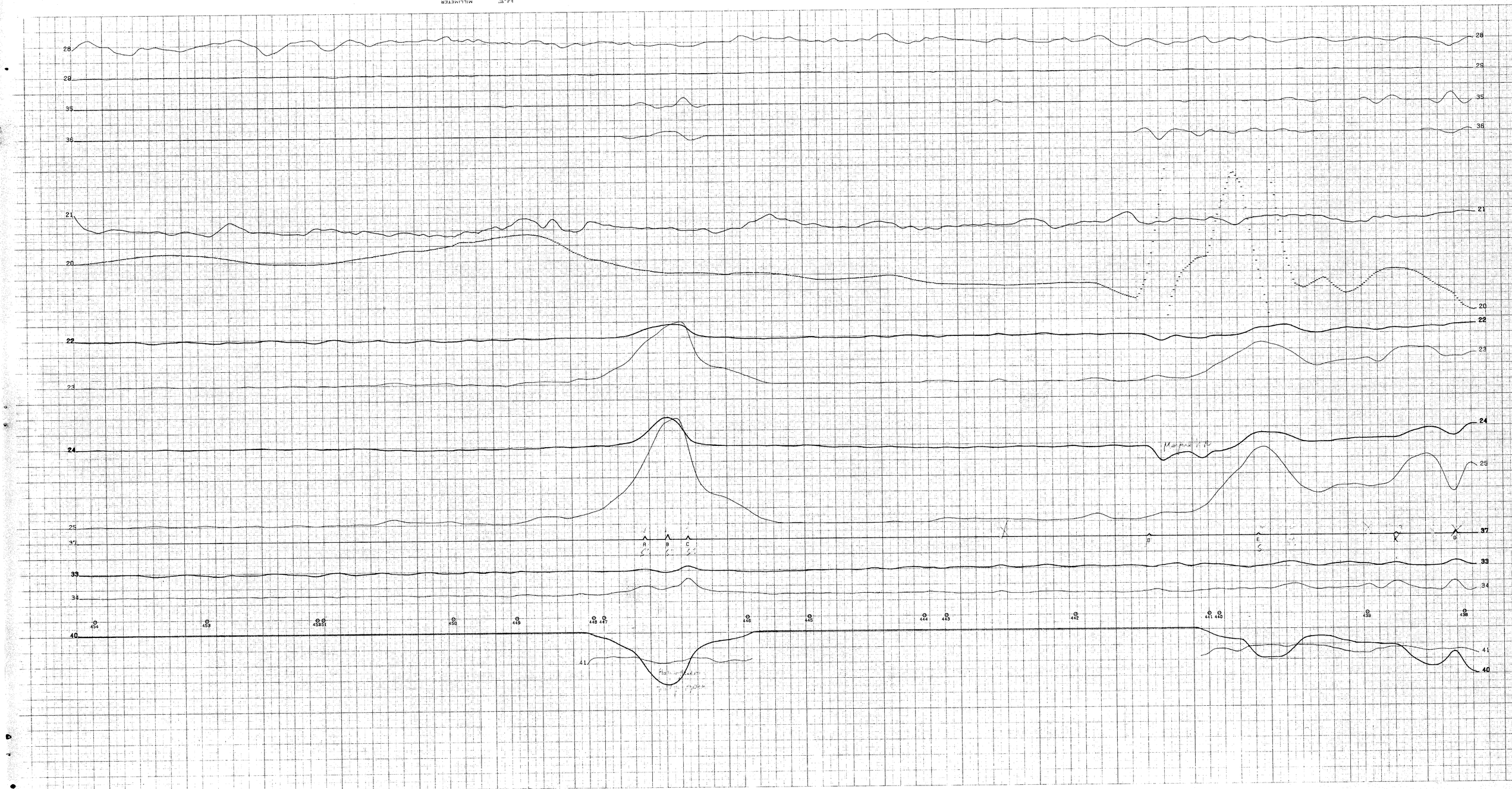
418 419 420 421 422 423 424 425 426 427 428 429 430 431 432

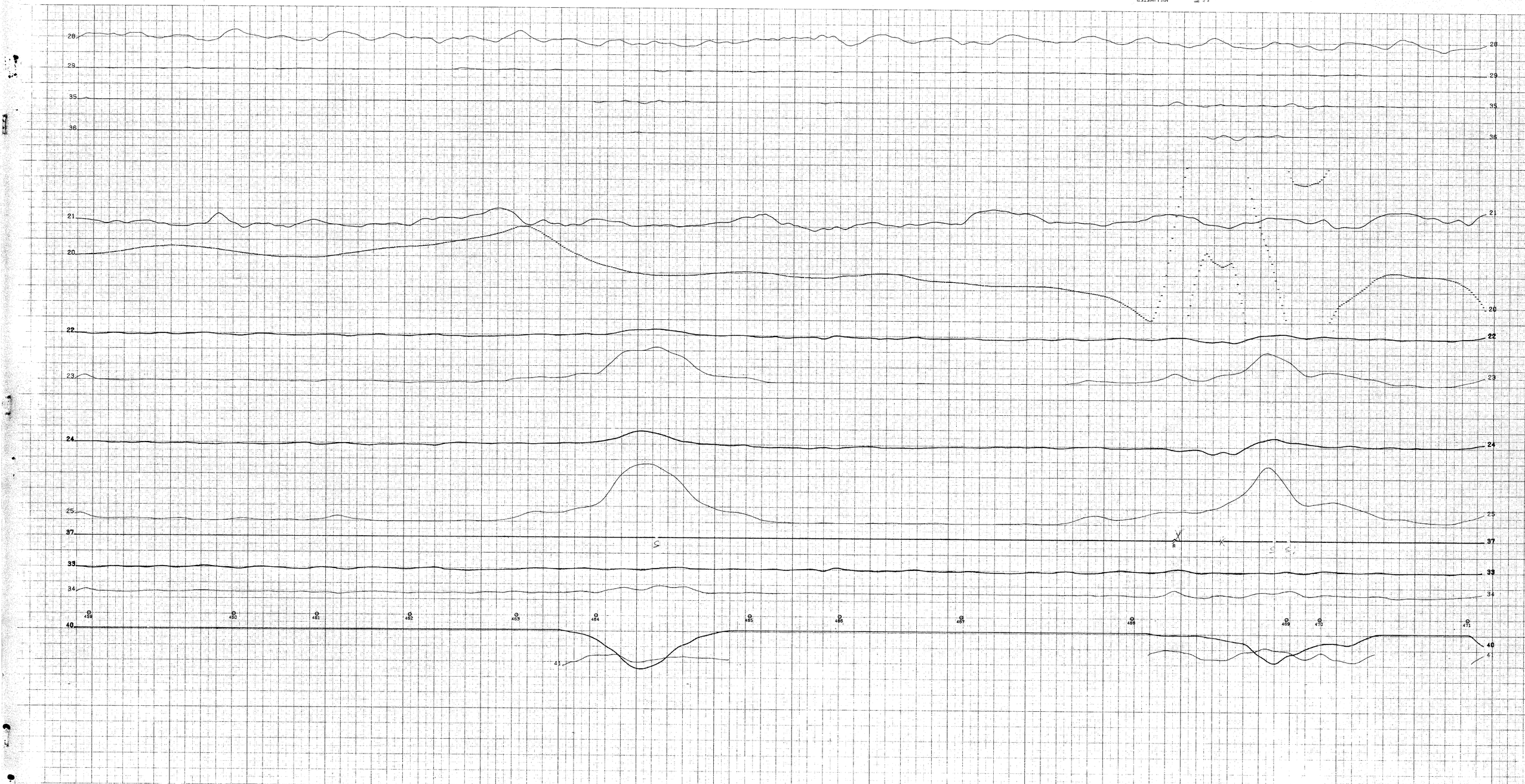
LINE 238

LINE 238



LINE -239

LINE -239



LINE 240

LINE 240

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm
0
Standard - inphase ch. 22

10 ppm
0
Standard - quadrature ch. 23

10 ppm
0
Whaletail - inphase ch. 24

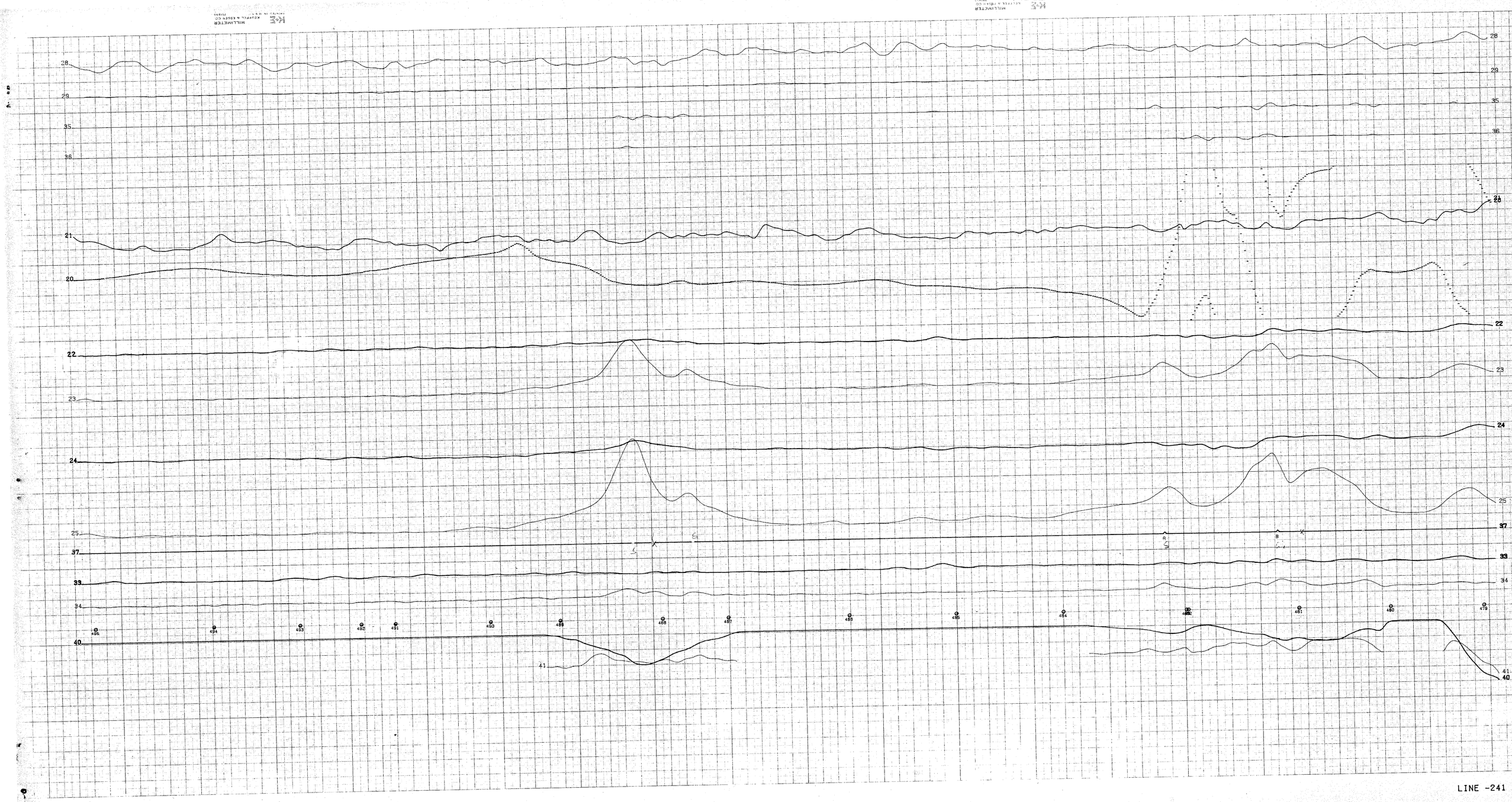
10 ppm
0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

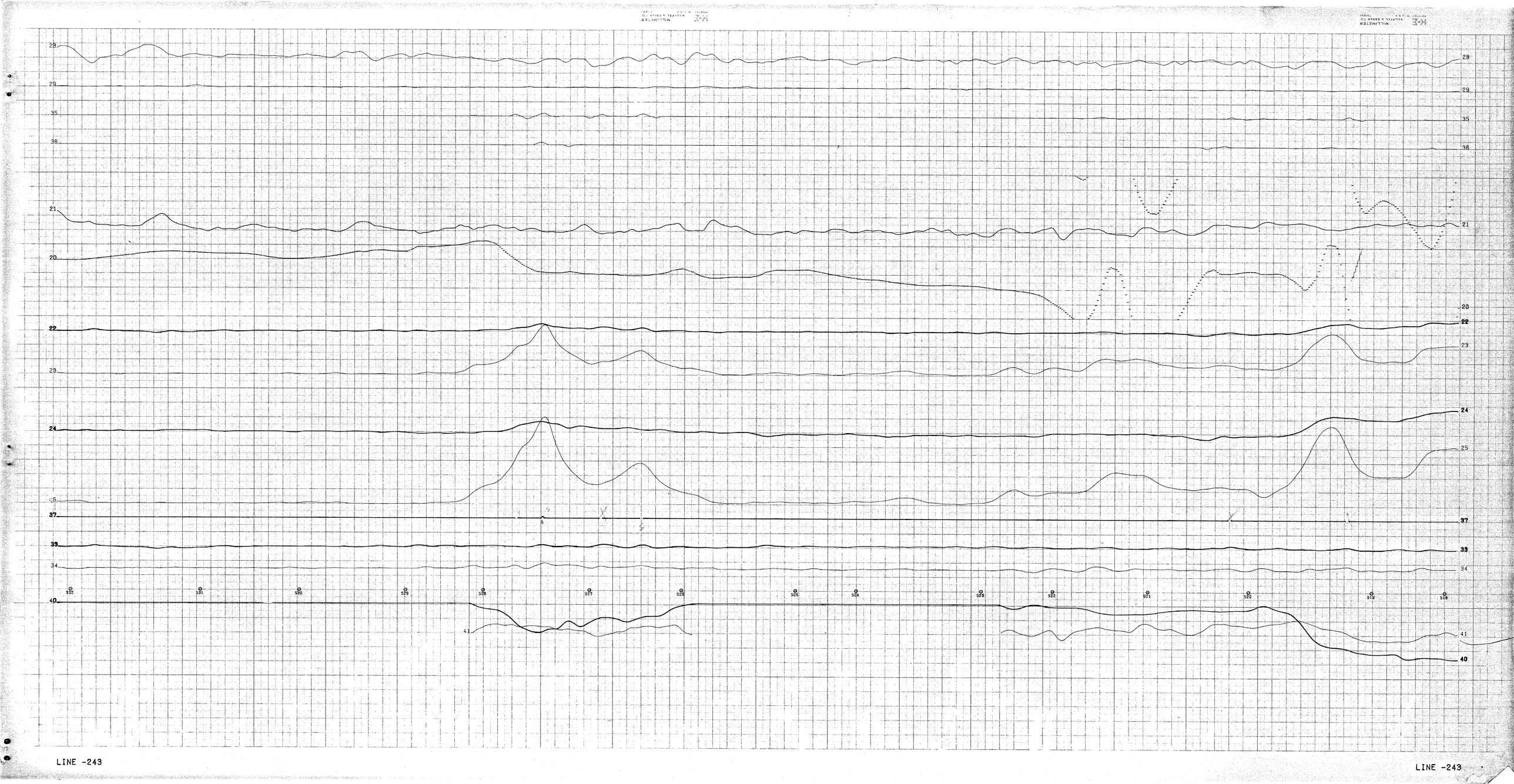
1000 ohm-m
0
Apparent depth ch. 41
30m
100 ohm-m
Resistivity ch. 40
10 ohm-m
ohm-m


LINE -241
LINE -241



LINE 242

LINE 242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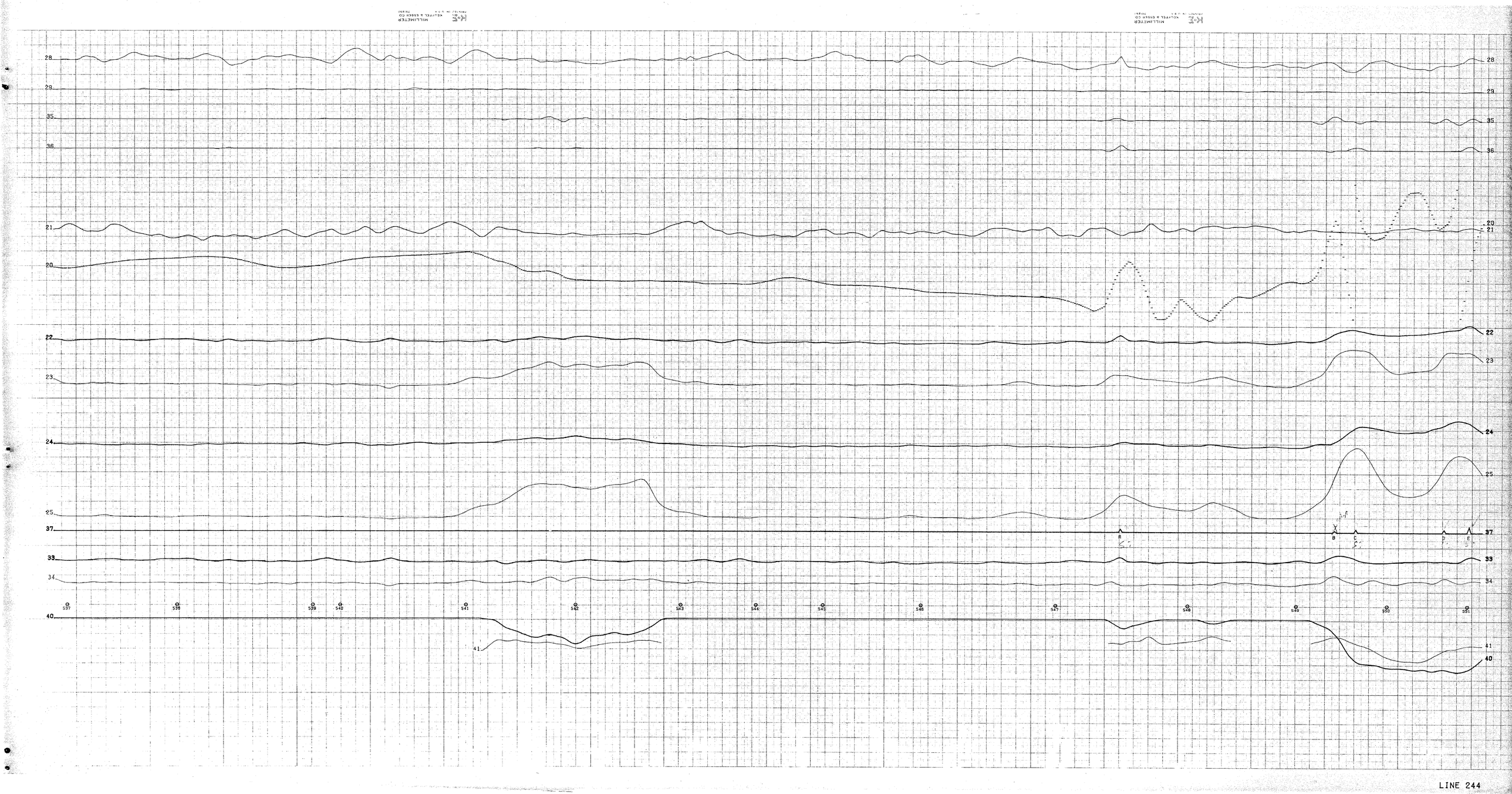
518
LINE -243
LINE -243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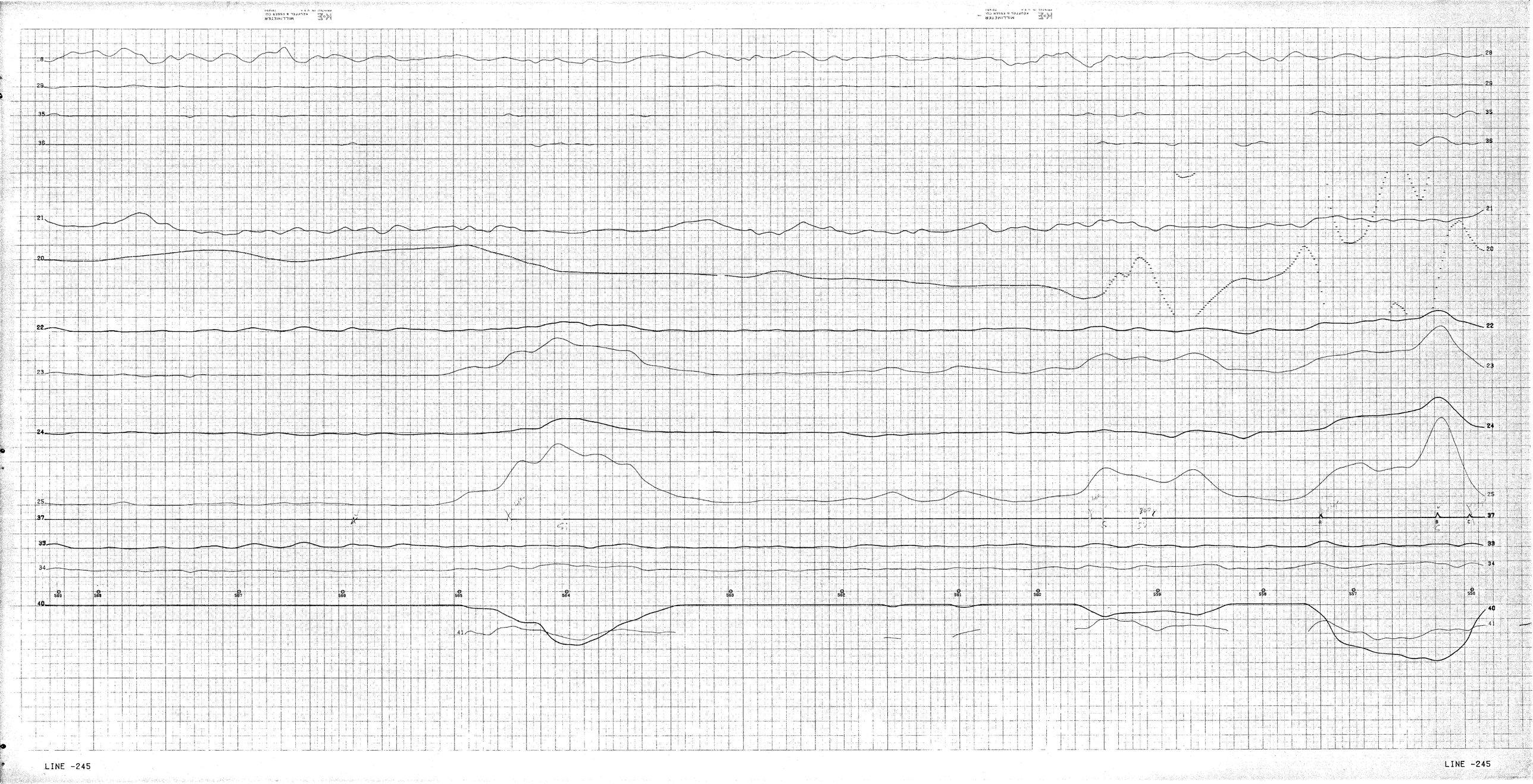
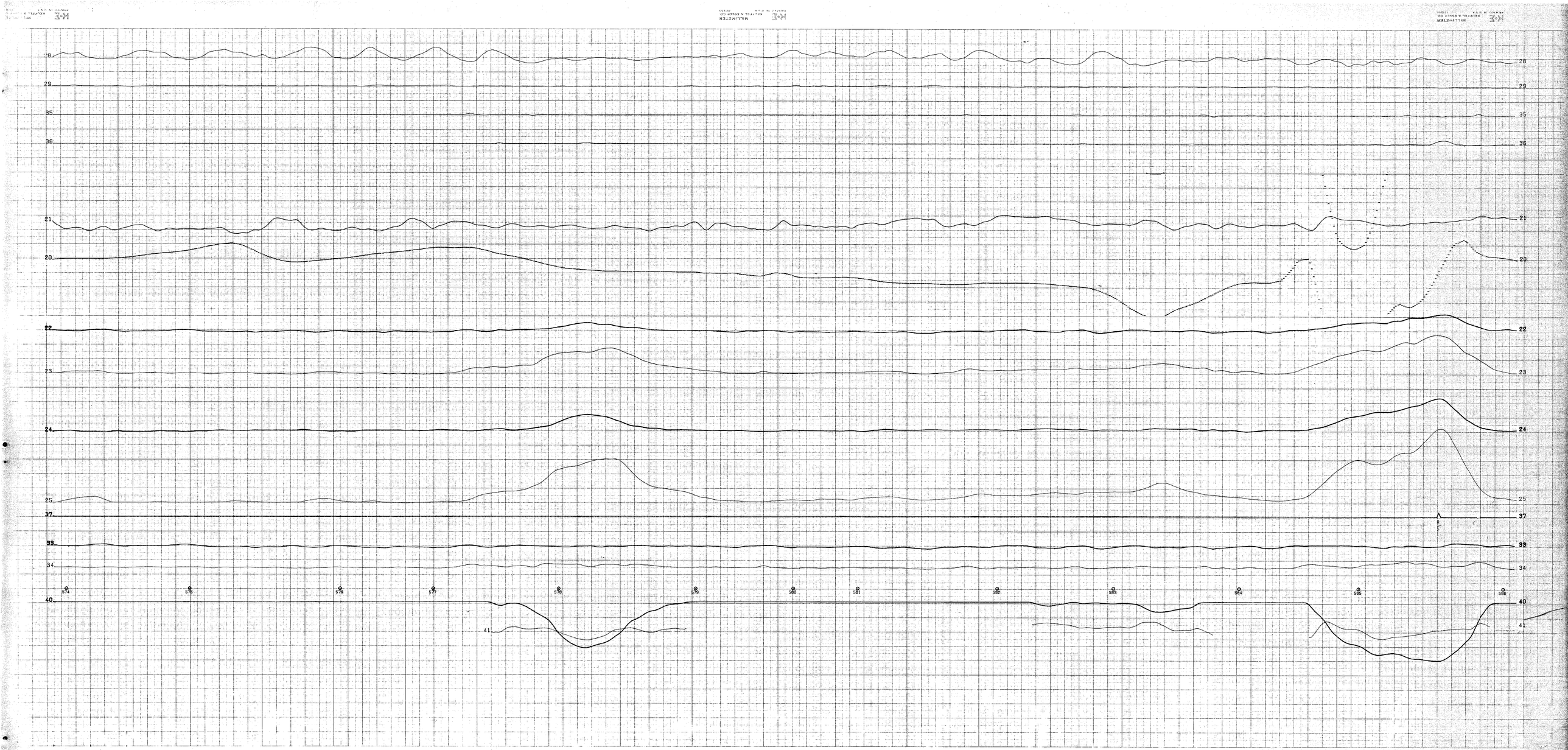
D
E

LINE 244



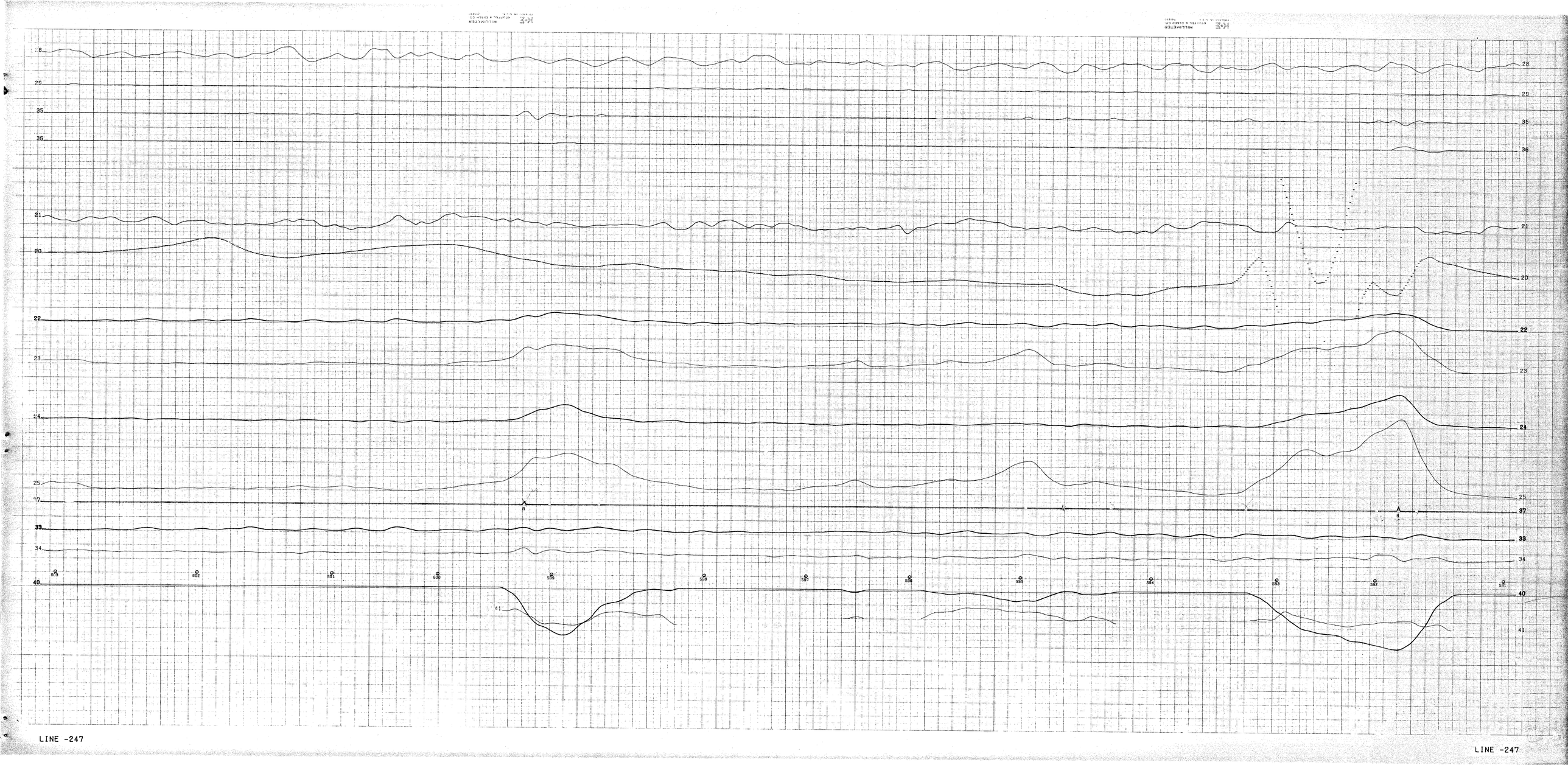
LINE -245

LINE -245



LINE 246

LINE 246



LINE -247

LINE -247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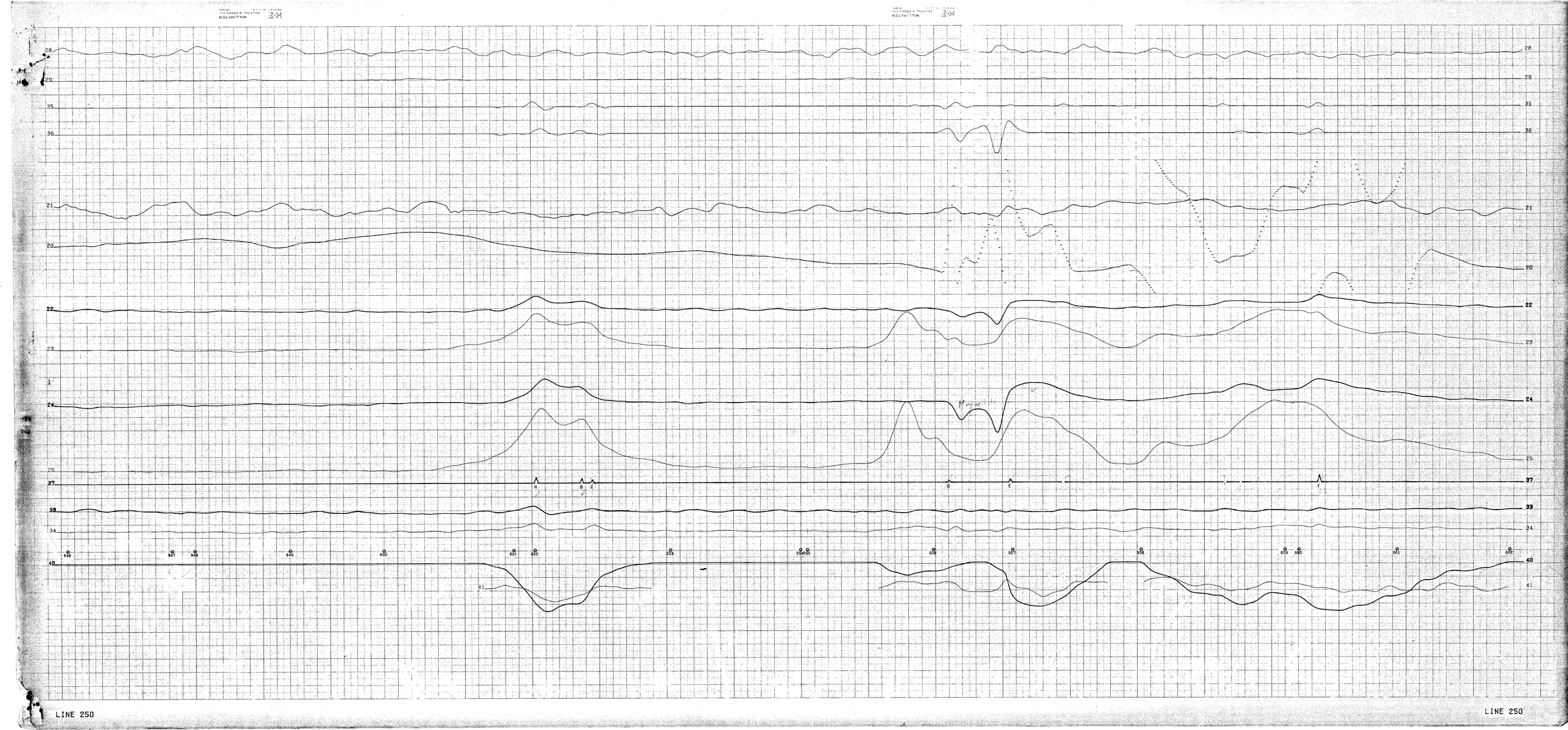
617
618
619
LINE 248
LINE 248



LINE -249

LINE -249



LINE 250

LINE 250

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch. 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm 0
Standard - inphase ch. 22

10 ppm 0
Standard - quadrature ch. 23

10 ppm 0
Whaletail - inphase ch. 24

10 ppm 0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m

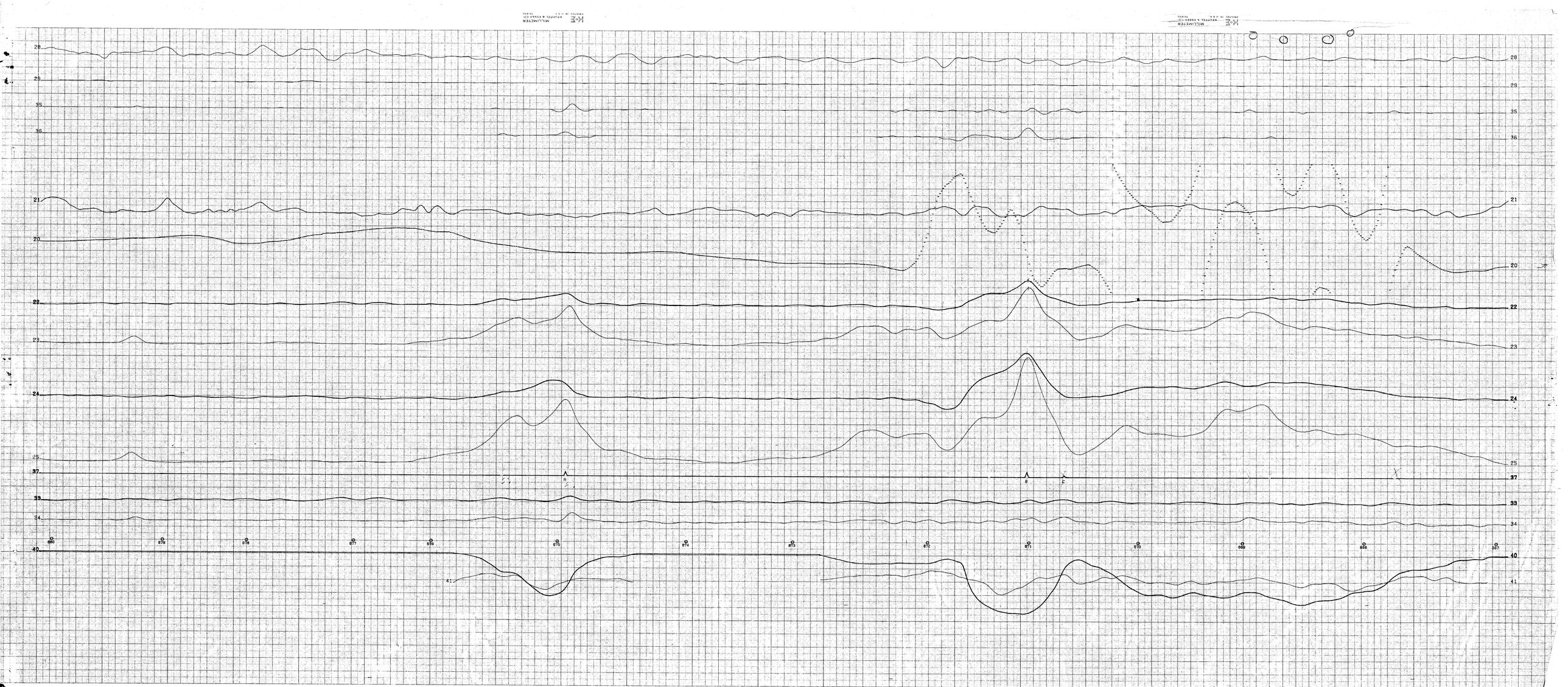
0
30m
Apparent depth ch. 41

100 ohm-m

Resistivity ch. 40

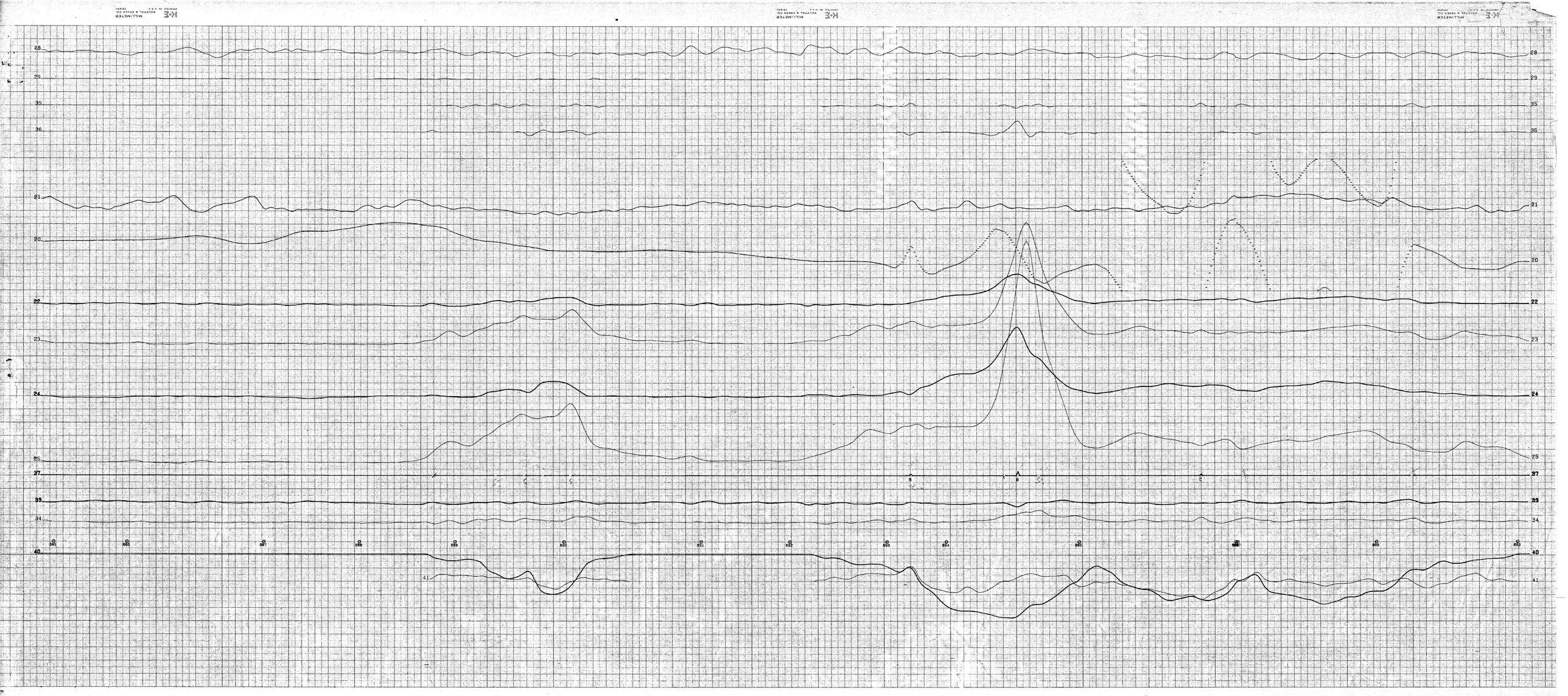
10 ohm-m

ohm-m



LINE -251

LINE -251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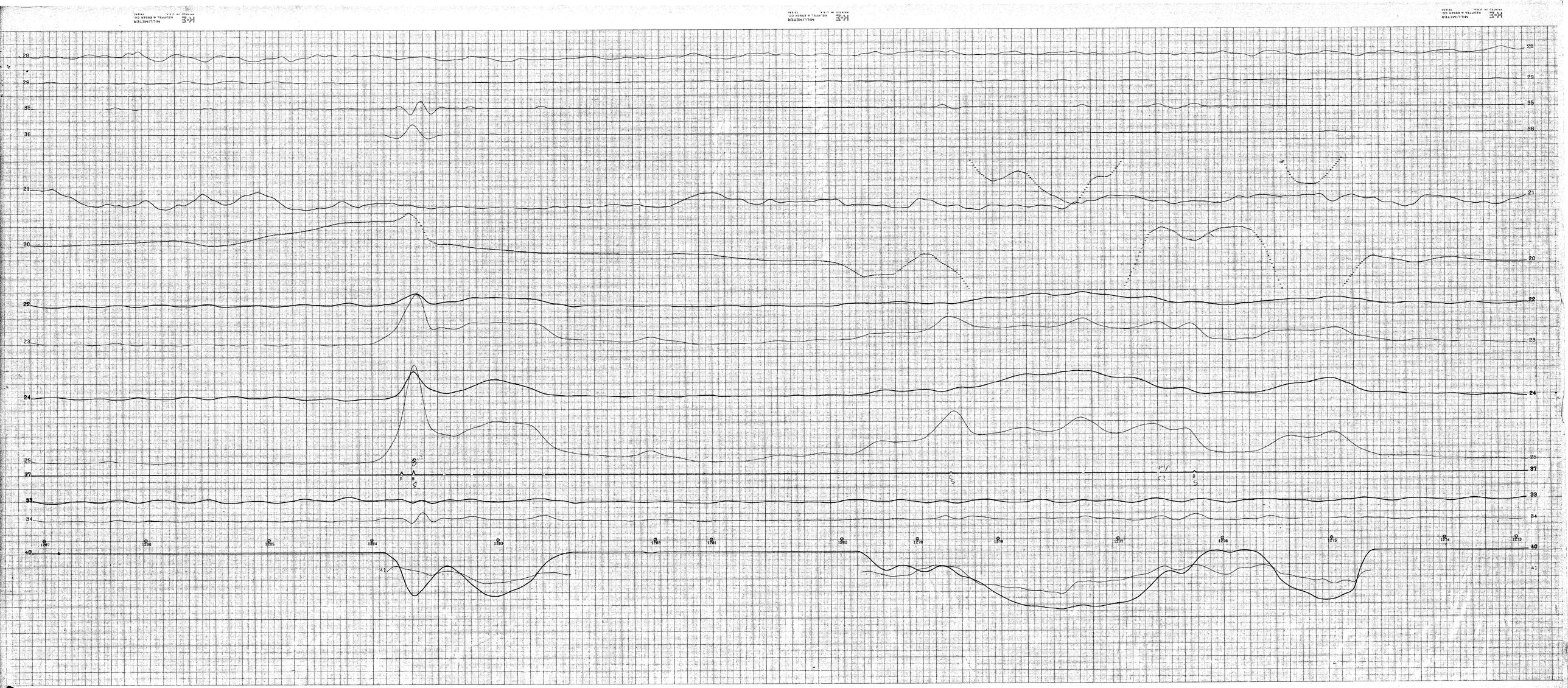

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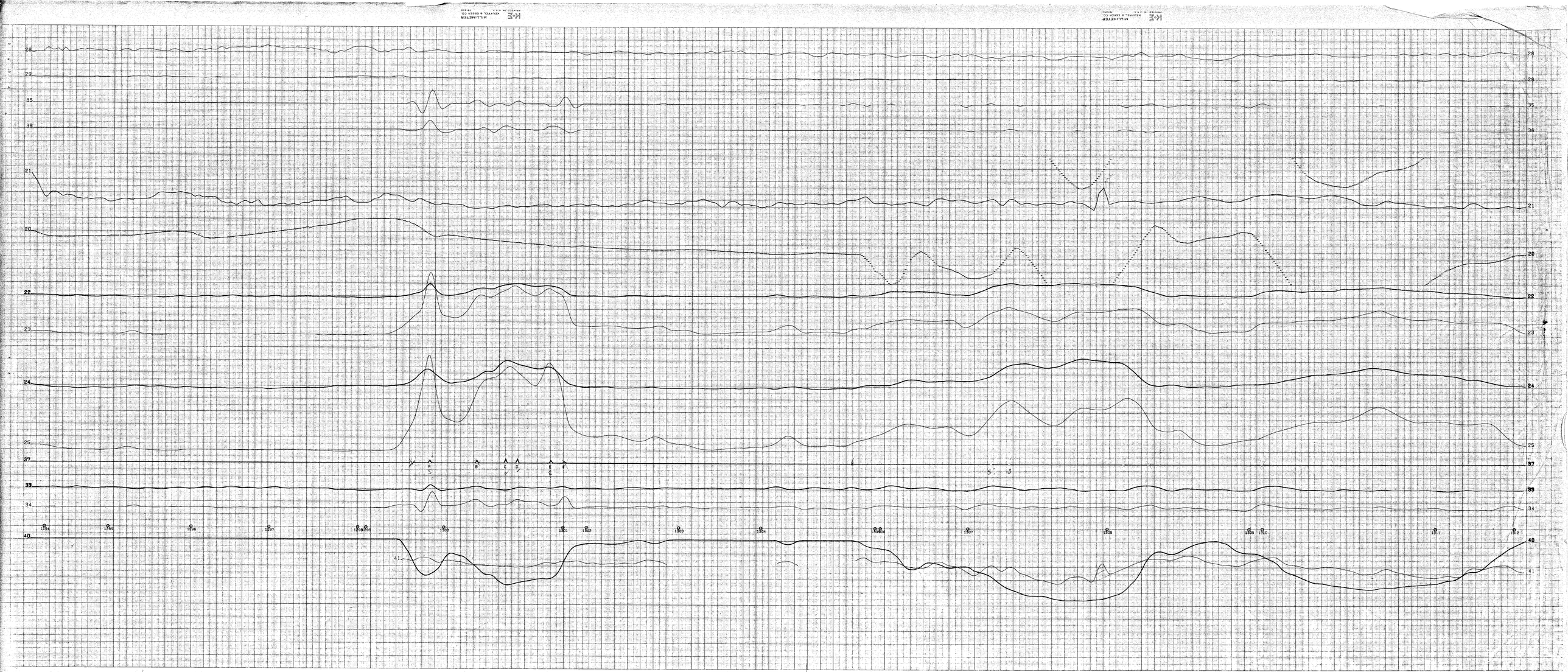

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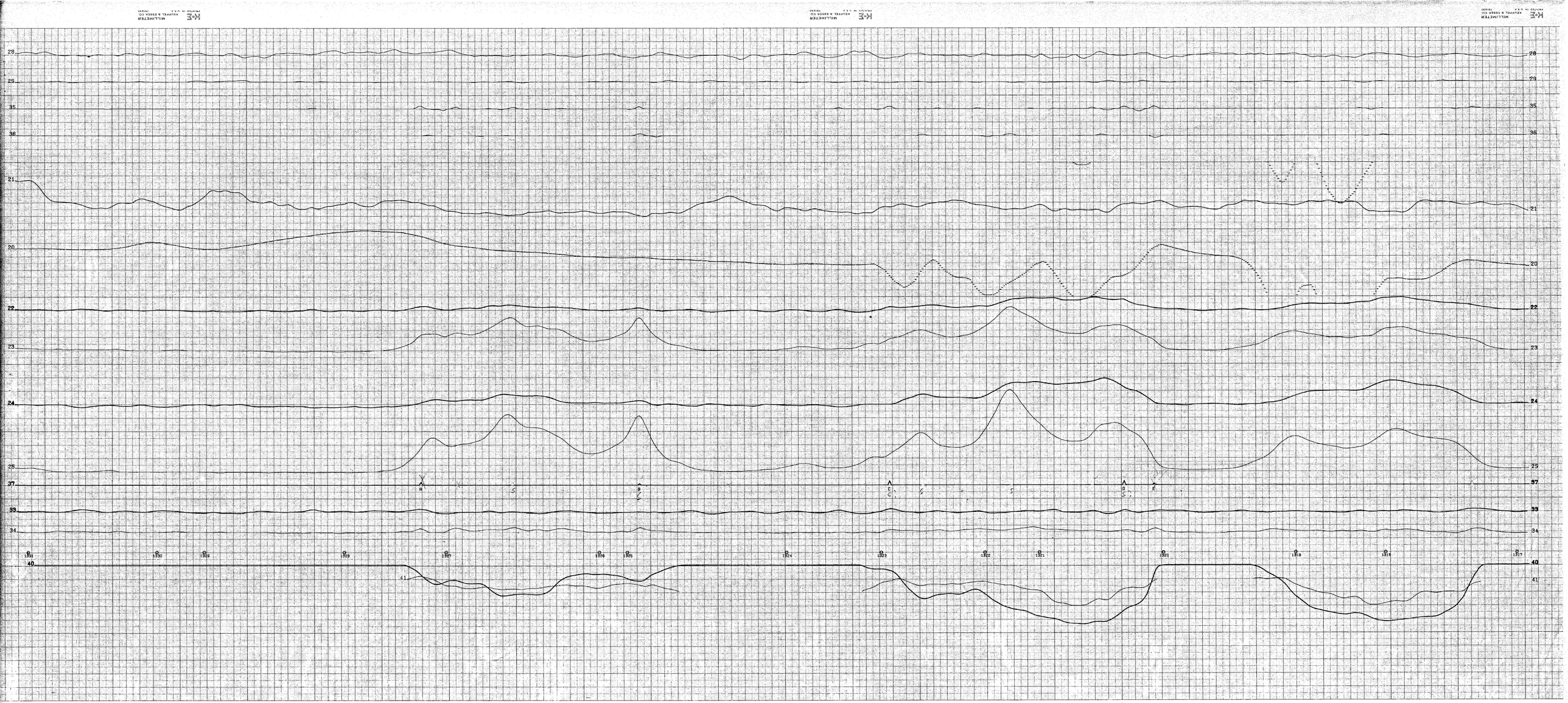
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KEUFFEL & ESSER CO
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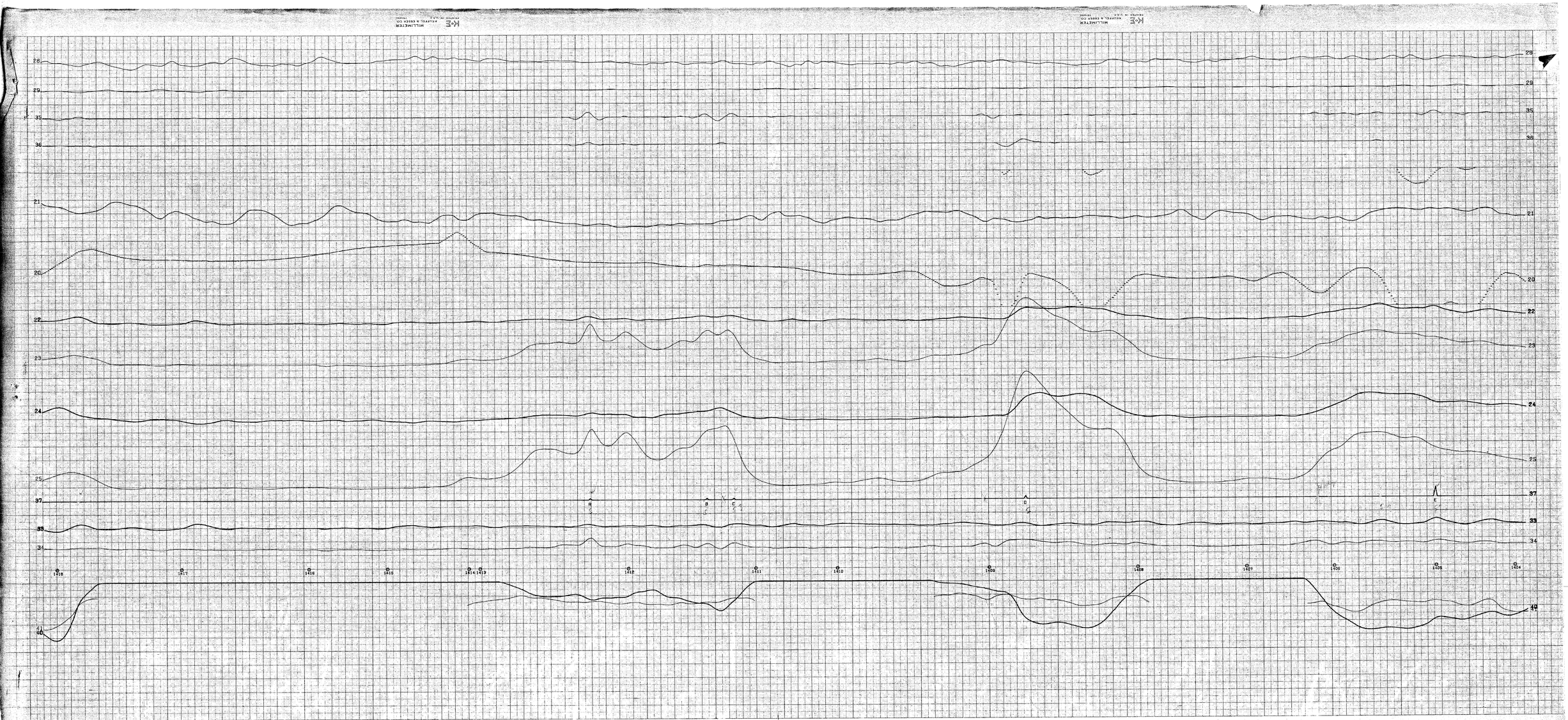
LINE 257
LINE 257.


LINE -258
LINE -258


LINE 259
LINE 259



LINE -260

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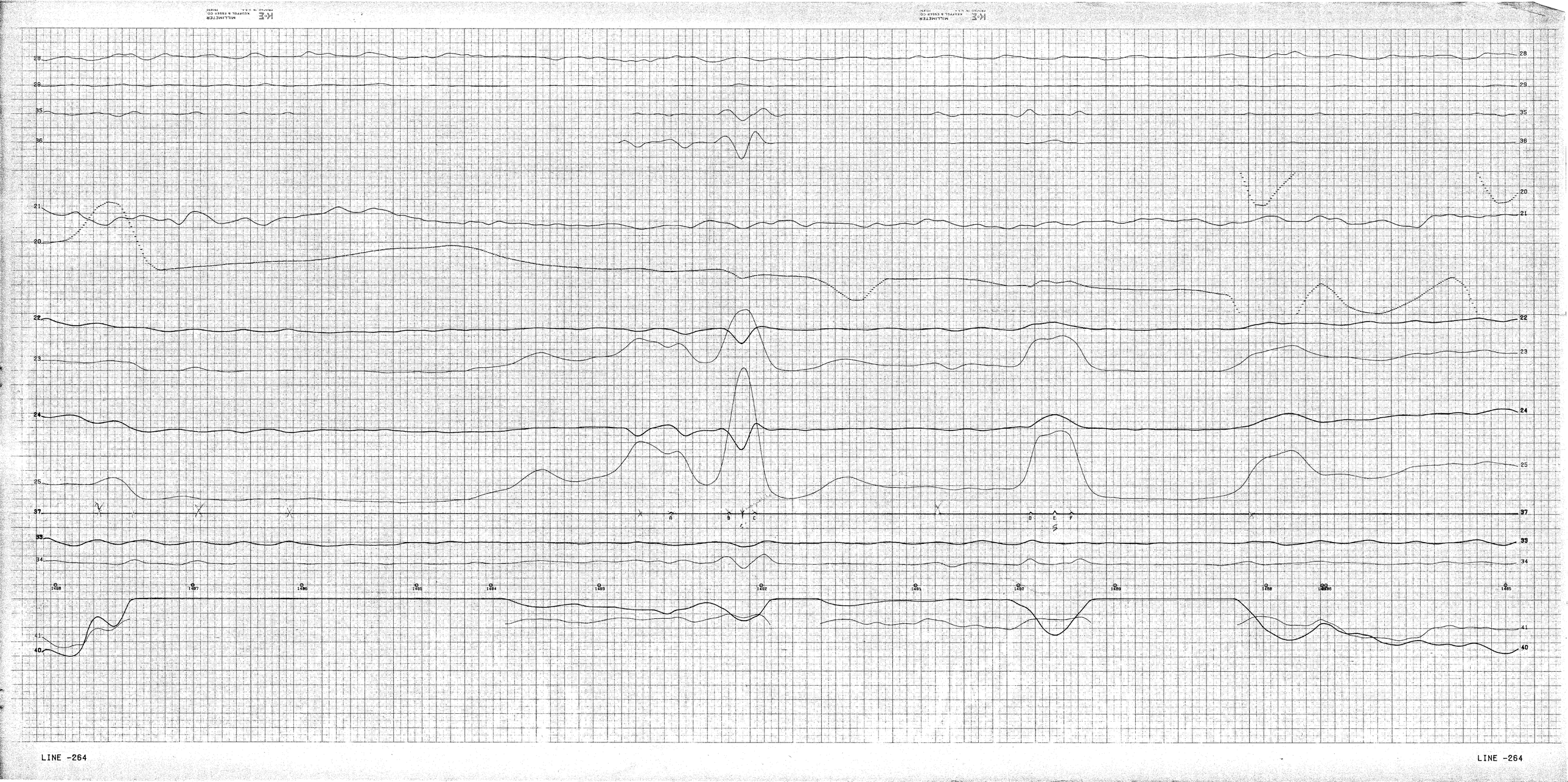
LINE -262



LINE 263

LINE 263



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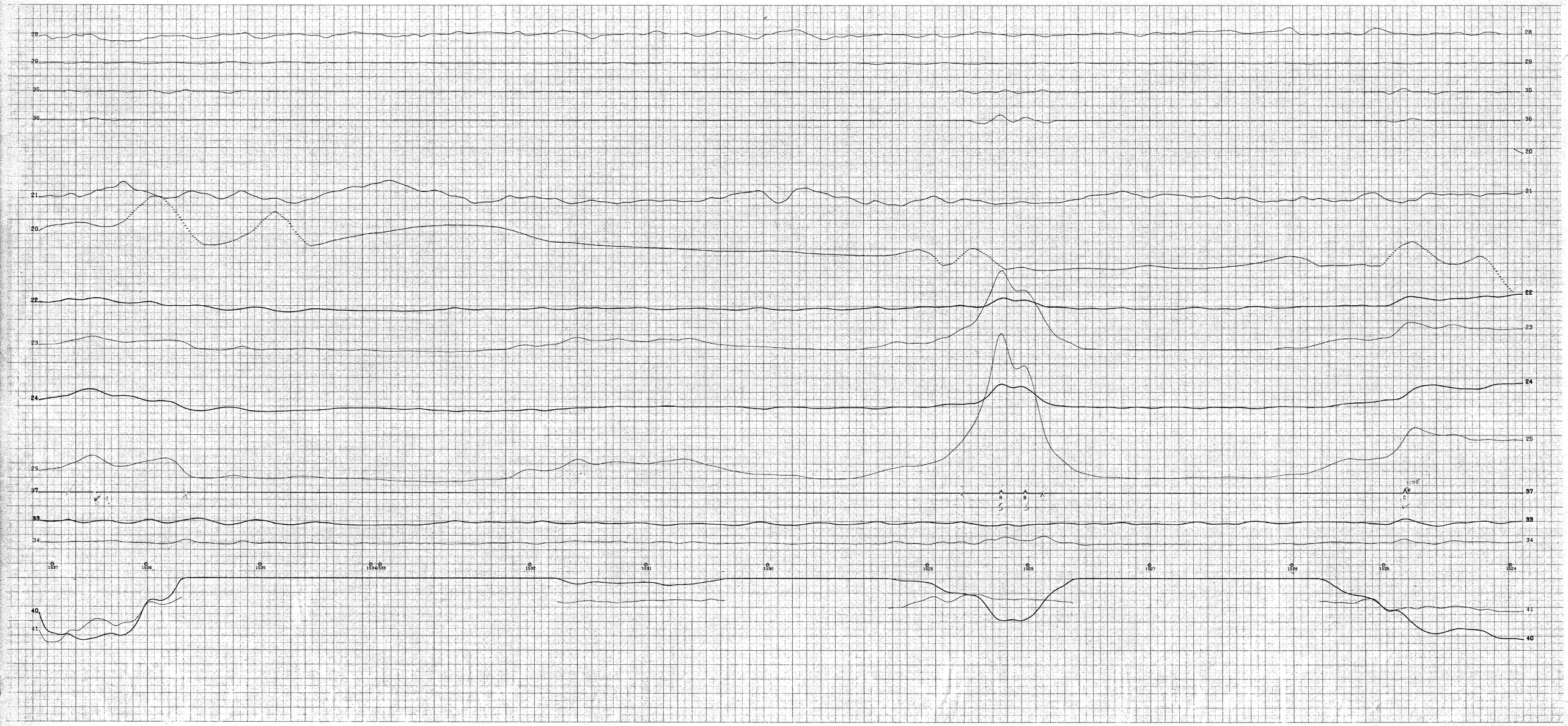
LINE 265



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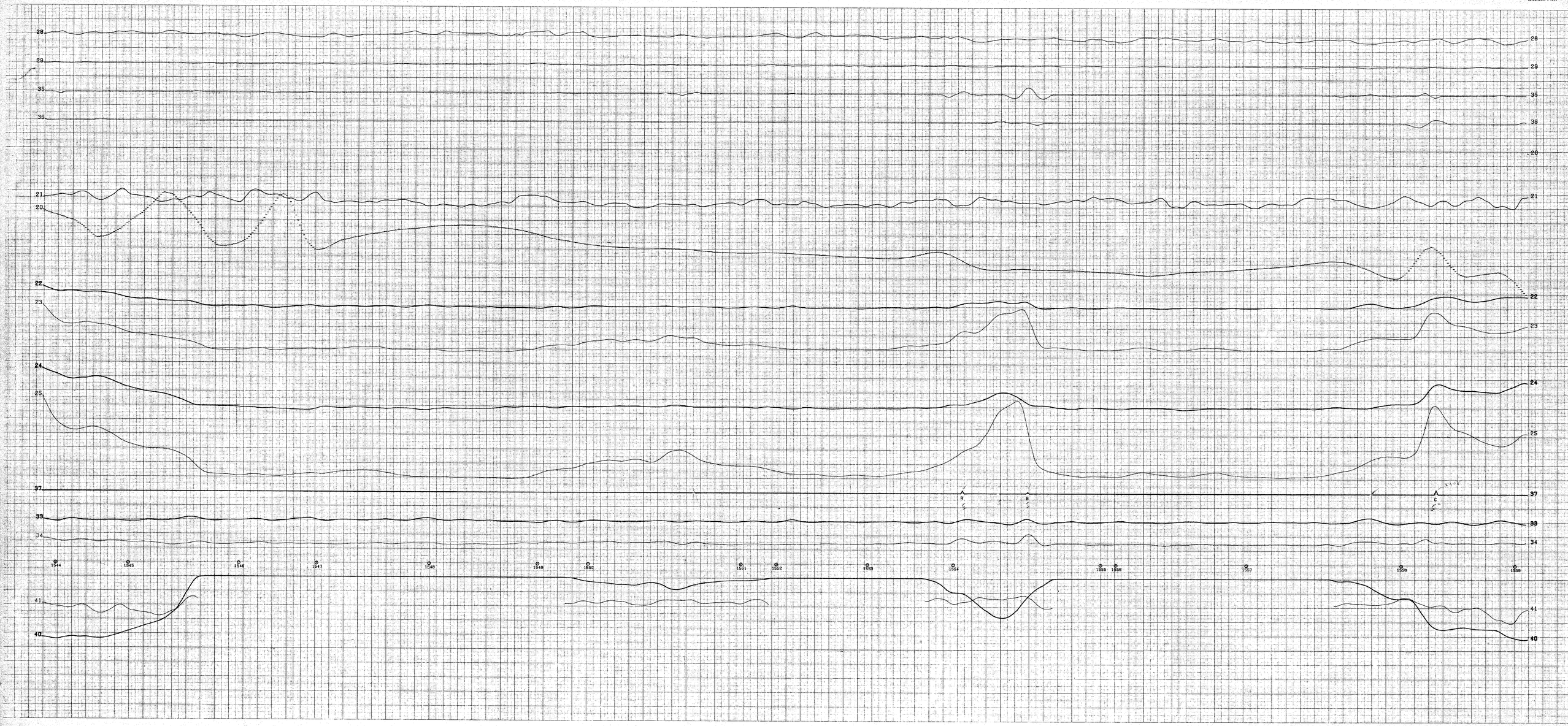
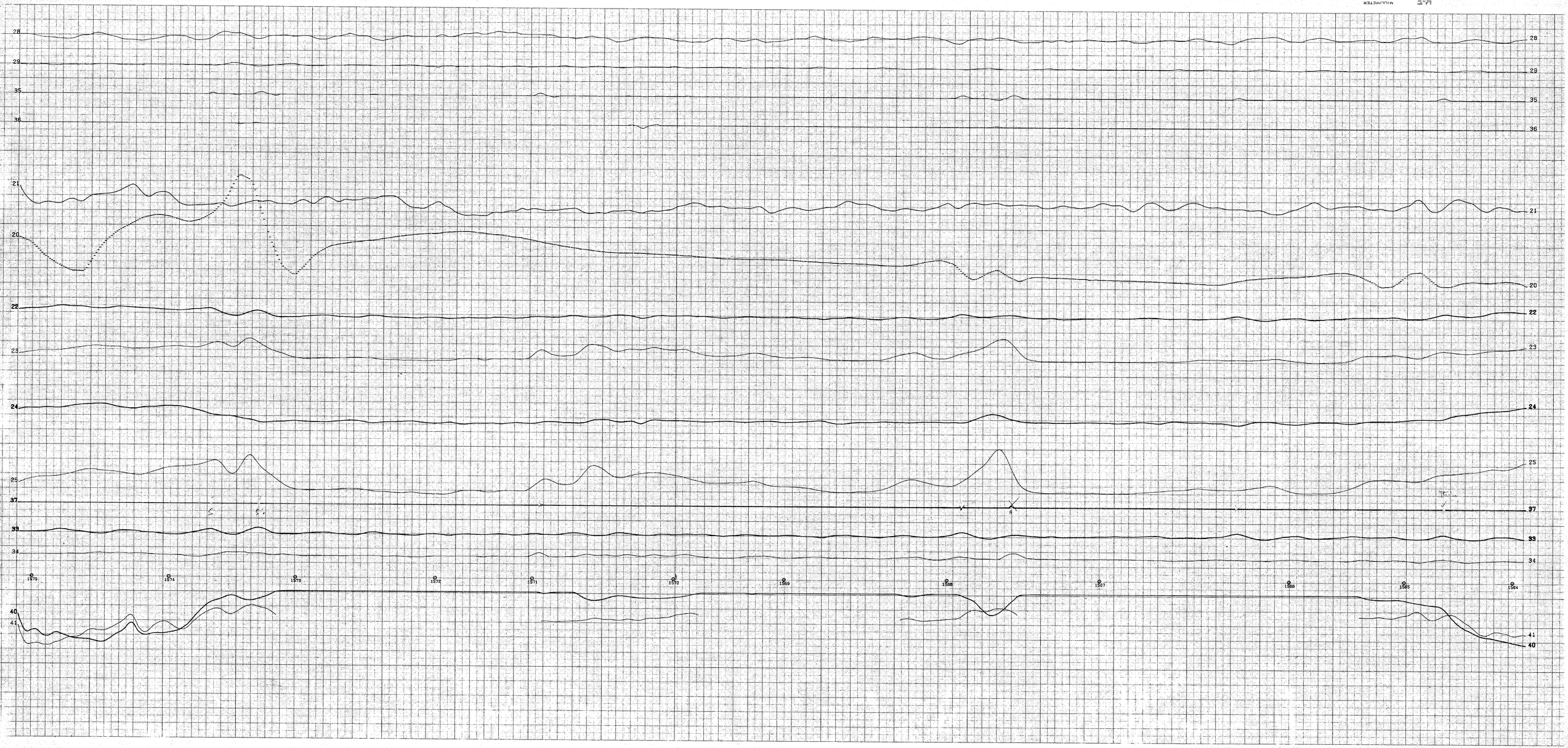


LINE 267

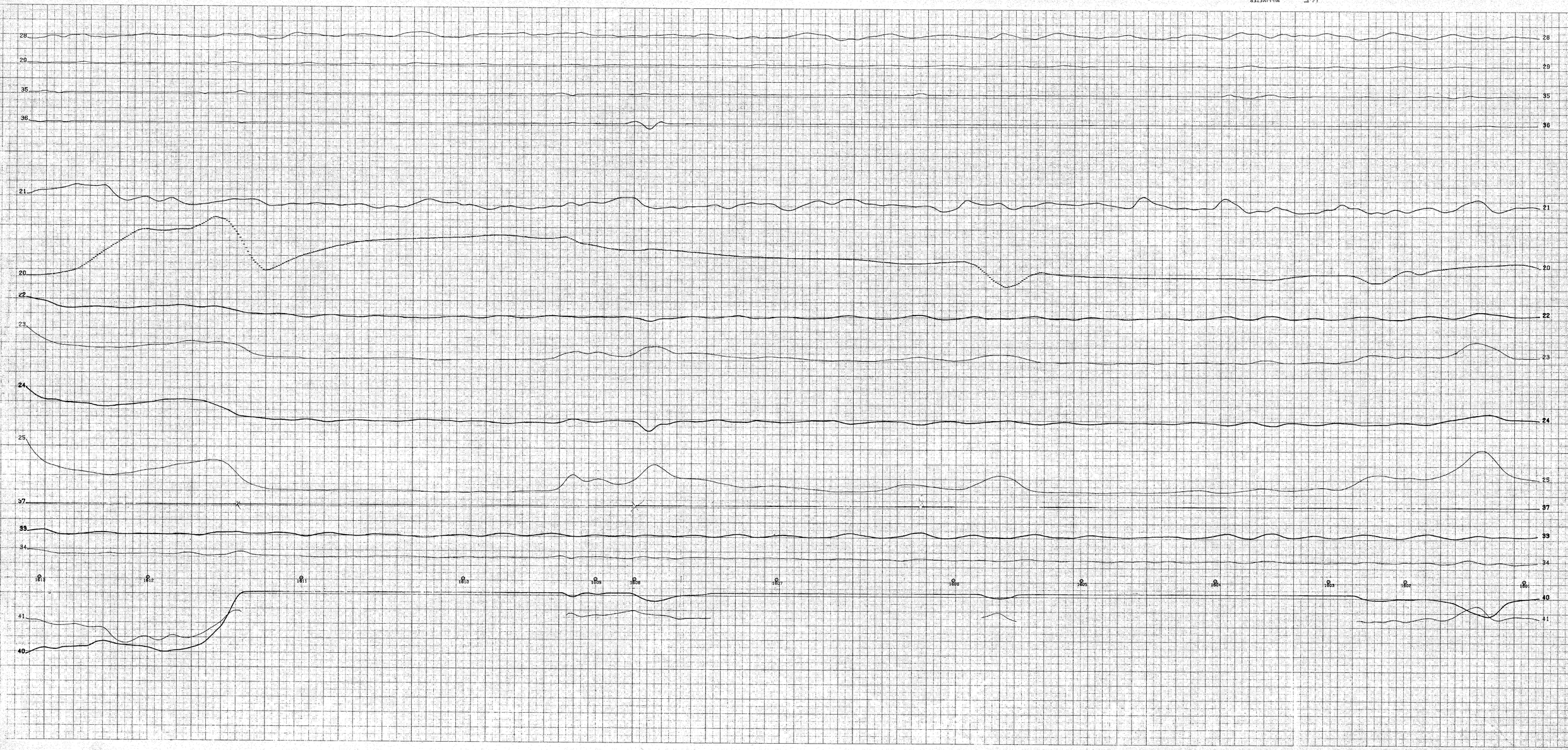
LINE 267



LINE -268

LINE -268


LINE 269
LINE 269



LINE -270

LINE -270

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm
0
Standard - inphase ch. 22

10 ppm
0
Standard - quadrature ch. 23

10 ppm
0
Whaletail - inphase ch. 24

10 ppm
0
Whaletail - quadrature ch. 25

Conductance ch. 37

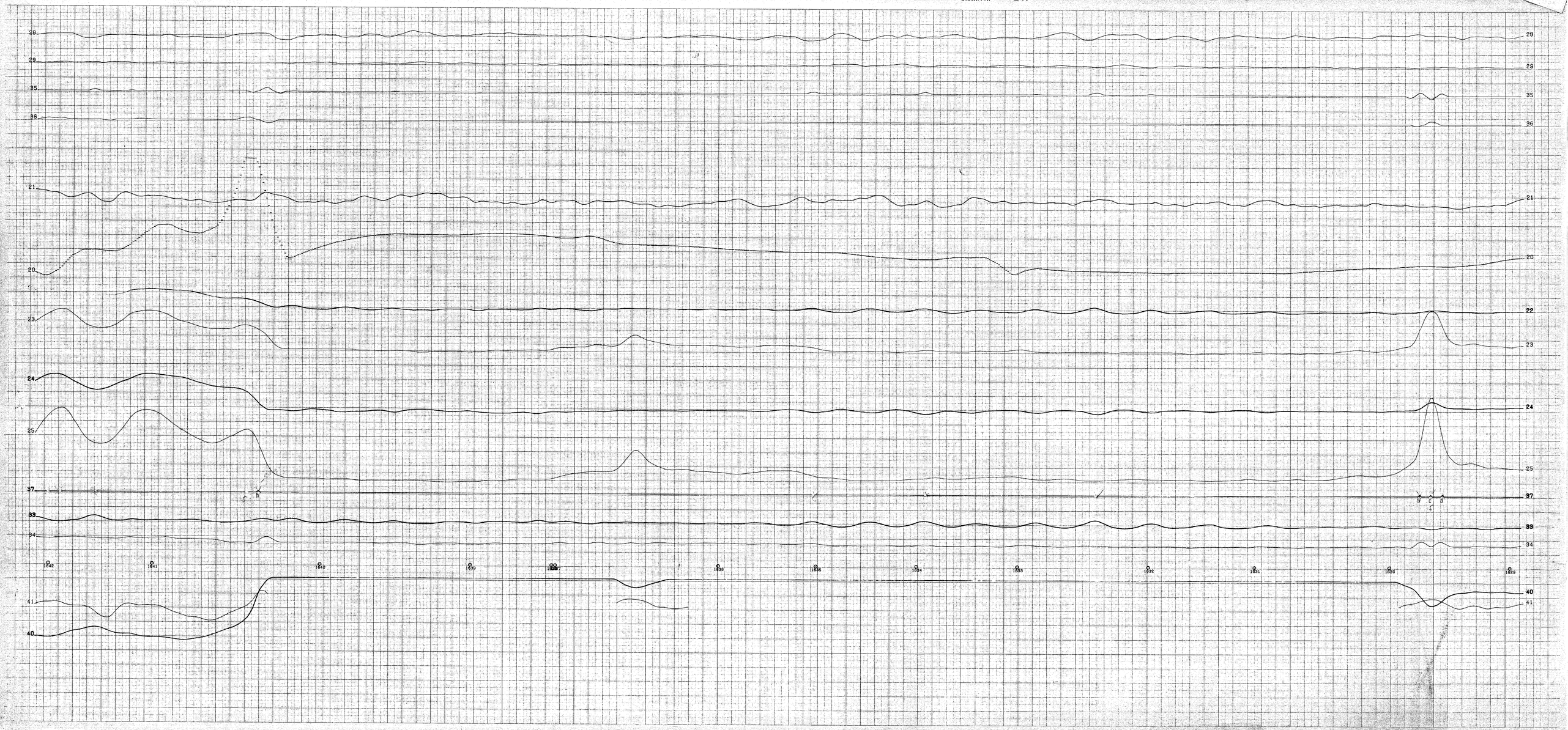
Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m
100 ohm-m
10 ohm-m
ohm-m
Resistivity ch. 40

0
30m
Apparent depth ch. 41

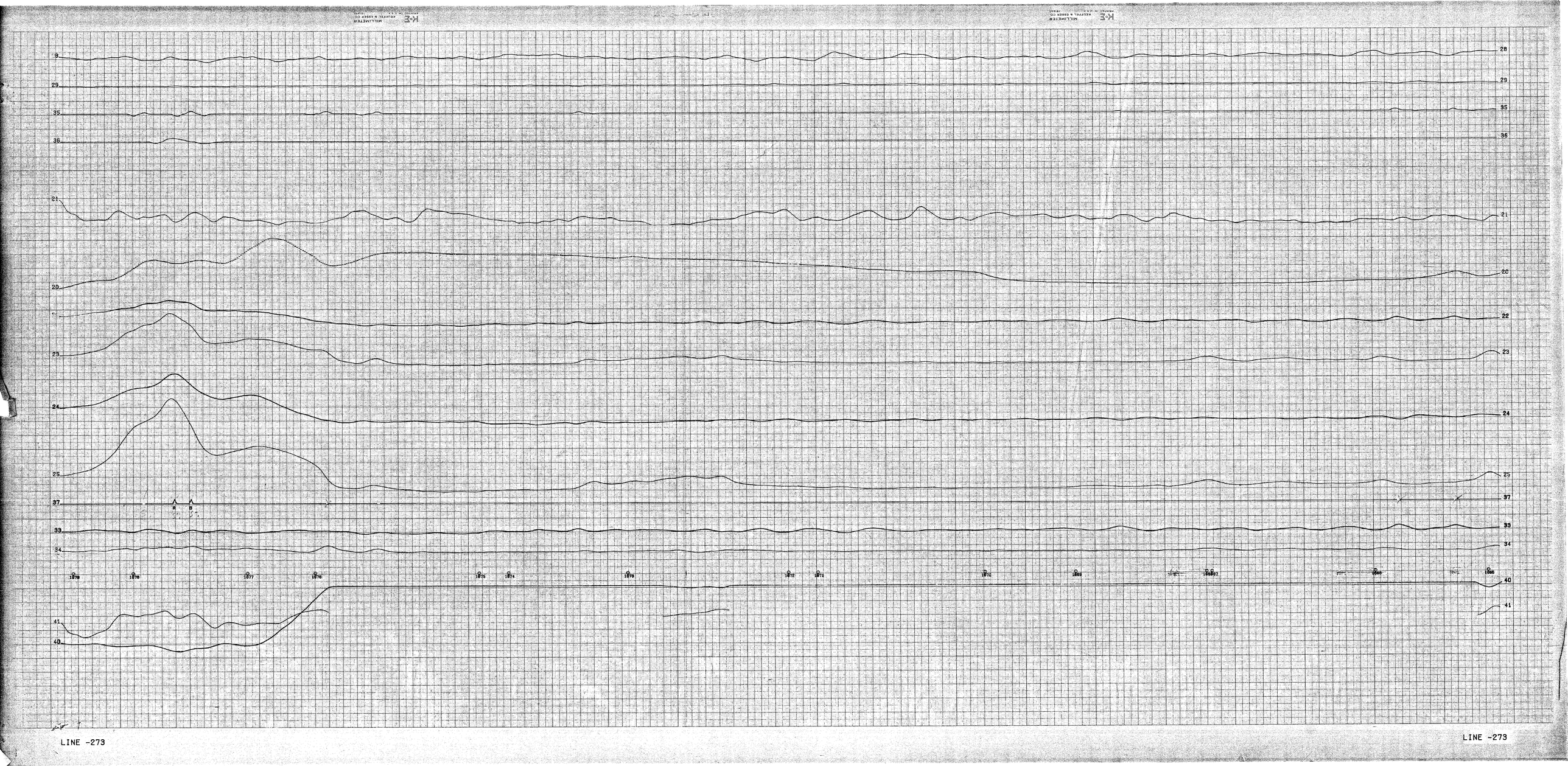
271A



LINE -271

LINE -271


LINE 272
LINE 272



LINE -273

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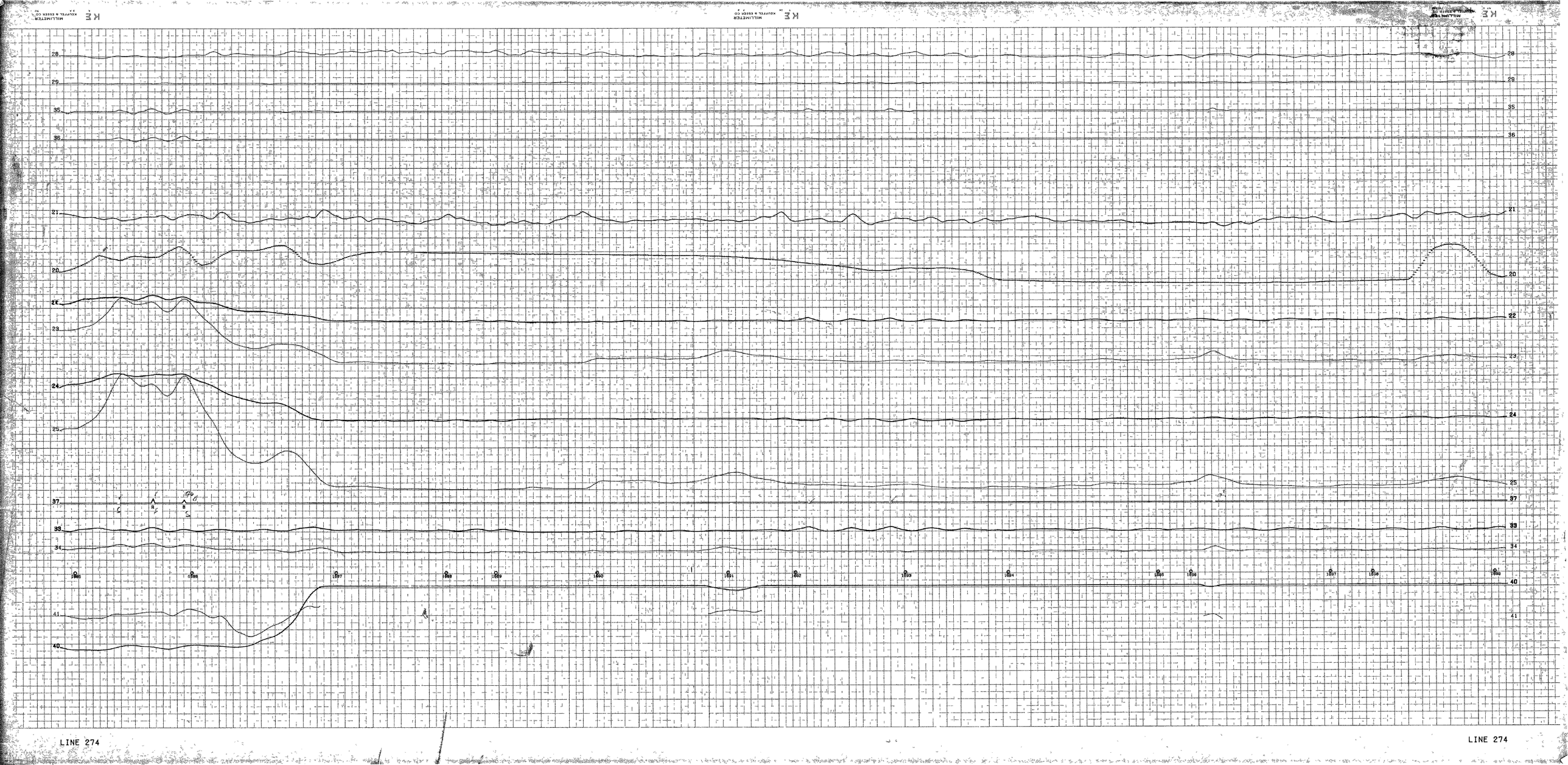
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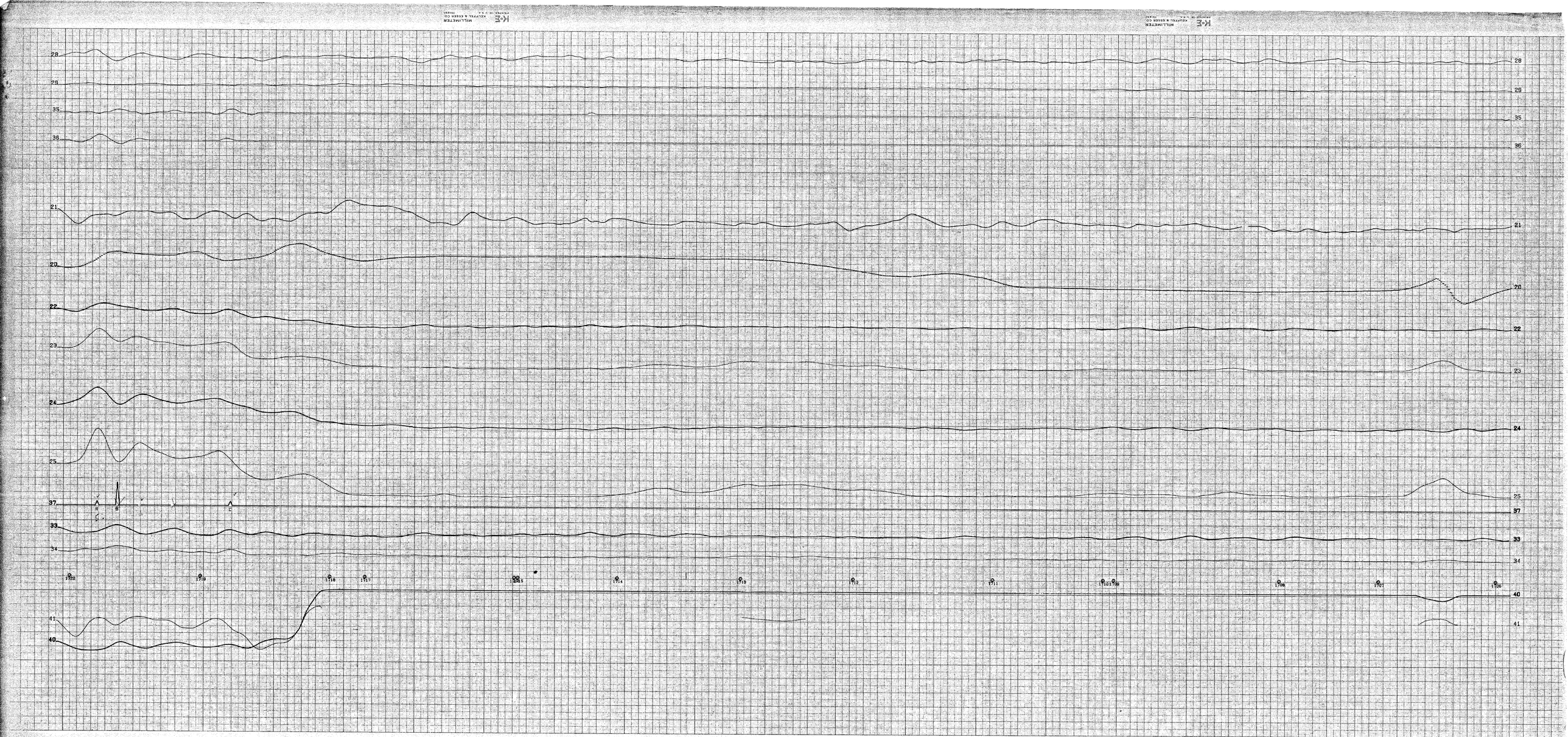

LINE -275

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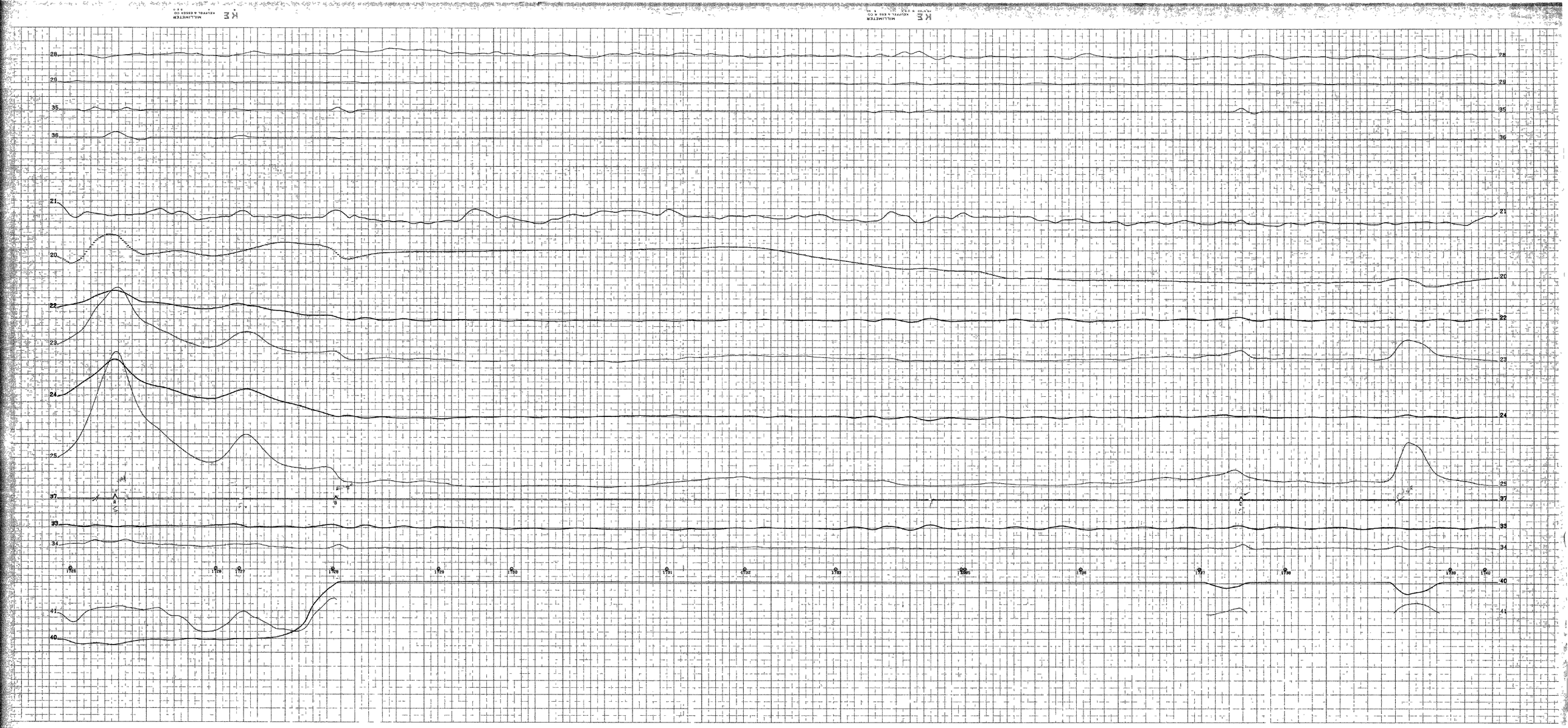

LINE 276

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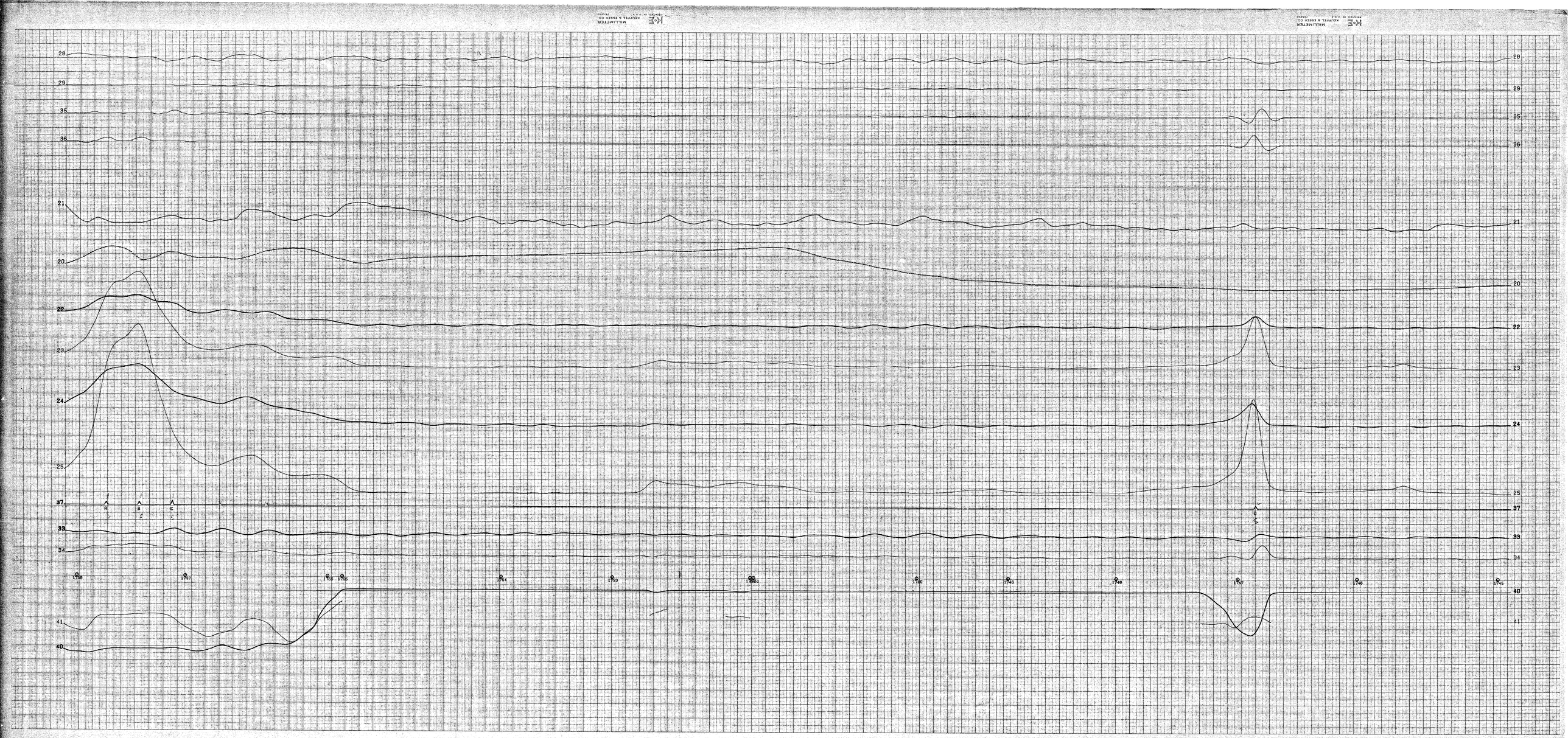

LINE -277

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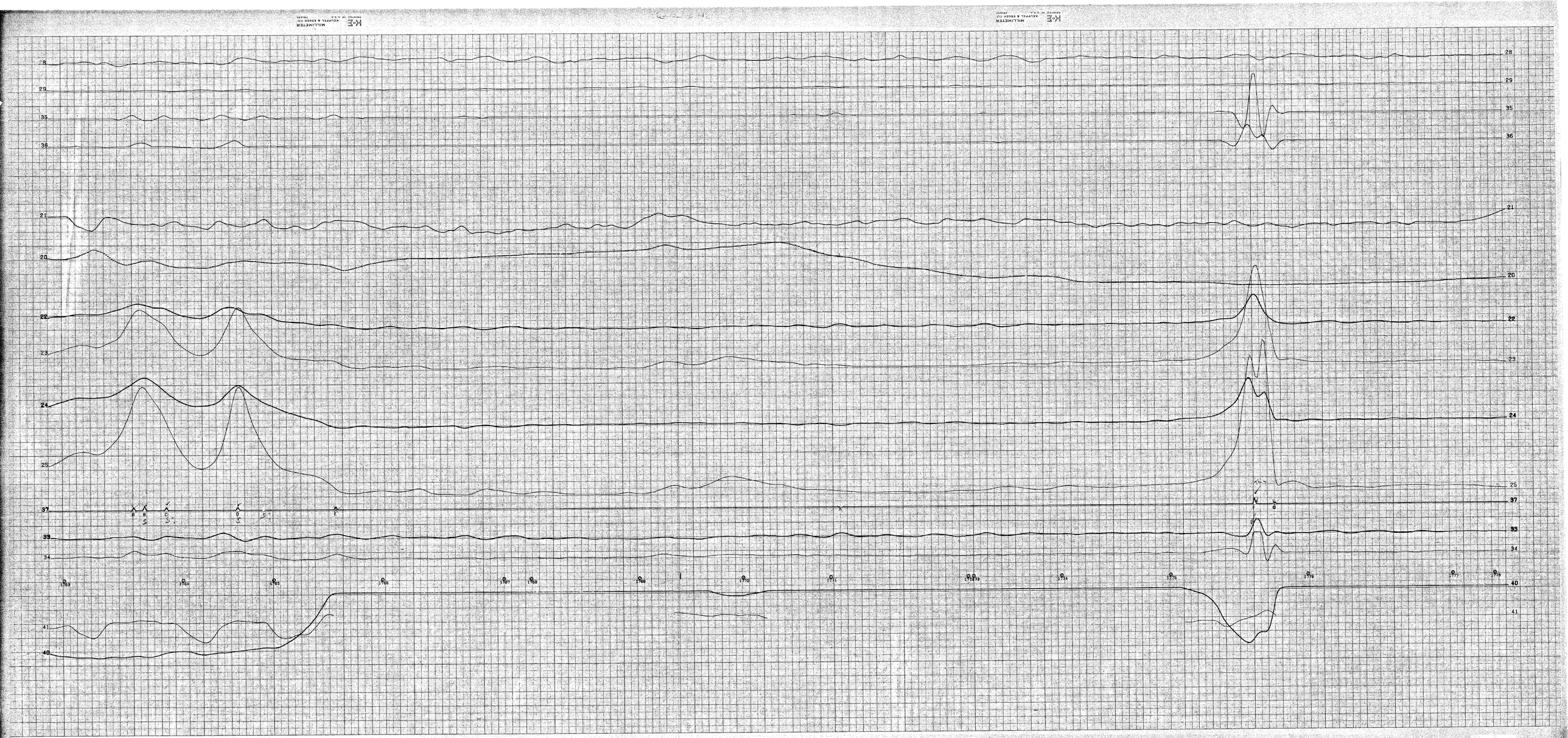
LINE 278
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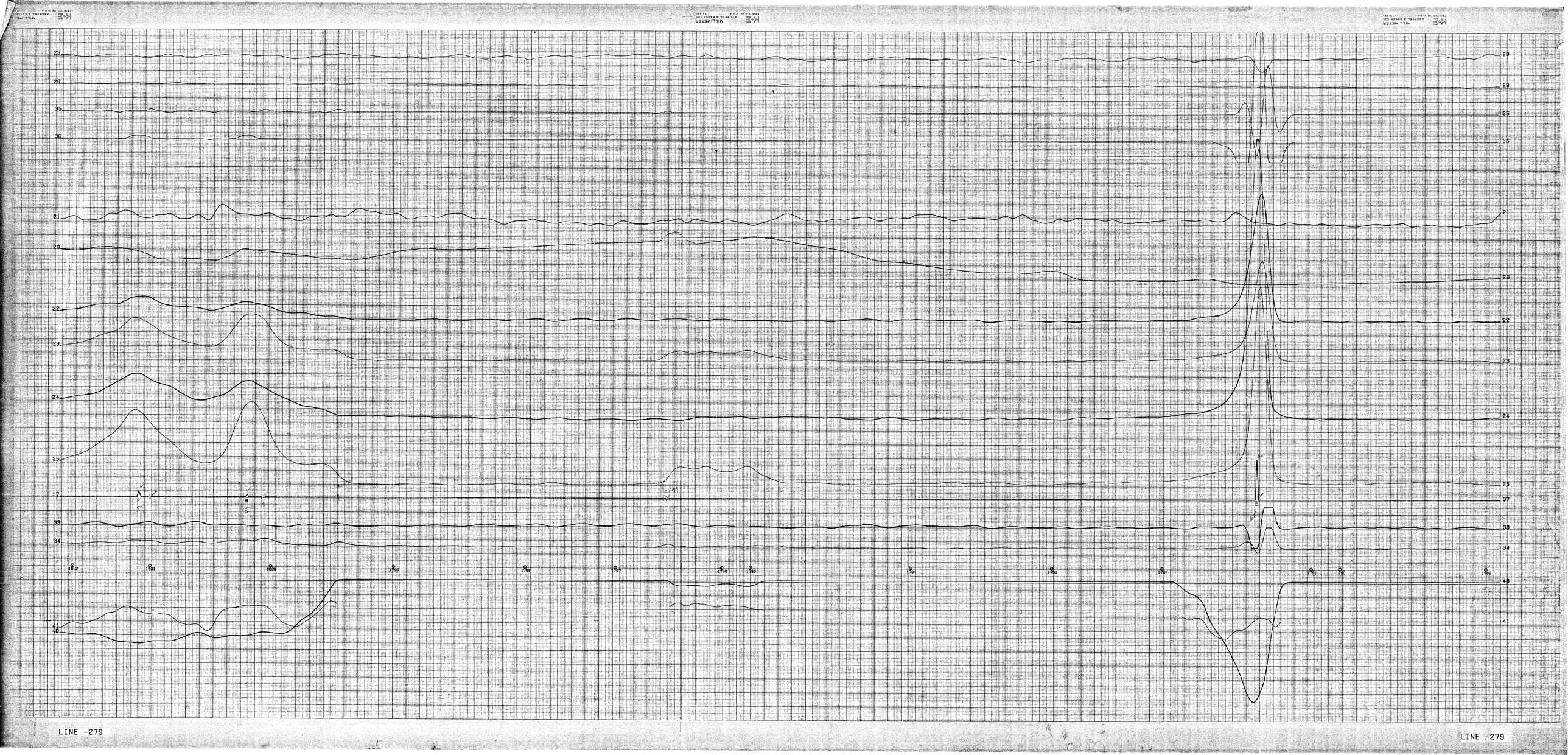
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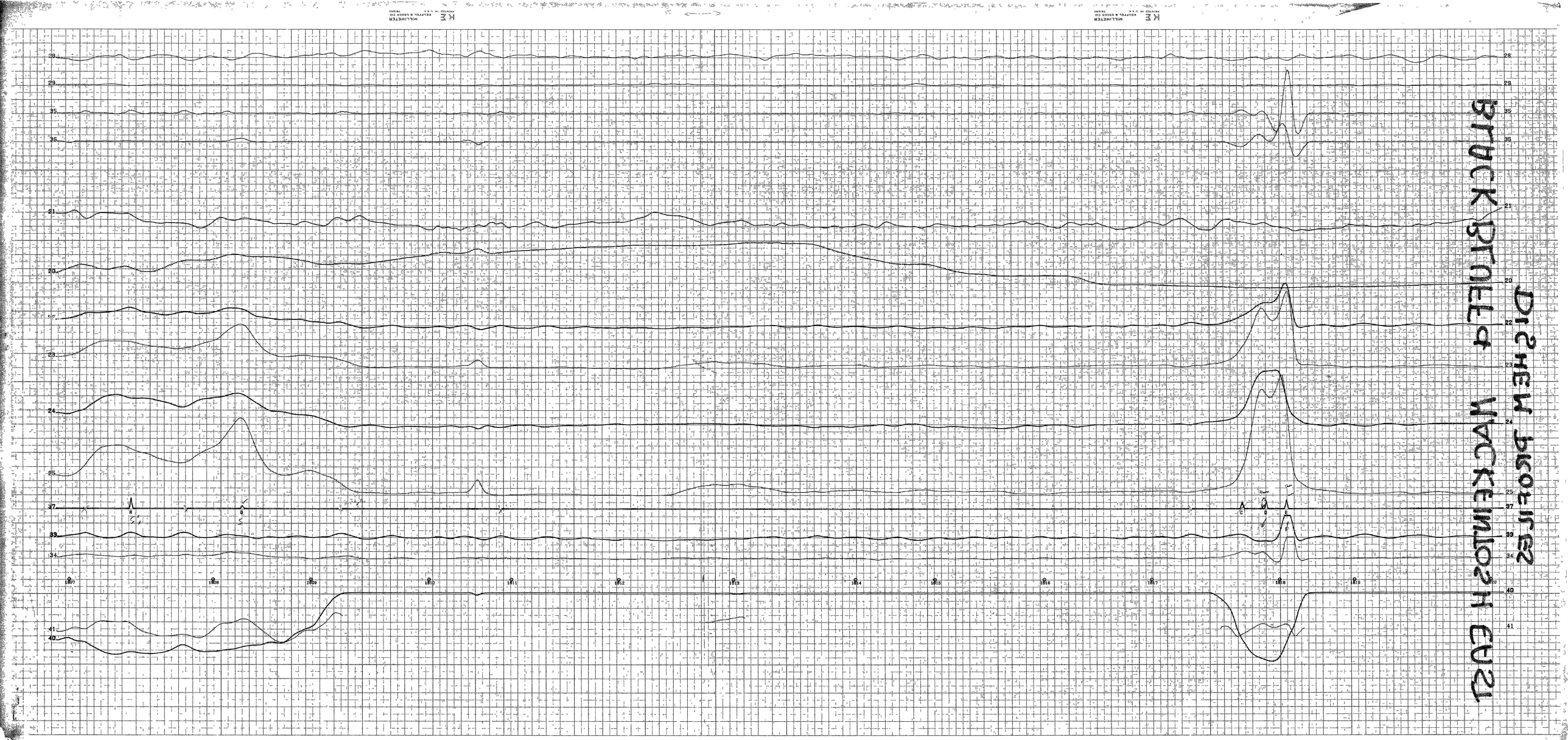
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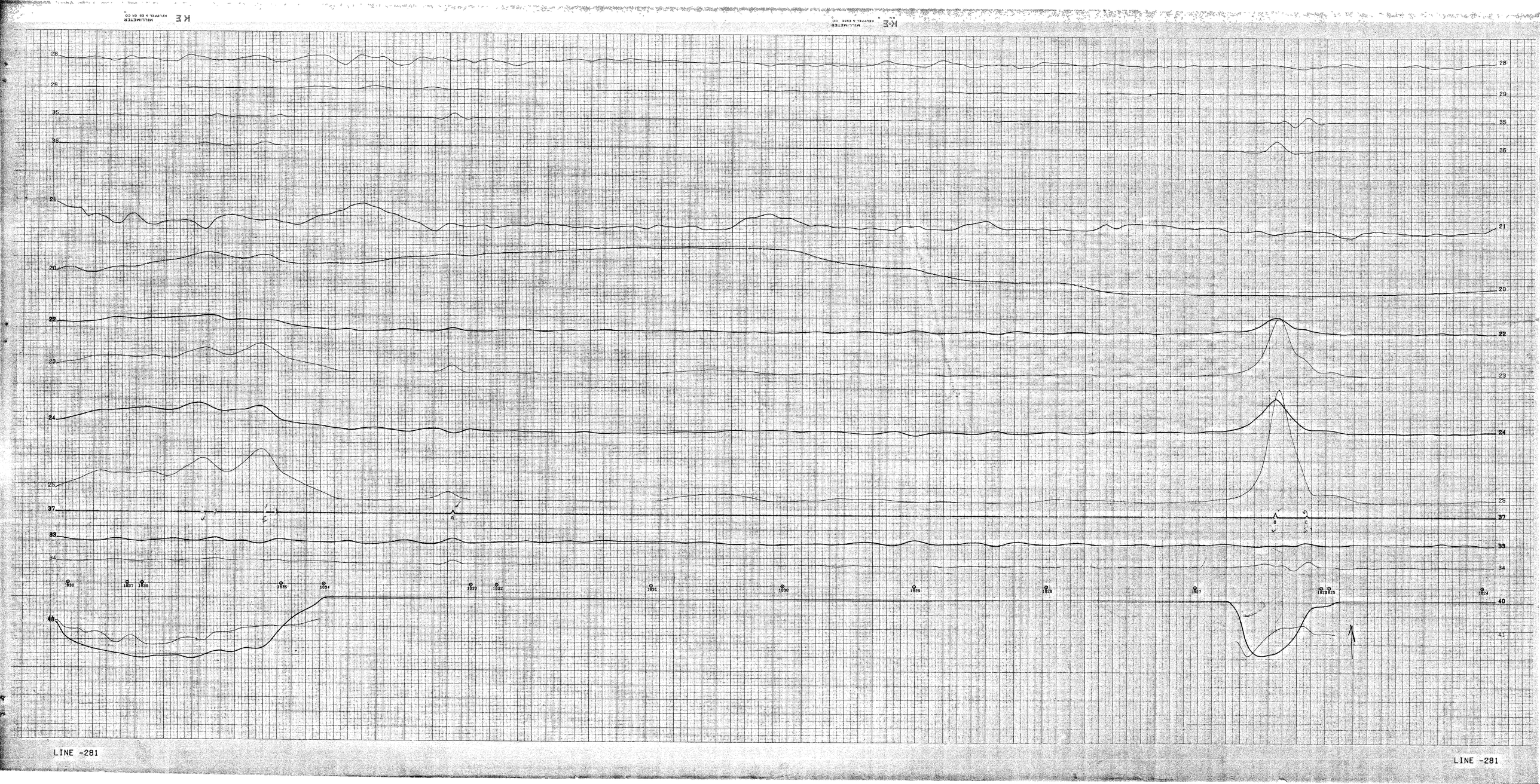
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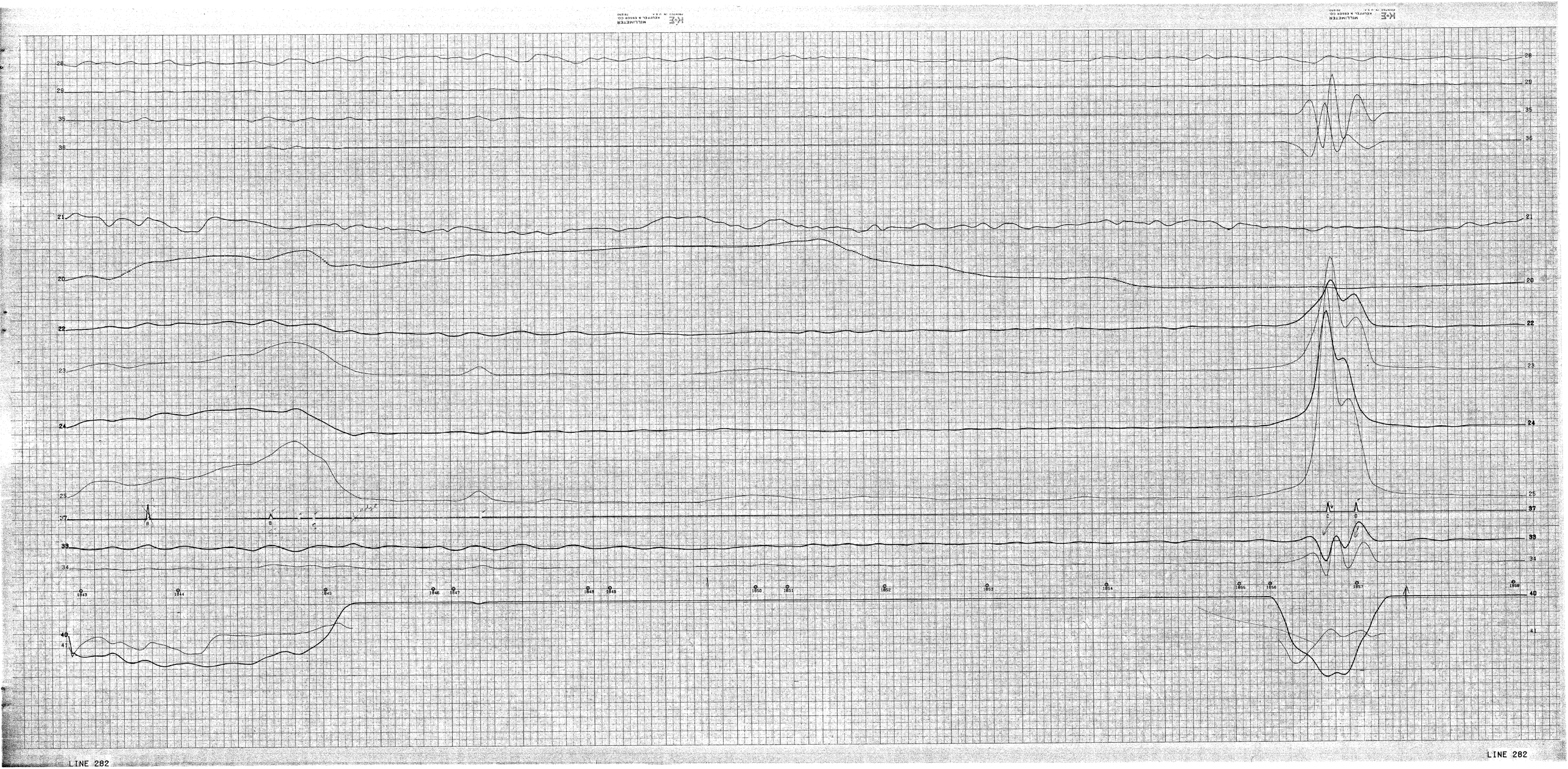
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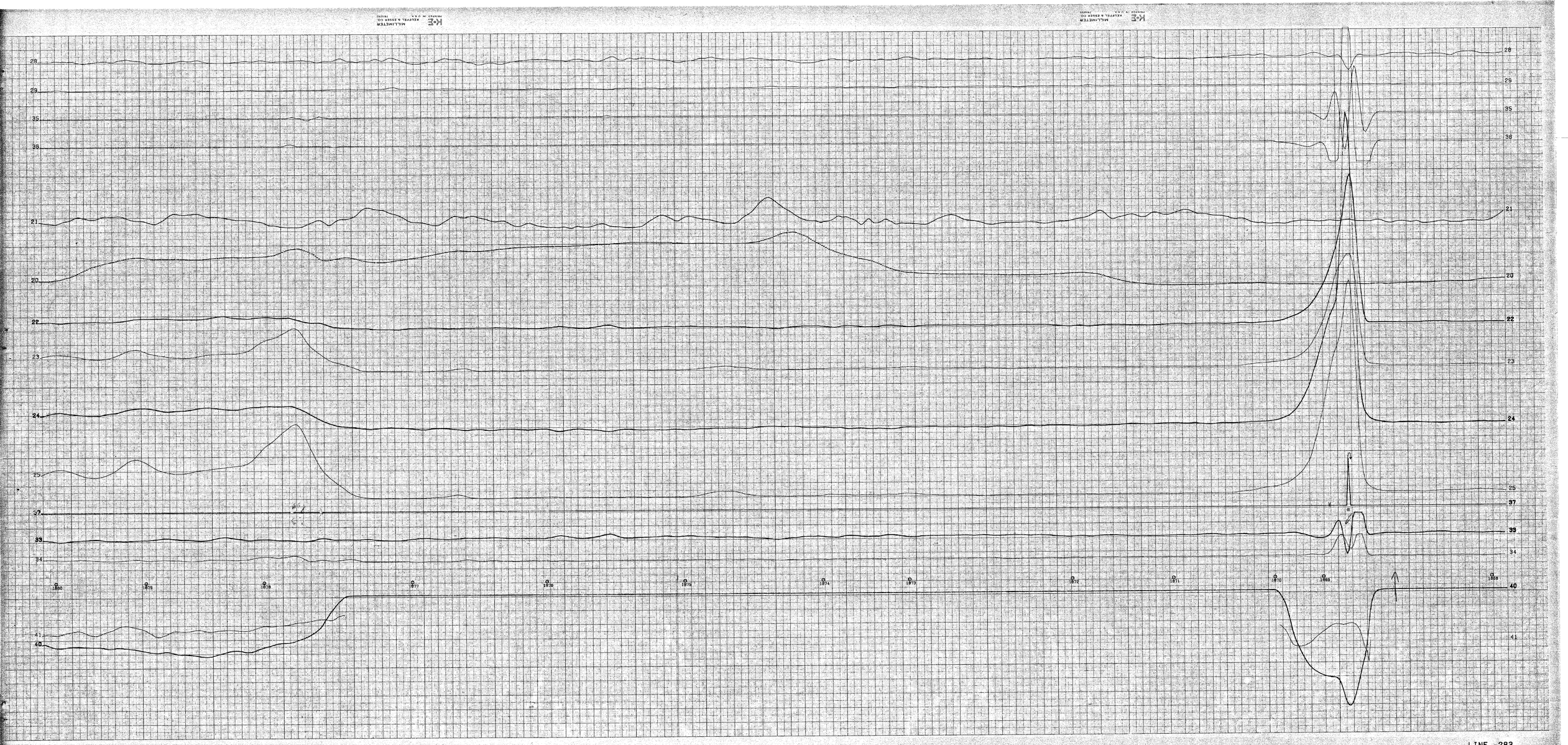
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LINE -283
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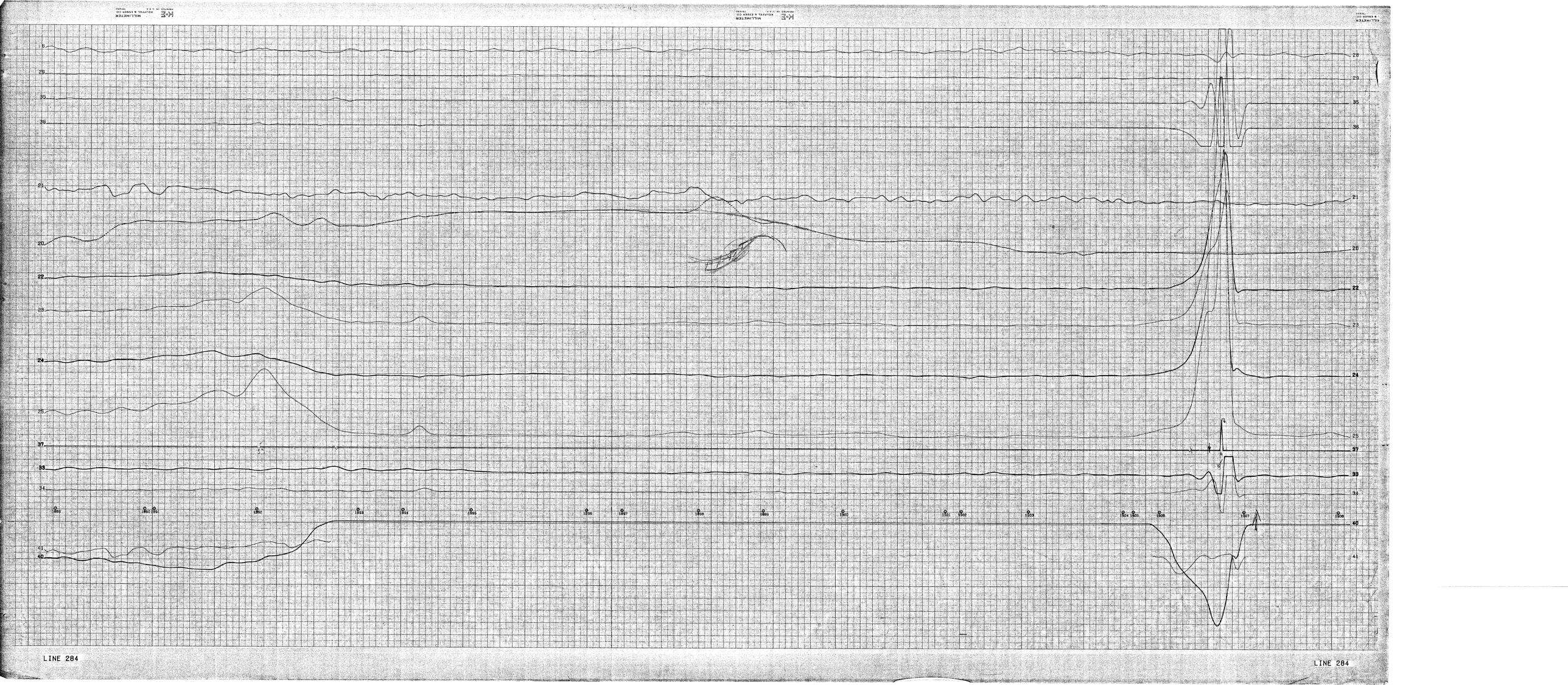
LINE 284
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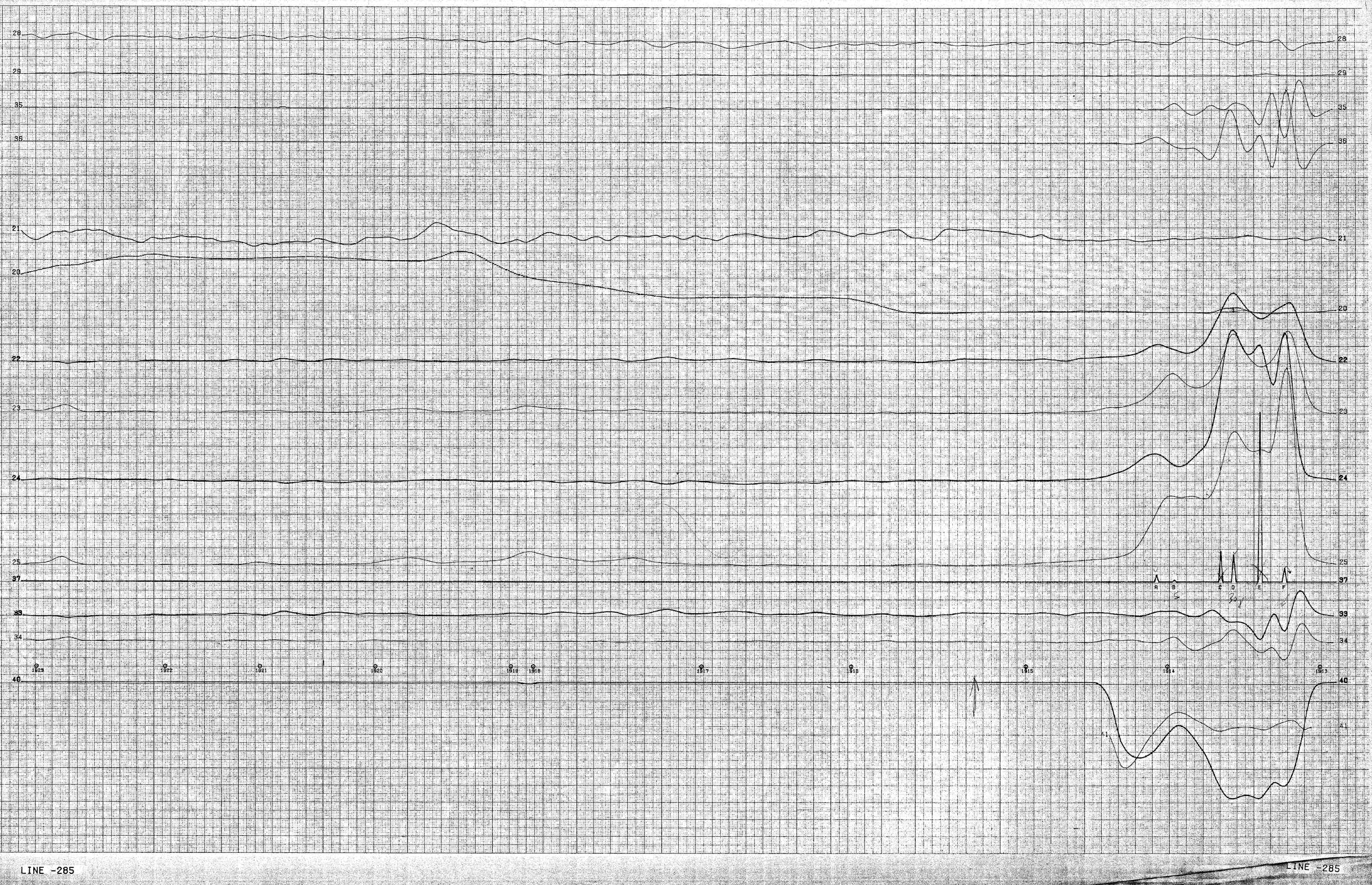

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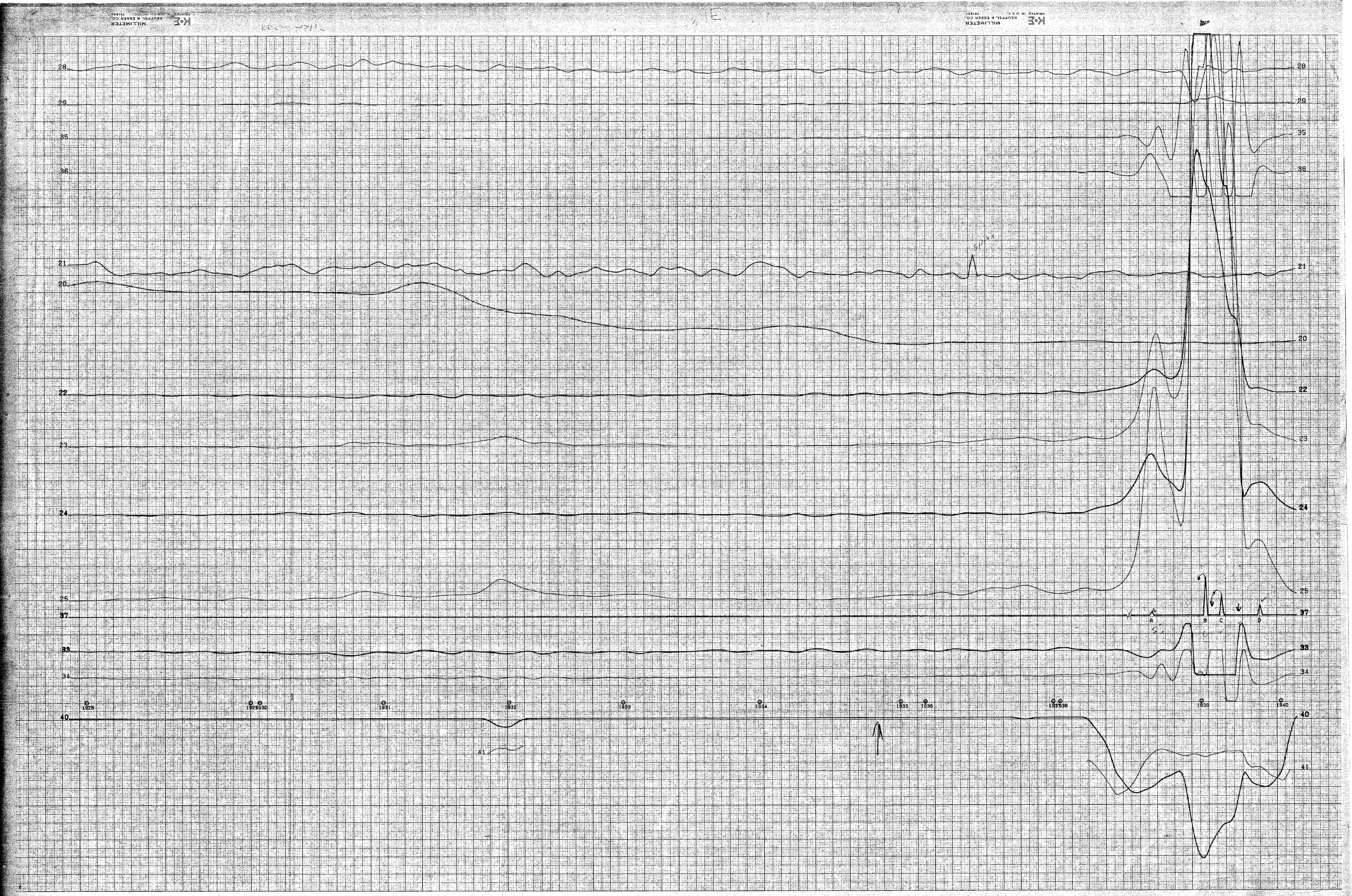
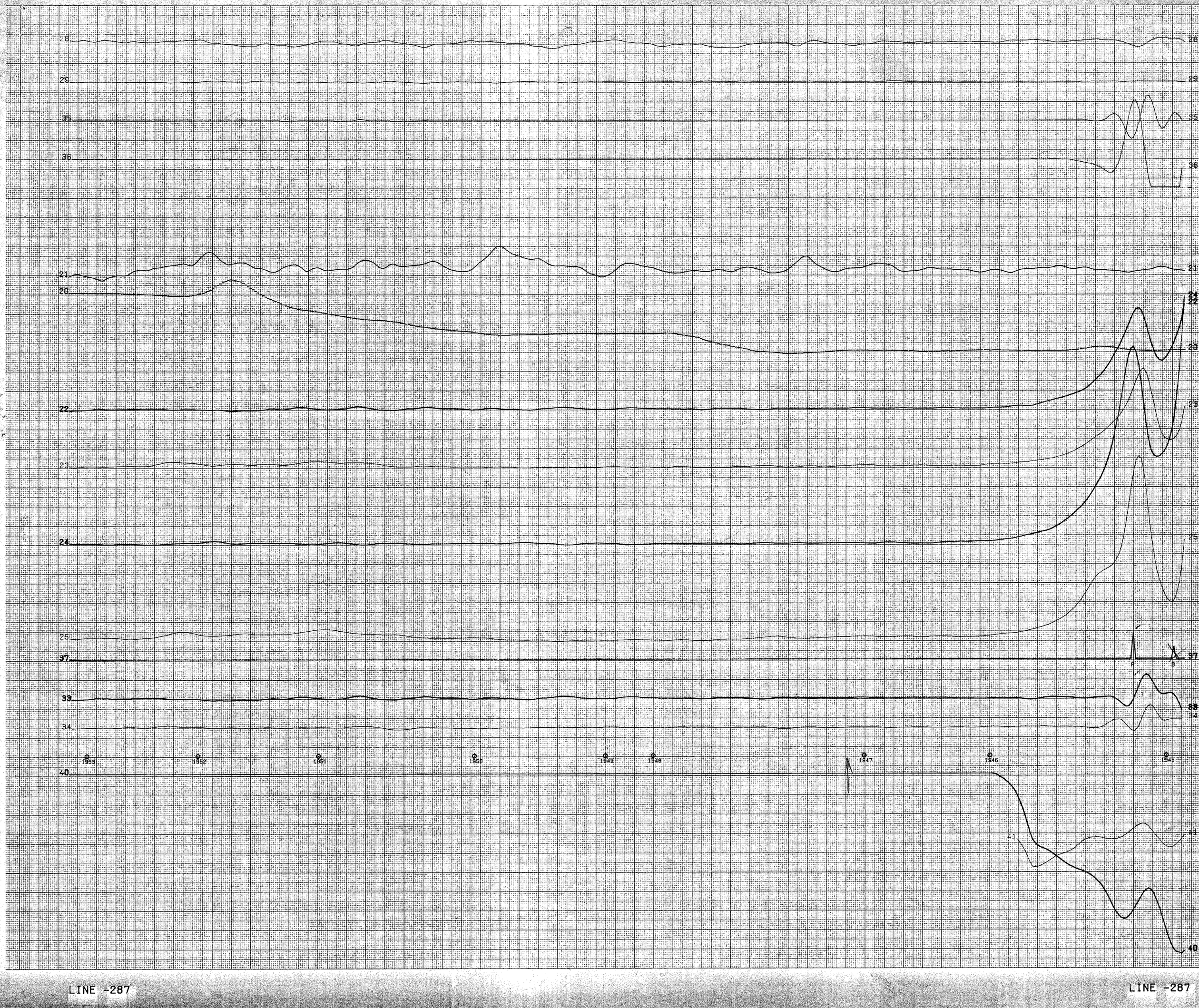


LINE 286

LINE 286



LINE -287

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MILLIMETER
KEUFFEL & ESSER CO.
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K&E
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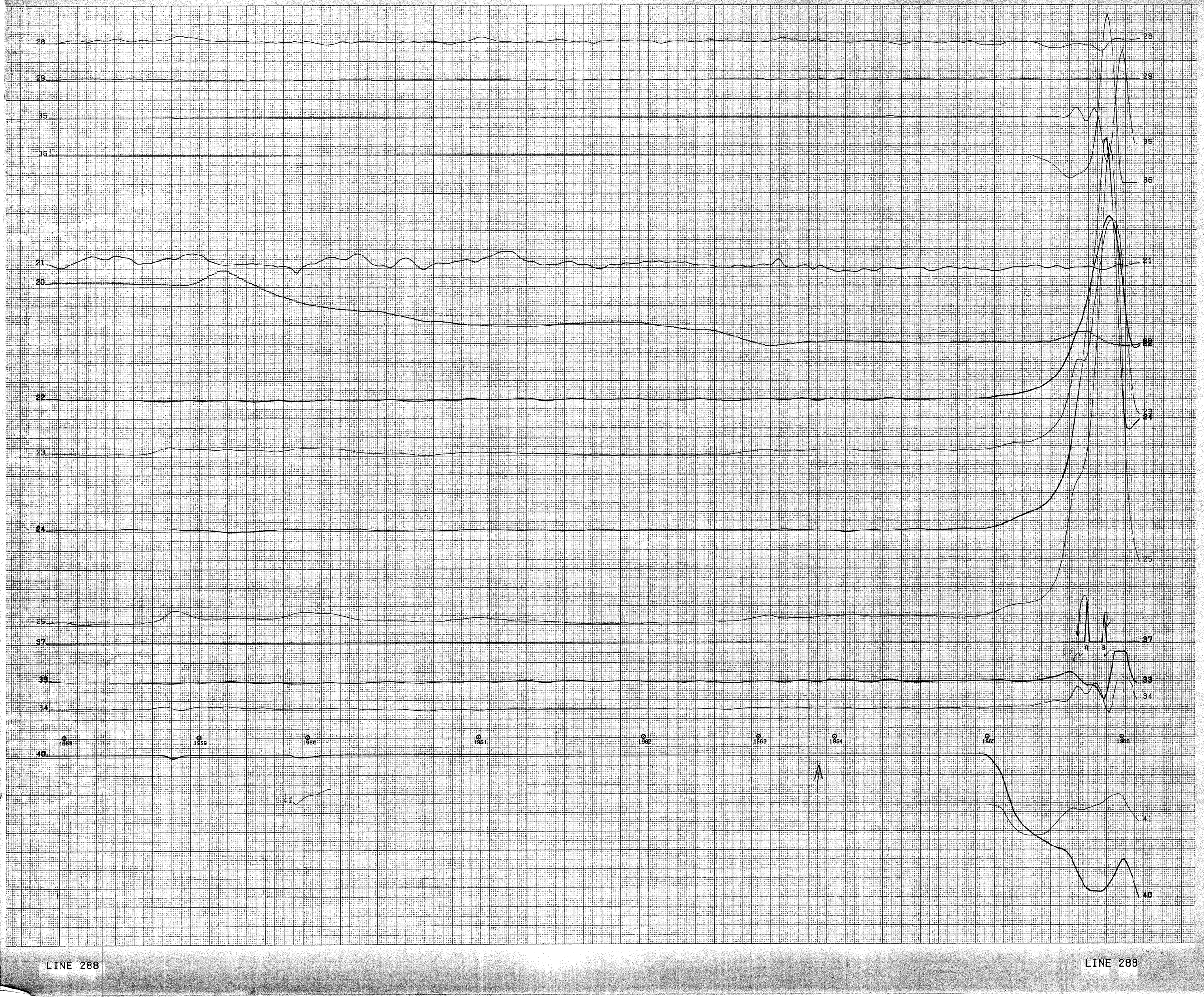
KEUFFEL & ESSER CO.



LINE 288

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K&E MILLIMETER KEUFFEL & ESSER CO. PRINTED IN U.S.A.

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K+E MILLIMETER
KEUFFEL & ESSER CO
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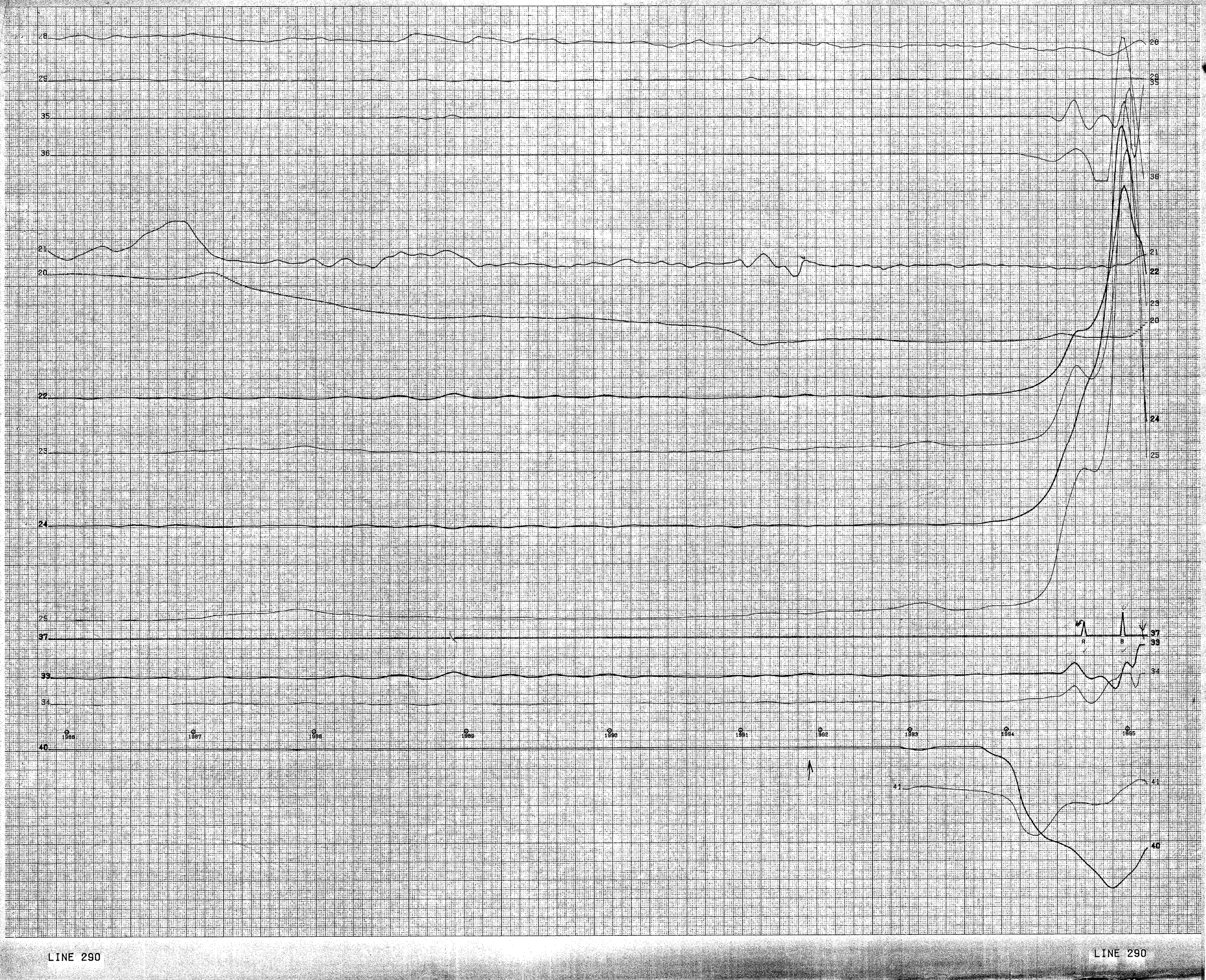

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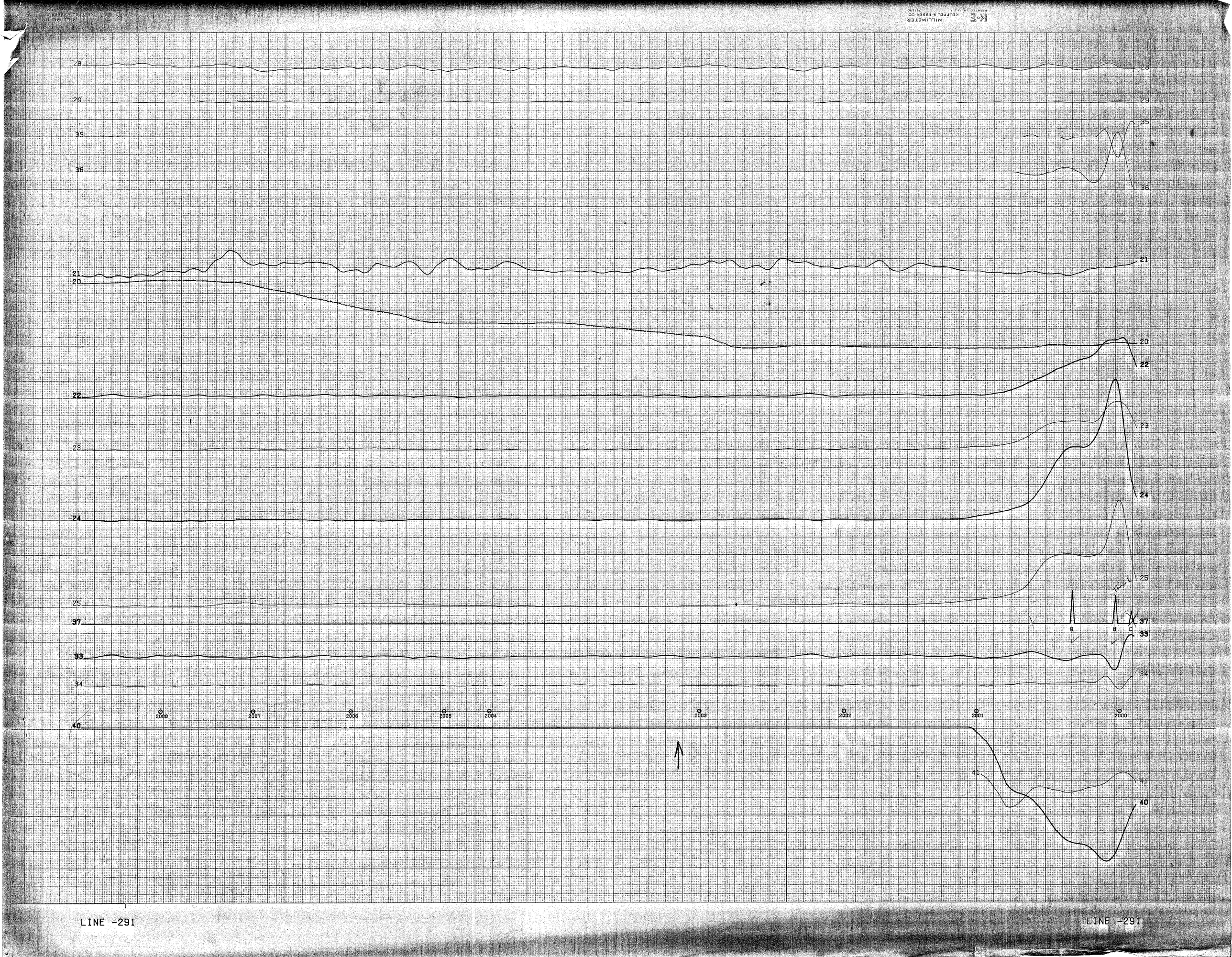
K&E MILLIMETER KEUFFEL & ESSER CO. MADE IN U.S.A. 29170



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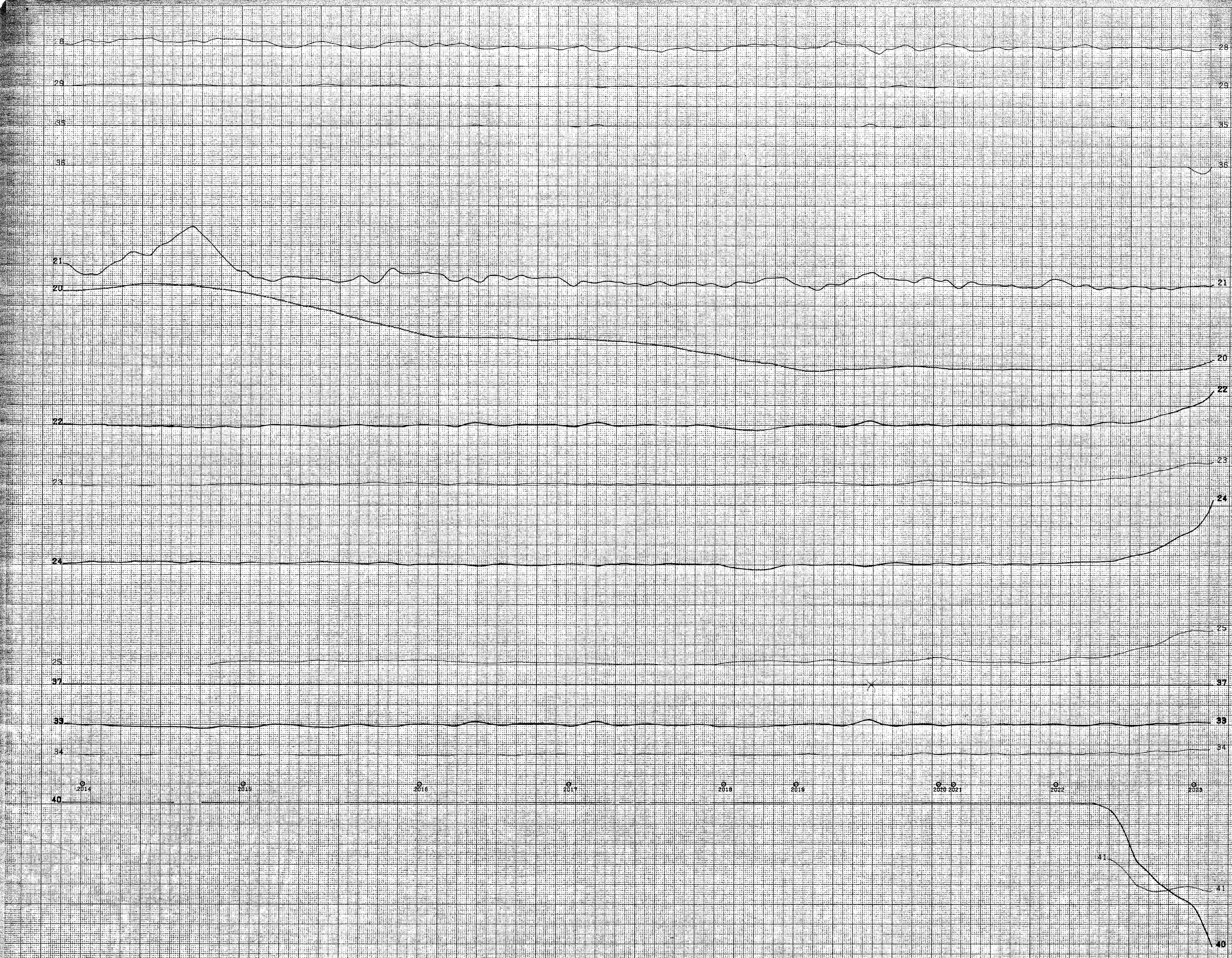
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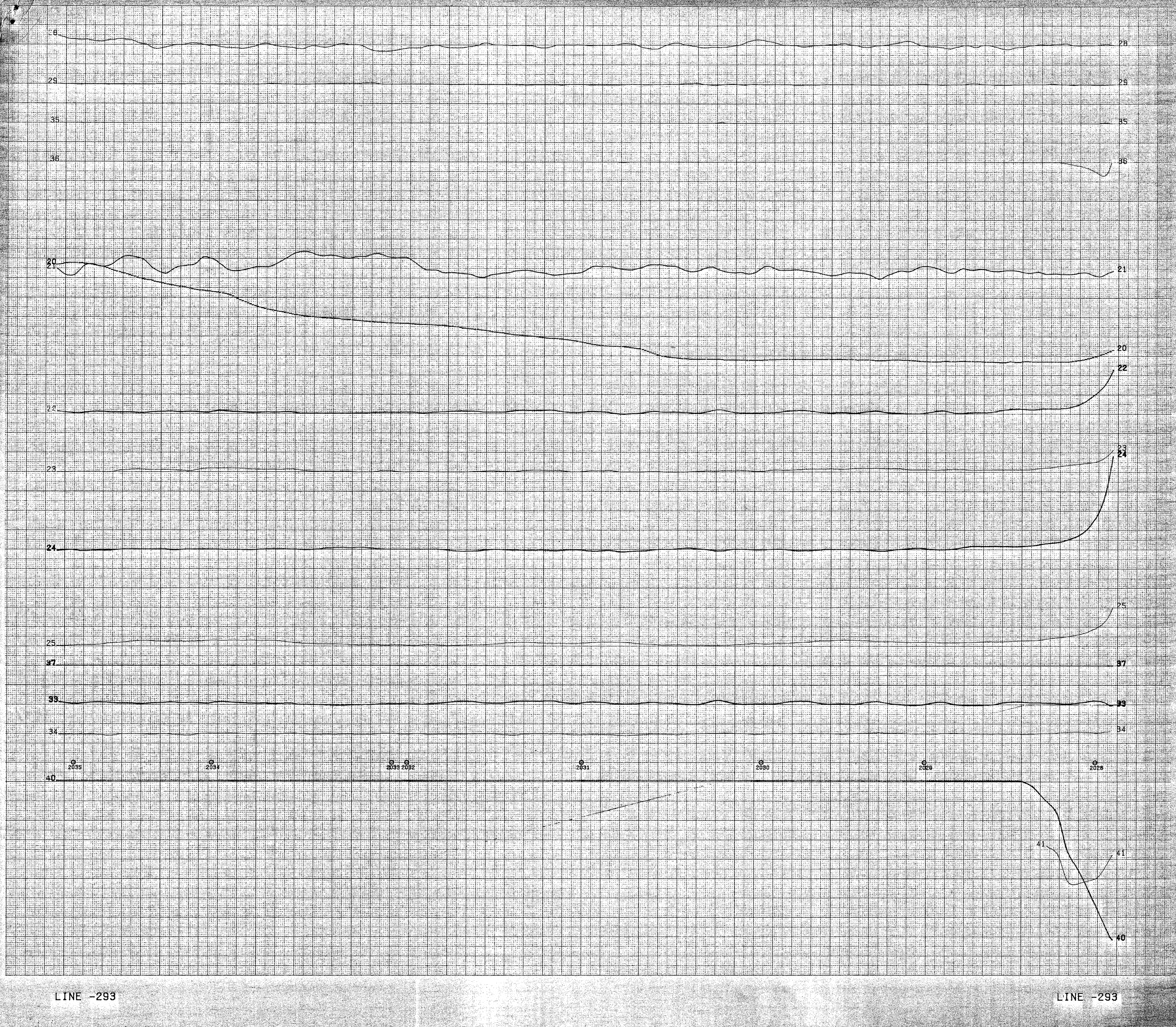
LINE 292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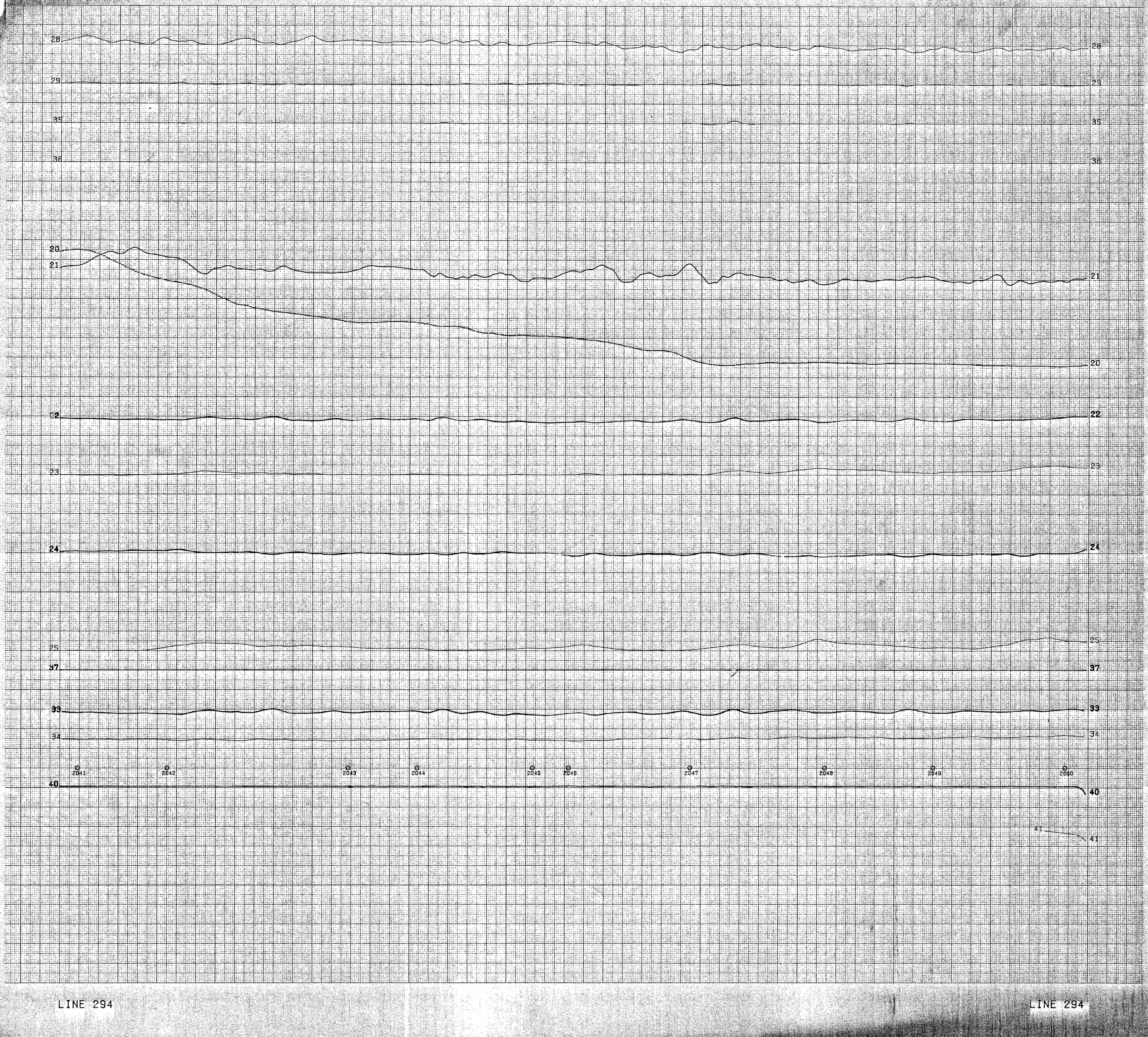
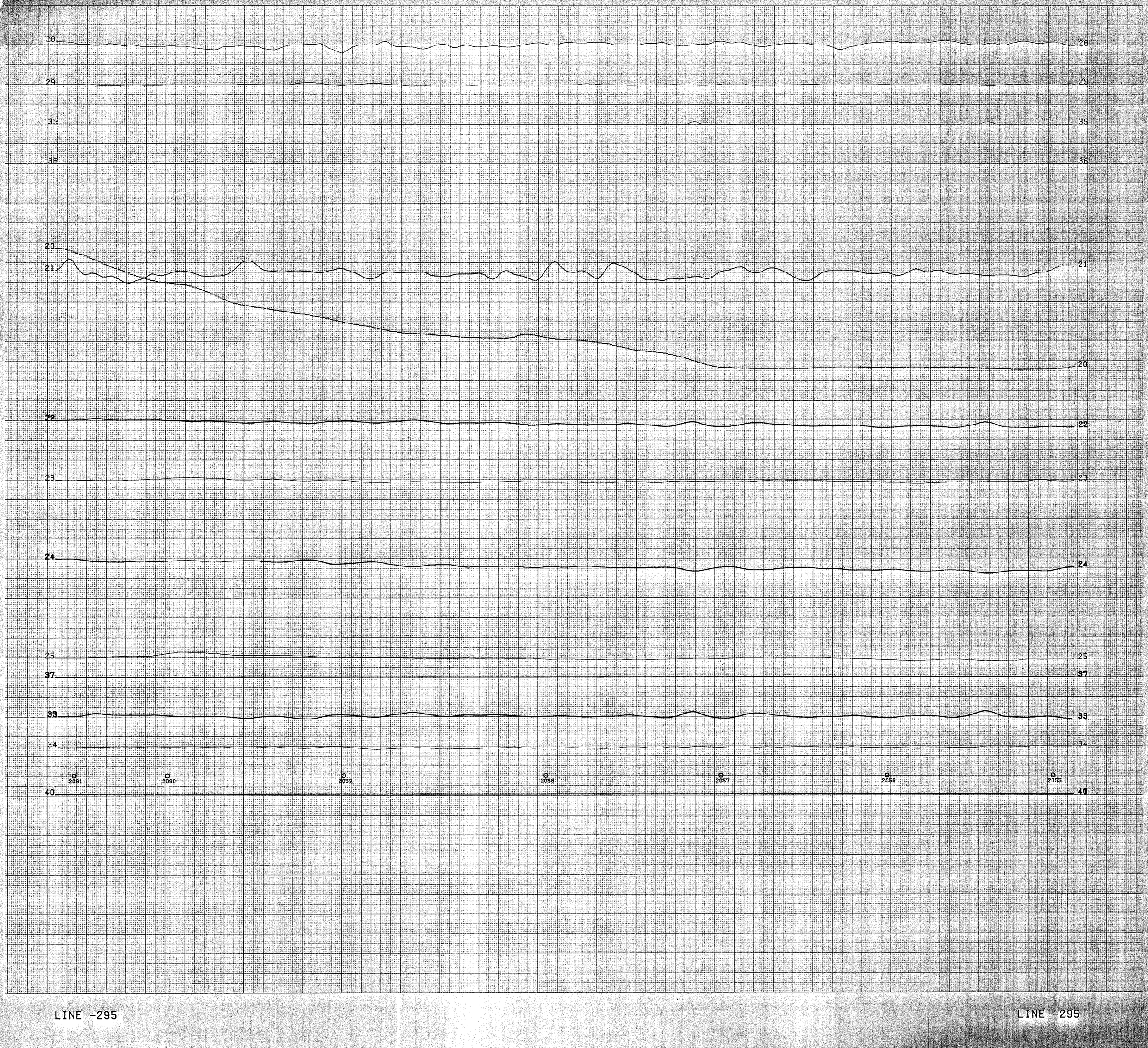
LINE -293
LINE -293

MILLIMETER
KEUFFEL & ESSER CO
K-E



LINE 294

LINE 294



LINE -295

LINE -295

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KEUFFEL & ESSER CO

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LINE 296

LINE 296

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LINE -297

LINE -297

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LINE 298

LINE 298

MILLIMETER
KEUFFEL & ESSER CO

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LINE -299

LINE -299

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LINE 300

LINE 300

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1 st. anomaly recognition function ch 35

2nd. anomaly recognition function ch 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm
0
Standard - inphase ch. 22

10 ppm
0
Standard - quadrature ch. 23

10 ppm
0
Whaletail - inphase ch. 24

10 ppm
0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m
0
Apparent depth ch. 41
30m
100 ohm-m
Resistivity ch. 40
10 ohm-m

ohm-m

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LINE -301 LINE -301

MILLIMETER
KEUFFEL & ESSER CO.
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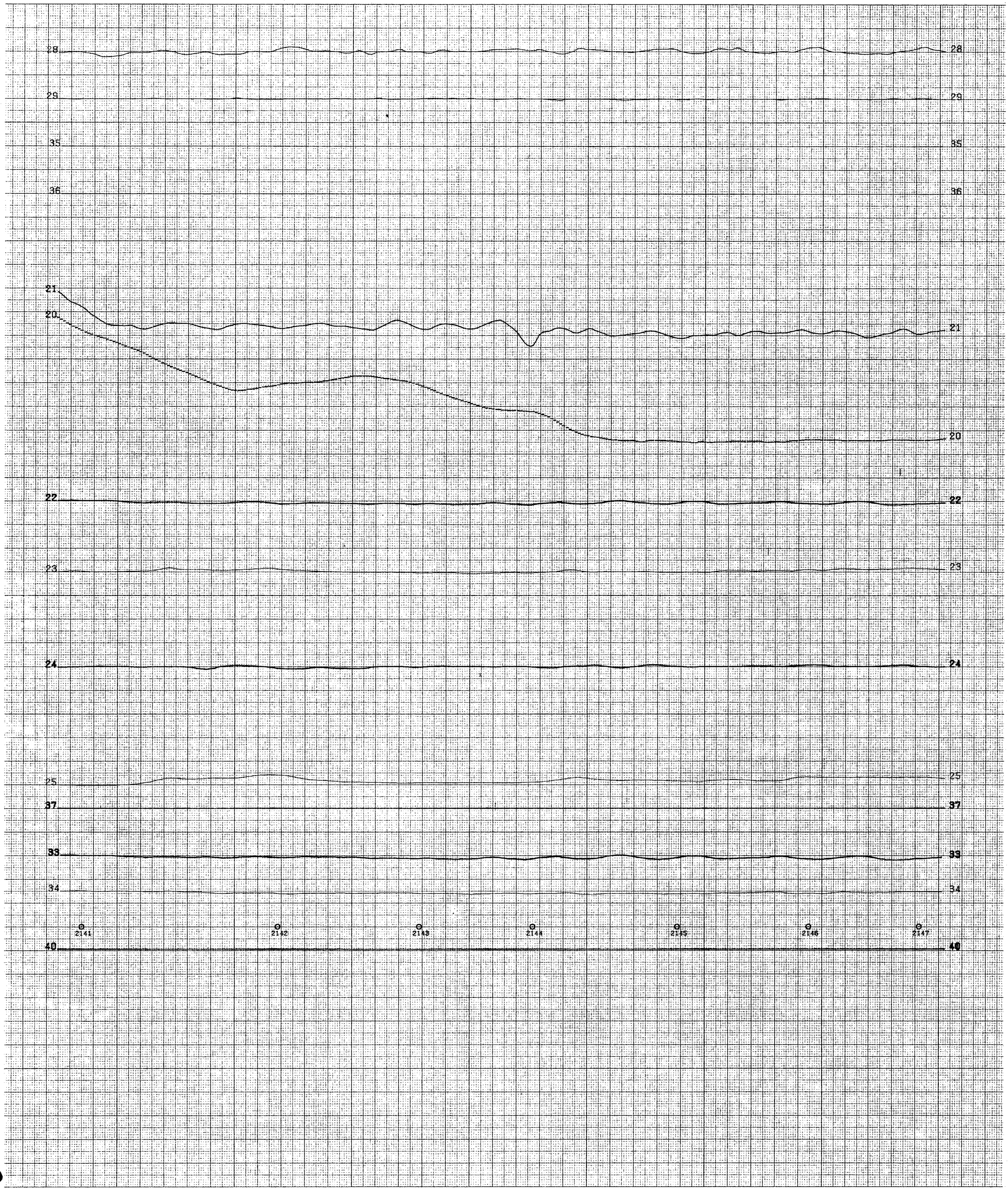

LINE 302

MILLIMETER
KEUFFEL & ESSER CO.
PRINTED IN U.S.A. 761250

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LINE -303

LINE -303

MILLIMETER
KEUFFEL & ESSER CO.
PRINTED IN U.S.A. 781250

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LINE 304

LINE 304

MILLIMETER
KEUFFEL & ESSER CO.
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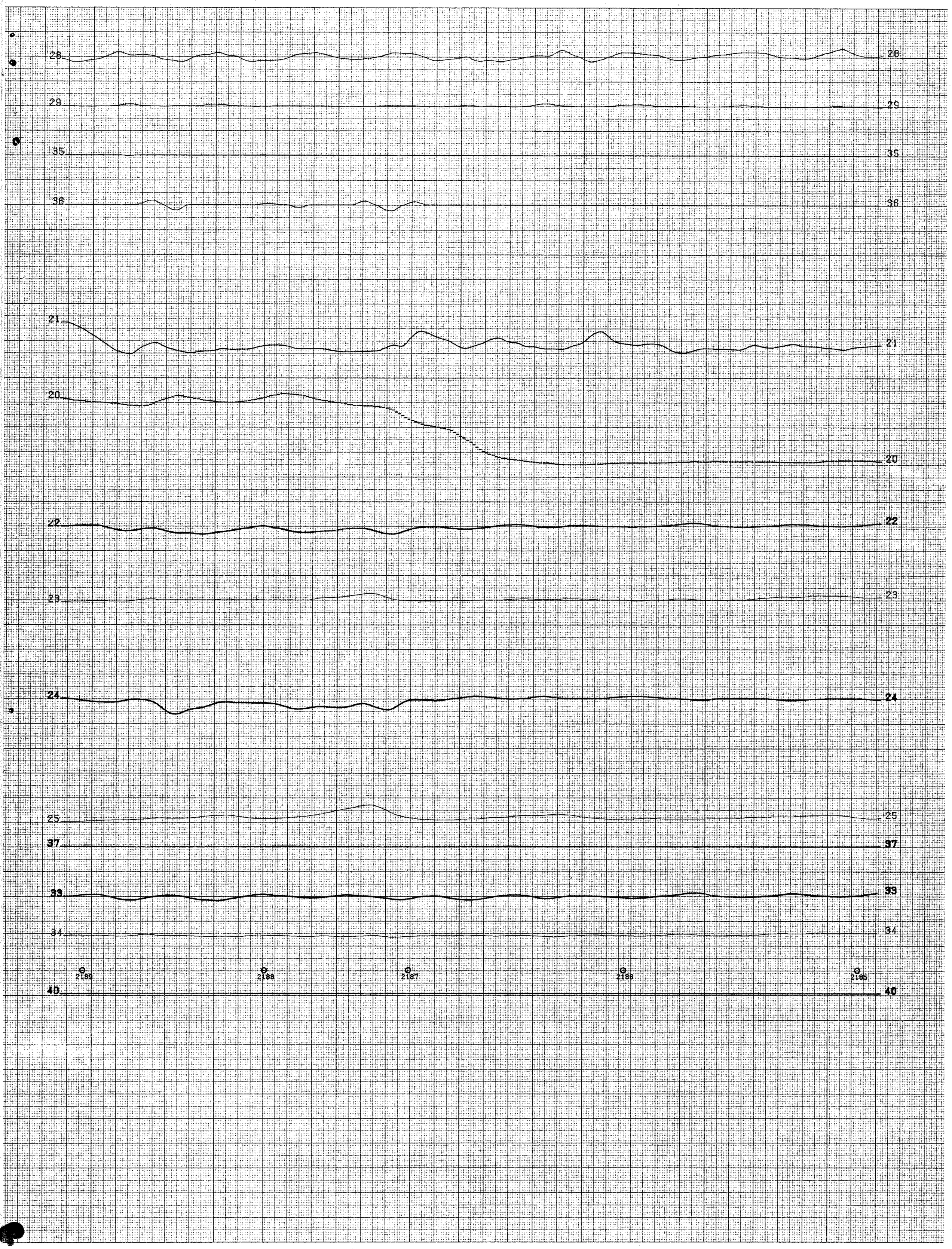

LINE -305

LINE -305

MILLIMETER
KEUFFEL & ESSER CO.
PRINTED IN U.S.A. 751250

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LINE 306

LINE 306

MILLIMETER
KEUFFEL & ESSER CO.
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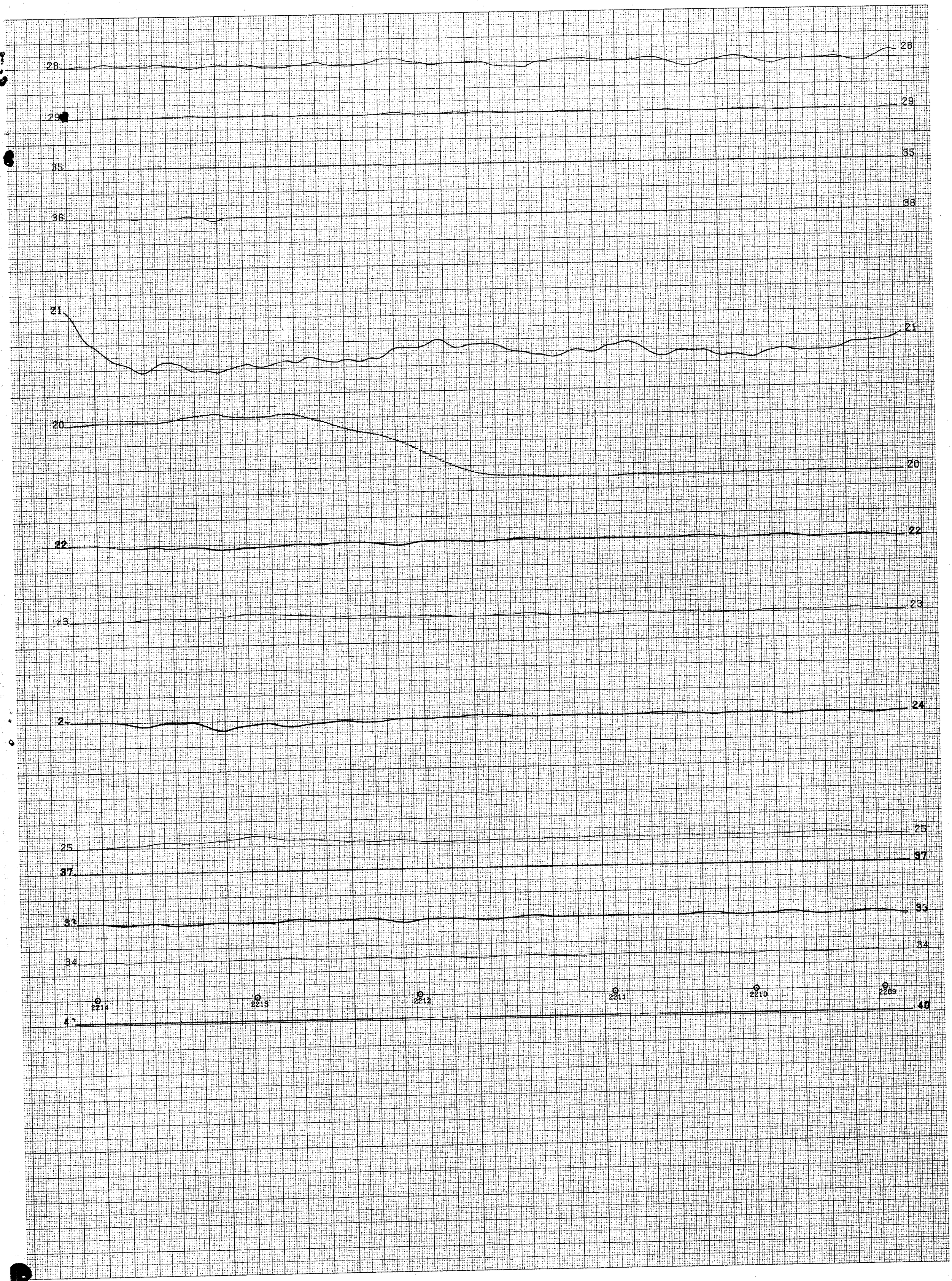

LINE -307

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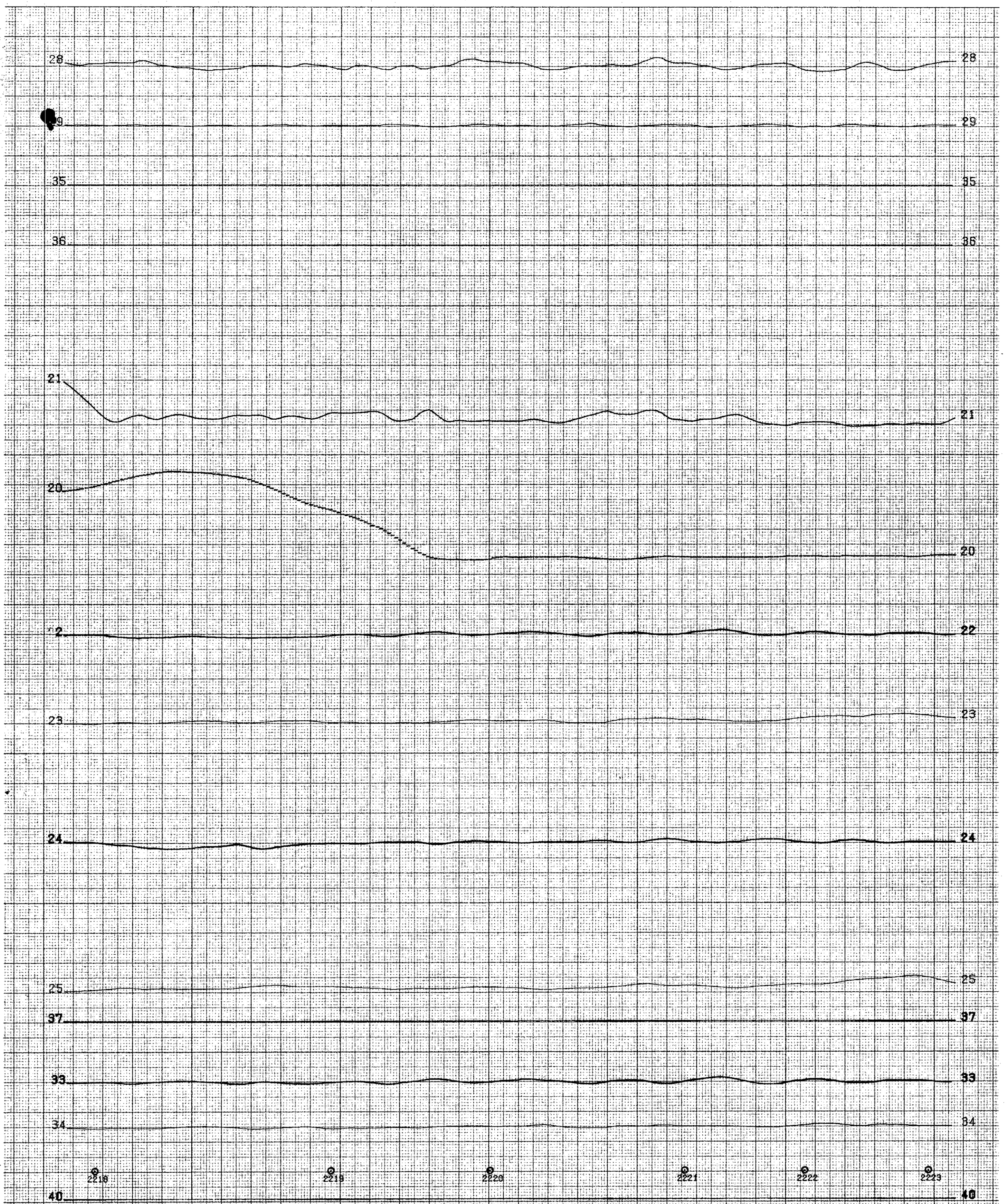

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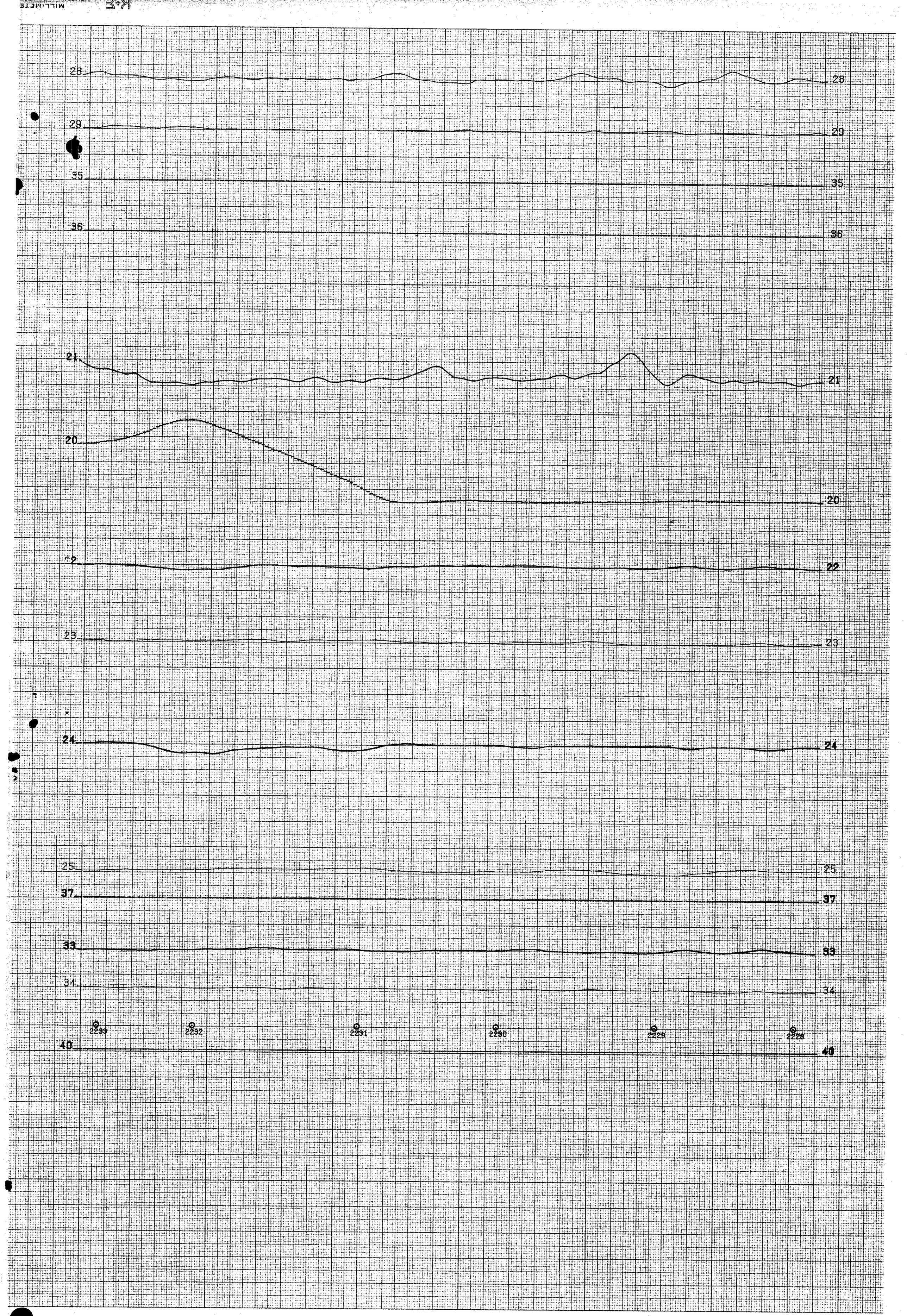

LINE -309

LINE -309

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch 36

200 / 100 / 0 — Bird altitude ch. 21

100 gammas — Magnetometer ch. 20

10 ppm / 0 — Standard - inphase ch. 22

10 ppm / 0 — Standard - quadrature ch. 23

10 ppm / 0 — Whaletail - inphase ch. 24

10 ppm / 0 — Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m / 0 / 30m / 100 ohm-m / 10 ohm-m / 1 ohm-m — Apparent depth ch. 41 / Resistivity ch. 40

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2240
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LINE 310

LINE 310

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm
0
Standard - inphase ch. 22

10 ppm
0
Standard - quadrature ch. 23

10 ppm
0
Whaletail - inphase ch. 24

10 ppm
0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m

0
30m
Apparent depth ch. 41

100 ohm-m

Resistivity ch. 40

10 ohm-m

1 ohm-m

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LINE -311

LINE -311

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2256

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LINE 312

LINE 312

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21 20 22 23 24 25 37 33 34 40

2267 2266 2265 2264 2263

LINE -313

LINE -313

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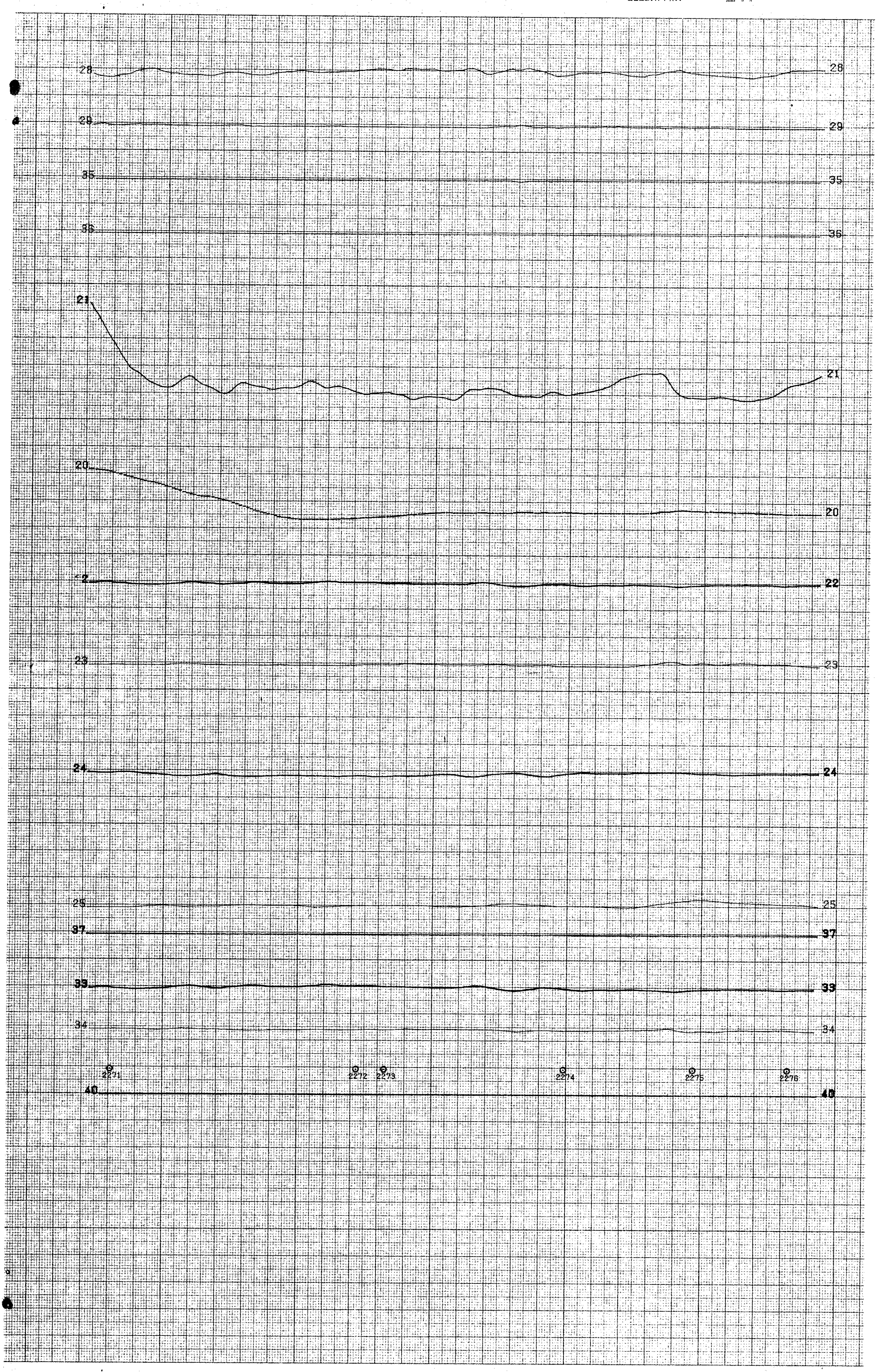

LINE 314

LINE 314

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LINE -315

LINE -315

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LINE 316

LINE 316

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LINE -317

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MILLIMETER
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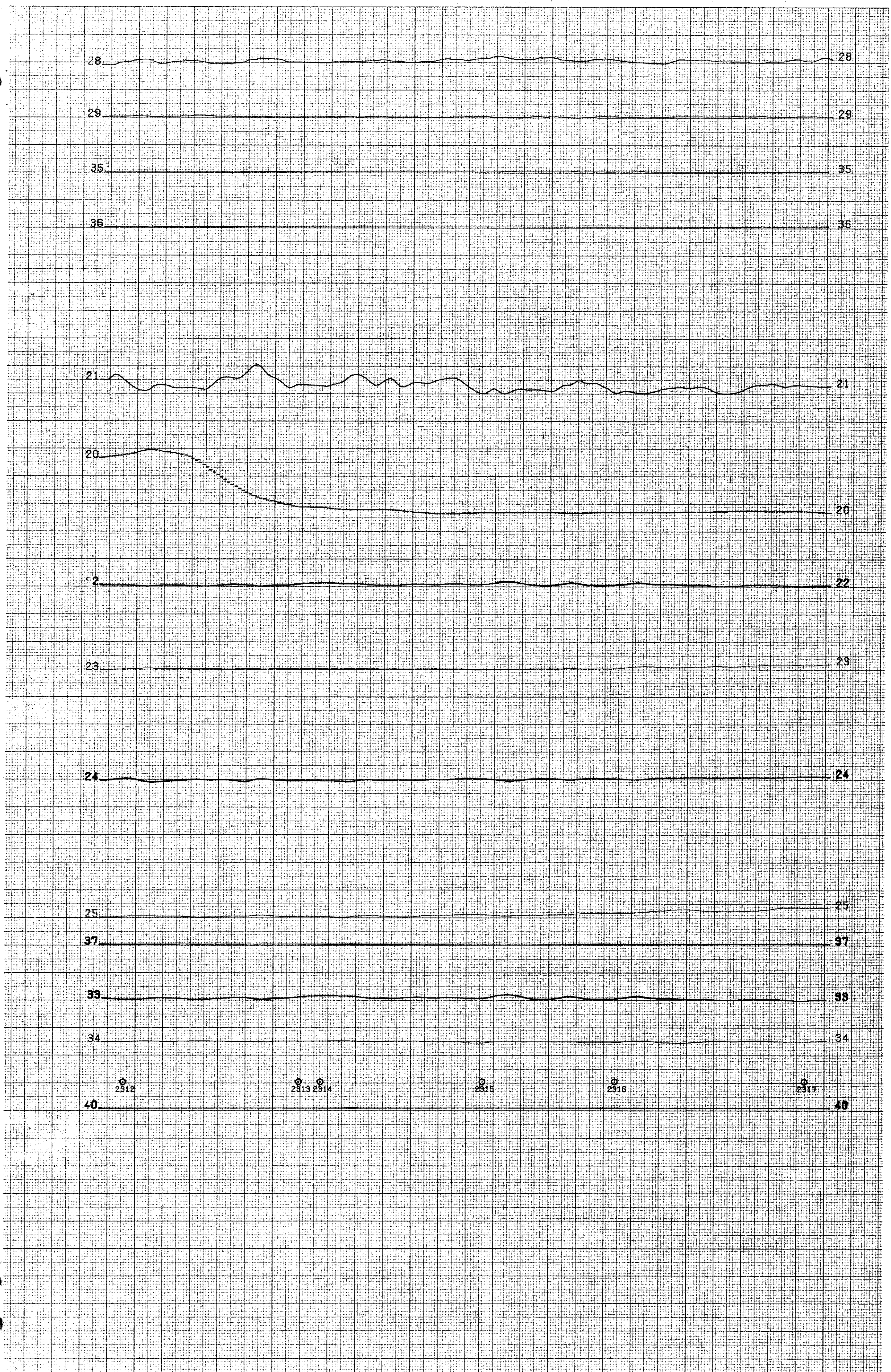
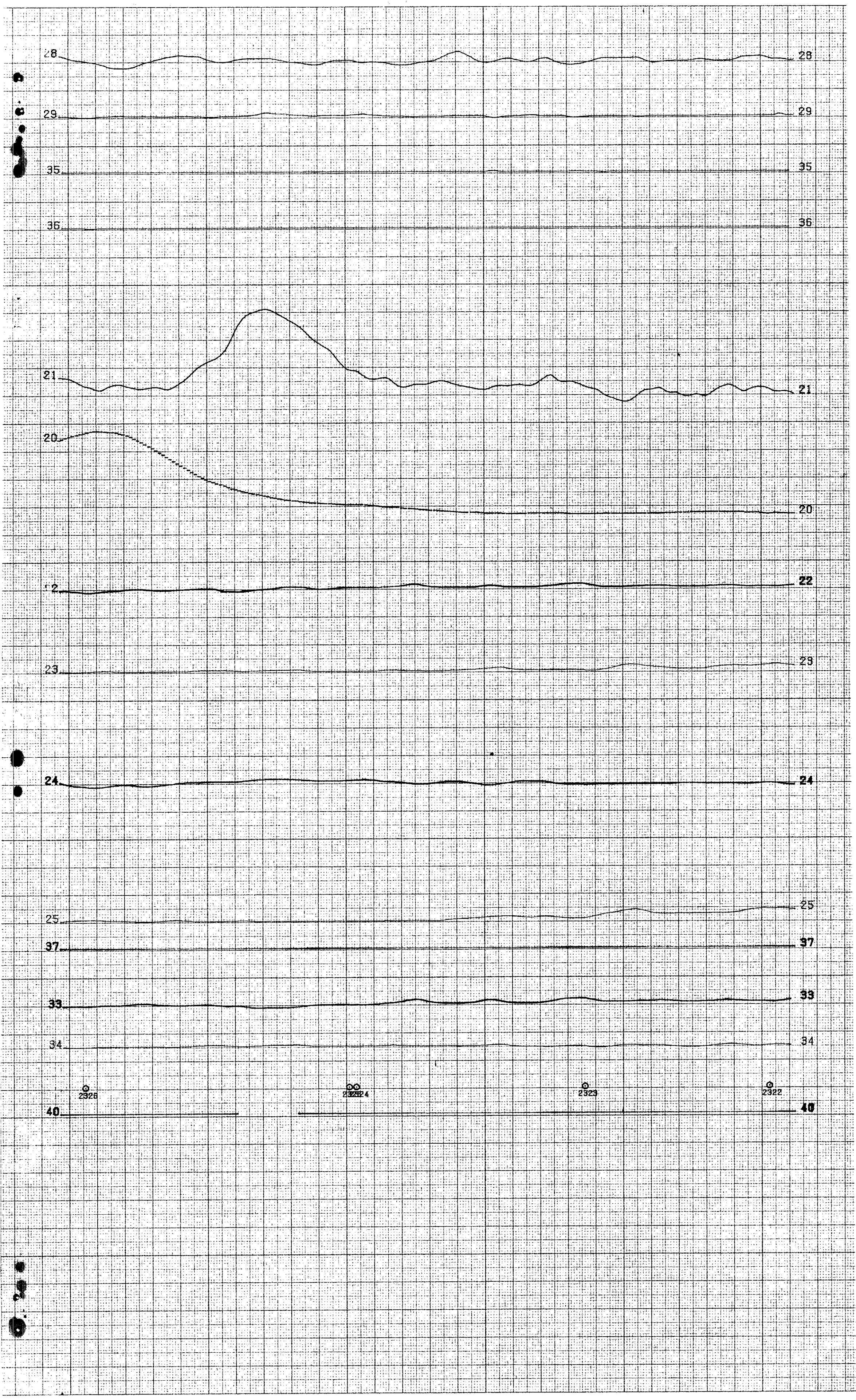


LINE 318

LINE 318



LINE -319

LINE -319

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MILLIMETER
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LINE 320

LINE 320

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm
0
Standard - inphase ch. 22

10 ppm
0
Standard - quadrature ch. 23

10 ppm
0
Whaletail - inphase ch. 24

10 ppm
0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m
0
Apparent depth ch. 41
30m
100 ohm-m
Resistivity ch. 40
10 ohm-m
ohm-m

MILLIMETER
KEUFFEL & ESSER CO
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LINE -321

LINE -321

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LINE 322 LINE 322

MILLIMETER
KEUFFEL & ESSER CO.

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LINE -323

LINE -323



LINE 324

LINE 324

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KEUFFEL & ESSER CO.
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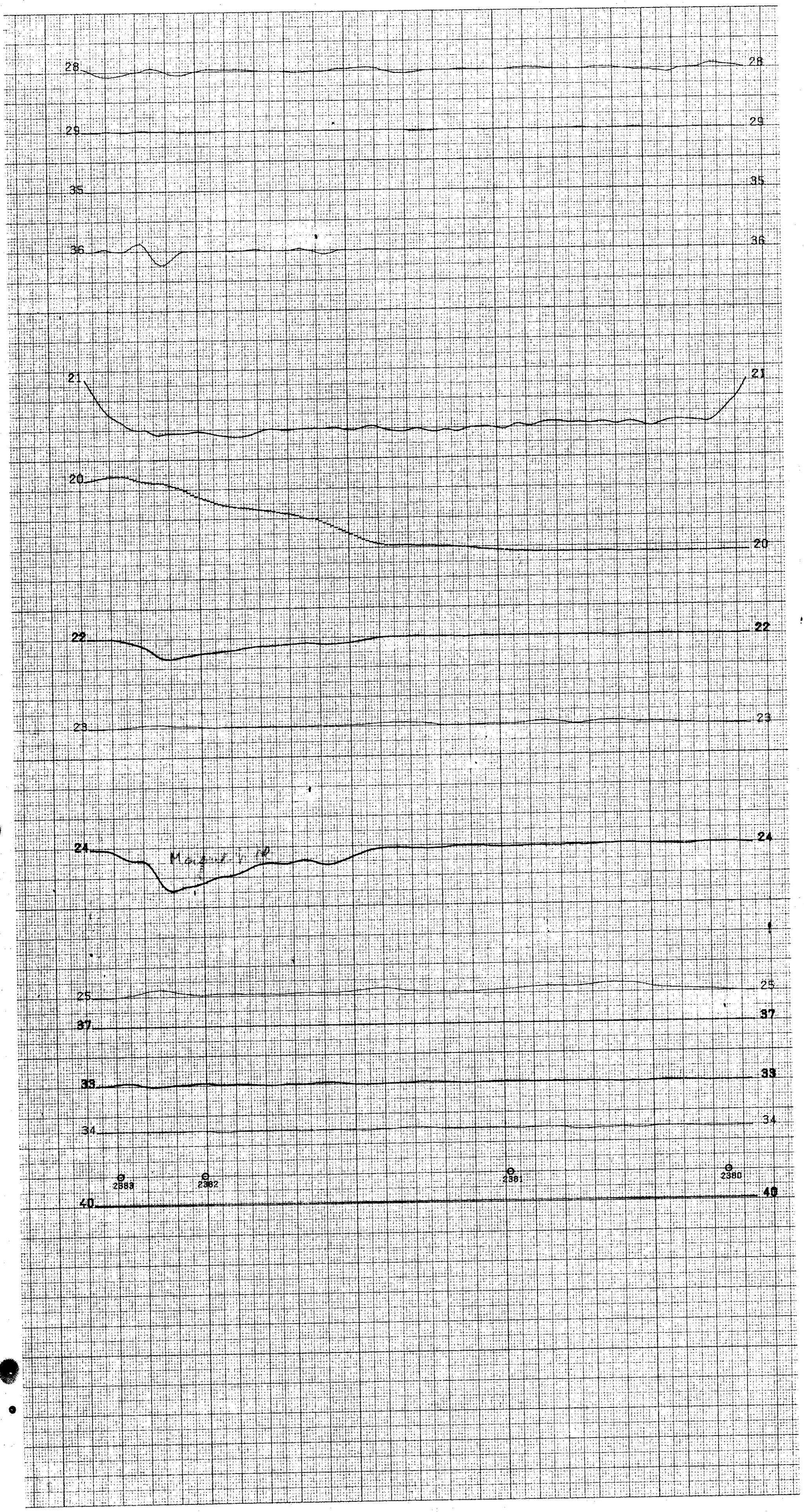


LINE -325

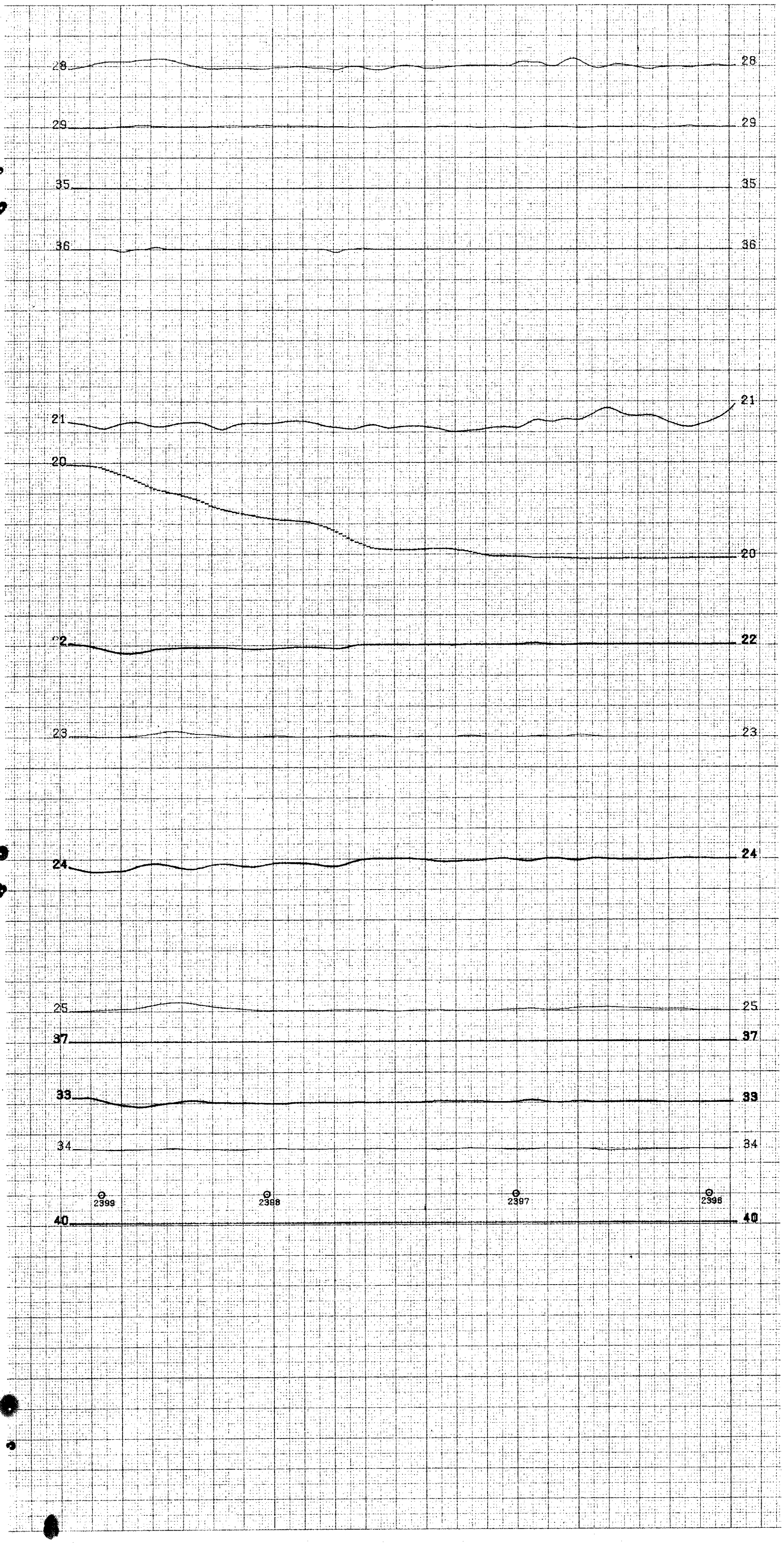
LINE -325



LINE 326

LINE 326

MILLIMETER
KEUFFEL & ESSER CO.



LINE -327

LINE -327

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LINE 328

LINE 328

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LINE -329

LINE -329

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LINE 330

LINE 330

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1 st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm 0
Standard - inphase ch. 22

10 ppm 0
Standard - quadrature ch. 23

10 ppm 0
Whaletail - inphase ch. 24

10 ppm 0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m
0
Apparent depth ch. 41
30m
100 ohm-m
Resistivity ch. 40
10 ohm-m
ohm-m

3314

28

29

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36

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LINE -331

LINE -331

MILLIMETER
KEUFFEL & ESSER CO

28 29 35 36

21 20 22 23

24 25 37 33 34 40

2437 2438 2439 2440 2441

LINE 332

LINE 332

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LINE -333

LINE -333

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28 29 35 36 21 20 22 23 24 25 37 33 34 40 41

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LINE 334

LINE 334



LINE -335

LINE -335

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LINE 336

LINE 336

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LINE -337

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MILLIMETER
KEUFFEL & ESSER CO.
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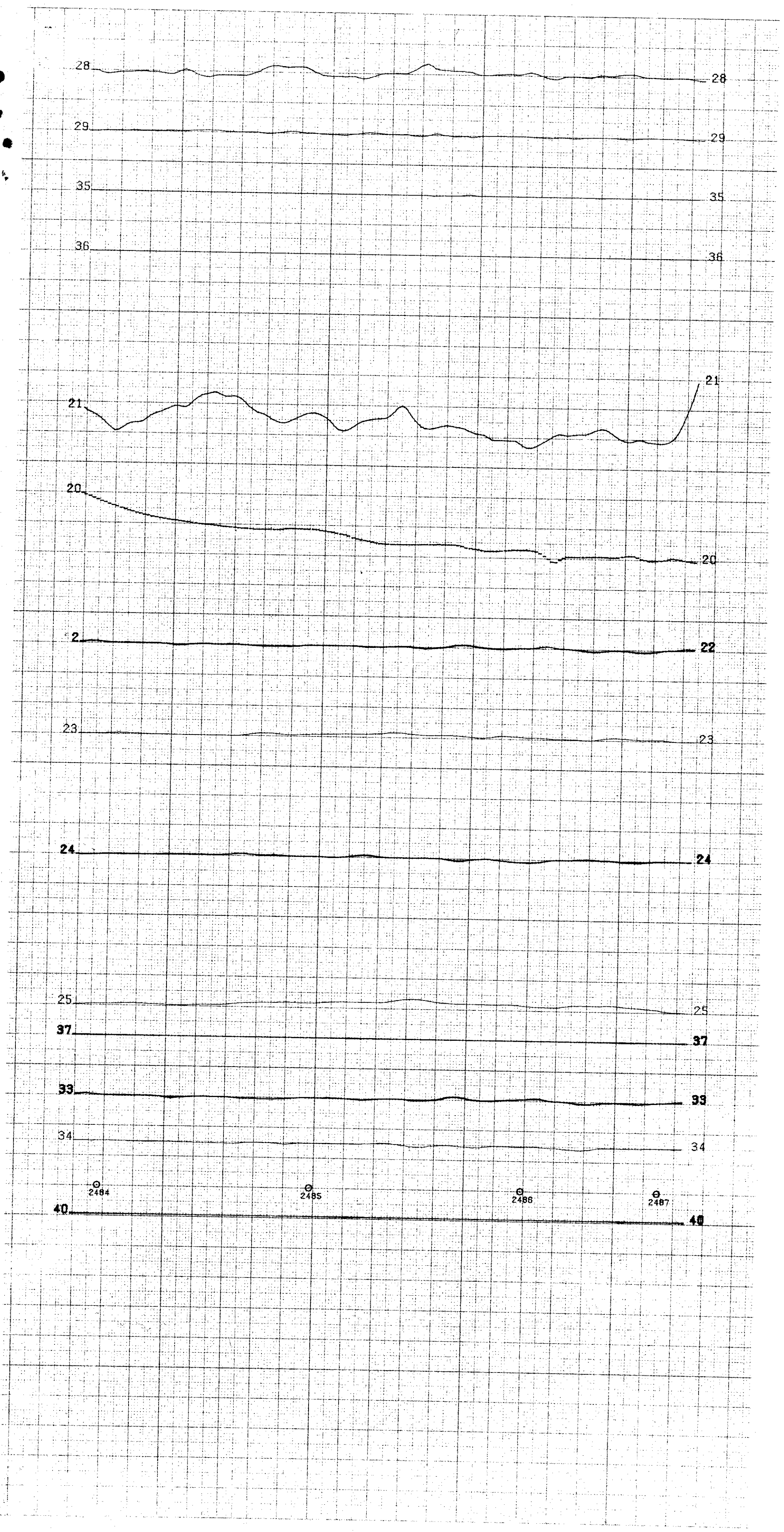

LINE 338

LINE 338

MILLIMETER
KEUFFEL & ESSER CO.
U.S.A. 718250

28 29 35 36 21 20 22 23 24 25 37 33 34 40

2494 2493 2492 2491

LINE -339 LINE -339

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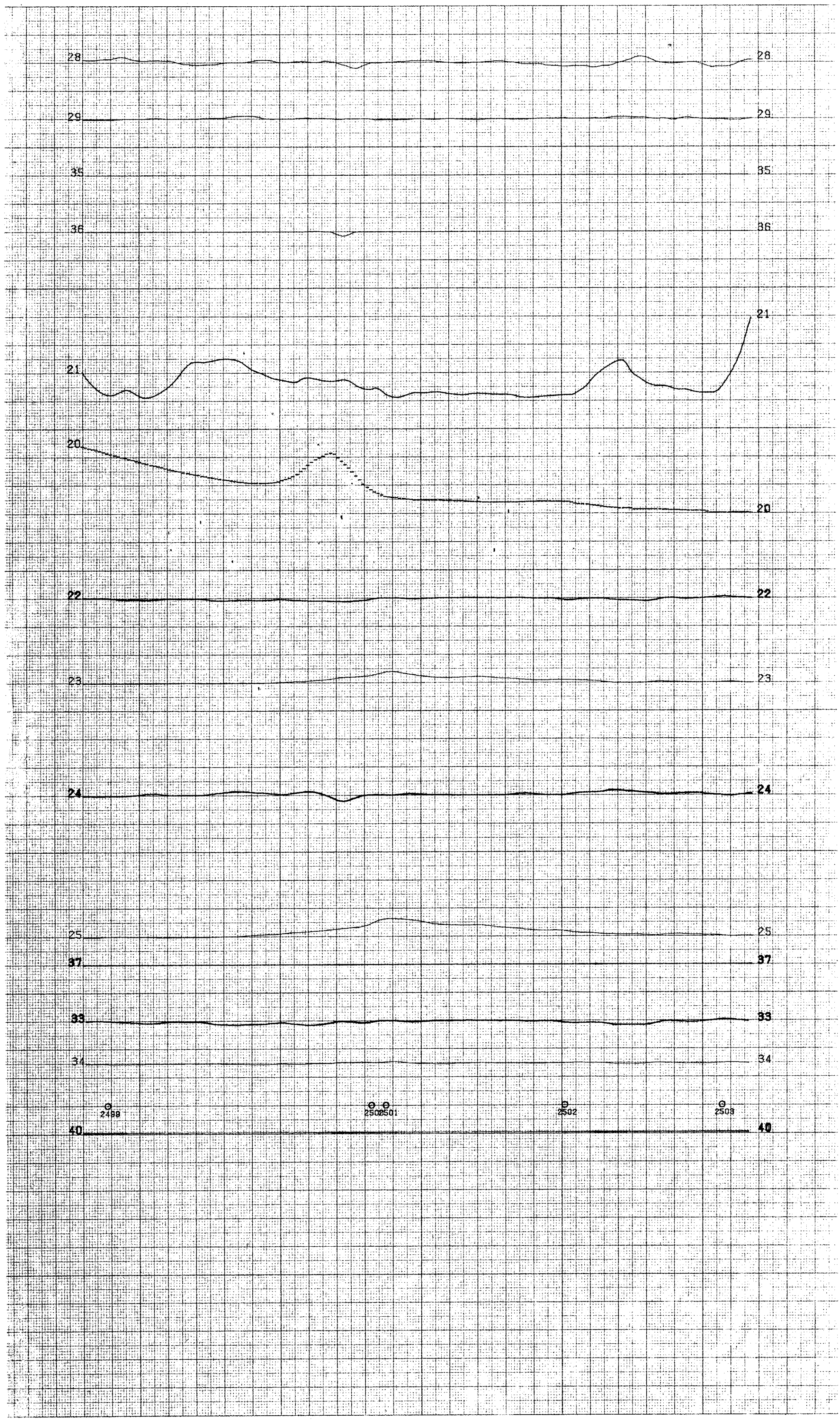

LINE 340

LINE 340

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch 36

200 / 100 / 0 — Bird altitude ch. 21

100 gammas — Magnetometer ch. 20

10 ppm / 0 — Standard - inphase ch. 22

10 ppm / 0 — Standard - quadrature ch. 23

10 ppm / 0 — Whaletail - inphase ch. 24

10 ppm / 0 — Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m

0 — Apparent depth ch. 41

30m

100 ohm-m

Resistivity ch. 40

10 ohm-m

ohm-m

28

29

35

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LINE -1

LINE -1

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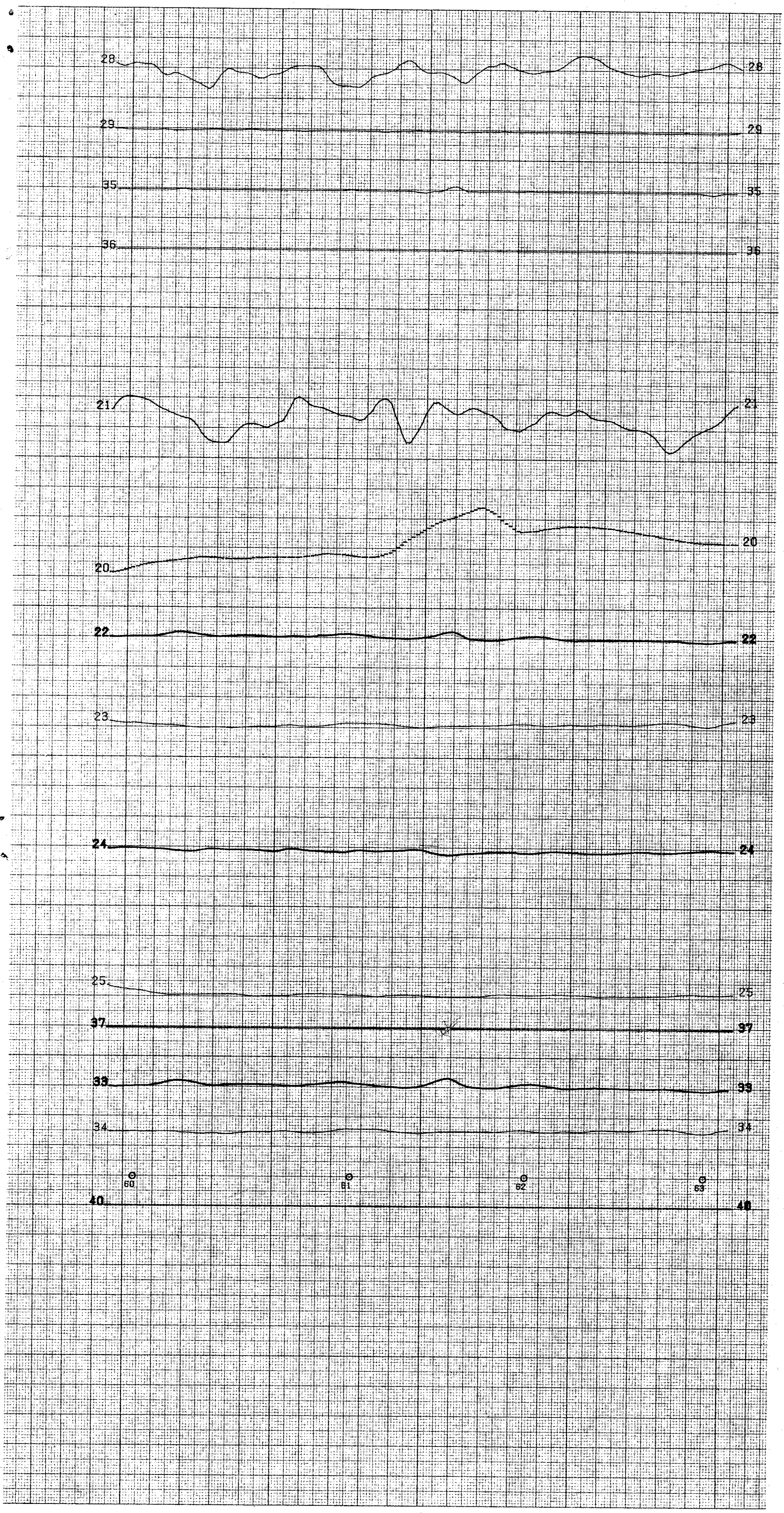

LINE 2

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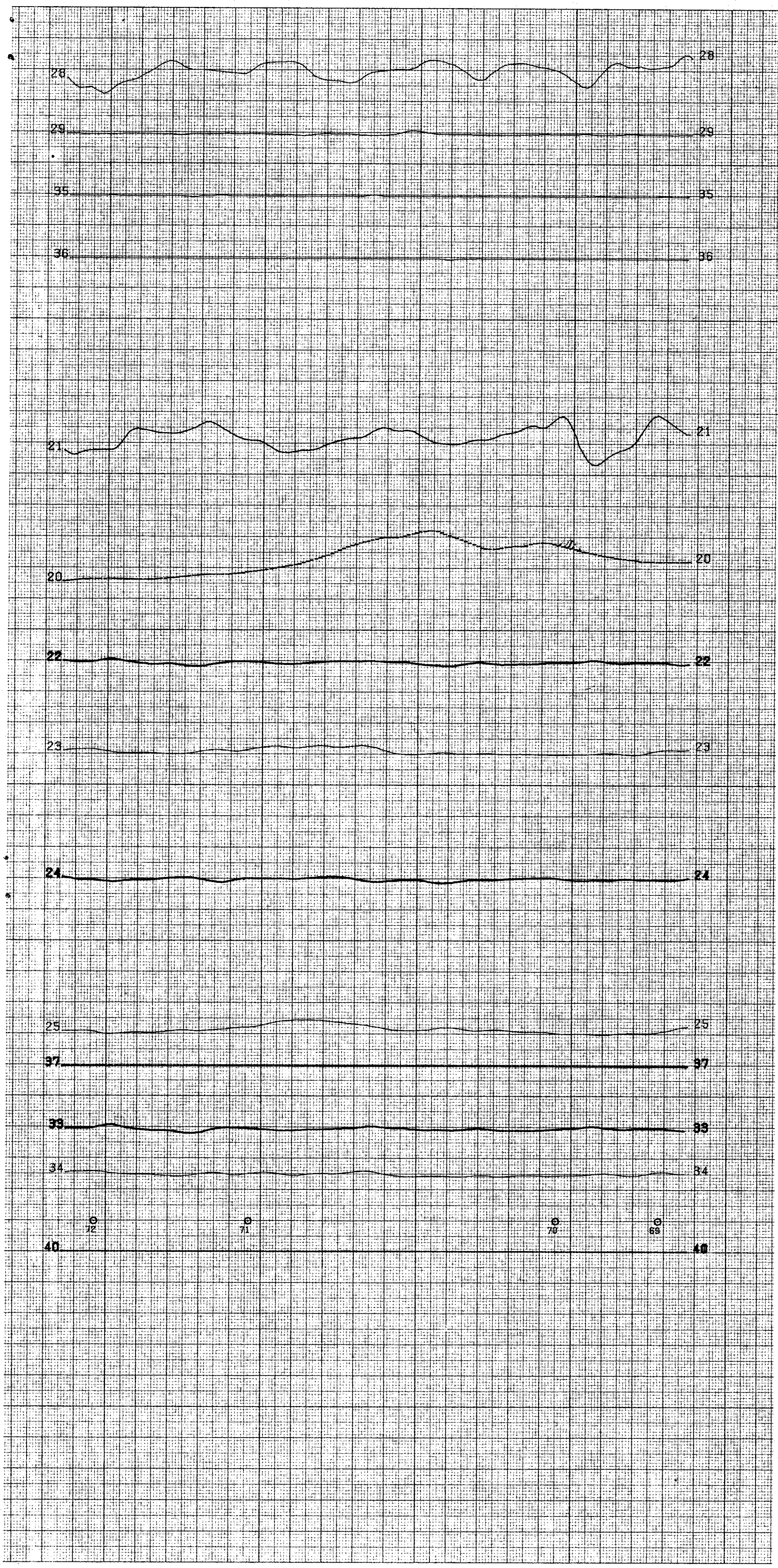

LINE -3

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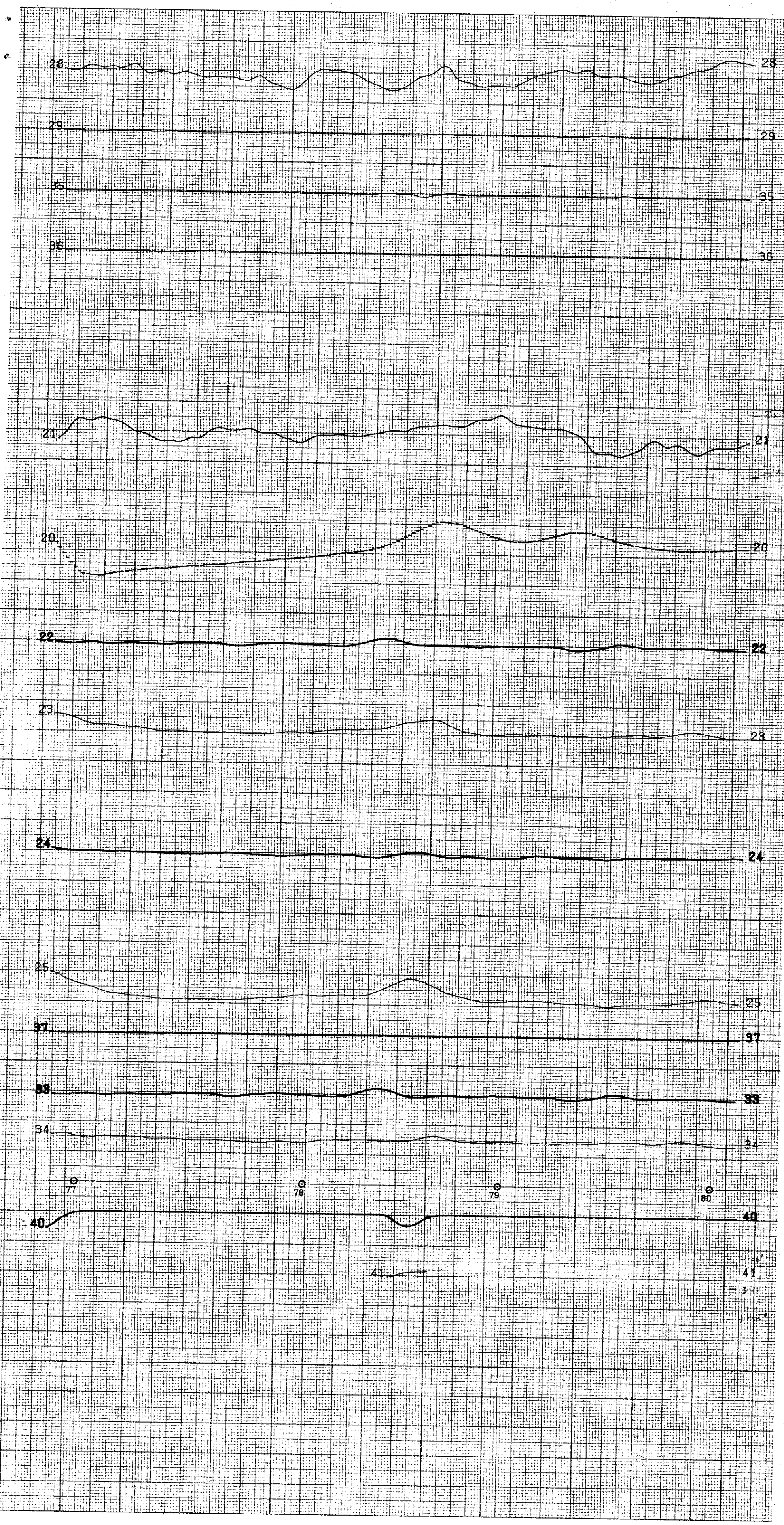

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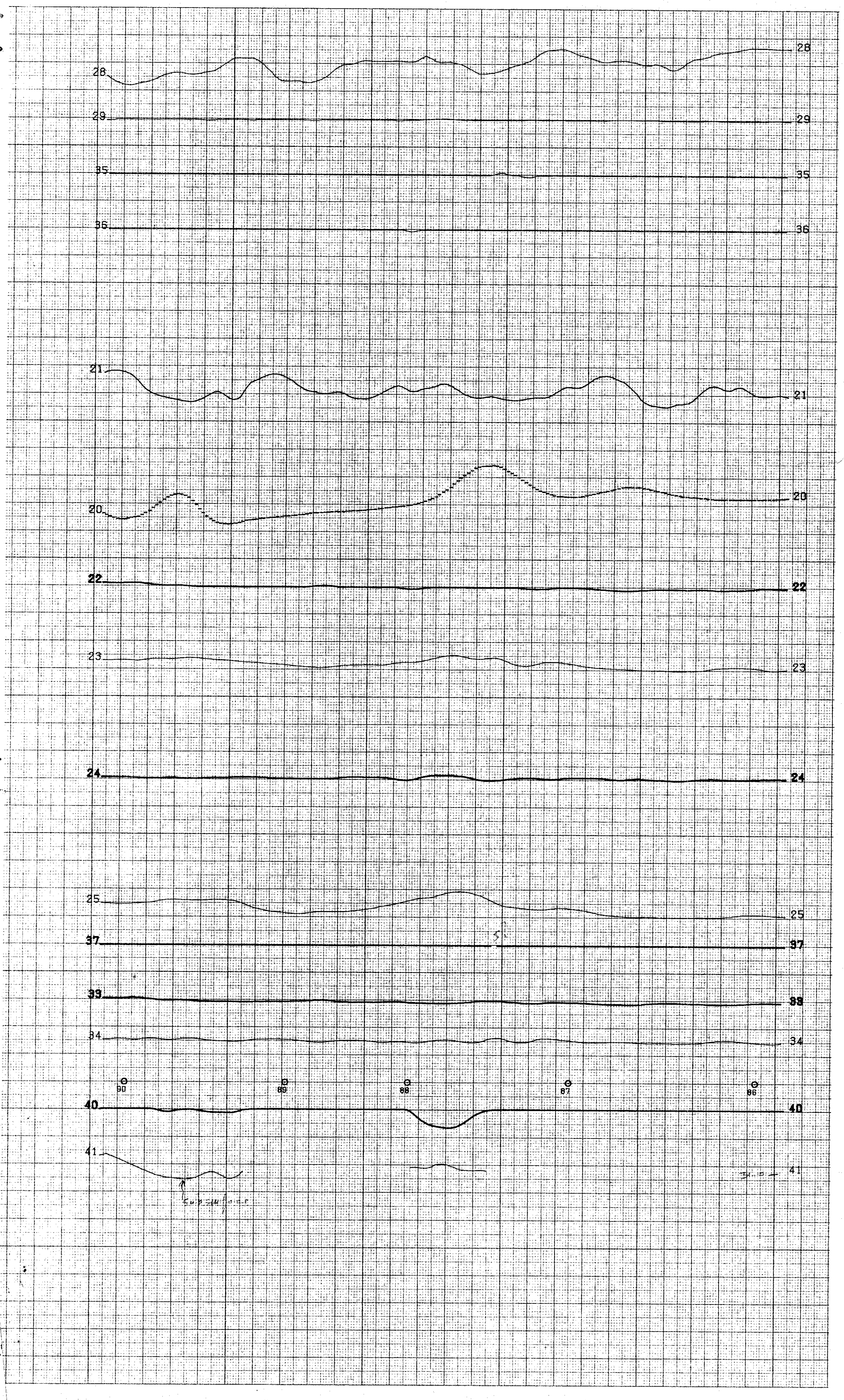
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LINE -5
LINE -5

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LINE 6

LINE 6

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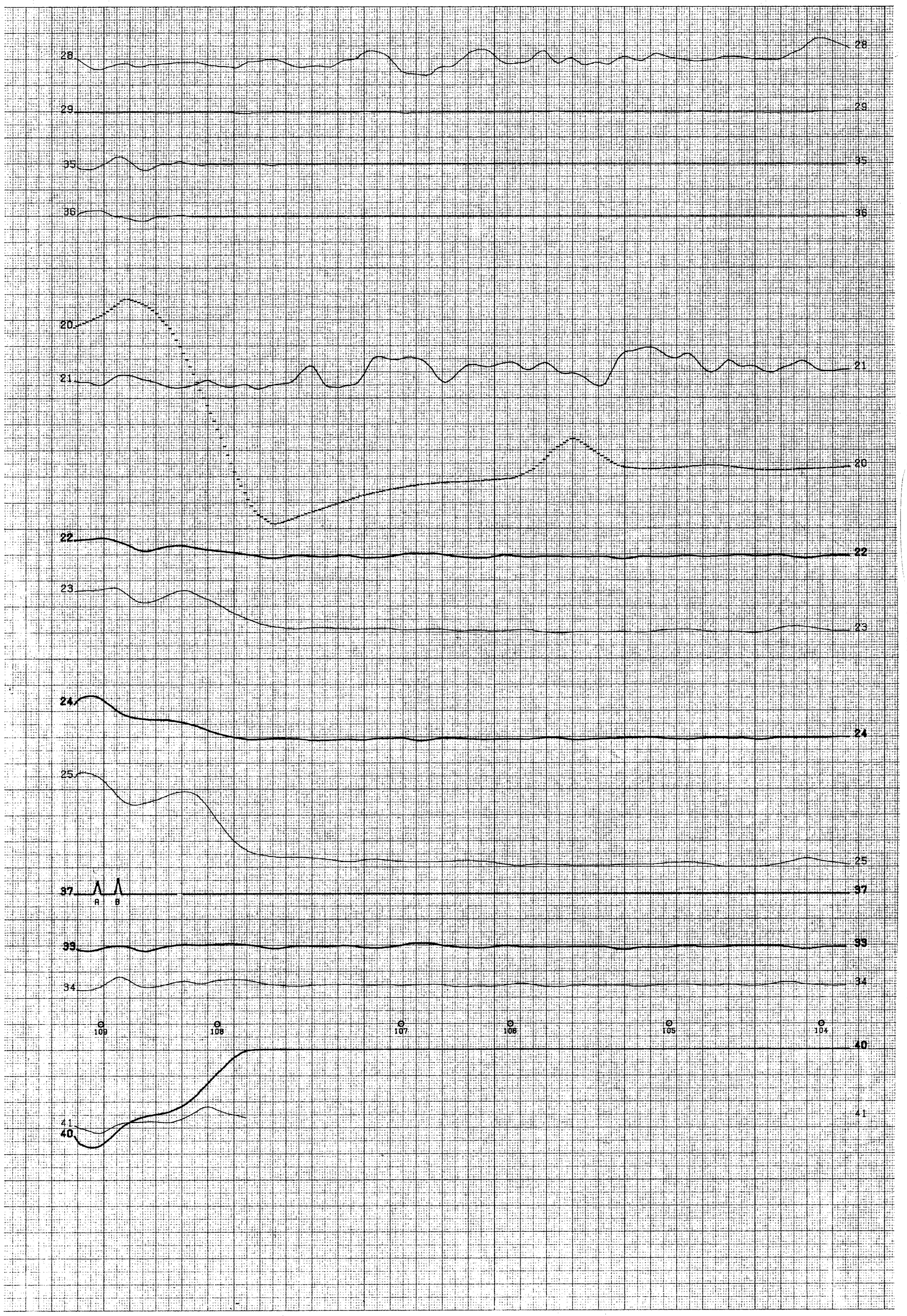

LINE -7

LINE -7

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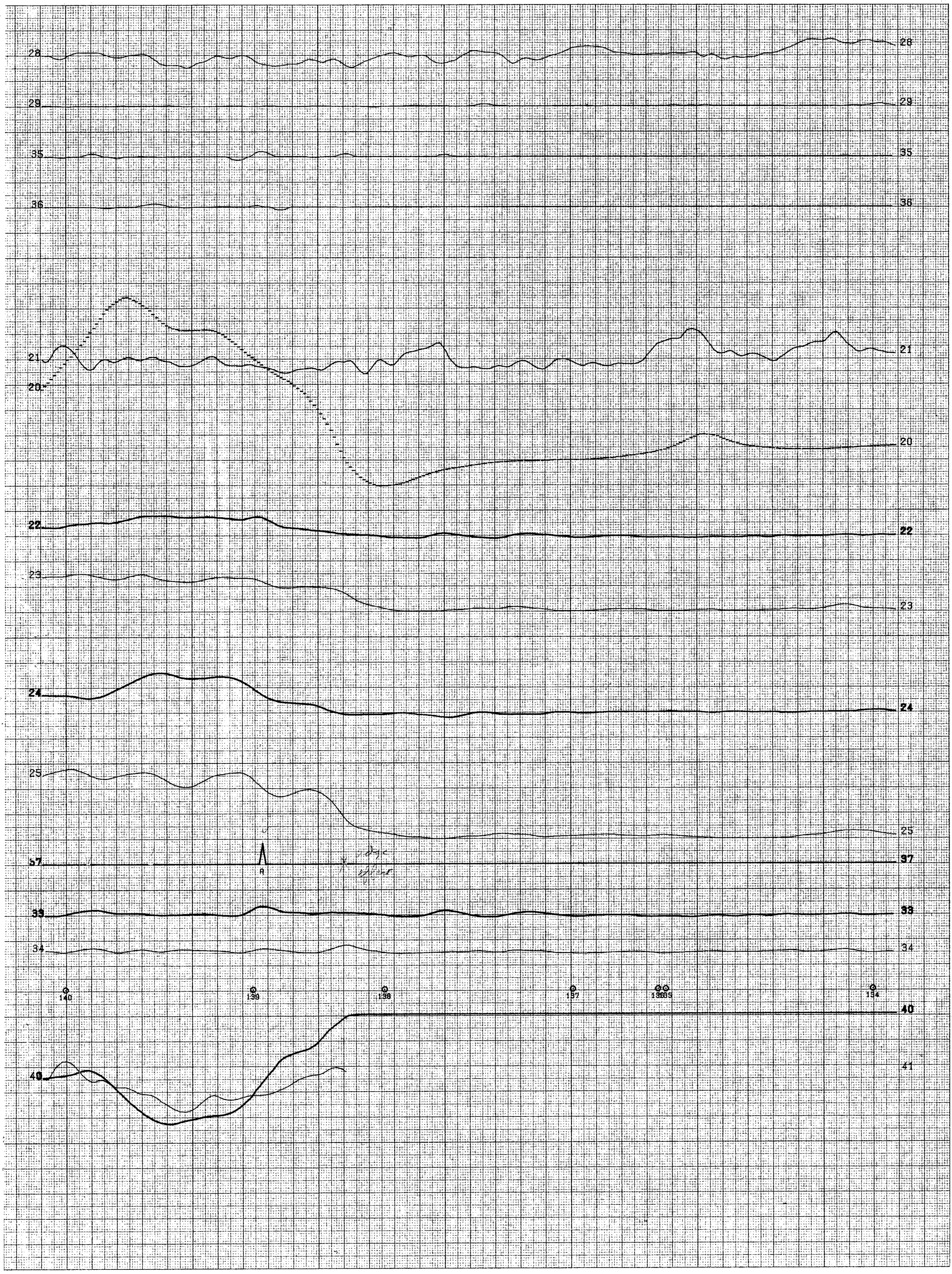
LINE 8

LINE 8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LINE -9
LINE -9

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LINE 10

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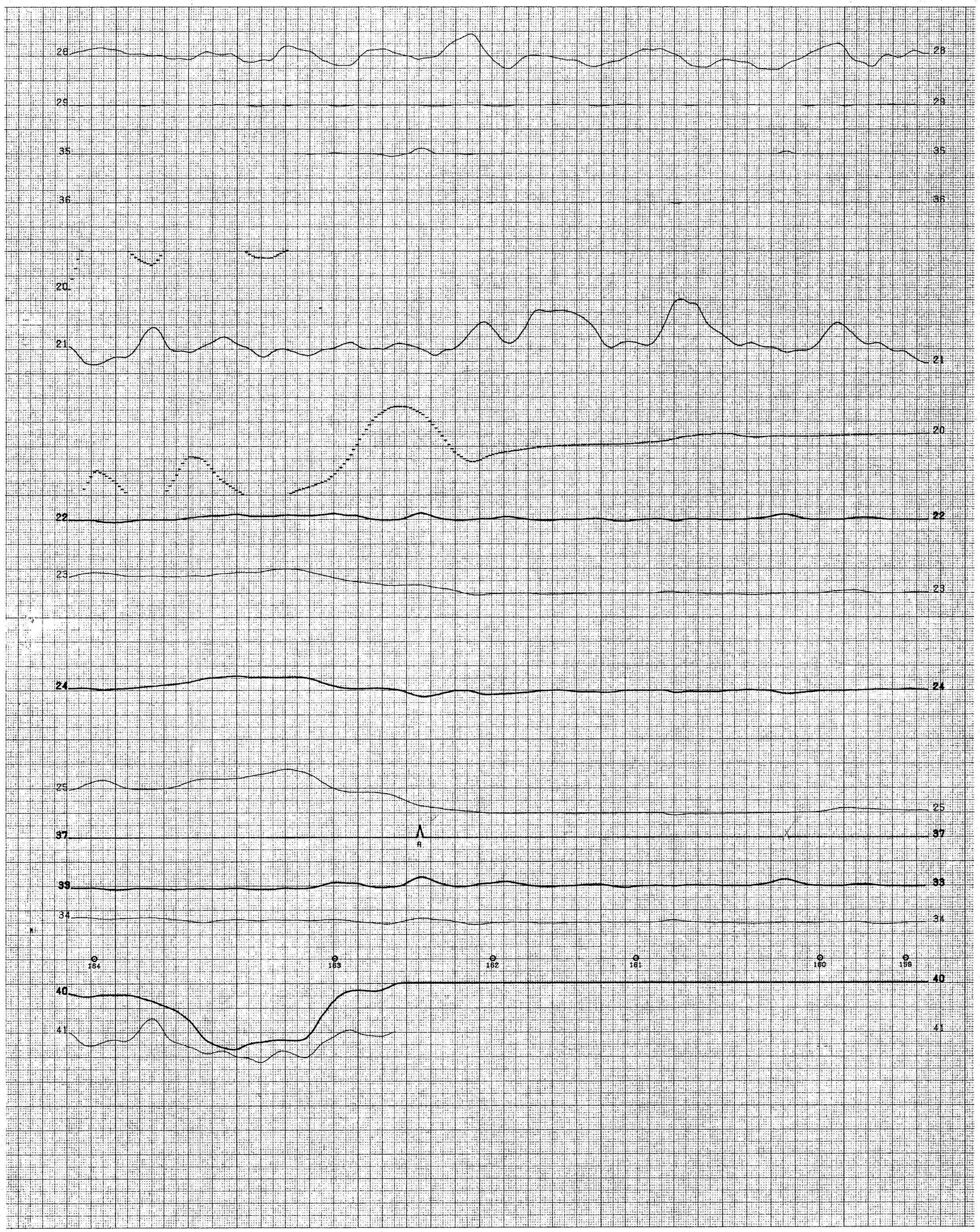

LINE -11

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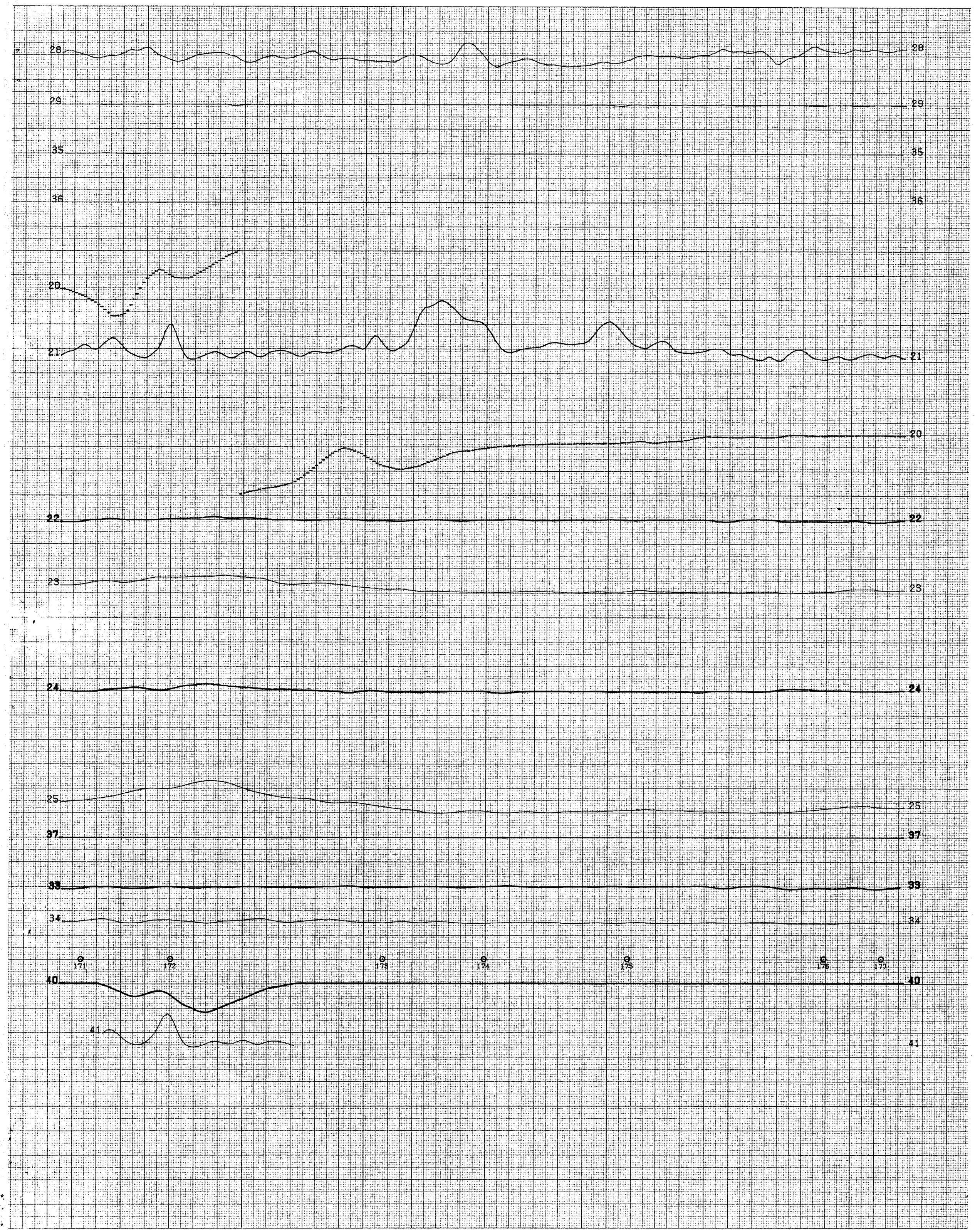

LINE 12

LINE 12

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LINE -13

LINE -13

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LINE 14

LINE 14

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KEUFFEL & ESSER CO.
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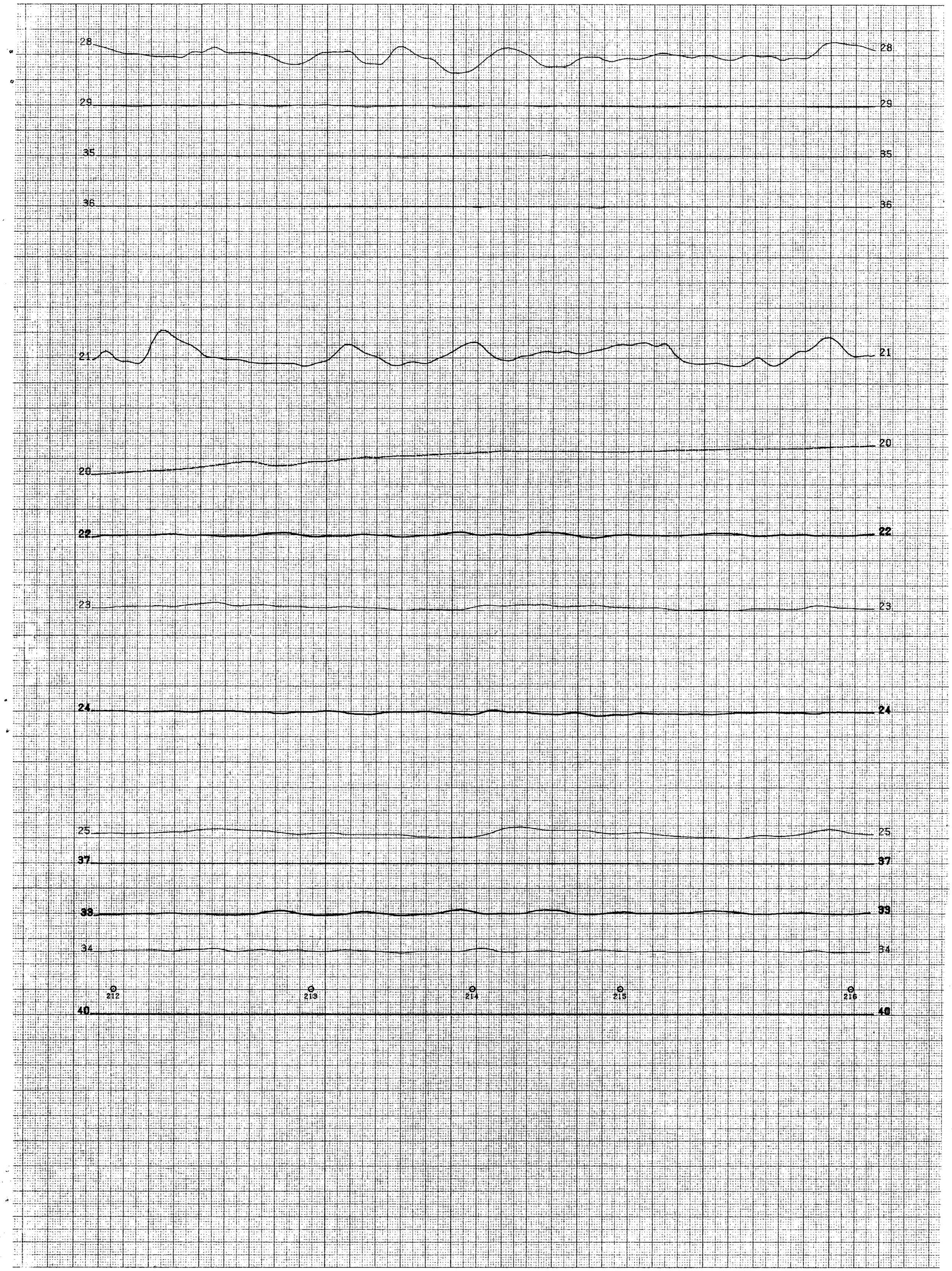
LINE -15 LINE -15



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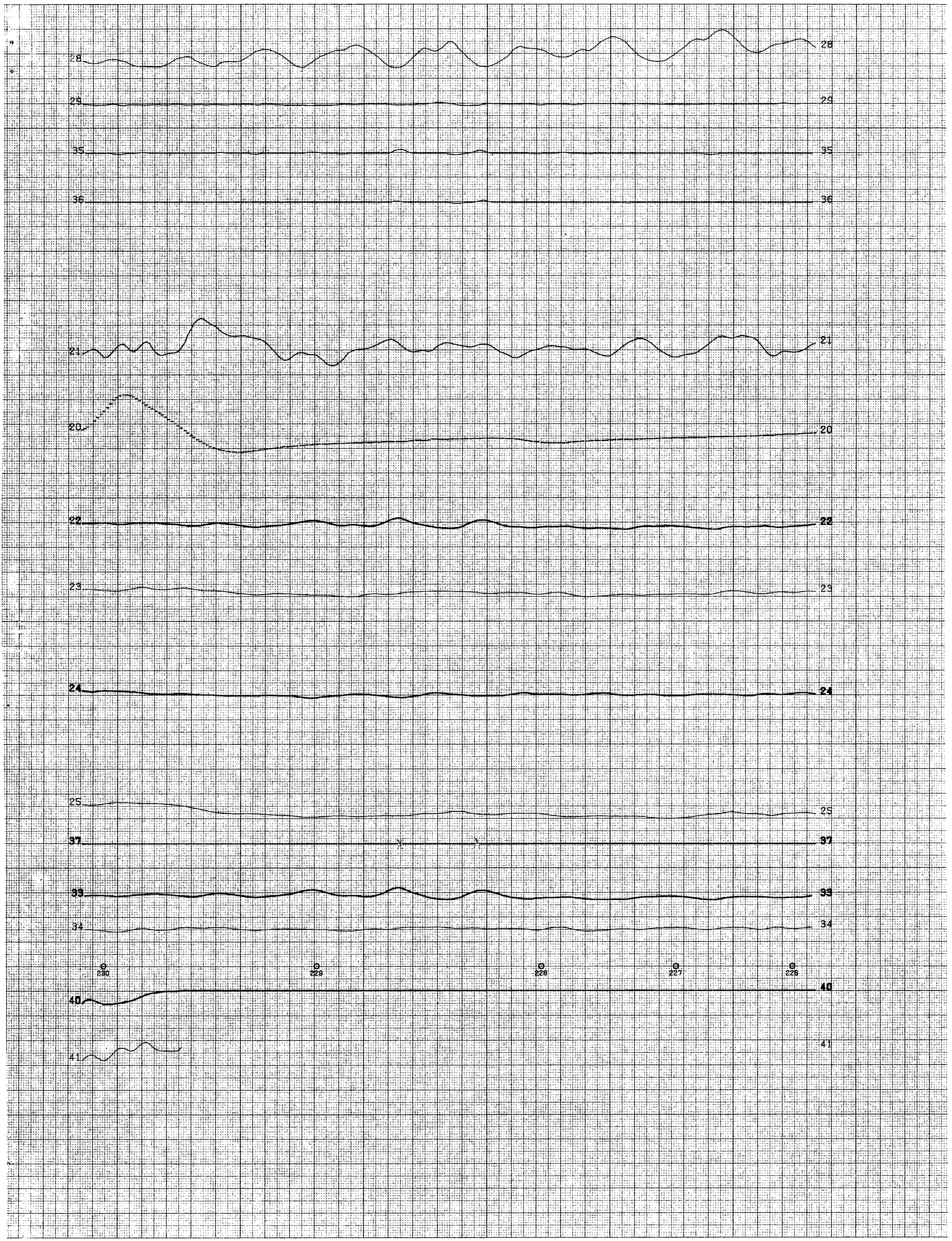

LINE -17

LINE -17

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LINE 18

LINE 18

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28 29 35 36

21 20 22 23

24 25 37 33 34

250 249 248 247 246

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LINE -19

LINE -19

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch. 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm
0
Standard - inphase ch. 22

10 ppm
0
Standard - quadrature ch. 23

10 ppm
0
Whaletail - inphase ch. 24

10 ppm
0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m
100 ohm-m
10 ohm-m
1 ohm-m
0
30m
Apparent depth ch. 41

Resistivity ch. 40

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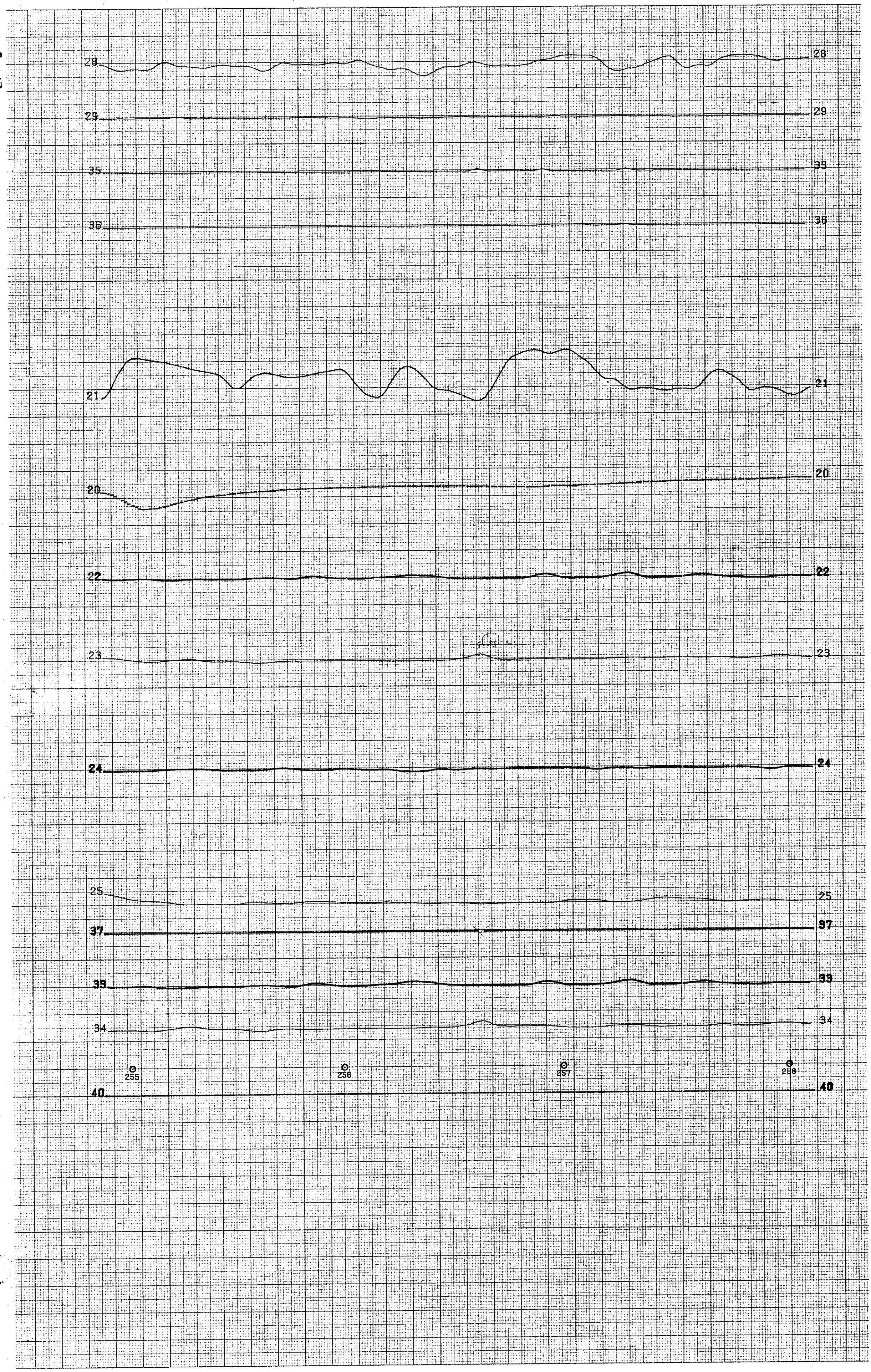

LINE 20

LINE 20

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LINE -21

LINE -21

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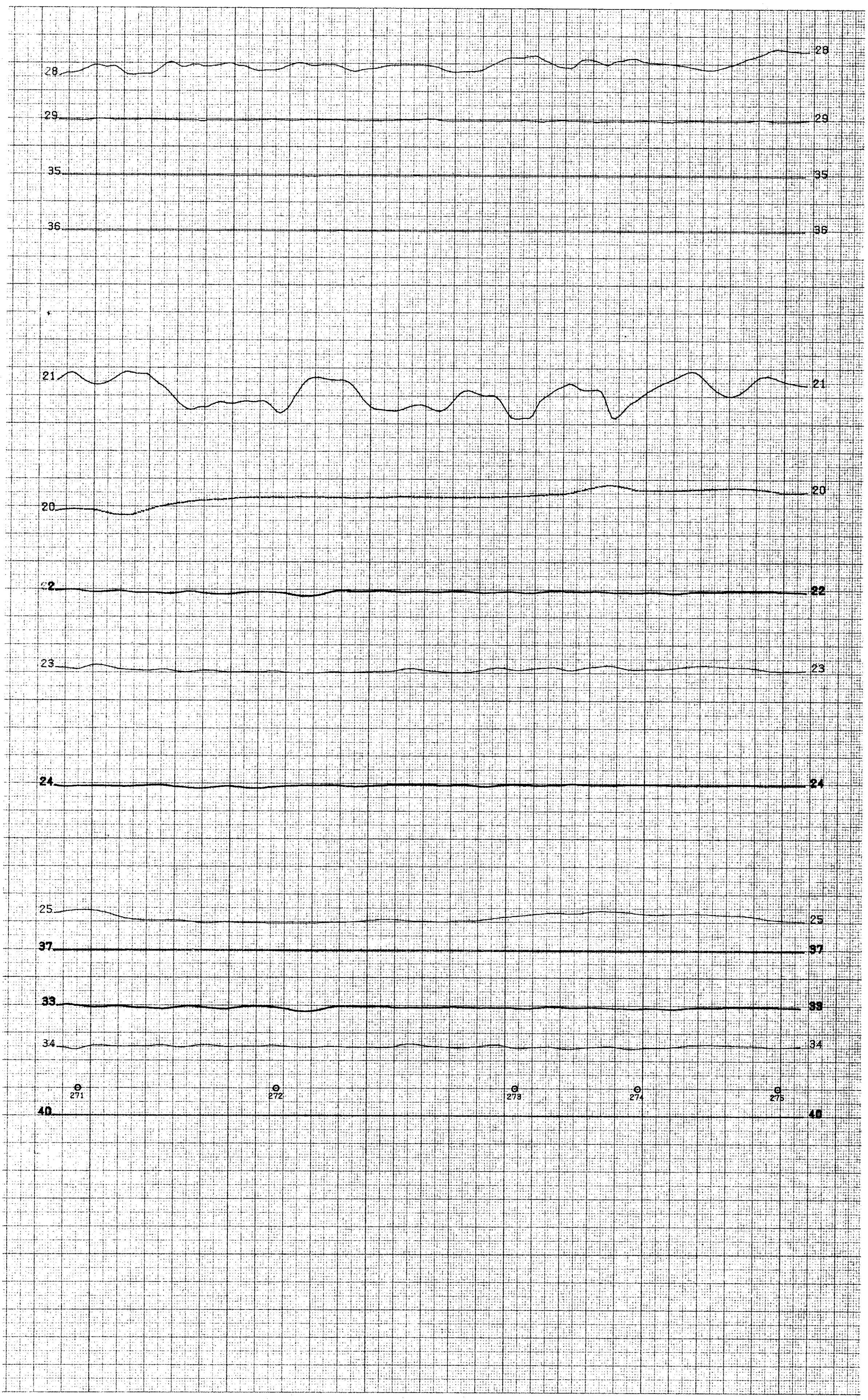

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LINE 22

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LINE -23

LINE -23



LINE 24

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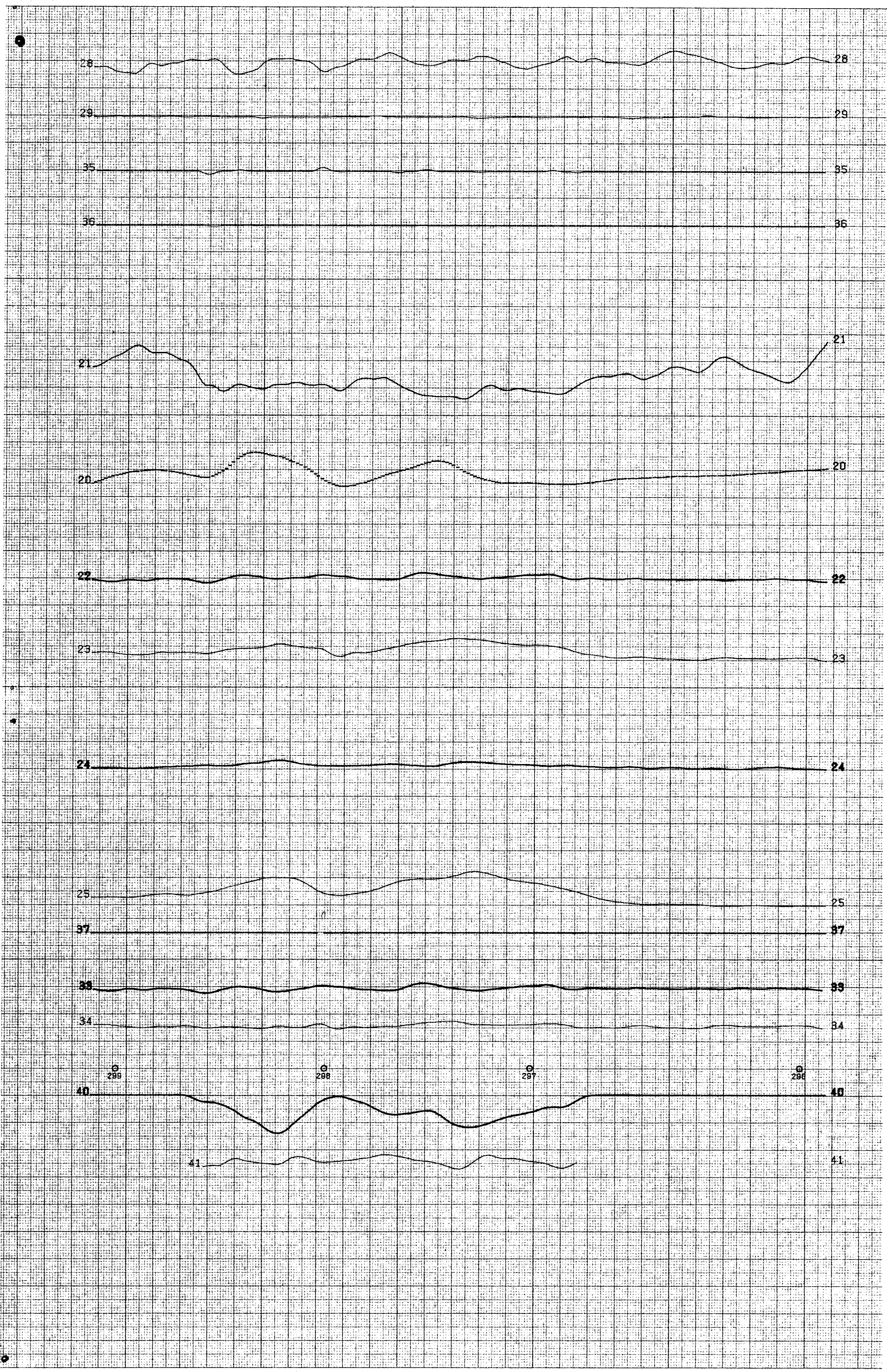

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KEUFFEL & ESSER CO.
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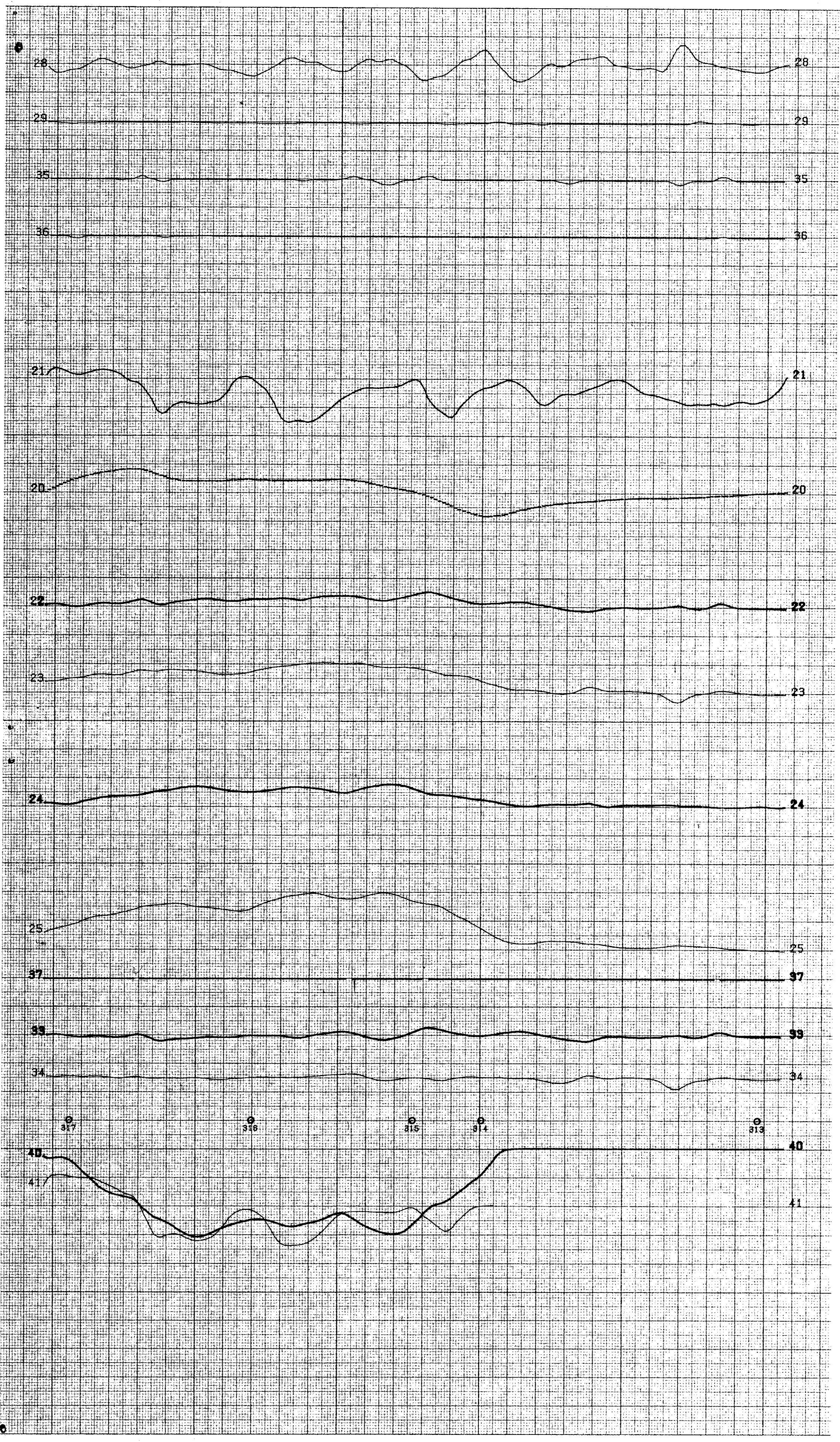
304 305 306 307

LINE 26

LINE 26



LINE -27

LINE -27

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LINE 28

LINE 28

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41

LINE -29

LINE -29

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1 st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm
0
Standard - inphase ch. 22

10 ppm
0
Standard - quadrature ch. 23

10 ppm
0
Whaletail - inphase ch. 24

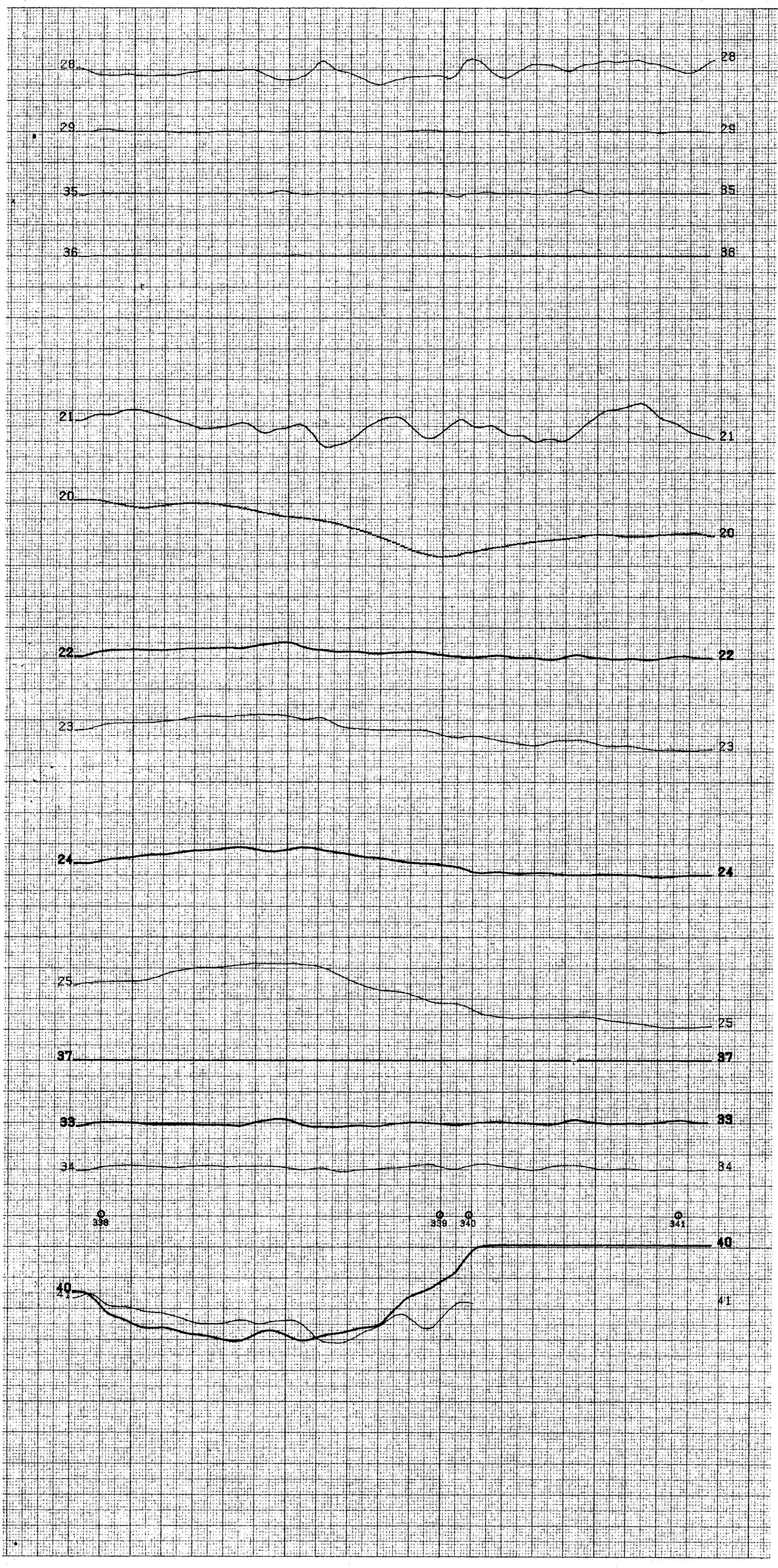
10 ppm
0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m
0
Apparent depth ch. 41
30m
100 ohm-m
Resistivity ch. 40
10 ohm-m
1 ohm-m



LINE 30

LINE 30

Standard environmental monitor ch. 28

Whaletail environmental monitor ch. 29

1st. anomaly recognition function ch. 35

2nd. anomaly recognition function ch. 36

200
100
0
Bird altitude ch. 21

100 gammas
Magnetometer ch. 20

10 ppm
0
Standard - inphase ch. 22

10 ppm
0
Standard - quadrature ch. 23

10 ppm
0
Whaletail - inphase ch. 24

10 ppm
0
Whaletail - quadrature ch. 25

Conductance ch. 37

Difference - inphase ch. 33

Difference - quadrature ch. 34

1000 ohm-m

0
30m
Apparent depth ch. 41

100 ohm-m

Resistivity ch. 40

10 ohm-m

ohm-m

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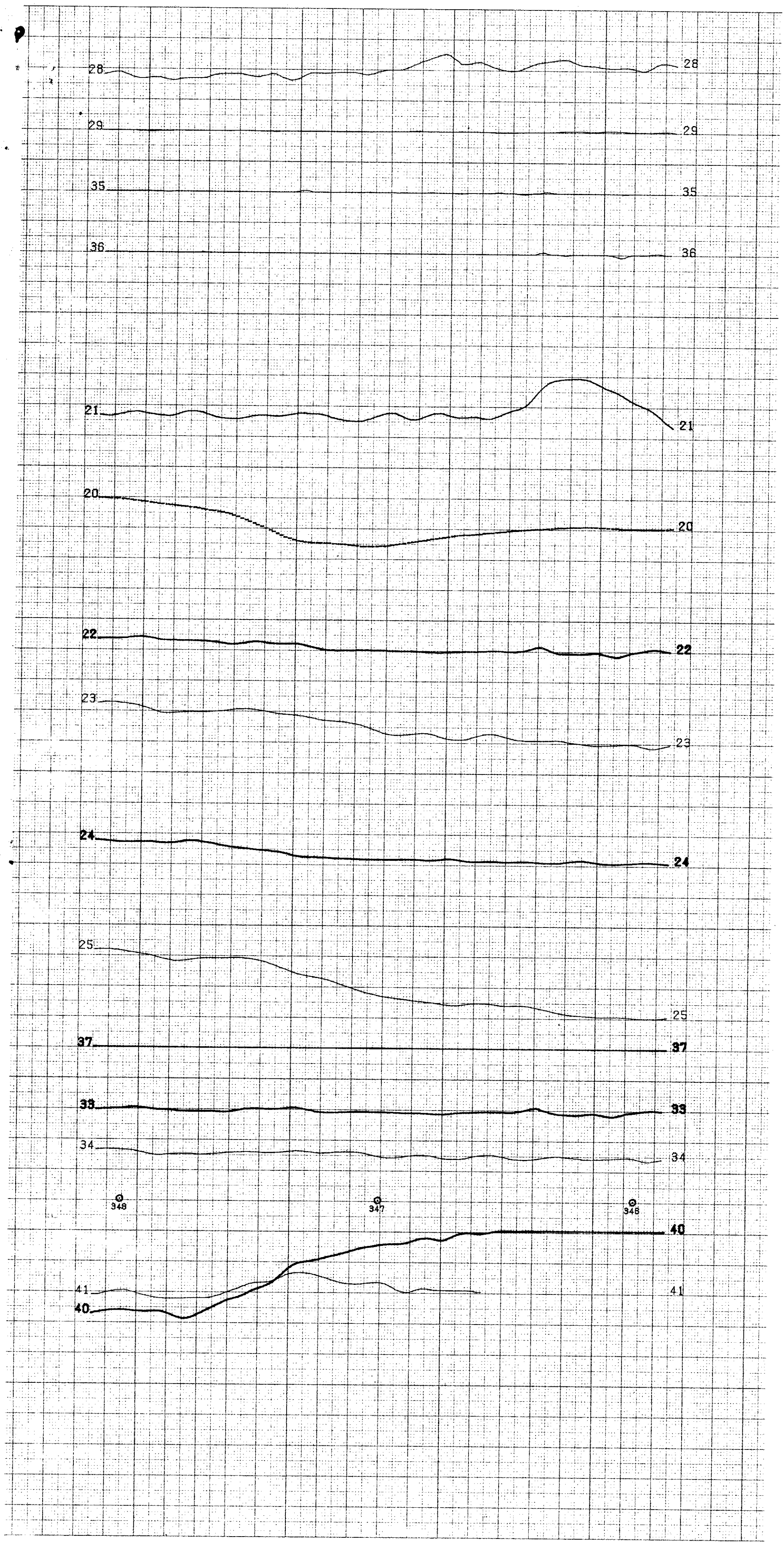

LINE -31

LINE -31

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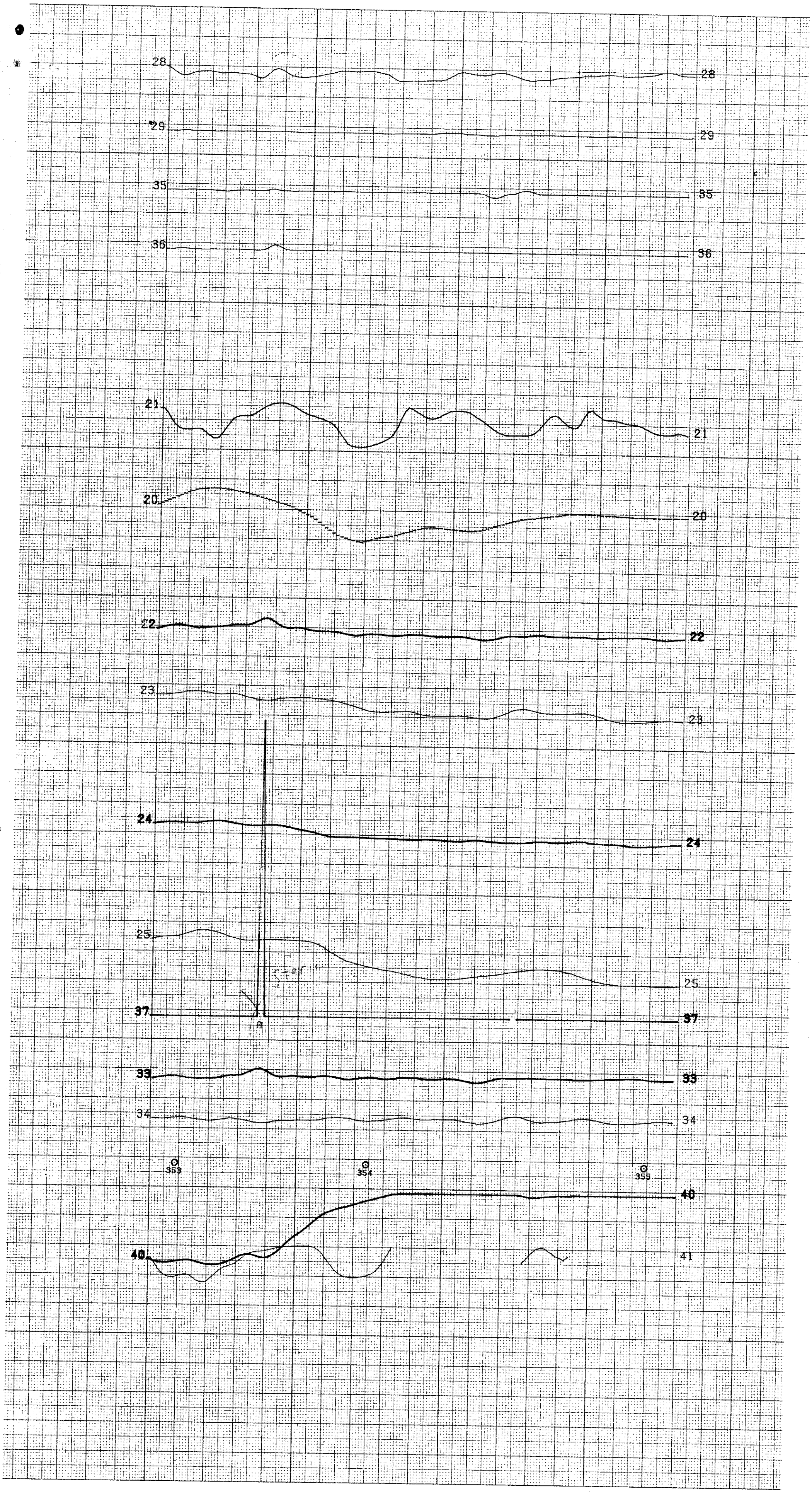

LINE 32

LINE 32

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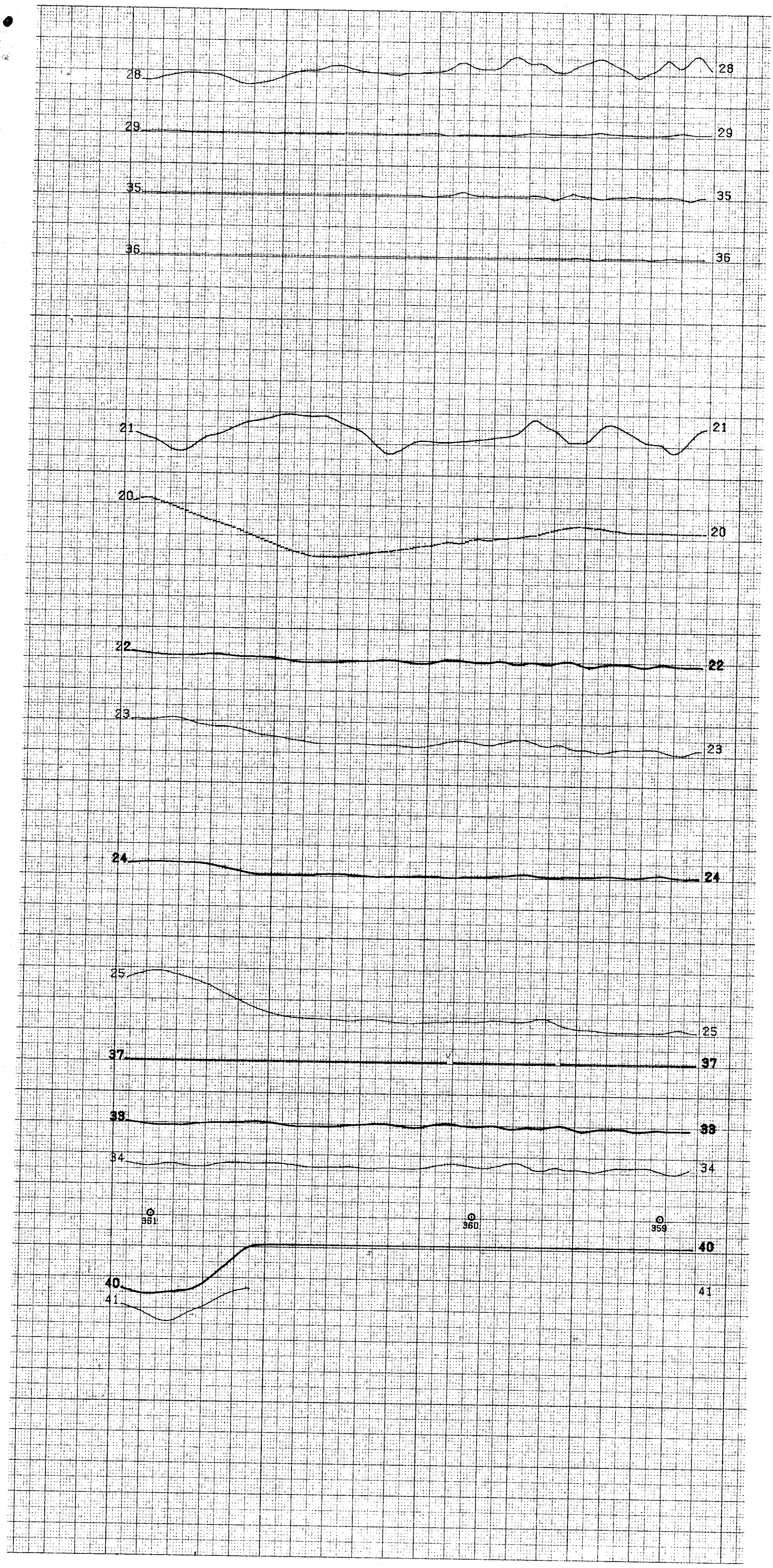

LINE -33

LINE -33



LINE 34

LINE 34

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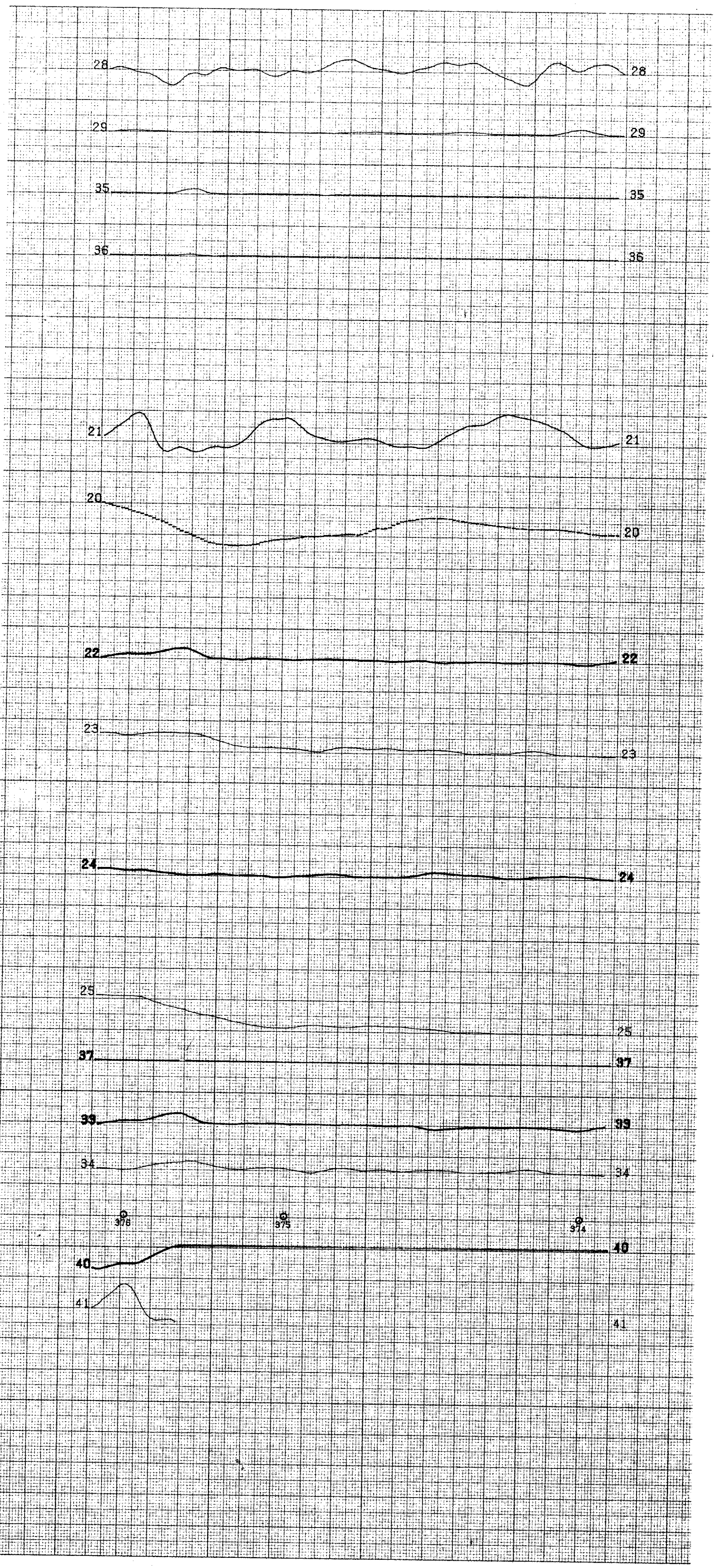
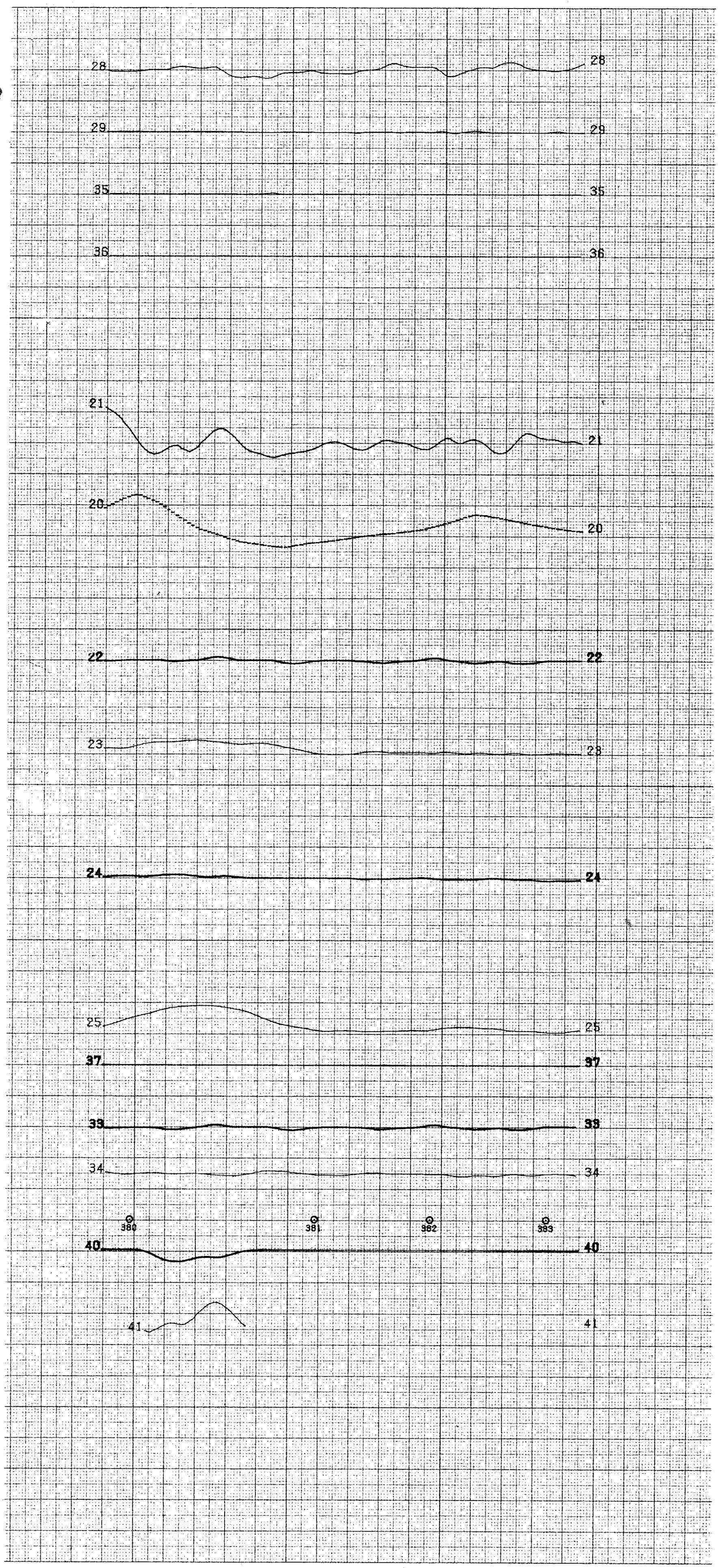


LINE -35

LINE -35



LINE 36 LINE 36 LINE 36

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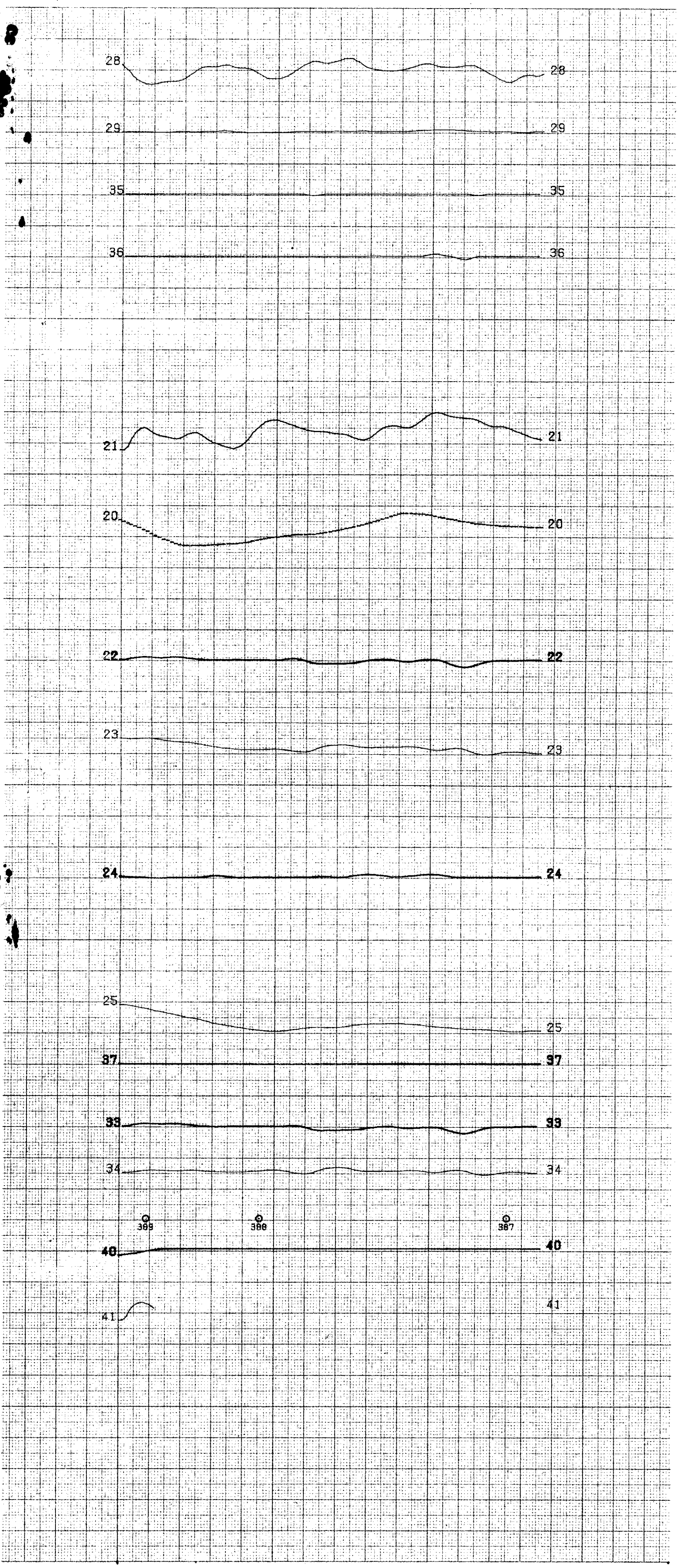

LINE -37 LINE -37