

6202342 Doc 12

SIMULTANEOUS
**COMPENSATED NEUTRON-
FORMATION DENSITY**

Schlumberger

COUNTY CHURCHILL
FIELD DIXIE VALLEY
LOCATION 21-24N-36E
WELL DIXIE FEDERAL 66-21
COMPANY THERMAL POWER CO.

COMPANY THERMAL POWER COMPANY
WELL DIXIE FEDERAL 66-21
FIELD DIXIE VALLEY
COUNTY CHURCHILL STATE NEVADA

LOCATION N/A
API SERIAL NO. 21 SEC. 21 TWP. 24N RANGE 36E

Other Services:
IES HRT
HDT BHC
DI-SFL

Permanent Datum: GL; Elev.: 3430
Log Measured From KB; 23 Ft. Above Perm. Datum
Drilling Measured From KB

Elev.: K.B. 3453
D.F. 3452
G.L. 3430

Date	Run No.	Depth-Driller	Depth-Logger	Btm. Log Interval	Top Log Interval	Casing-Driller	Casing-Logger	Bit Size	Type Fluid in Hole	Dens. Visc.	pH	Fluid Loss	Source of Sample	Rm @ Meas. Temp.	Rmf @ Meas. Temp.	Rmc @ Meas. Temp.	Source: Rmf Rmc	Rm @ BHT	Time	Max. Rec. Temp.	Equip. Location	Recorded By	Witnessed By Mr.
8-3-79	ONE	4580	8947	8940	4579	13 3/4"	2154	12 1/2"	IGNOSULFO.	10.10 50	9.8	1.6 ml	FLOWLINE	1.09 @ 114°F	1.26 @ 80°F	2.18 @ 80°F	M M	0.58 @ 212°F	1930	212°F	8126 SAC	FINNELL	DE LEON
9-4-79	TWO	8947	8940	8940	4579	9 5/8"	4574	8 1/2"	GEL/CAUSTIC	10.2 40	10	26 ml	PIT	0.61 @ 121°F	0.75 @ 87°F	1.64 @ 86°F	M M	0.24 @ 314°F	1200	314°F	8126 SAC	ANDERSEN	SKINNER/MC MURDIE
9-17-79	THREE	9780	9680	9680	4574	9 5/8"	4580	8 1/2"	GEL/CAUSTIC/BAR	10.2 46	10	24 ml	CIRCULATED	0.94 @ 75°F	0.81 @ 72°F	1.44 @ 73°F	M M	0.21 @ 366°F	0800 9-18	366°F	7763 SAC	BRASFIELD	MURDIE/MC MURDIE

FOLD HERE The well name, location and borehole reference data were furnished by the customer.

RUN NO.	ONE	TWO	THREE	Type Log	Depth
Service Order No.	82945	64800	83081		
Fluid Level	FULL	FULL	FULL		
Salinity, PPM CL.	--	--	--		
Speed - F.P.M.	--	30	30		
EQUIPMENT DATA				REMARKS:	
Dens. Panel	418	418	EJ-1352		
Dens. Cart.	--	--	G-260		
Dens. Skid.	E-206	E-206	E-253		
Dens. Sonde	EC-392	EC-392	EC-426		
Dens. Source	--	5153	5199		
Dens. Calibrator	--	1177	1241		
Neut. Panel	--	418	BA-39		
Neut. Cart.	--	409	A-1208		
Neut. Source	--	--	1171		
Neut. Calibrator	--	594	AB-1192		
GR Cart.	--	--	JC-1410		
Memorizer Panel	--	--	CA-337		
Tape Recorder (TTR)	--	--	1940		
Depth Encoder (DRE)	--	--	C-2733		
Pressure Wheel (CPW)	--	--	1736		
Centralizers: Enter Spring, Standoffs, In-line, or None	Type	ECC	ECC		
	No.	--	--		
	S. O. - Inches	--	--		
CALIBRATION DATA				RUN ONE: NEUTRON RUN UP TO SOFT	
GR	BKG. CPS	32	36	63	
	Source CPS	195	205	291	
	Sens. - Cal	165	STD	0-150	
	T. C. - Cal	2	--	--	
TNC	Short Spacing - Before Log	RATIO	2814	334	
	Long Spacing - Before Log	2.15	1238	144	
	Short Spacing - After Log	RATIO	RATIO	N/A	
	Long Spacing - After Log	2.15	2.16	N/A	
FDC	P1 - Before Log	337	323	111.0	
	P2 - Before Log	528	514	210.0	
	P1 - After Log	336	332	109.9	
	P2 - After Log	505	515	209.3	

LOGGING DATA												
DEPTH		CNP			FDC			GR				
Top	Bottom	Porosity Scale	Matrix	Auto Corr. or Hole Size Setting	Porosity Scale	Grain Density	Liquid Density	Hole Fluid	Sens. Logged	T. C.	Zero. Div. Left	Scale Per 100 Div.
2154	4579	45 -15	SS-OH	AUTO	45 -15	2.68	1.0	LIQ	150	2	0	150
4574	8940	45 -15	SS-OH	AUTO	45 -15	2.68	1.0	LIQ	150	AUTO	0	150
8500	9680	45 -15	SS-OH	AUTO	45 -15	2.68	1.0	LIQ	150	2	0	150

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 4 of our General Terms and Conditions as set out in our current Price Schedule.

CALIPER	DIAM. IN INCHES	6"	16"
GAMMA RAY	API UNITS	0	150
DEPTH		45	30
POROSITY INDEX % SAND STONE	MATRIX	15	0
COMPENSATED FORMATION DENSITY POROSITY			-15
COMPENSATED NEUTRON POROSITY			-15

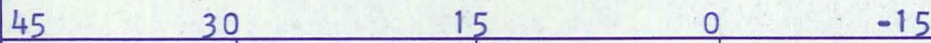
Top	Bottom	Scale	Matrix	Hole Size Setting	Scale	Density	Density	Fluid	Logged	T. C.	Div. Left	100 Div.		
2154	4579	45	-15	SS-OH	AUTO	45	-15	2.68	1.0	LIQ	150	2	0	150
4574	8940	45	-15	SS-OH	AUTO	45	-15	2.68	1.0	LIQ	150	AUTO	0	150
8500	9680	45	-15	SS-OH	AUTO	45	-15	2.68	1.0	LIQ	150	2	0	150

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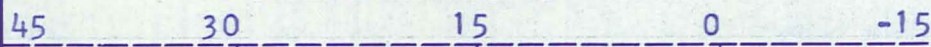


DEPTH

POROSITY INDEX % SAND STONE MATRIX
COMPENSATED FORMATION DENSITY POROSITY



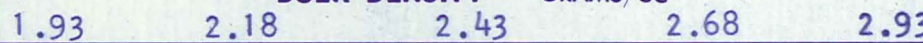
COMPENSATED NEUTRON POROSITY



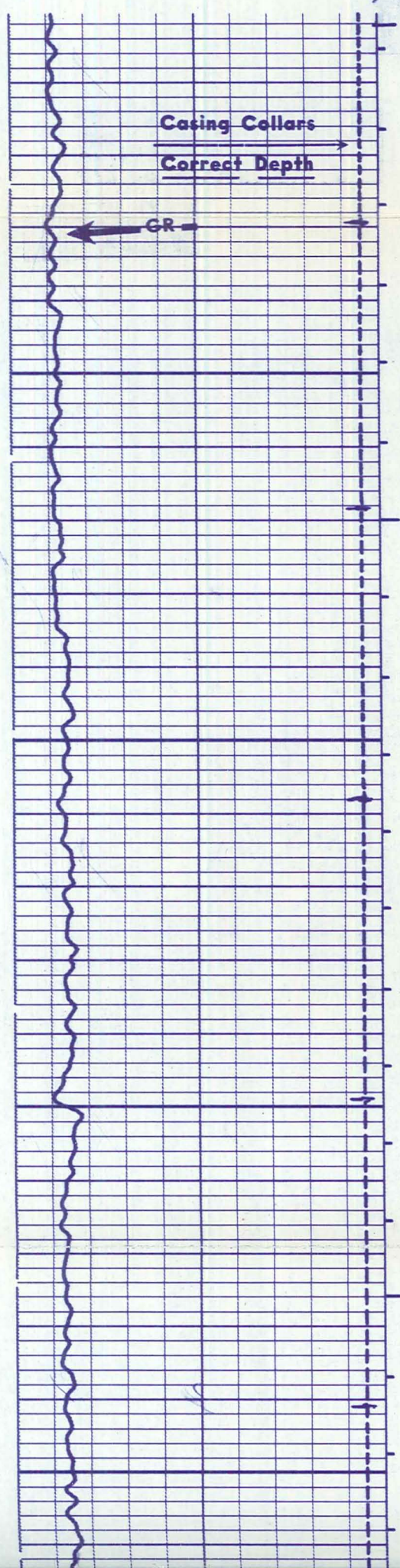
CORRECTION GRAMS/CC



BULK DENSITY GRAMS/CC



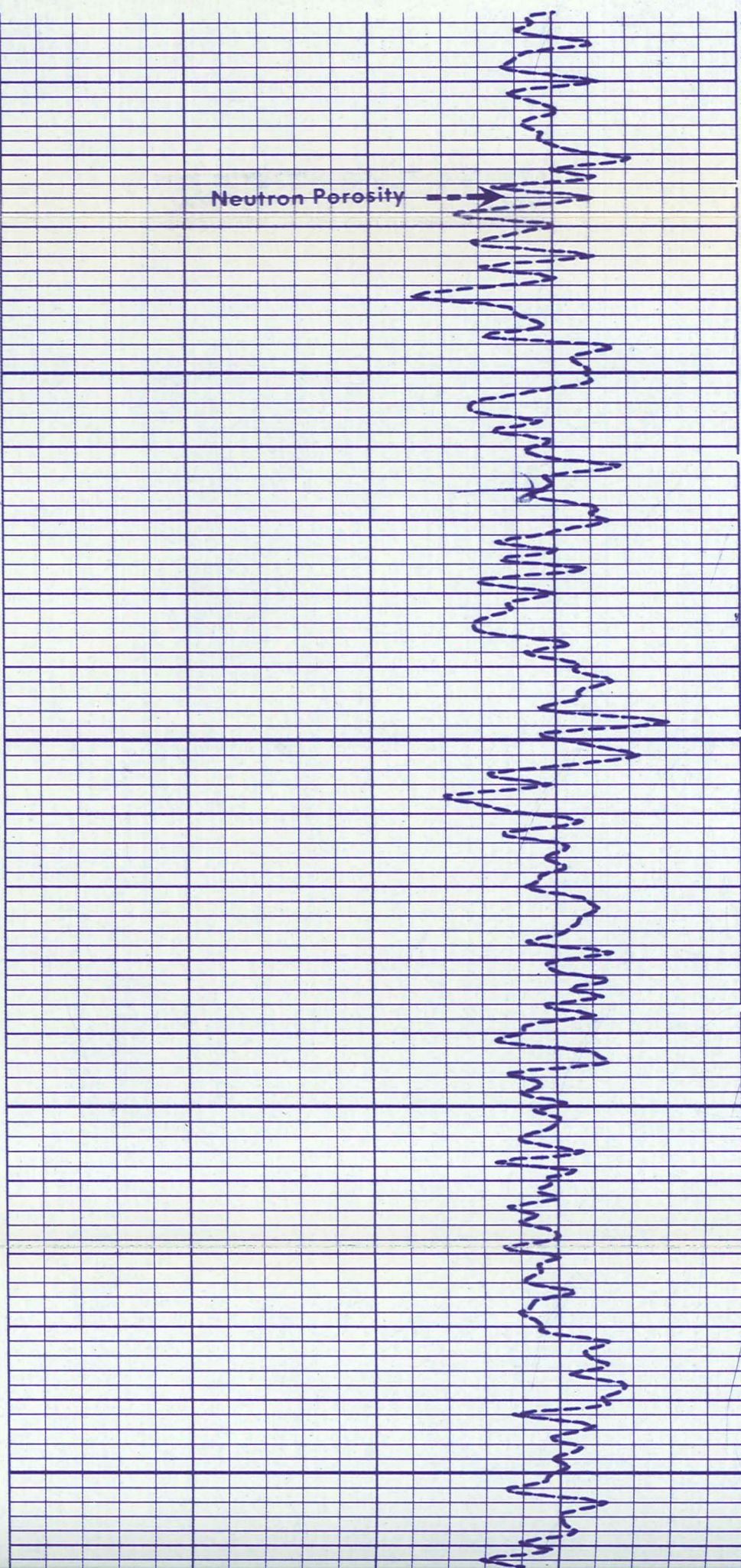
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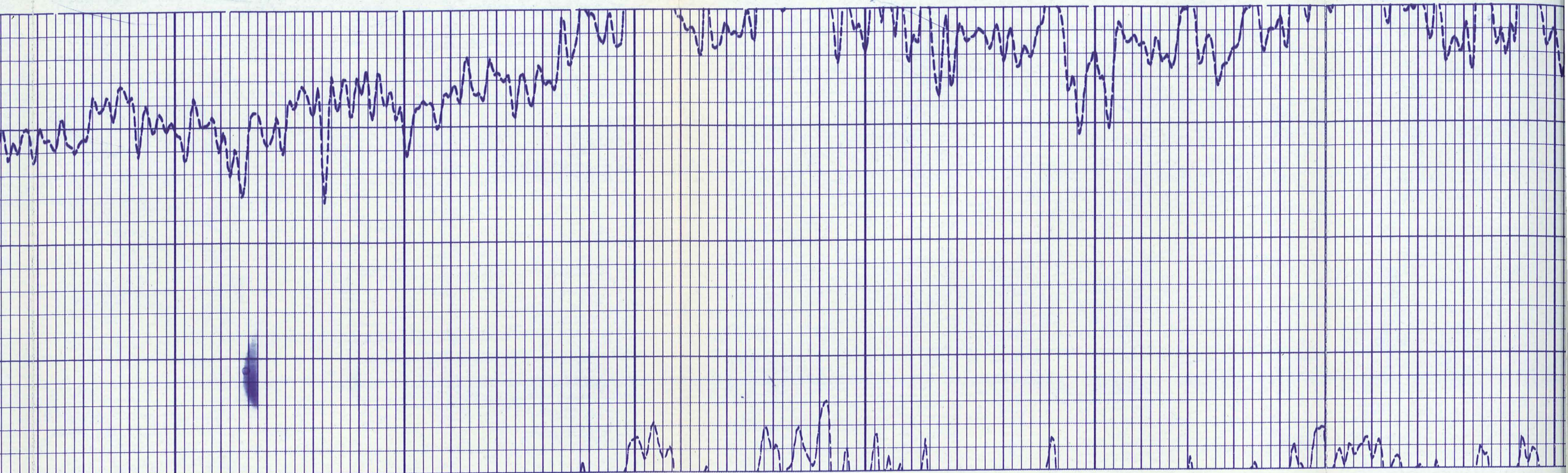
LR

100

200



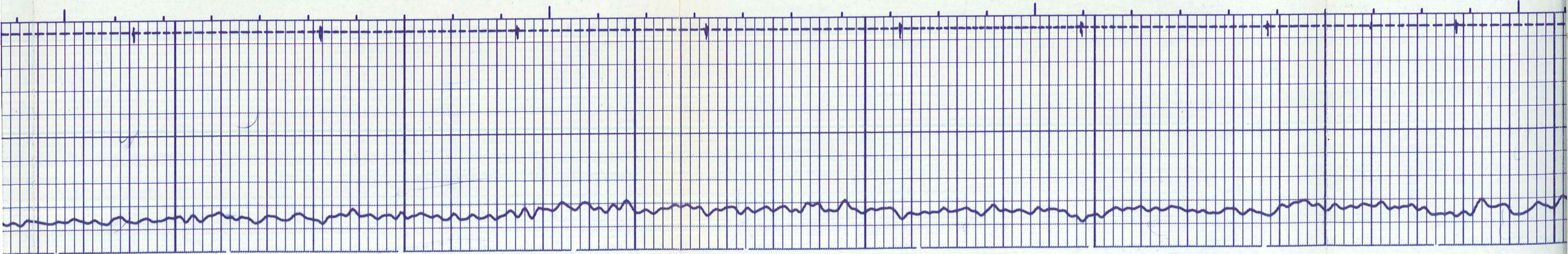
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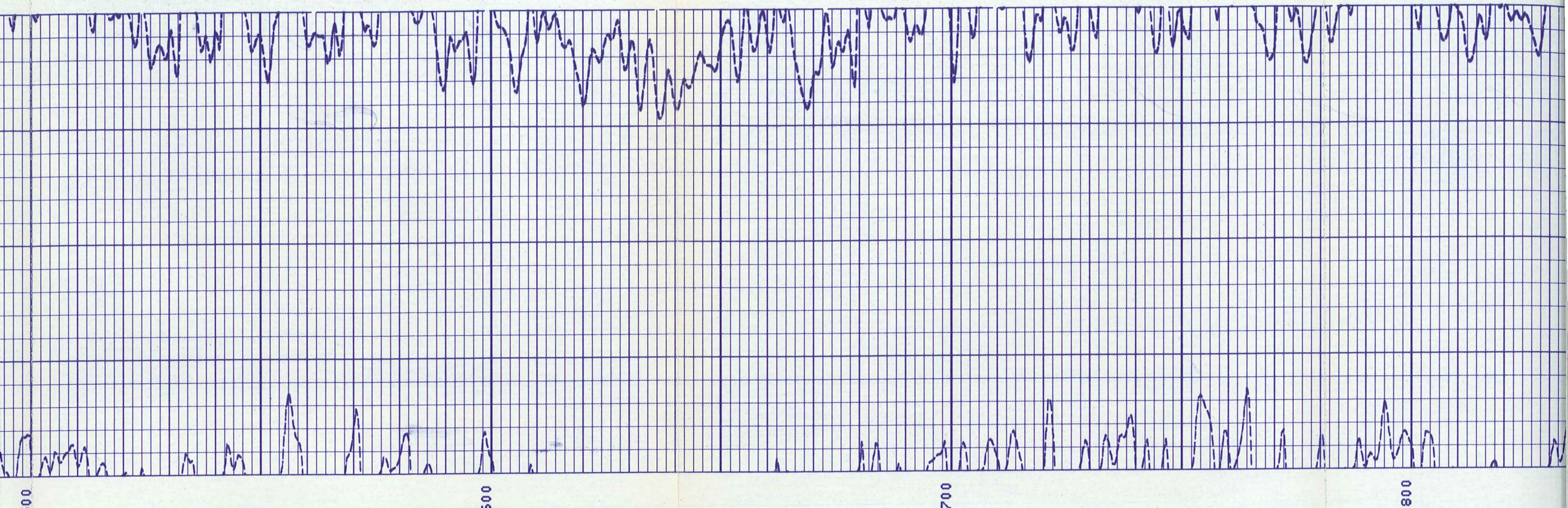


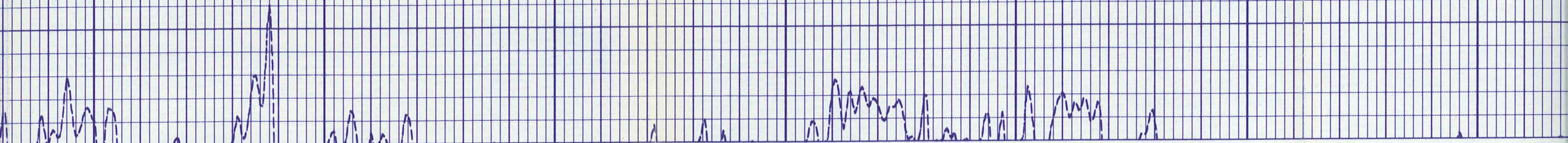
300

400

500







800

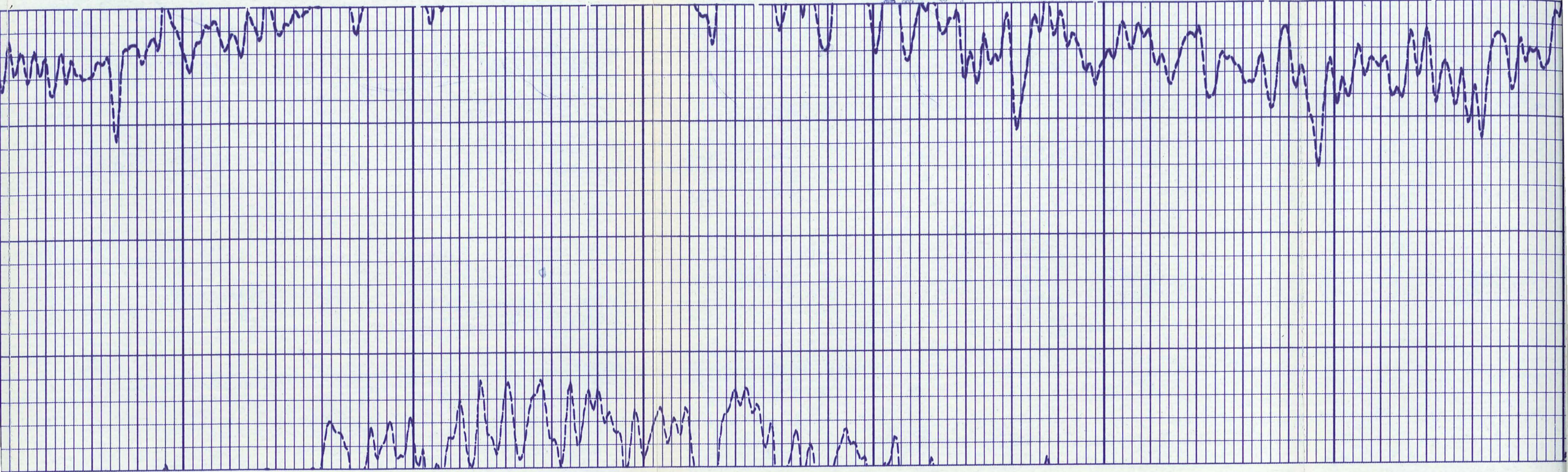
900

1000

1100



11-07-79SIC082945

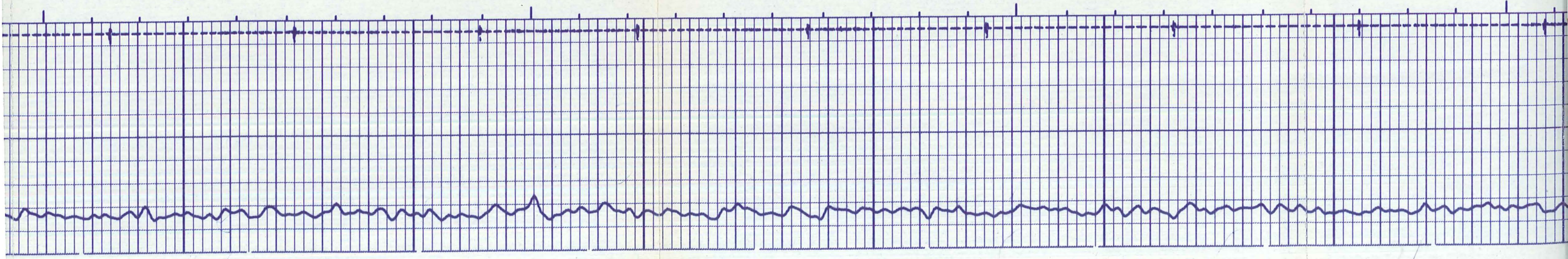


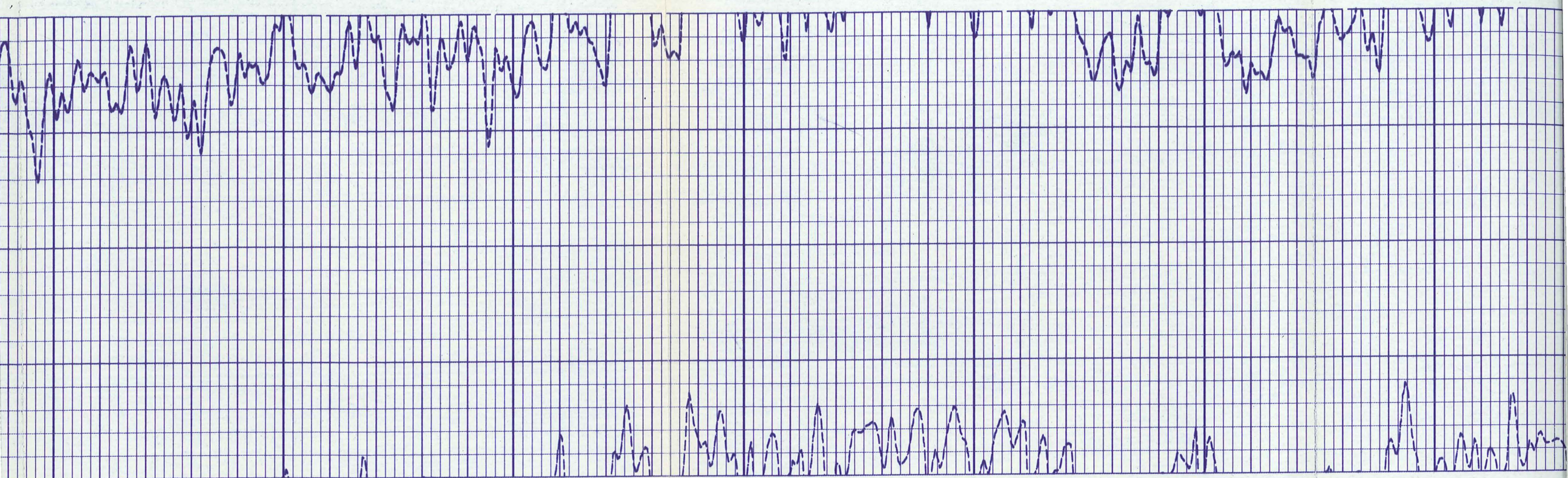
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1200

1300

1400

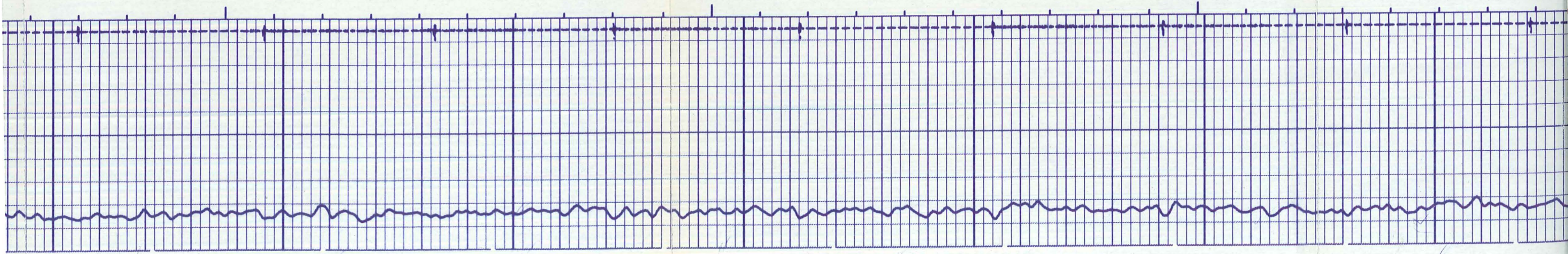


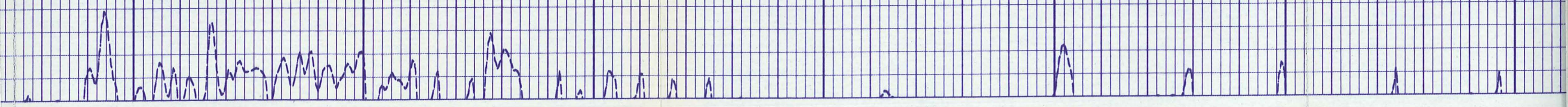
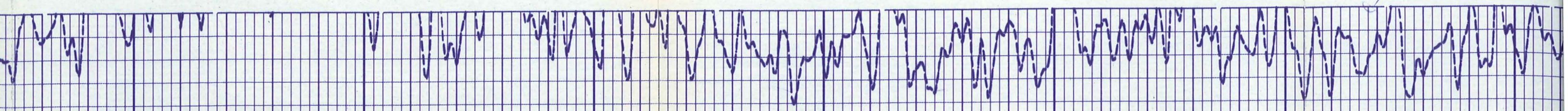


1400

1500

1600



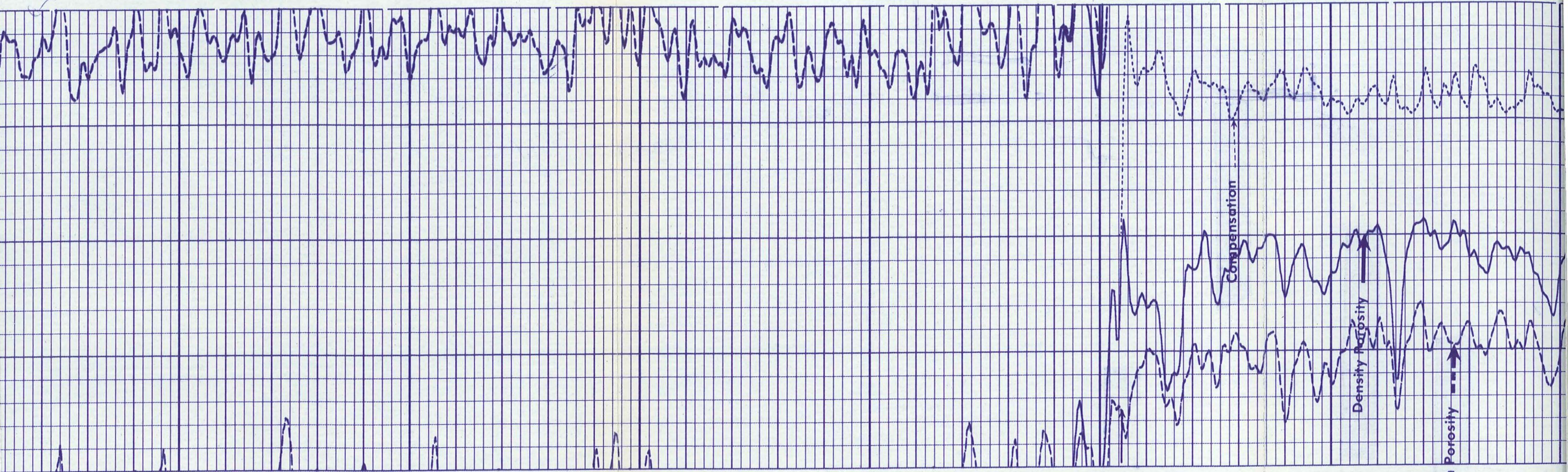


1700

1800

1900





2000

2100

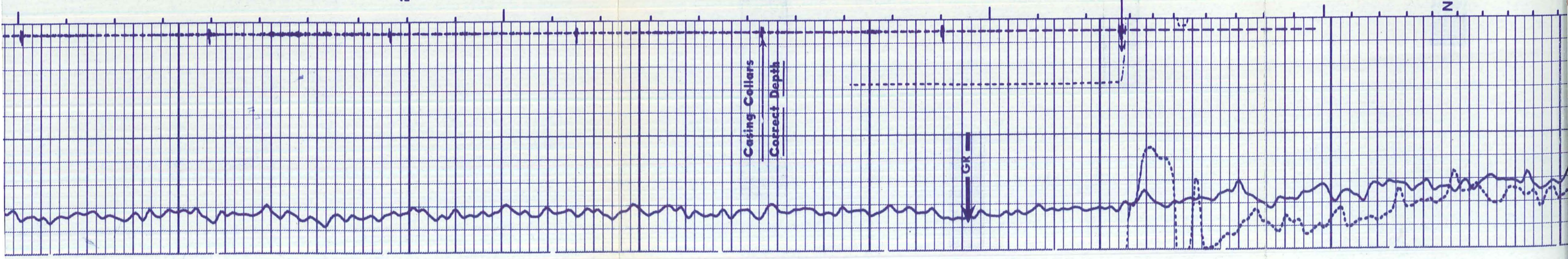
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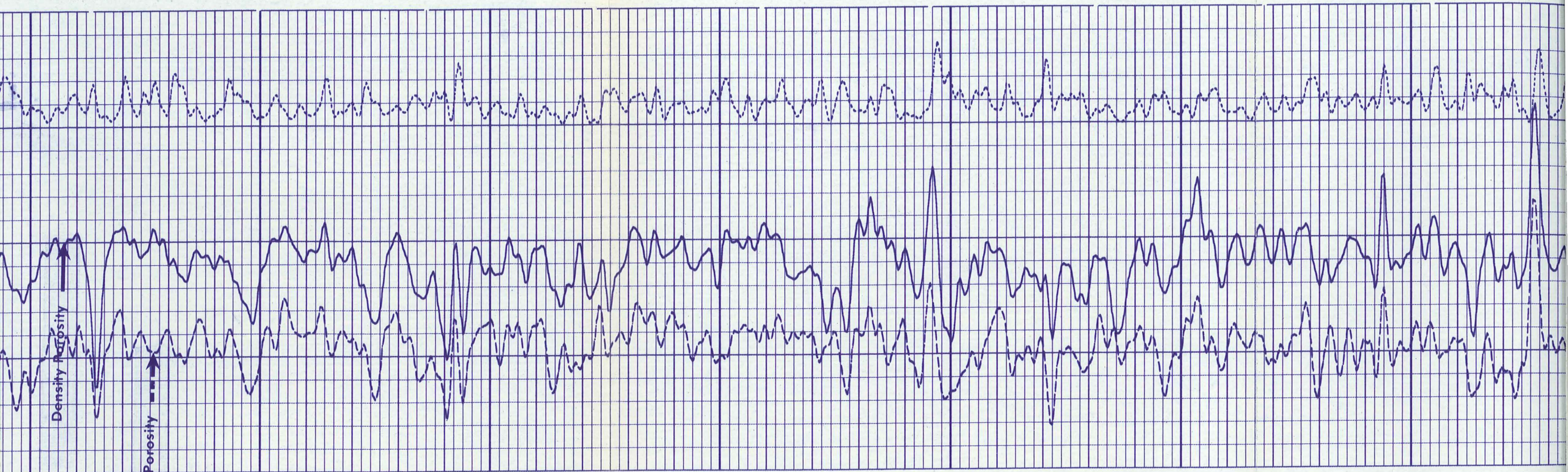
2200

Neutron Porosity

Casing Cellars
Correct Depth

GR





2200

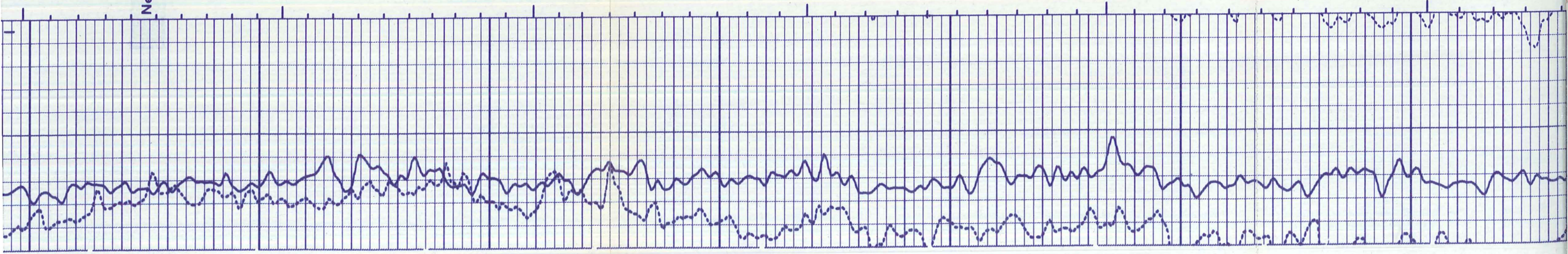
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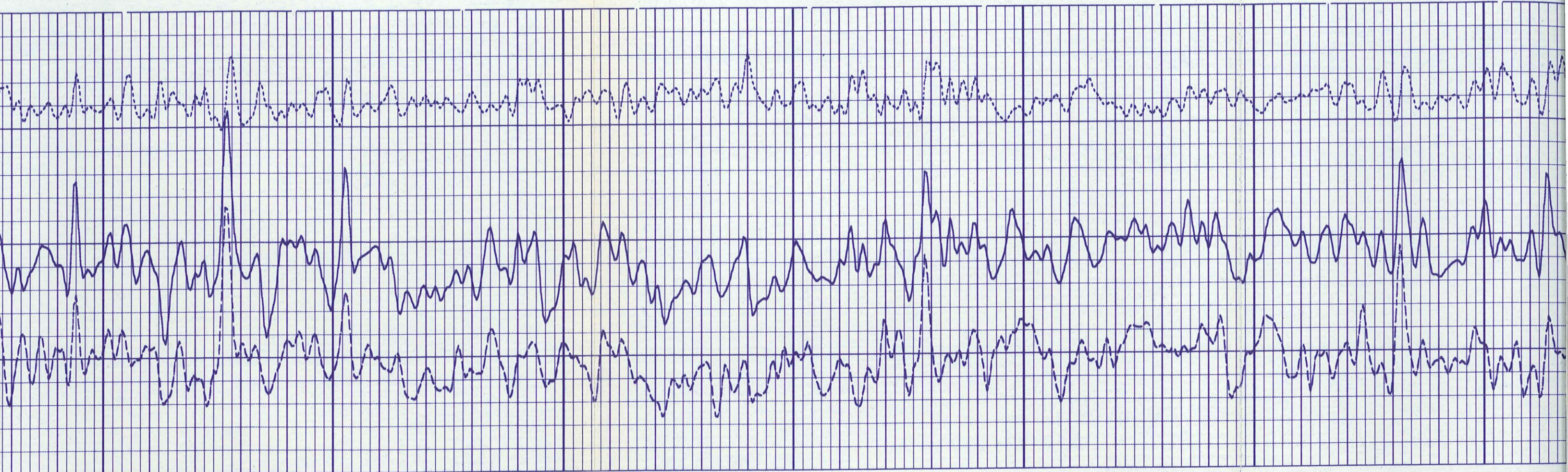
Neutron Porosity

2300

2400

2500



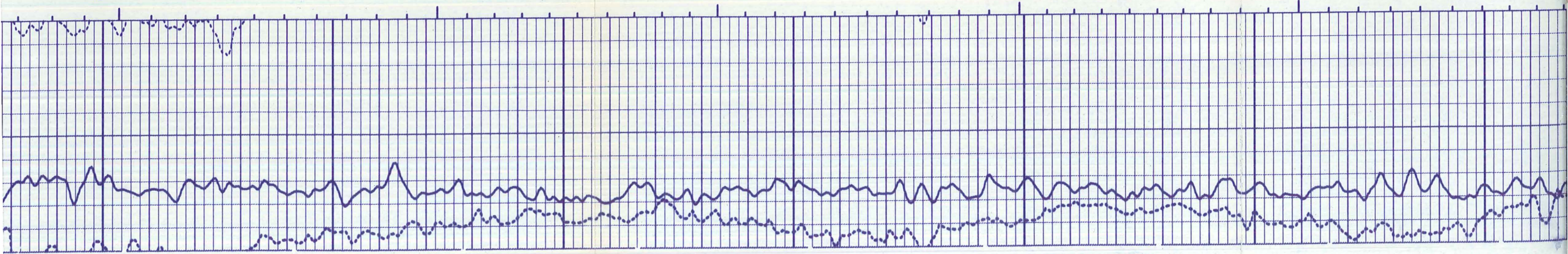


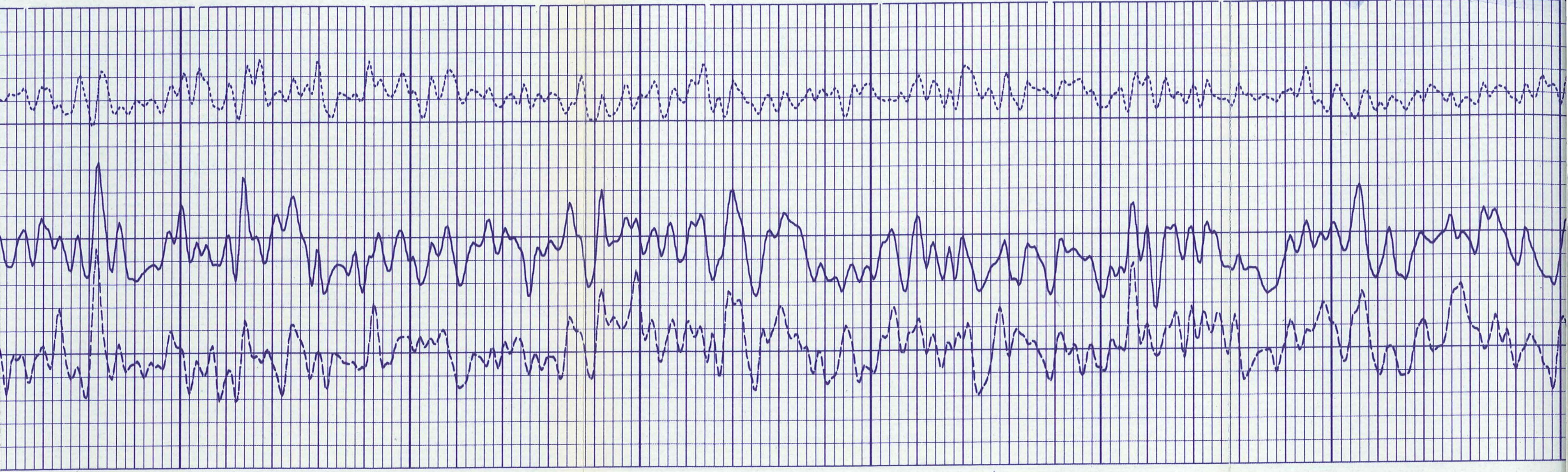
2500

2600

2700

2800



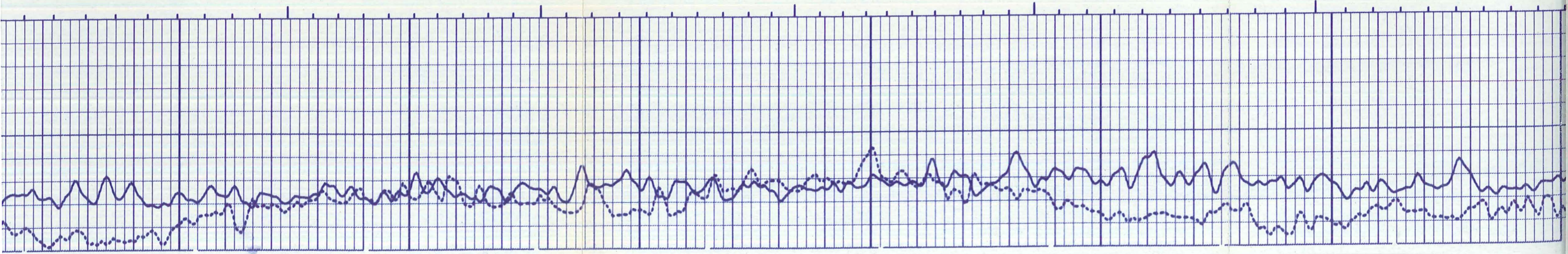


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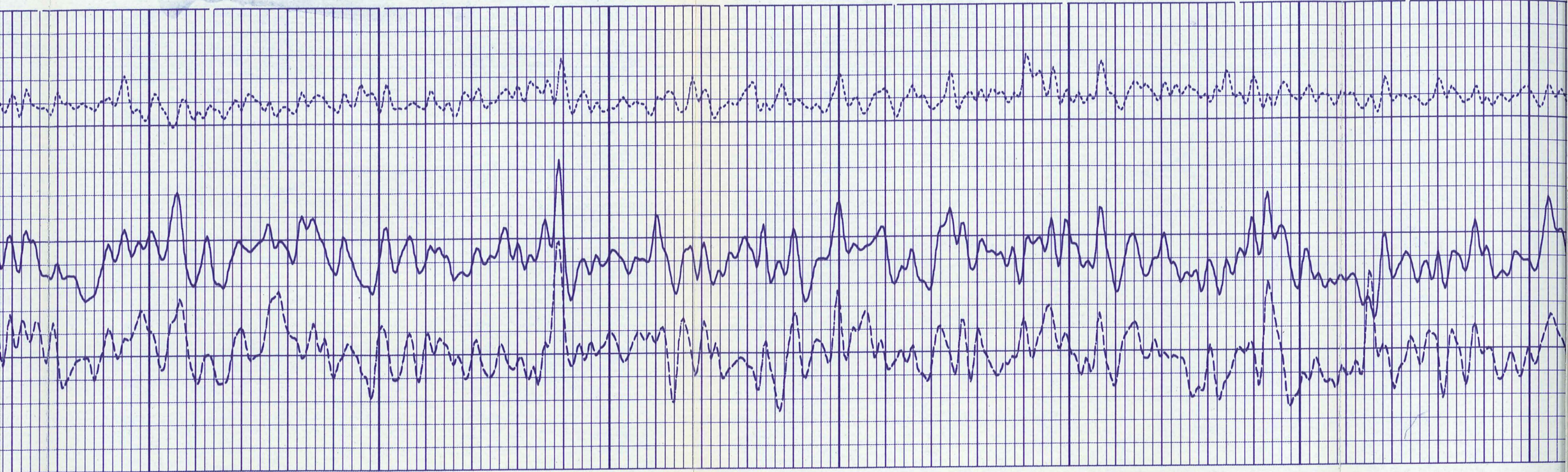
2900

3000

3100



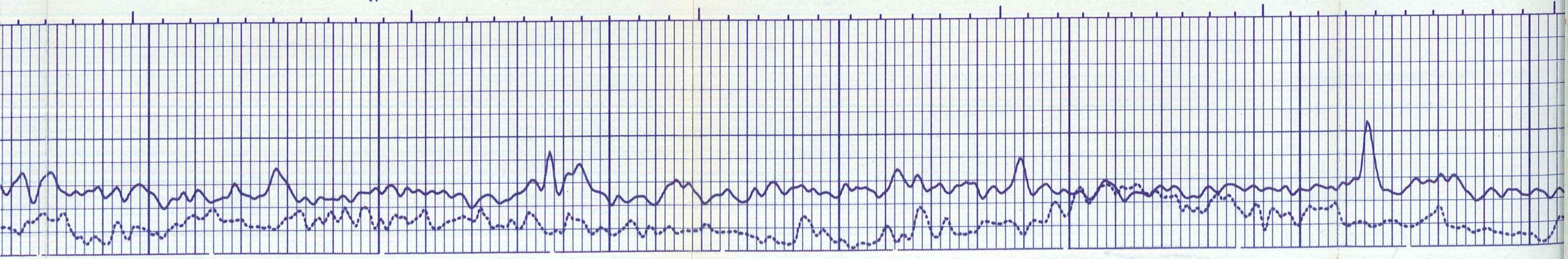
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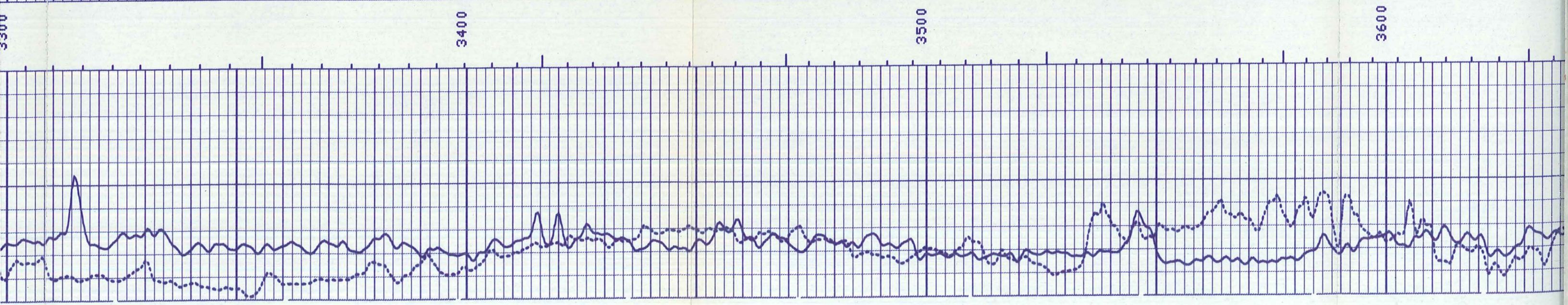
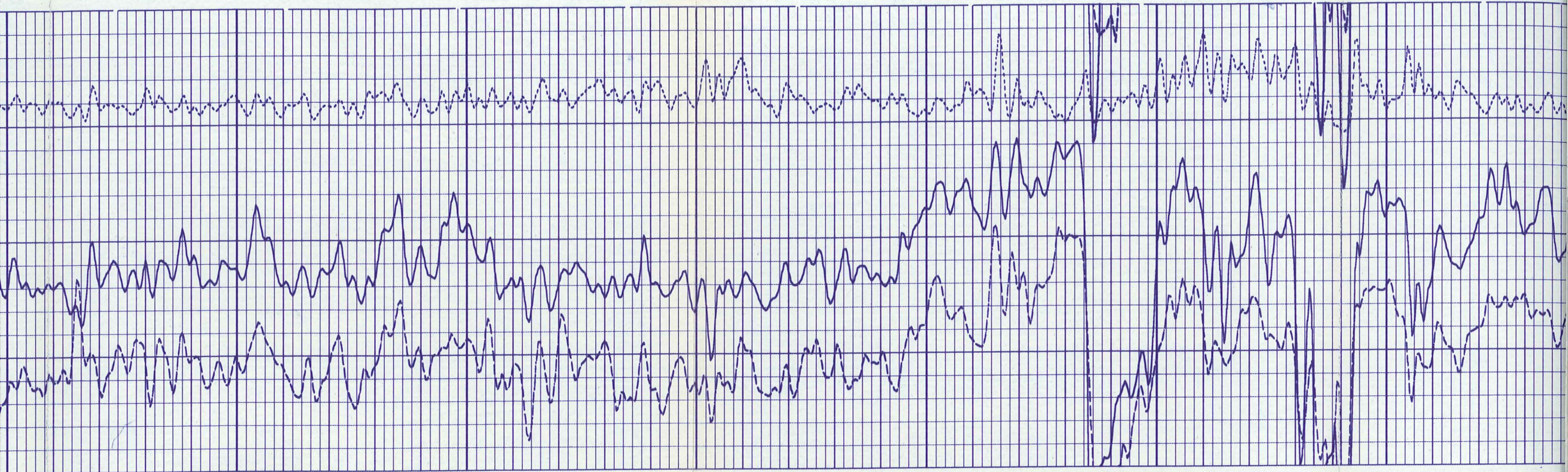


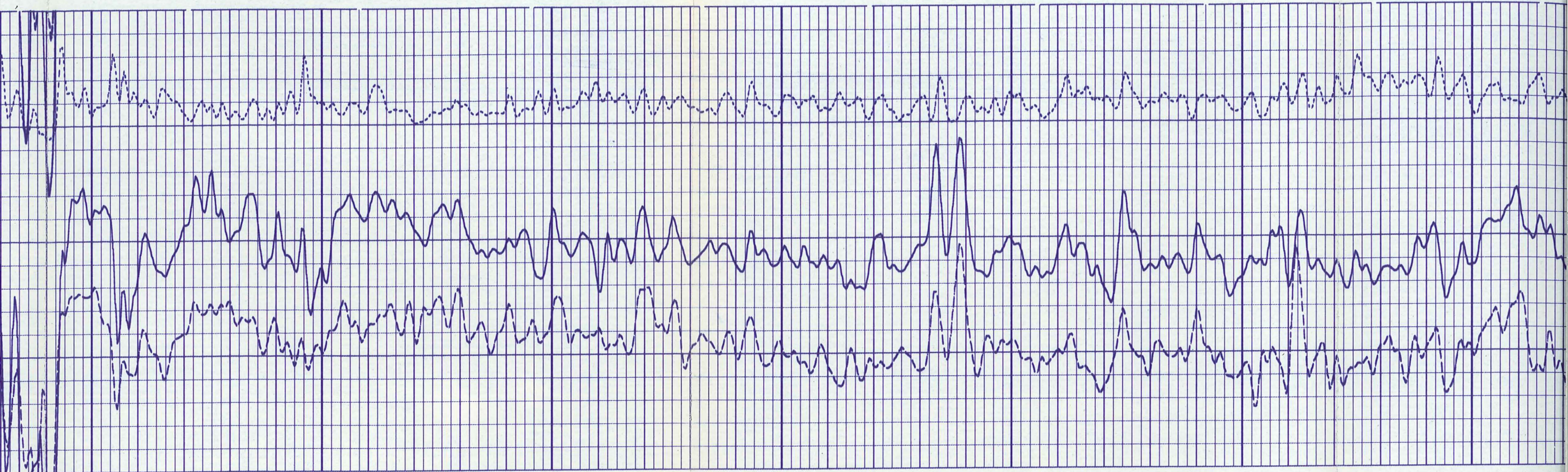
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3200

3300





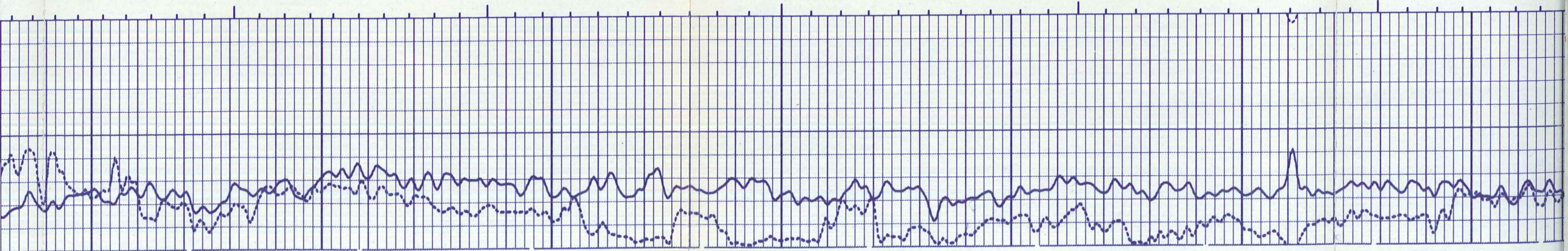


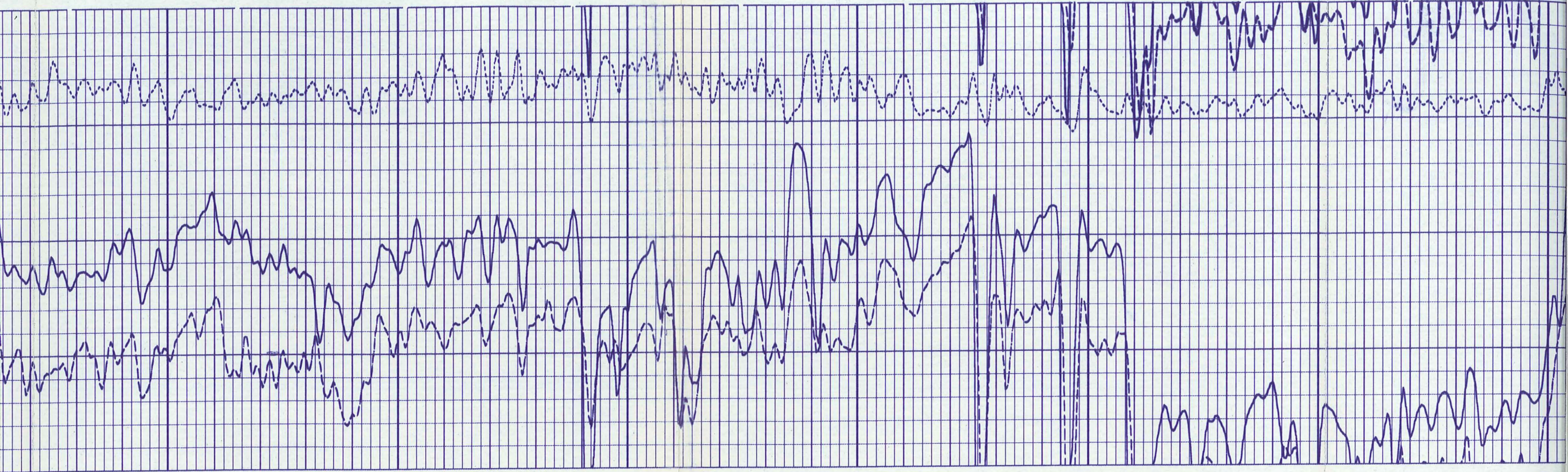
3600

3700

3800

3900



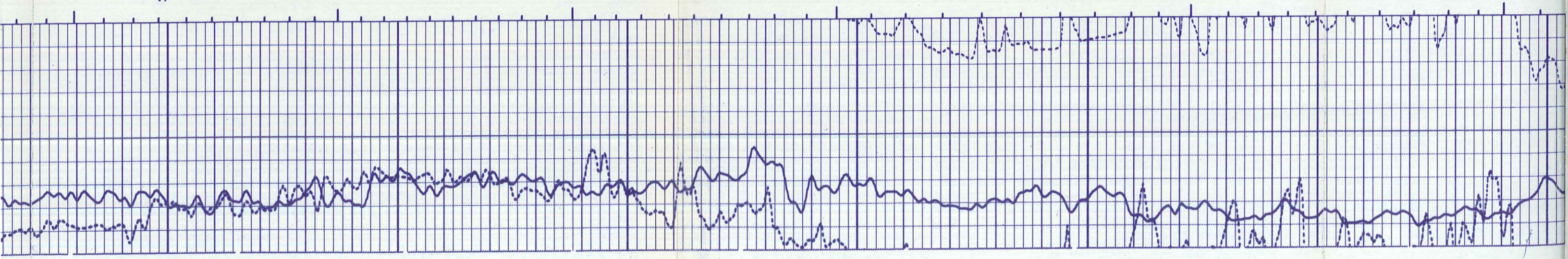


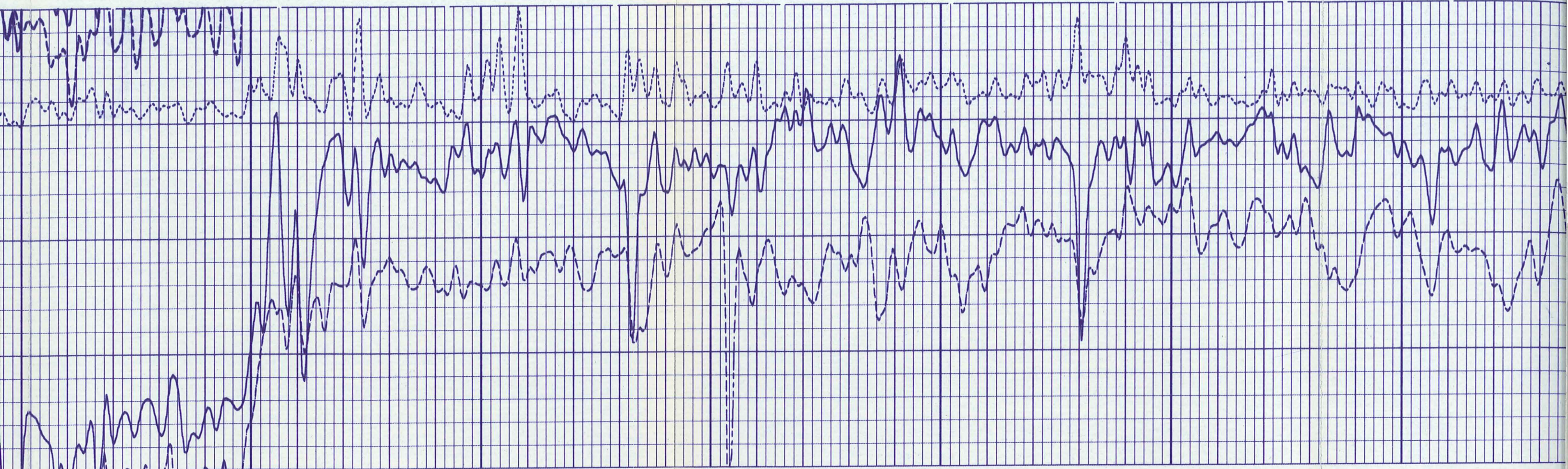
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4000

4100

4200

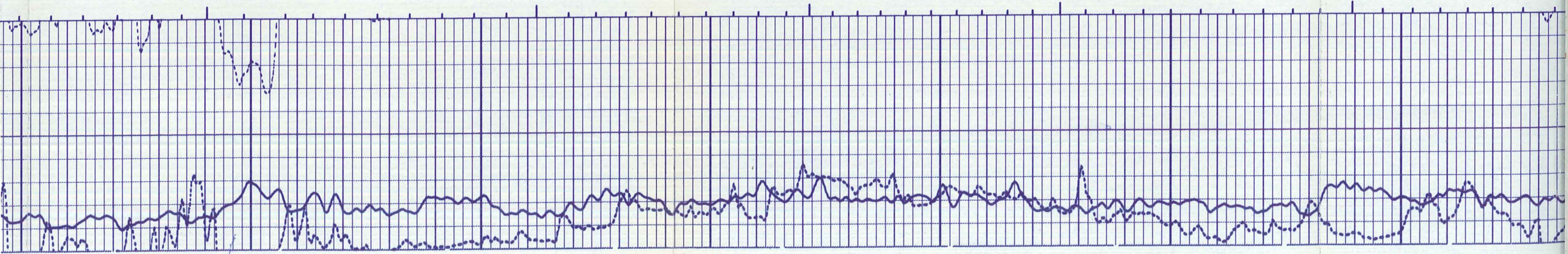


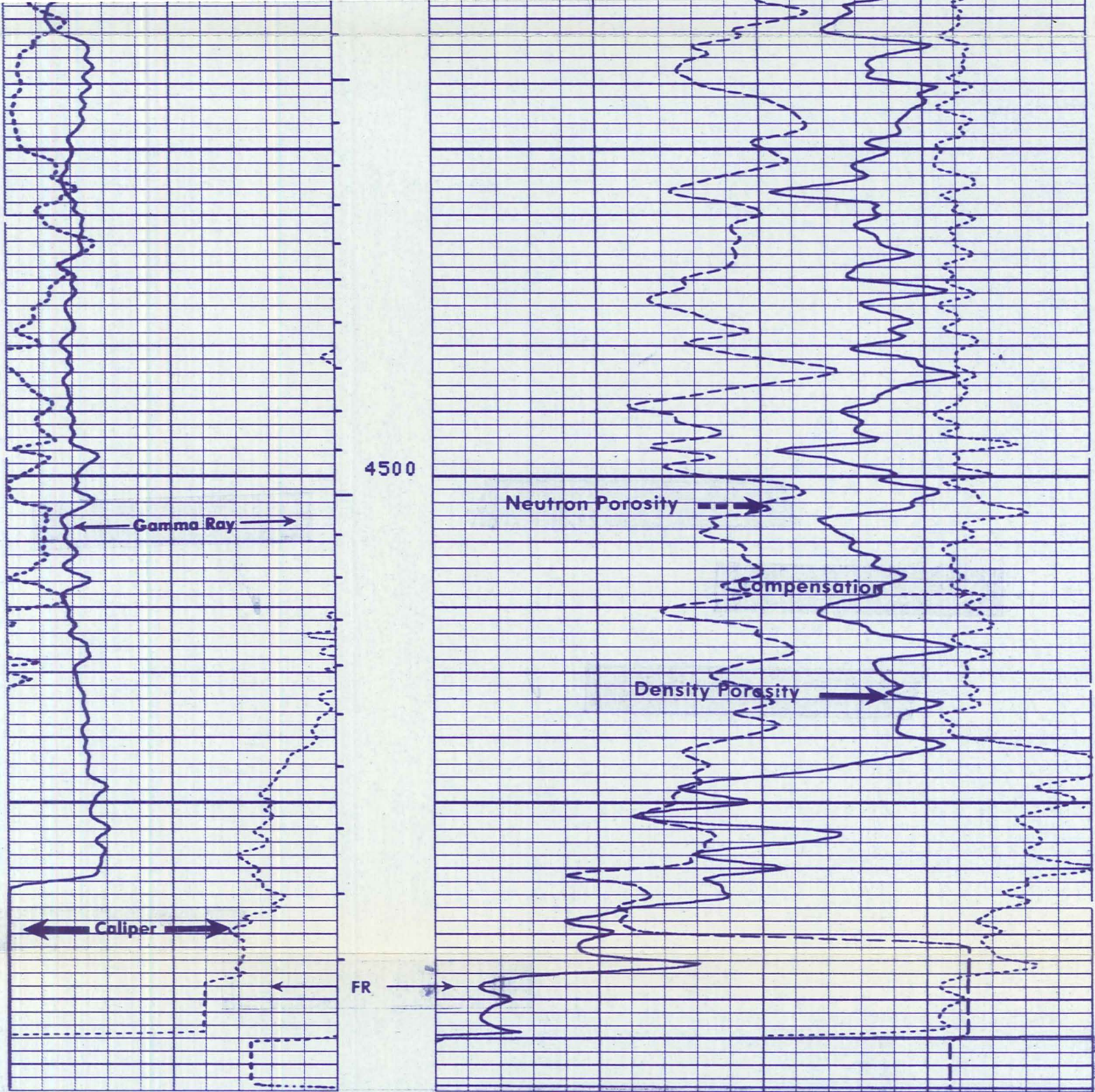


4200

4300

4400





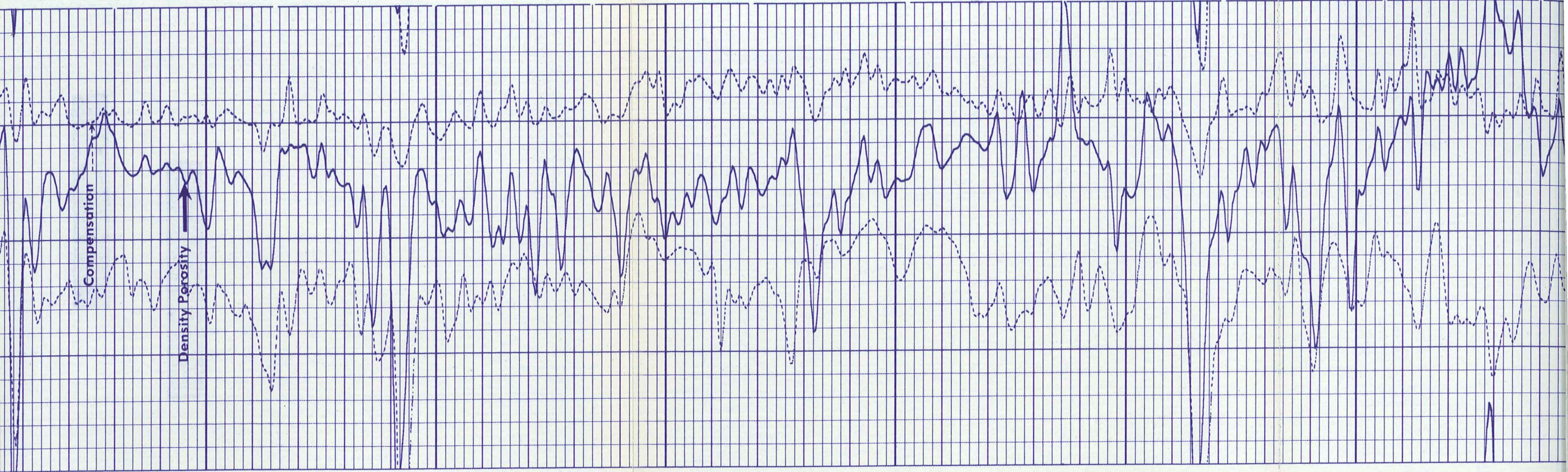
CALIPER DIAM. IN INCHES 6" 16" GAMMA RAY 0 150 <hr/>	Run 1 CORRECTION GRAMS/CC -0.25 0 +0.25
	BULK DENSITY GRAMS/CC 1.93 2.18 2.43 2.68 2.93
	COMPENSATED NEUTRON POROSITY SANDSTONE MATRIX 45 30 15 0 -15
	DENSITY POROSITY INDEX % SANDSTONE MATRIX 45 30 15 0 -15

COMPANY	THERMAL POWER COMPANY	SCHL. FR	4579
WELL	DIXIE FEDERAL 66-21	SCHL. TD	4579
FIELD	DIXIE VALLEY	DRLR. TD	4580
COUNTY	CHURCHILL	STATE	NEVADA
		Elev:	KB 3453
			DF 3452
			GL 3430

DETAIL LOG
5" = 100'

CALIPER DIAM. IN INCHES 6" 16"	Run 2 CORRECTION GRAMS/CC -0.25 0 +0.25
	GAMMA RAY 0 150

11-07-79 11082945

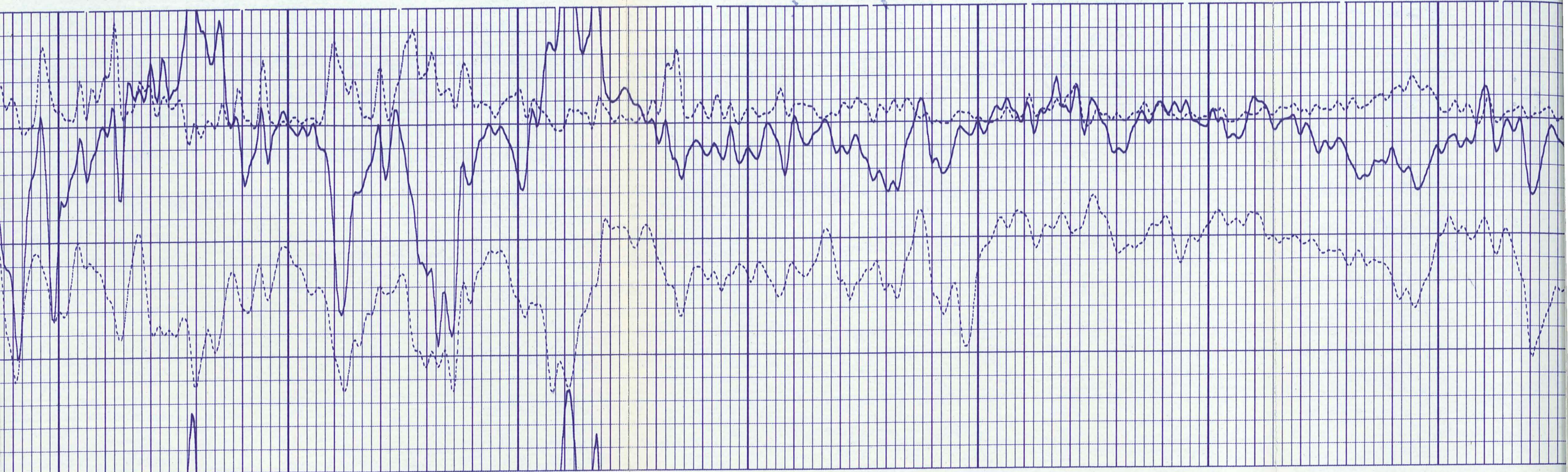


4700

4800

4900



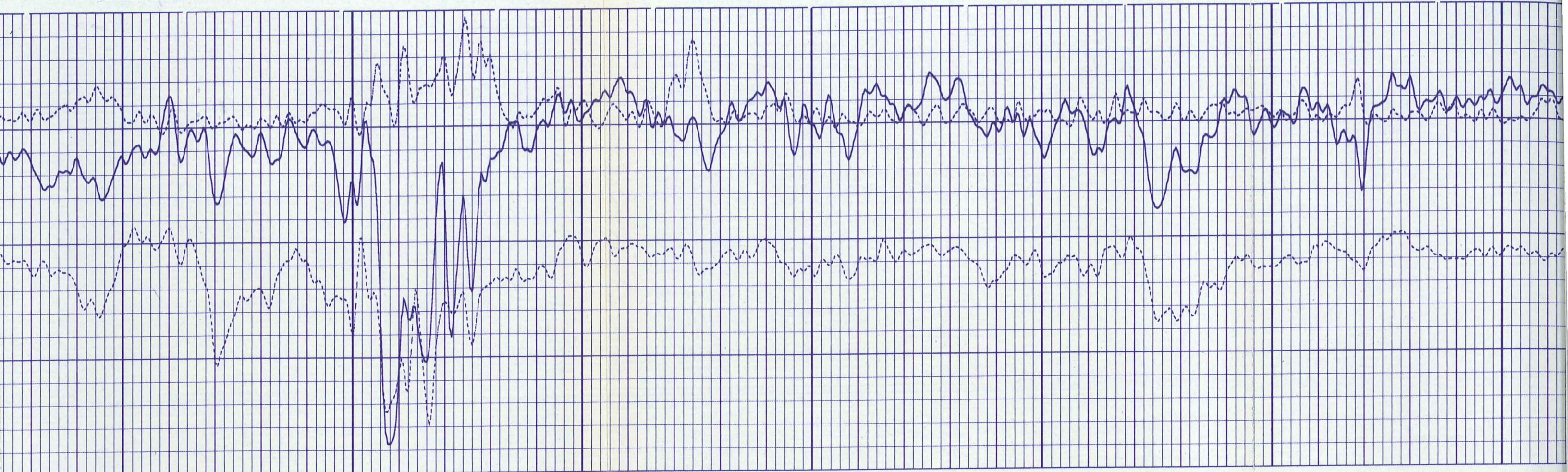


5000

5100

5200



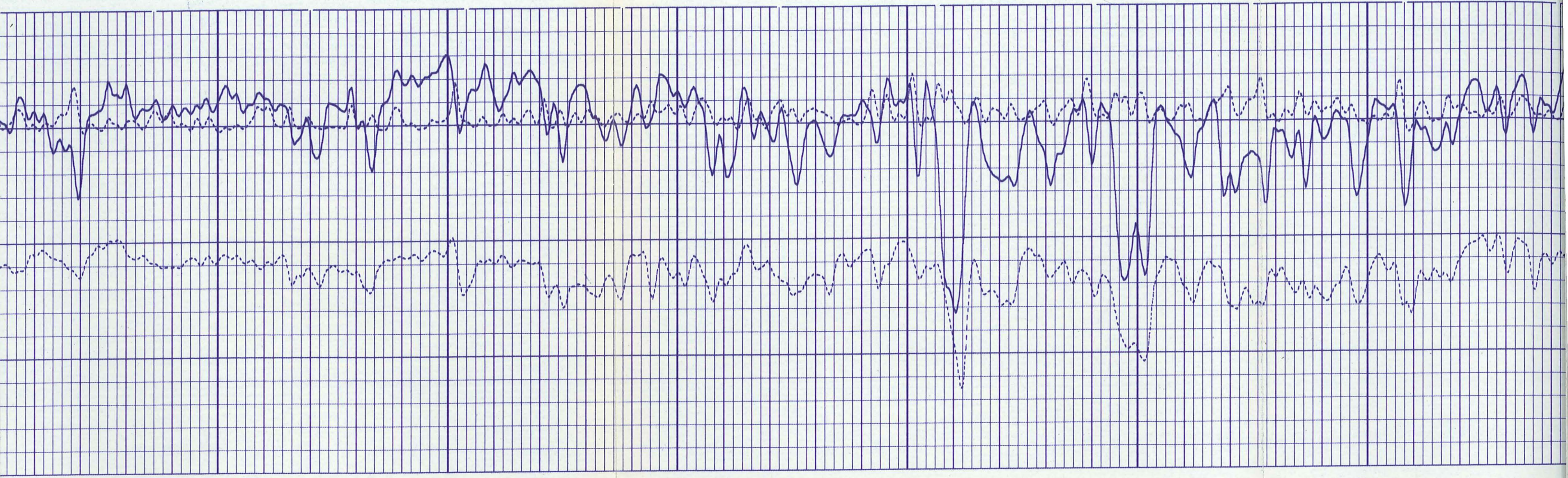


5300

5400

5500

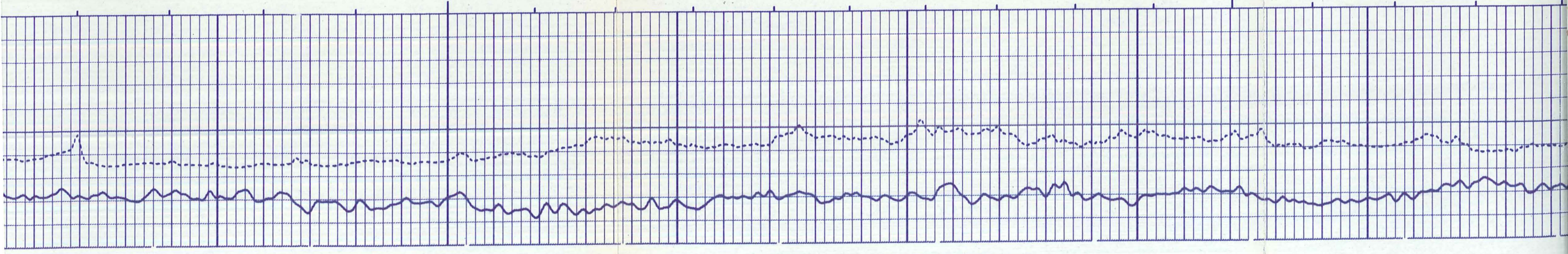




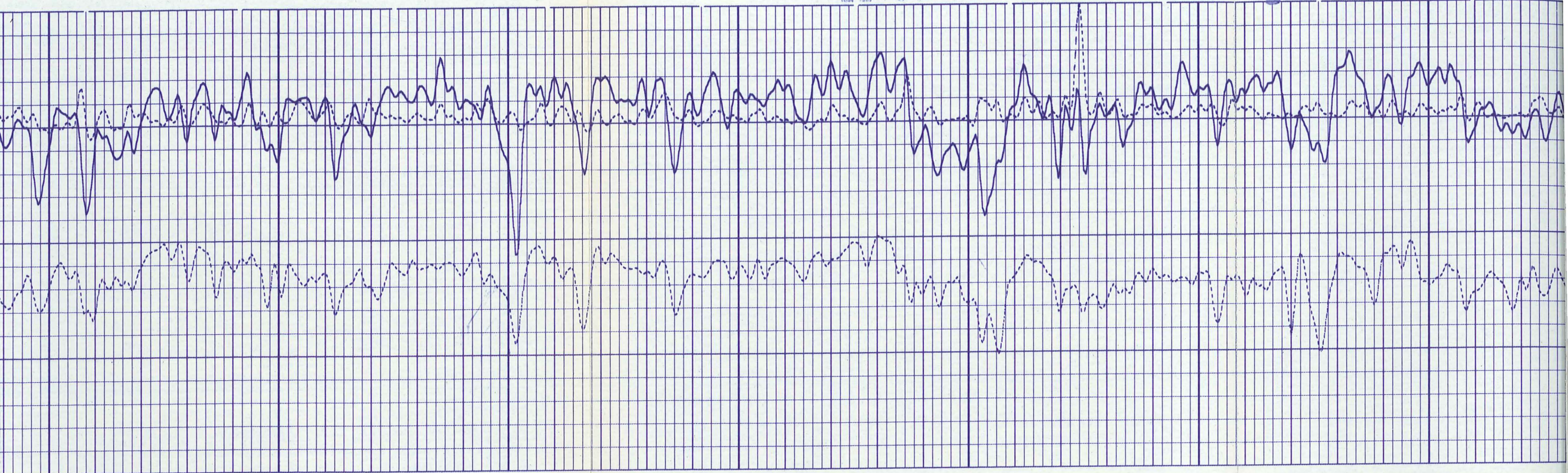
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5700

5800



11-07-79 SIC 082945



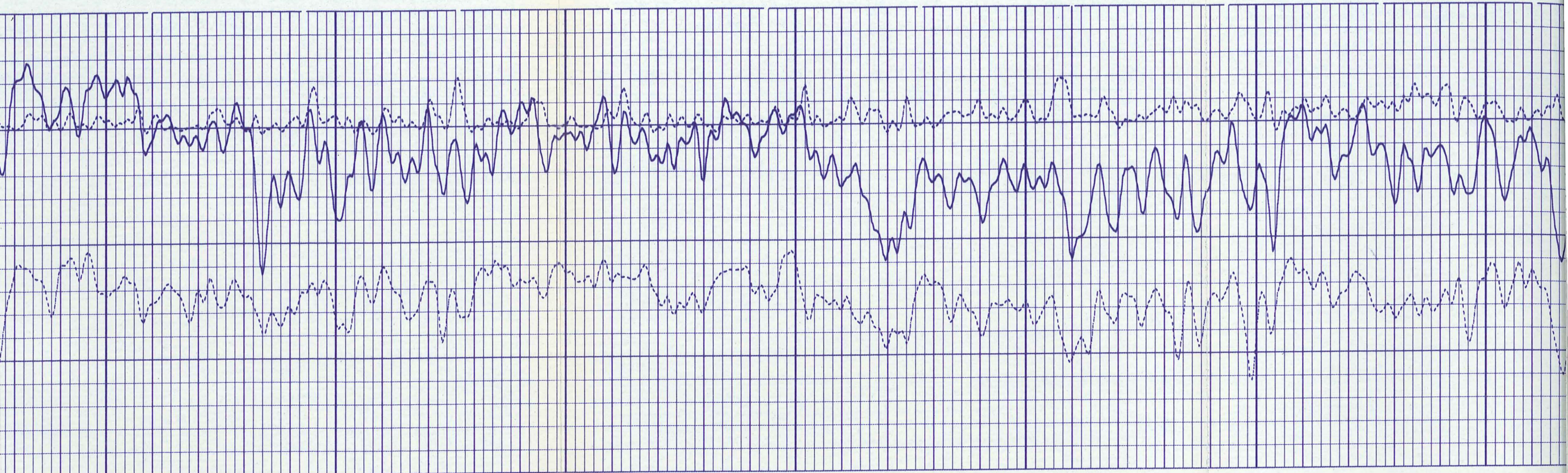
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5900

6000

6100



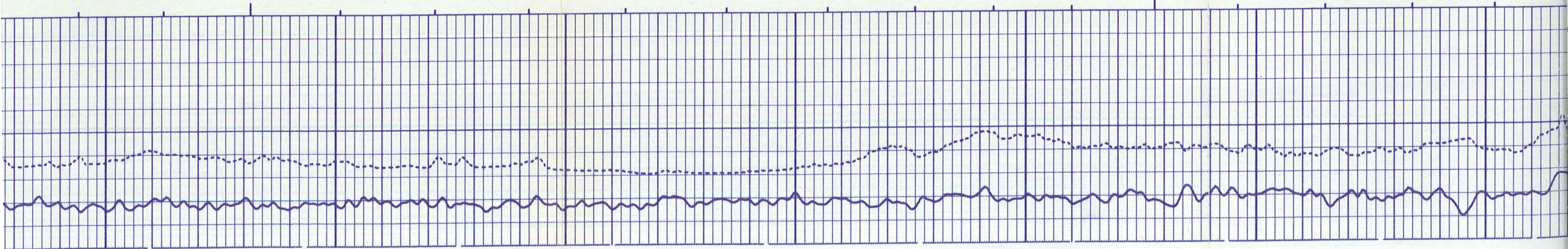


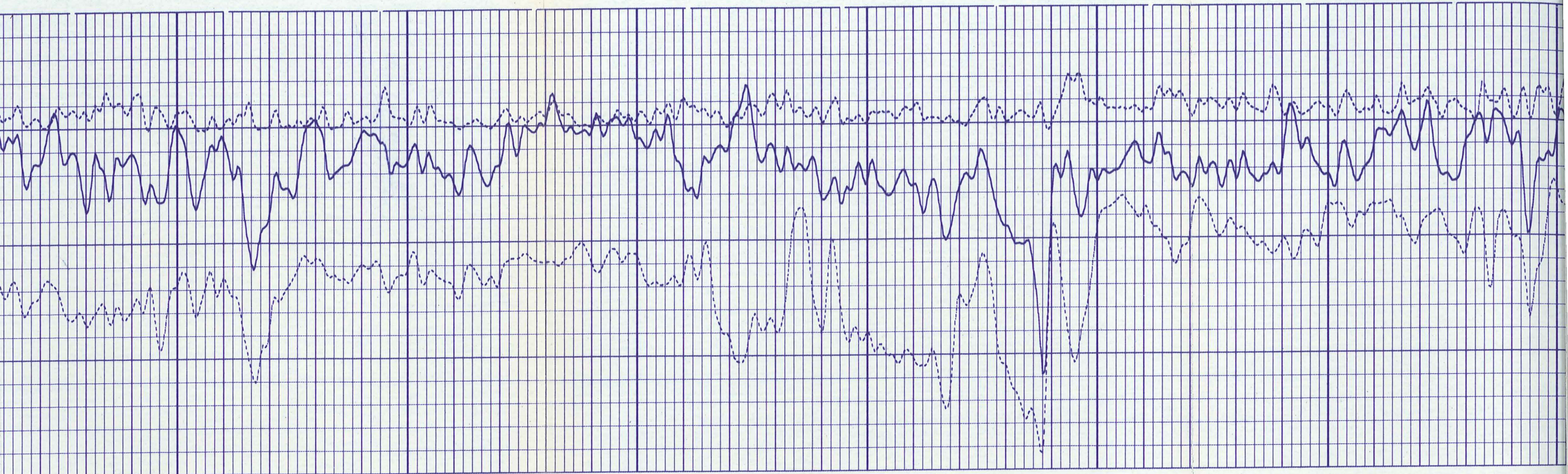
6100

6200

6300

6400



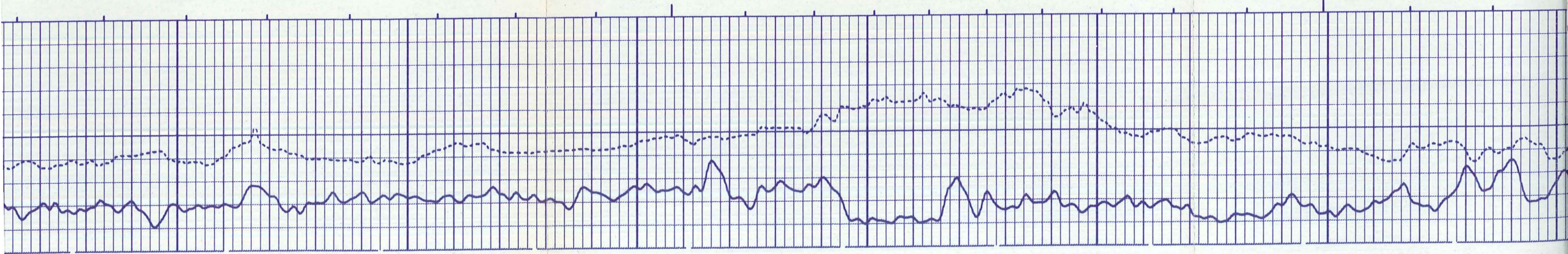


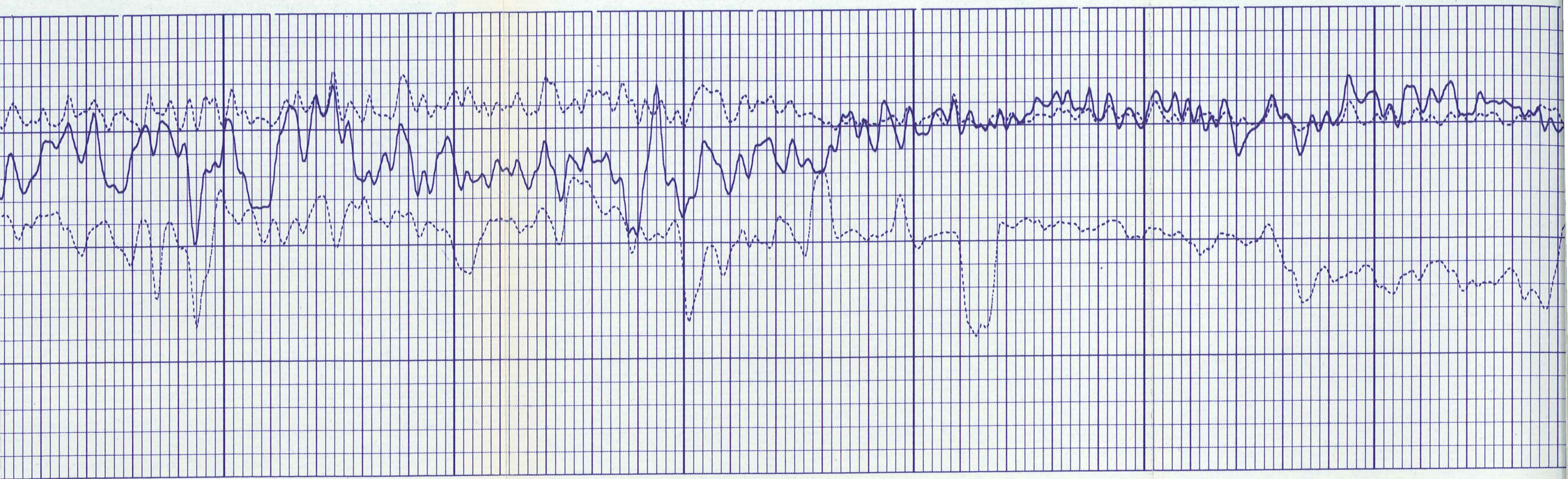
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6500

6600

6700

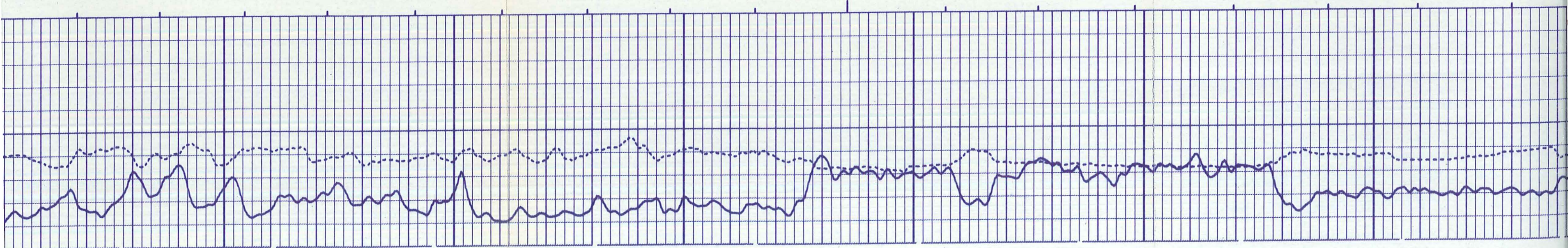


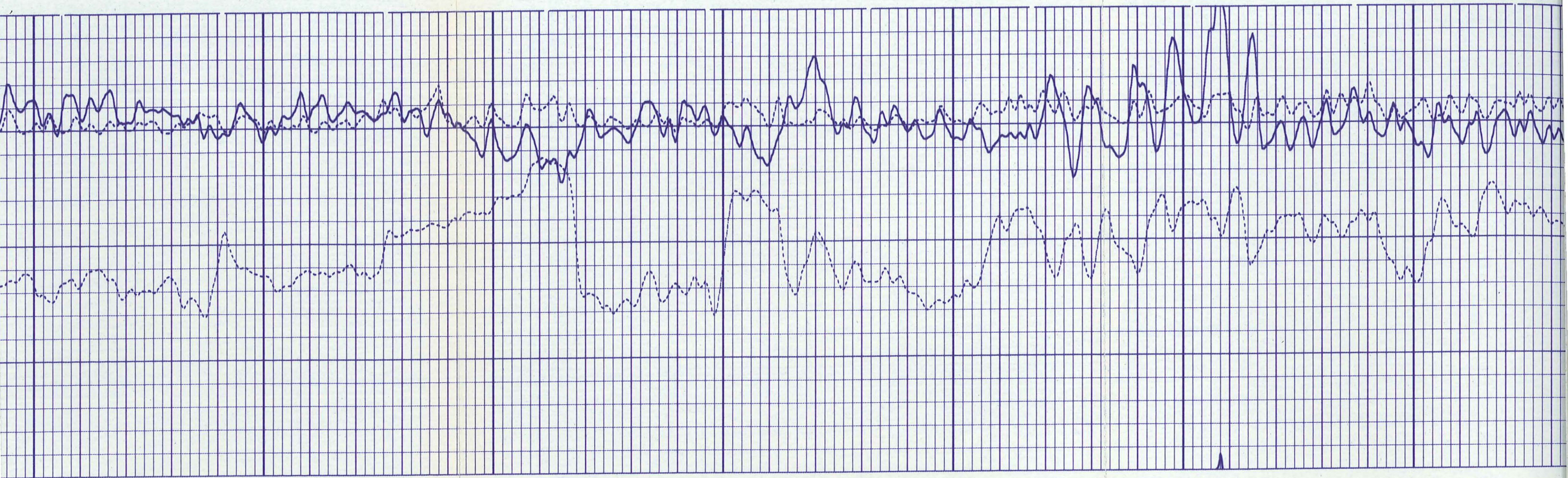


6700

6800

6900

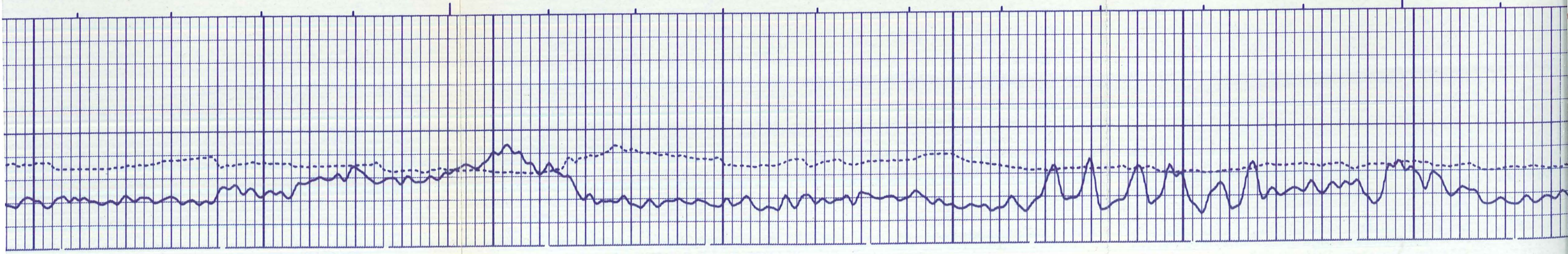


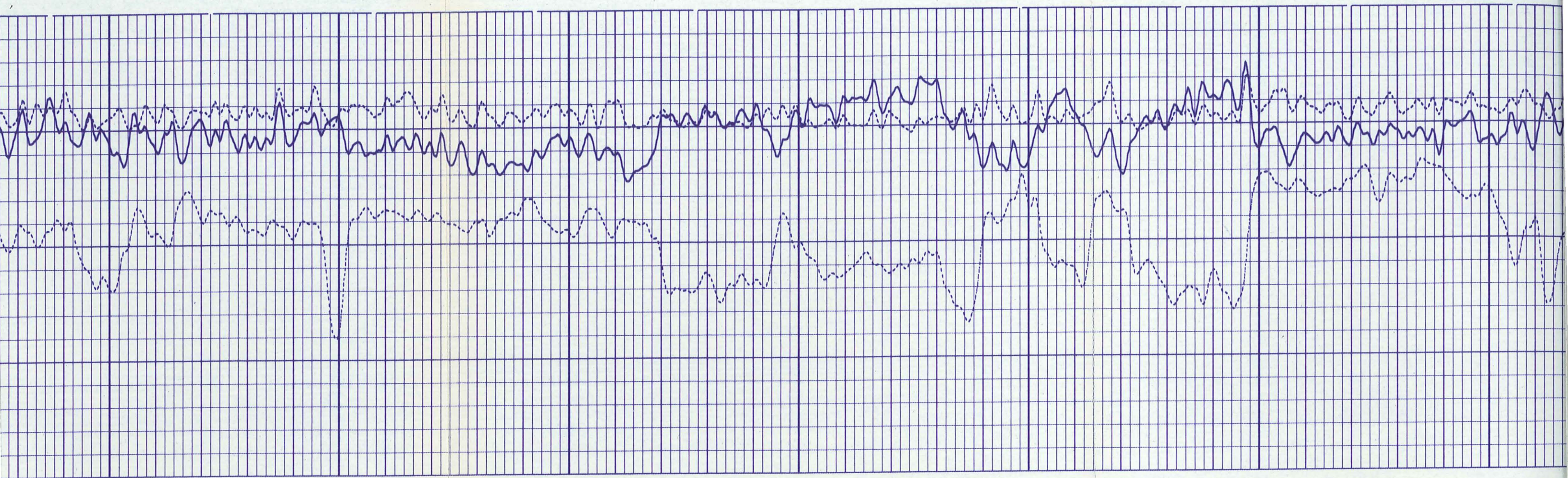


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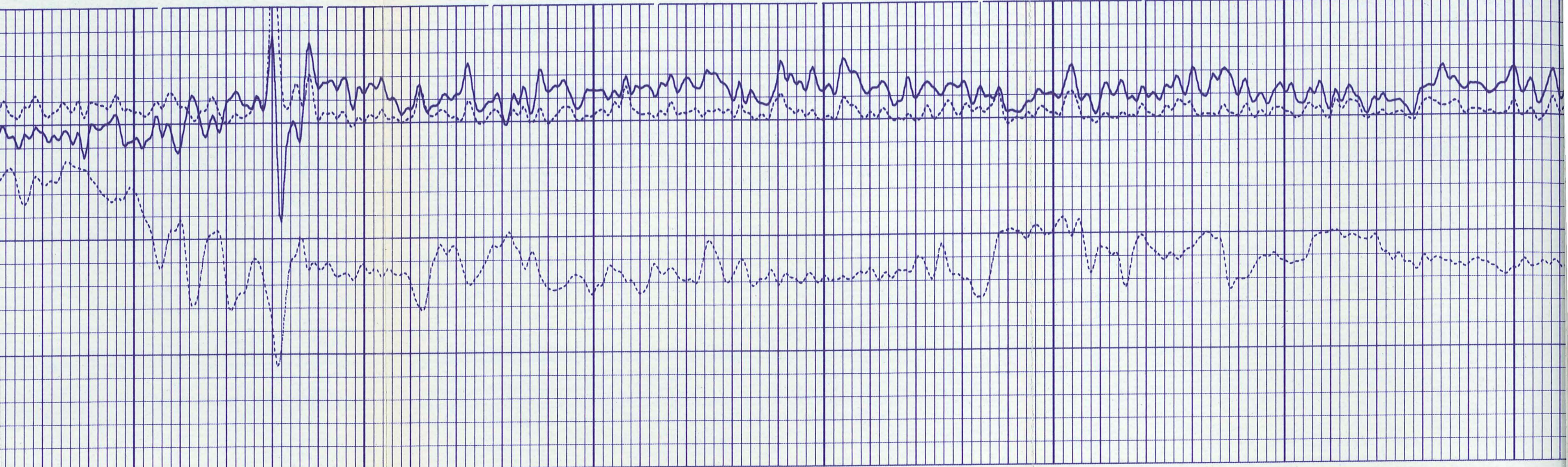
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7200





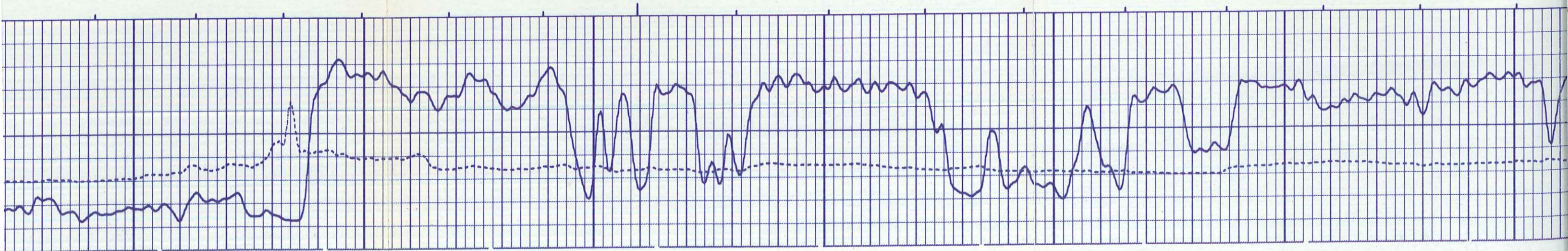
11-07-79 082945



7600

7700

7800



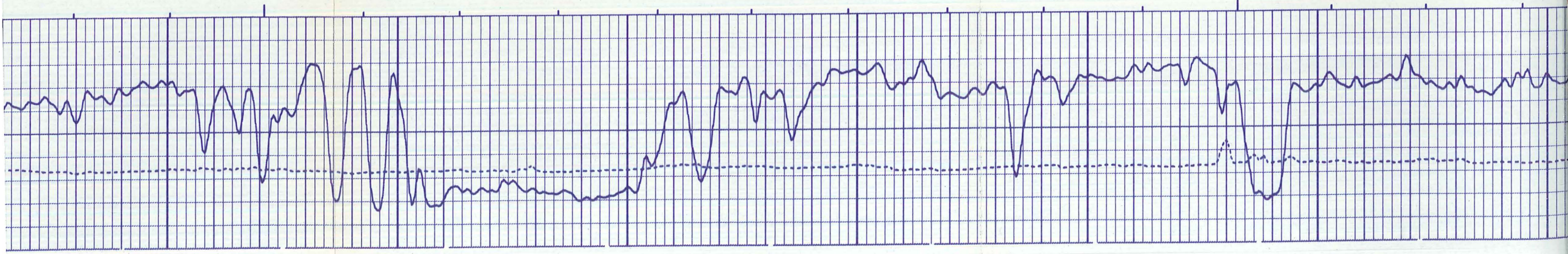
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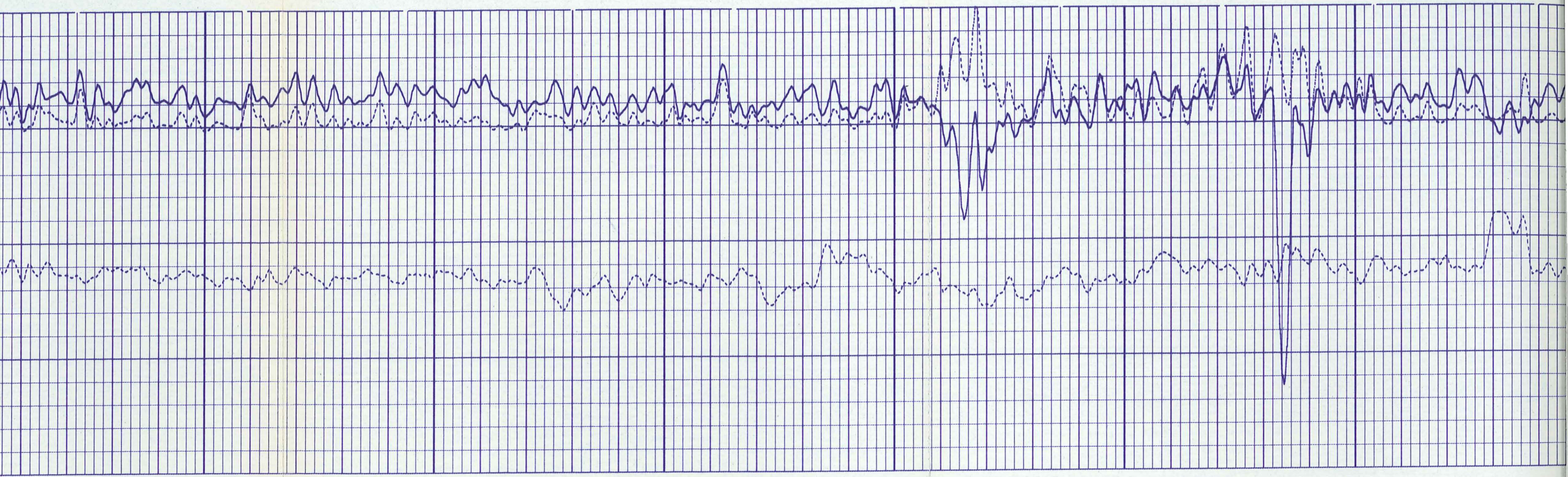


7900

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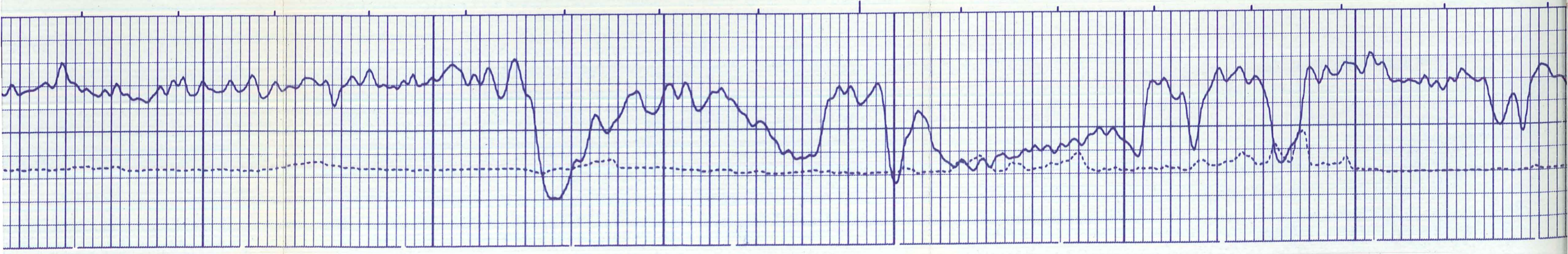


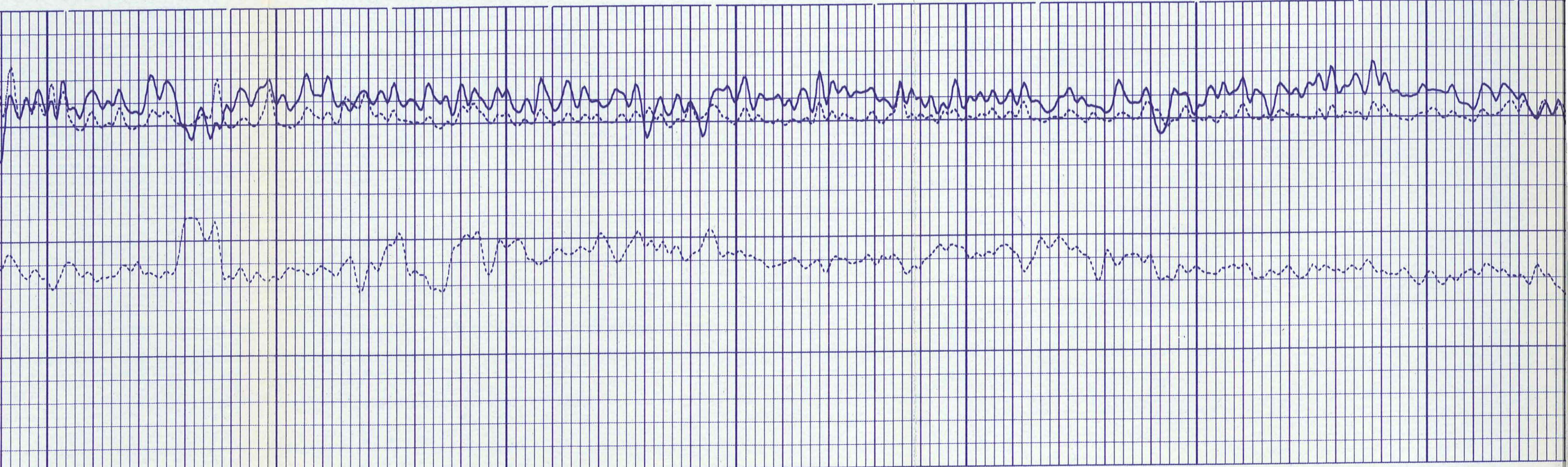


8200

8300

8400





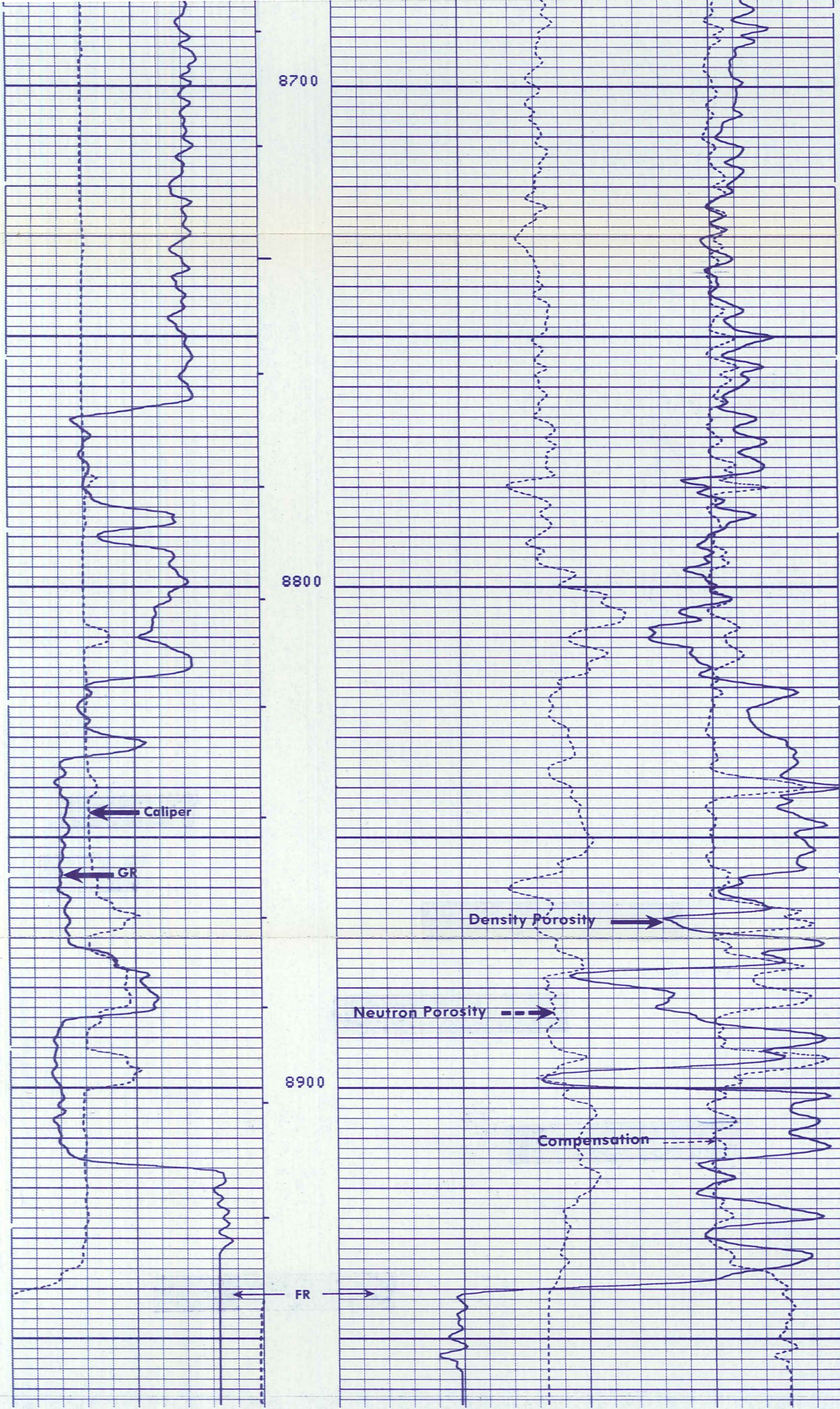
8400

8500

8600

8700





Run 2

DENSITY POROSITY INDEX % SANDSTONE MATRIX

45 30 15 0 -15

COMPENSATED NEUTRON SANDSTONE MATRIX POROSITY

45 30 15 0 -15

BULK DENSITY GRAMS/CC

1.93 2.18 2.43 2.68 2.93

GAMMA RAY API UNITS

1107951082945

Run 2

DENSITY POROSITY INDEX % SANDSTONE MATRIX

45 30 15 0 -15

COMPENSATED NEUTRON SANDSTONE MATRIX
POROSITY

45 30 15 0 -15

BULK DENSITY GRAMS/CC

1.93 2.18 2.43 2.68 2.93

GAMMA RAY API UNITS

0 150

CALIPER DIAM. IN INCHES

6" 16"

CORRECTION GRAMS/CC

-.25 0

COMPANY THERMAL POWER COMPANY

WELL DIXIE FEDERAL 66-21

FIELD DIXIE VALLEY

COUNTY CHURCHILL STATE NEVADA

SCHL. FR 8940

SCHL. TD 8940

DRLR. TD 8947

Elev:

KB 3453

DF 3452

GL 3430

DETAIL LOG

5" = 100'

CALIPER DIAM. IN INCHES

6" 16"

GAMMA RAY

0 150

Run 3

CORRECTION GRAMS/CC

-.25 0 +.25

BULK DENSITY GRAMS/CC

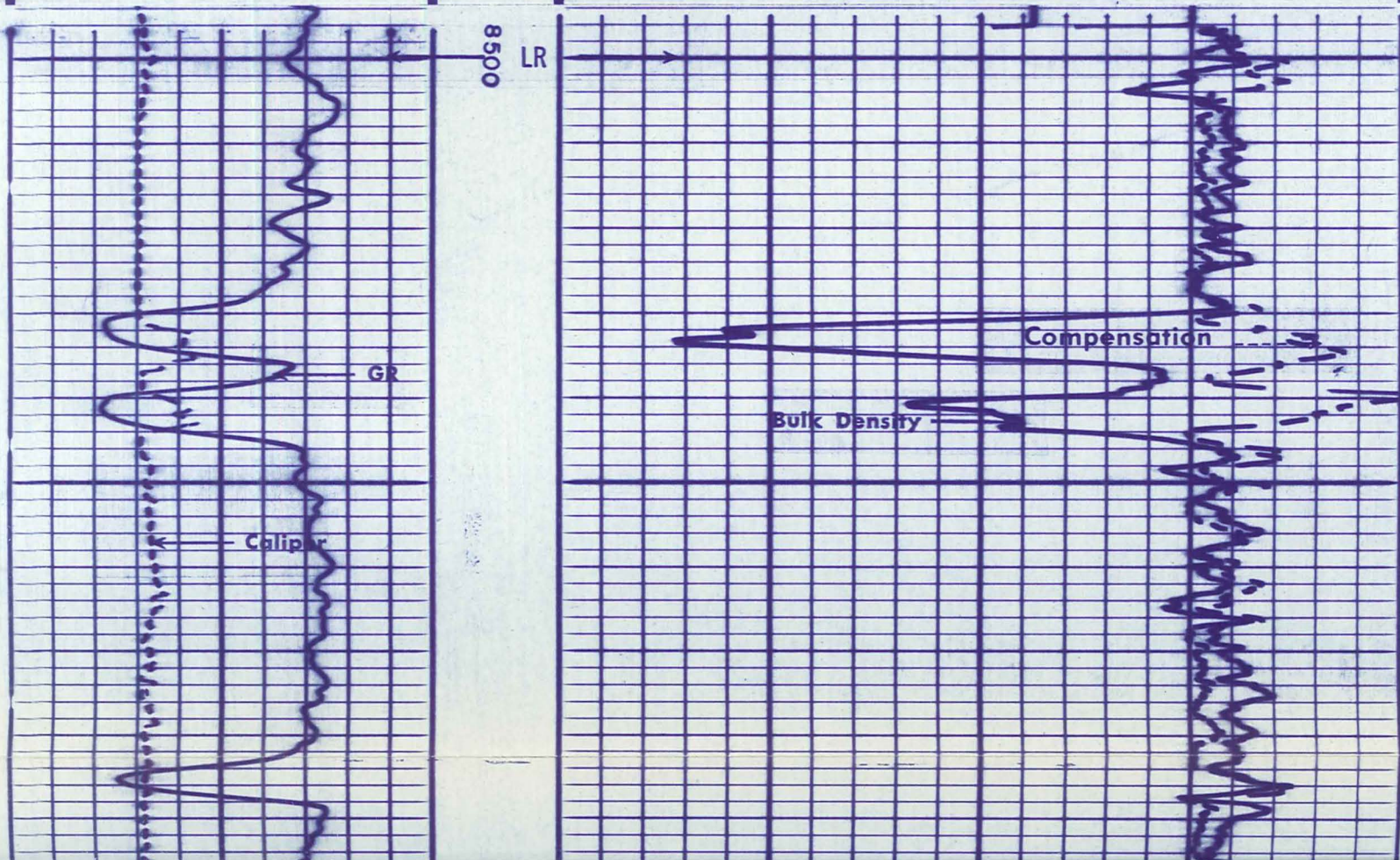
1.93 2.18 2.43 2.68 2.93

COMPENSATED NEUTRON SANDSTONE MATRIX
POROSITY

45 30 15 0 -15

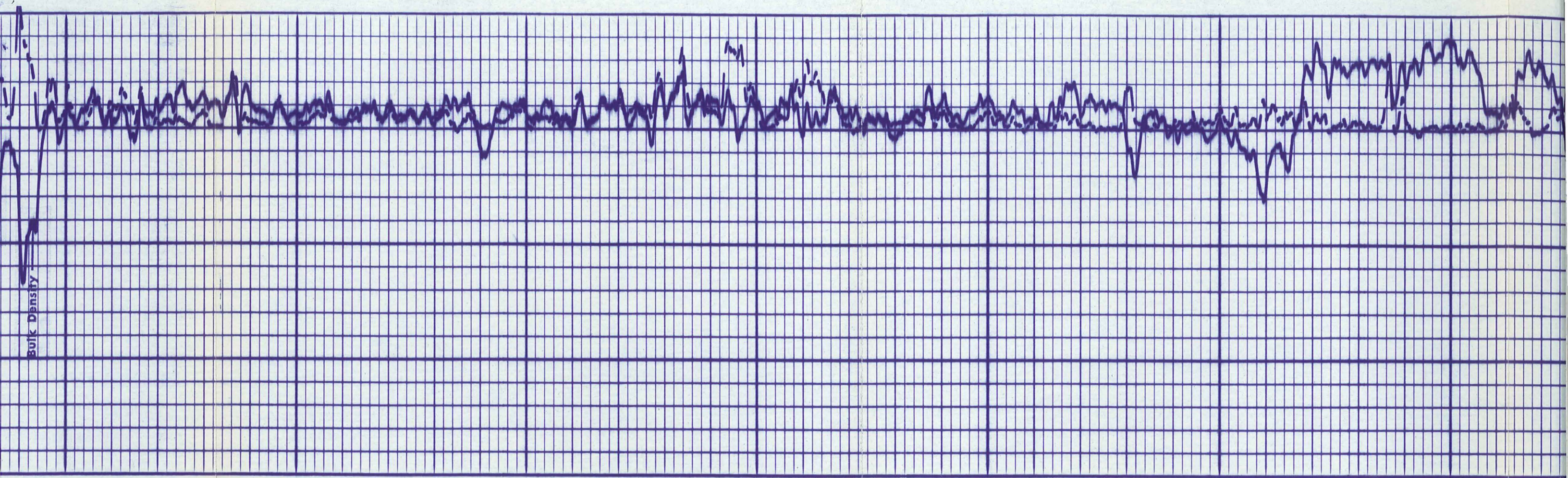
DENSITY POROSITY INDEX % SANDSTONE MATRIX

45 30 15 0 -15



10082945

10082945

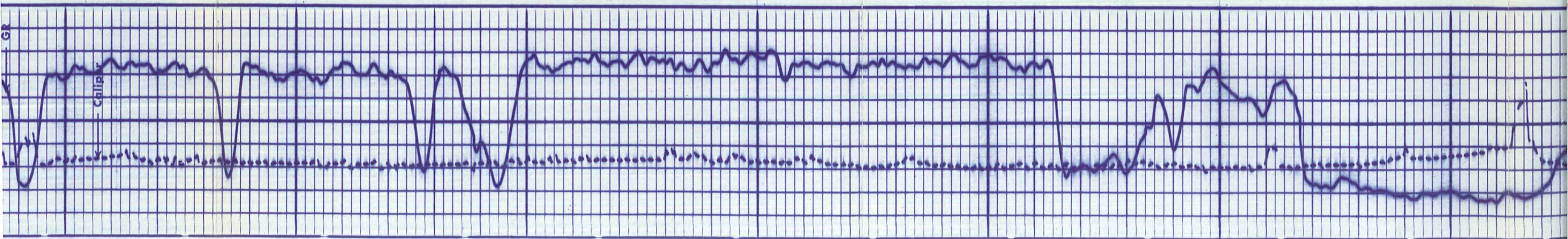


Bulk Density

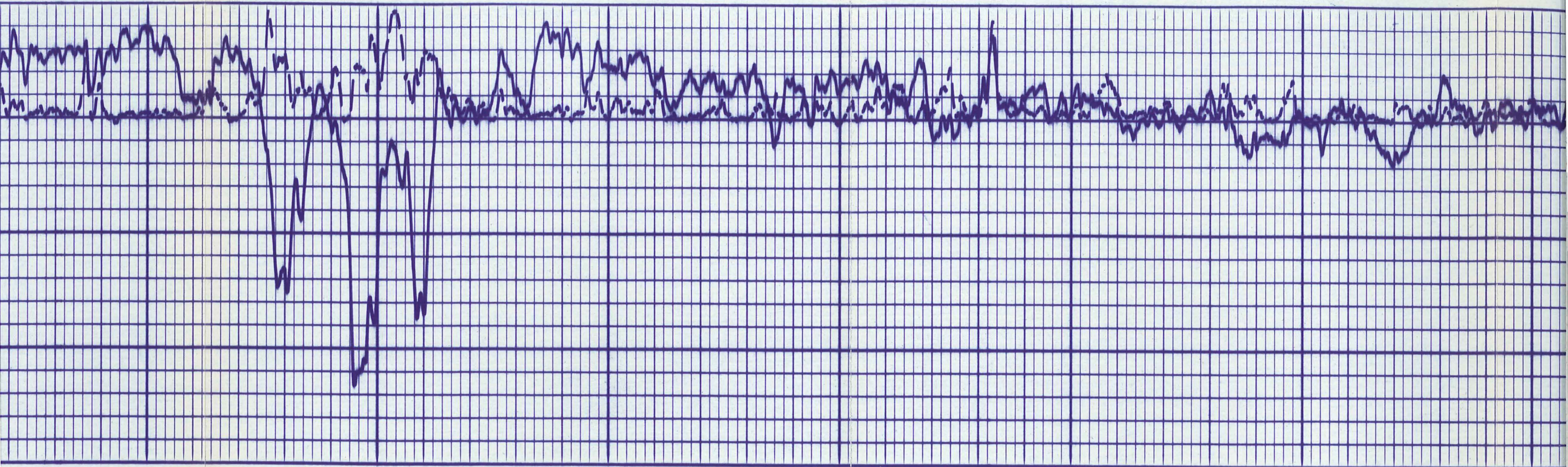
8600

8700

8800



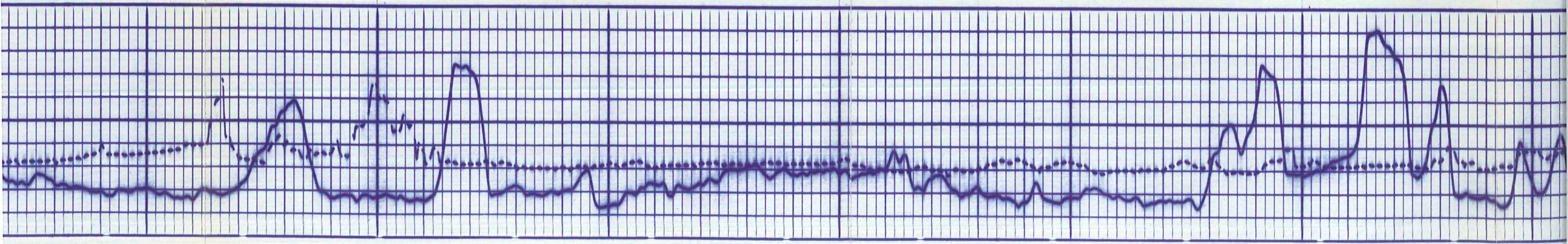
Caliper

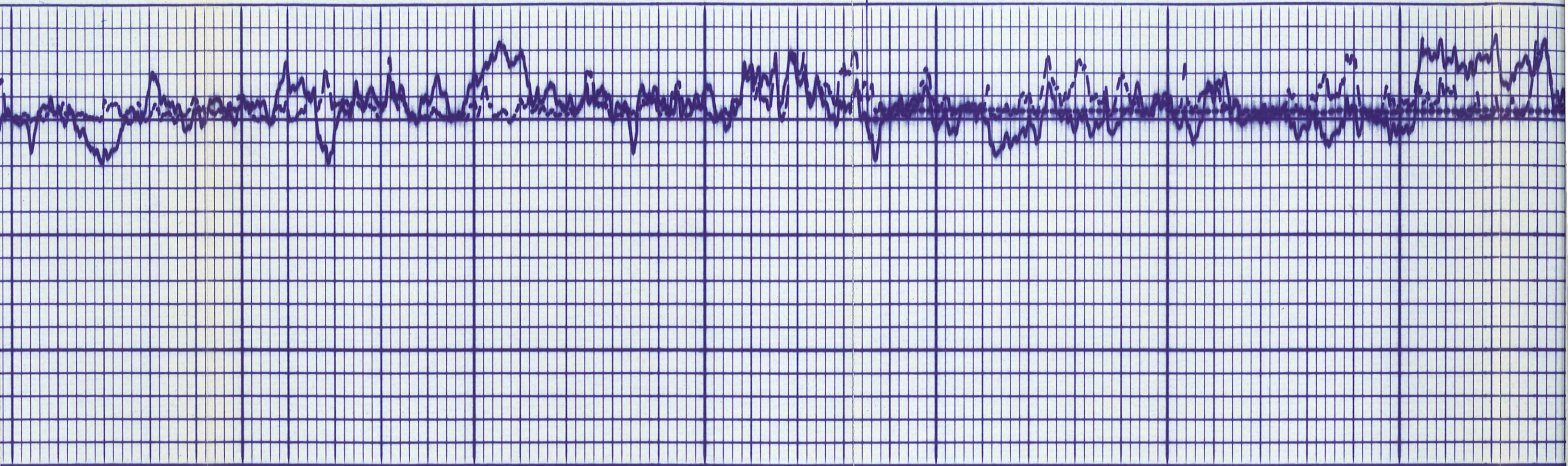


8900

9000

9100



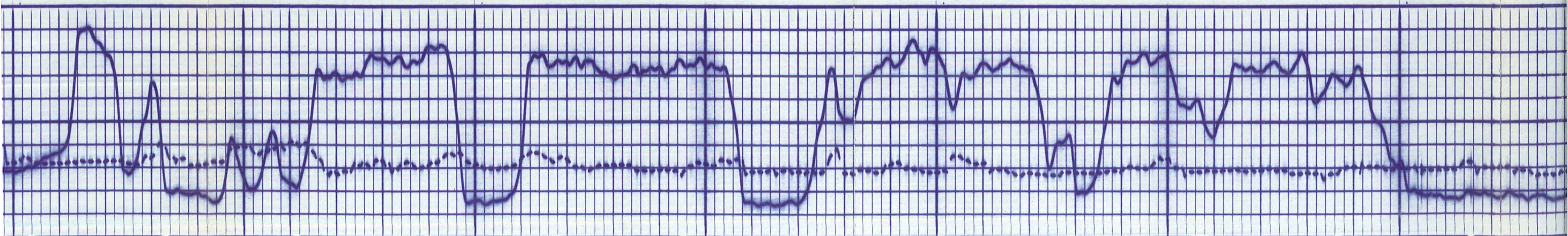


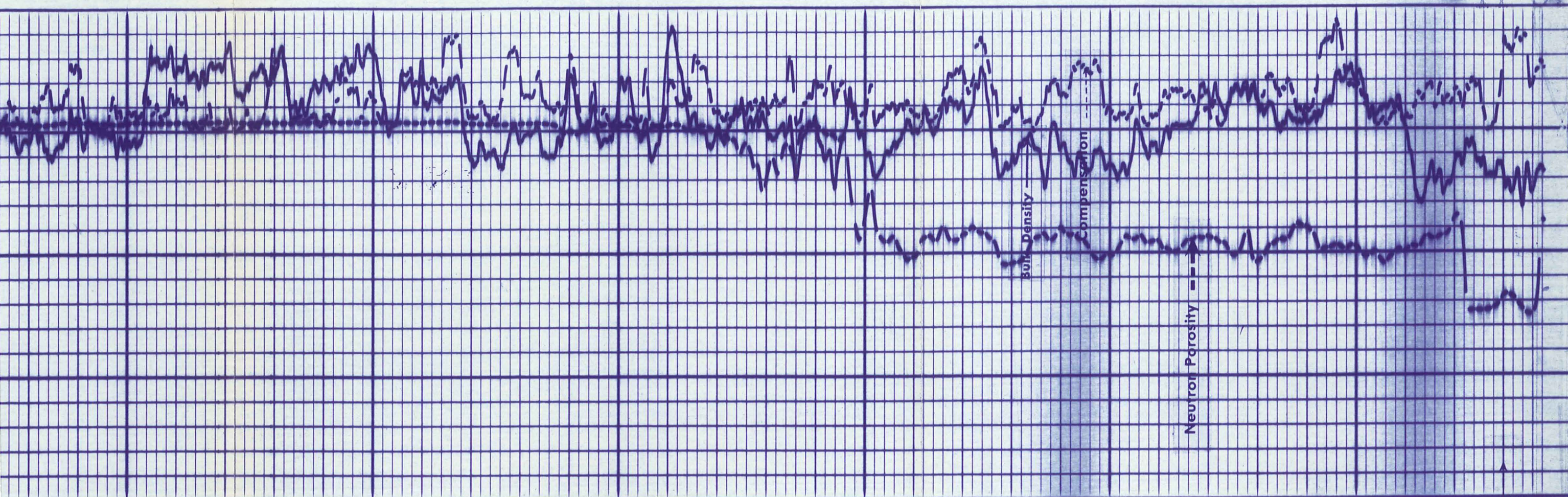
1100

9200

9300

9400



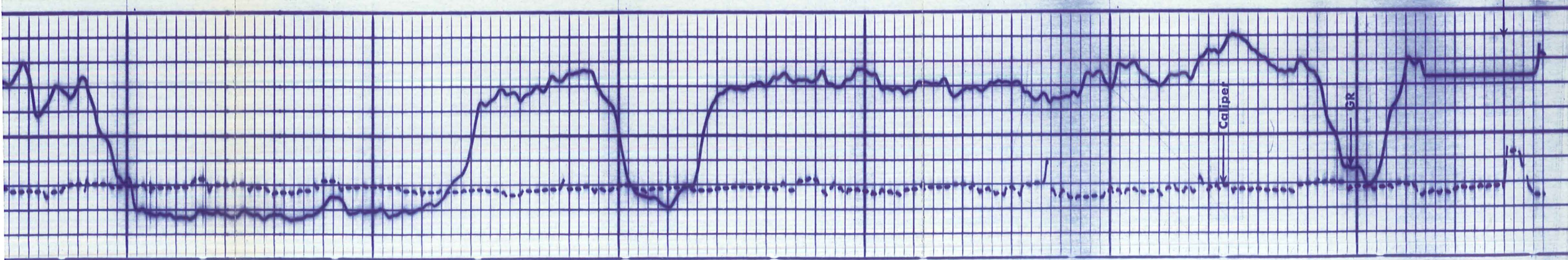


9400

9500

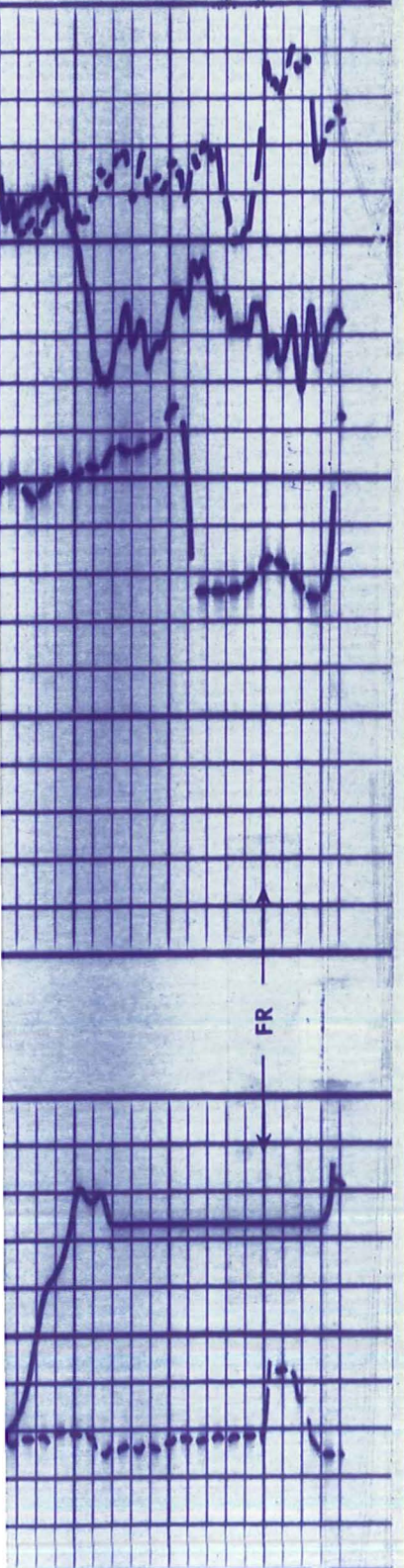
9600

FR

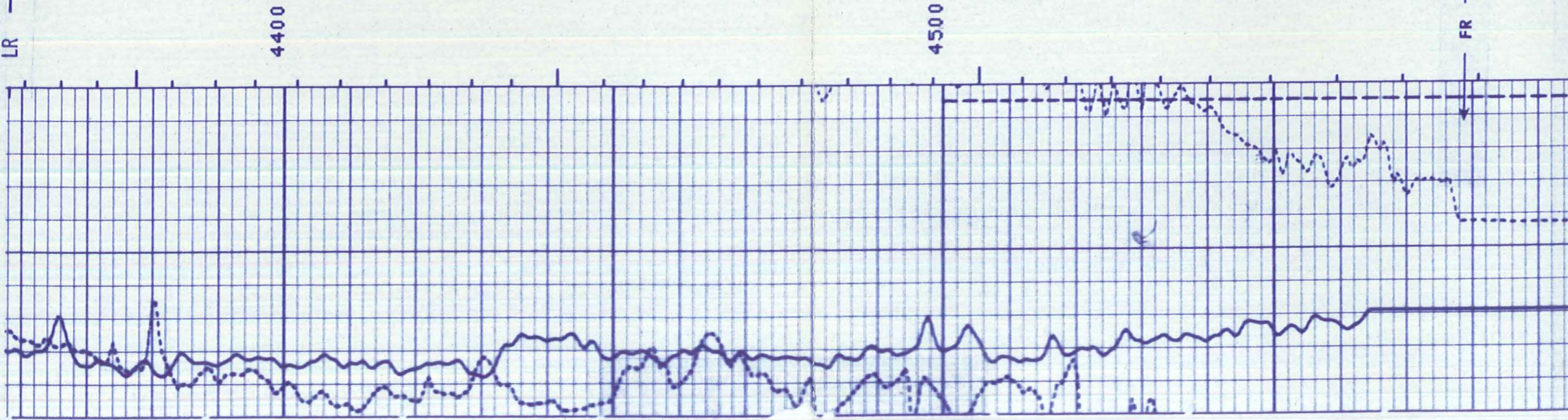
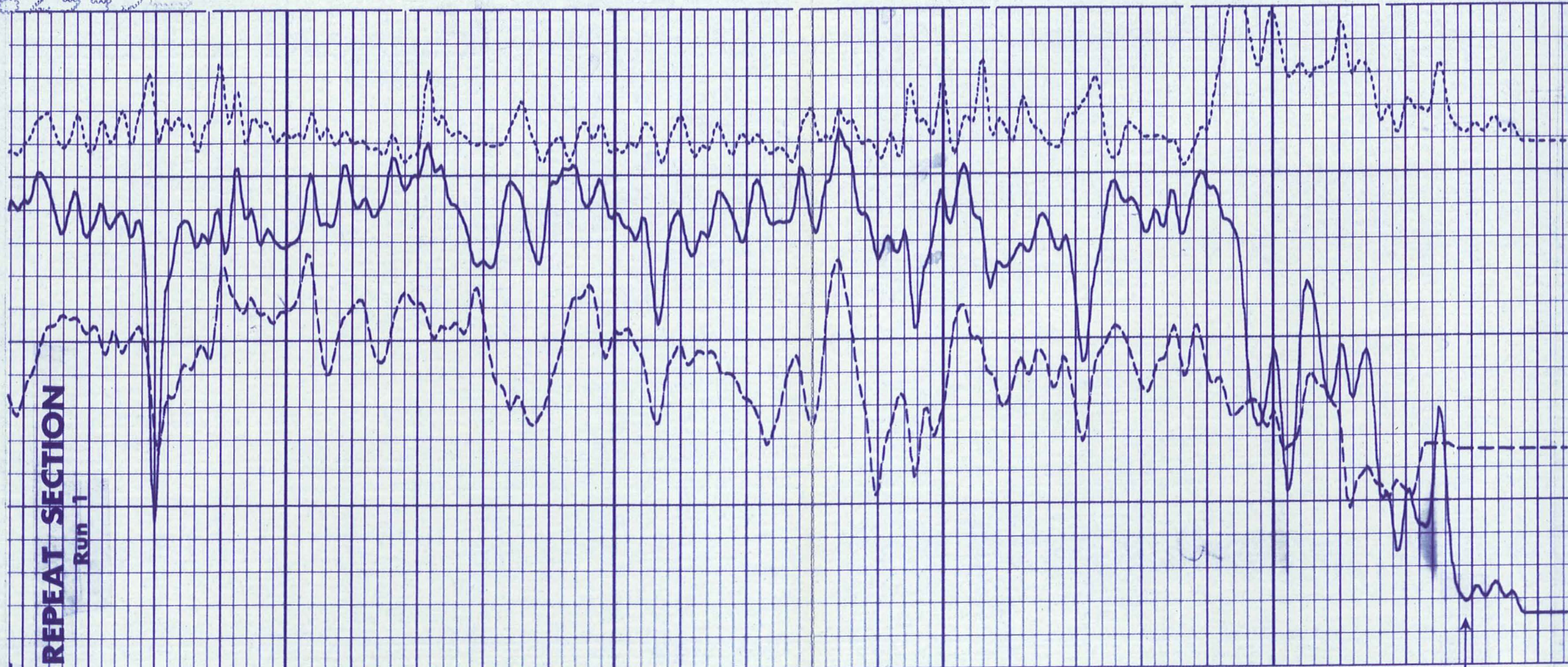


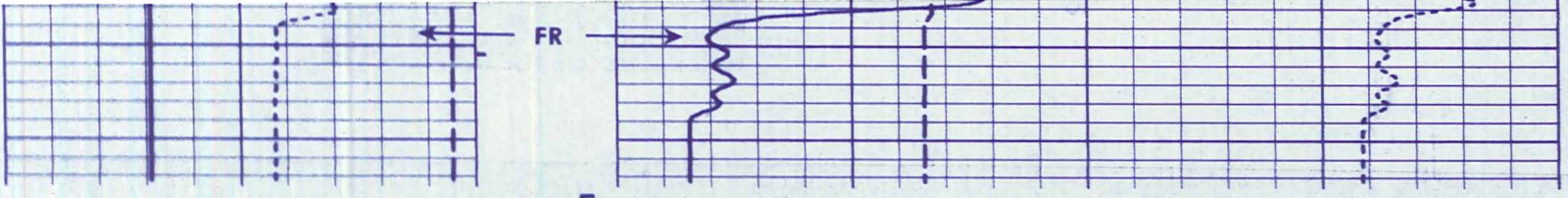
REPEAT SECTION

11-07-79 082945



REPEAT SECTION

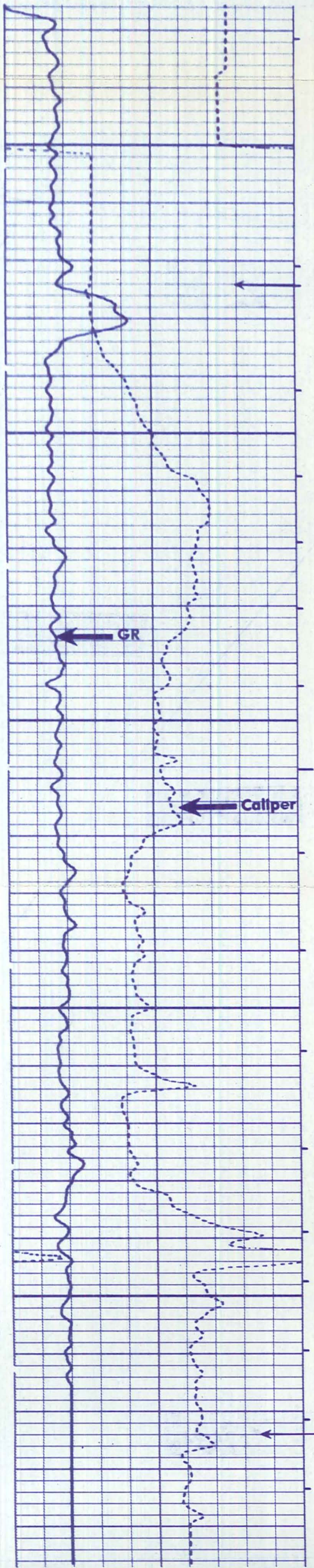




4
4
5

REPEAT SECTION

Run 2



CSG.

4600

GR

Caliper

4700

Neutron Porosity

Density Porosity

Compensation

FR

4
4

DENSITY POROSITY INDEX % SANDSTONE MATRIX

45 30 15 0 -15

COMPENSATED NEUTRON SANDSTONE MATRIX POROSITY

1107031082945

PERFORMED: 79/08/03
PROGRAM FILE: NUC (VERSION 14.4 79/ 6/ 1)

CNTA TOOL CHECK

JIG
BEFORE AFTER
NRAT 2.15 2.15

POROSITY CHANGE (LIME): -0.000

PGTE TOOL CHECK

JIG
BEFORE AFTER UNITS
FFDC 337 336 CPS
NFDC 528 505 CPS
11
11
11

SHOP SUMMARY

PERFORMED: 79/07/20
PROGRAM FILE: SHOP (VERSION 14.4 79/ 6/ 1)

PGTE DETECTOR CALIBRATION SUMMARY

	BLOCK		JIG		UNITS
	MEASURED	CALIBRATED	MEASURED	CALIBRATED	
FFDC	415	337	419	340	CPS
NFDC	811	528	810	527	CPS

(PGS:392 , PDH:208 , GSR:5153 , SFT:1177)

SHOP SUMMARY

PERFORMED: 79/08/01
PROGRAM FILE: SHOP (VERSION 14.4 79/ 6/ 1)

CNTA DETECTOR CALIBRATION SUMMARY

	TANK		JIG	
	MEASURED	CALIBRATED	MEASURED	CALIBRATED
NRAT	2.27	2.15	2.26	2.14

(CNC:409 , CNB:594)

AFTER SURVEY TOOL CHECK SUMMARY

Run 2

PERFORMED: 79/09/05
PROGRAM FILE: NUC (VERSION 14.4 79/ 6/ 1)

CNTA TOOL CHECK

JIG
BEFORE AFTER
NRAT 2.15 2.16

POROSITY CHANGE (LIME): 0.001

PGTE TOOL CHECK

JIG
BEFORE AFTER UNITS
FFDC 323 332 CPS
NFDC 515 514 CPS
6
6

BEFORE SURVEY CALIBRATION SUMMARY

PERFORMED: 79/09/05
PROGRAM FILE: NUC (VERSION 14.4 79/ 6/ 1)

SGTE DETECTOR CALIBRATION SUMMARY

	MEASURED		CALIBRATED	UNITS
	BKGD	JIG		
GR	36	205	165	GAPI

CNTA DETECTOR CALIBRATION SUMMARY

	TANK		JIG	
	MEASURED	CALIBRATED	MEASURED	CALIBRATED

PERFORMED: 79/09/05
 PROGRAM FILE: NUC (VERSION 14.4 79/ 6/ 1)

SGTE DETECTOR CALIBRATION SUMMARY

GR	MEASURED		CALIBRATED	UNITS
	BKGD	JIG		
	36	205	165	GAPI

CNTA DETECTOR CALIBRATION SUMMARY

NRAT	INPUT	TANK		MEASURED	UNITS
		CALIBRATED	JIG		
	0.0	0.0		2.27	2.15

PGTE DETECTOR CALIBRATION SUMMARY

FFDC	NFDC	BLOCK		MEASURED	CALIBRATED	UNITS
		INPUT	JIG			
		431	337	413	323	CPS
		805	528	785	515	CPS

PGTE CALIPER CALIBRATION SUMMARY

CALI	MEASURED		CALIBRATED		UNITS
	SMALL	LARGE	SMALL	LARGE	
	6.8	10.0	8.0	12.0	IN

2
2
2
2

SHOP SUMMARY

PERFORMED: 79/08/01
 PROGRAM FILE: SHOP (VERSION 14.4 79/ 6/ 1)

CNTA DETECTOR CALIBRATION SUMMARY

NRAT	TANK		JIG	
	MEASURED	CALIBRATED	MEASURED	CALIBRATED
	2.27	2.15	2.26	2.14

(CNC:409 , CNB:594)

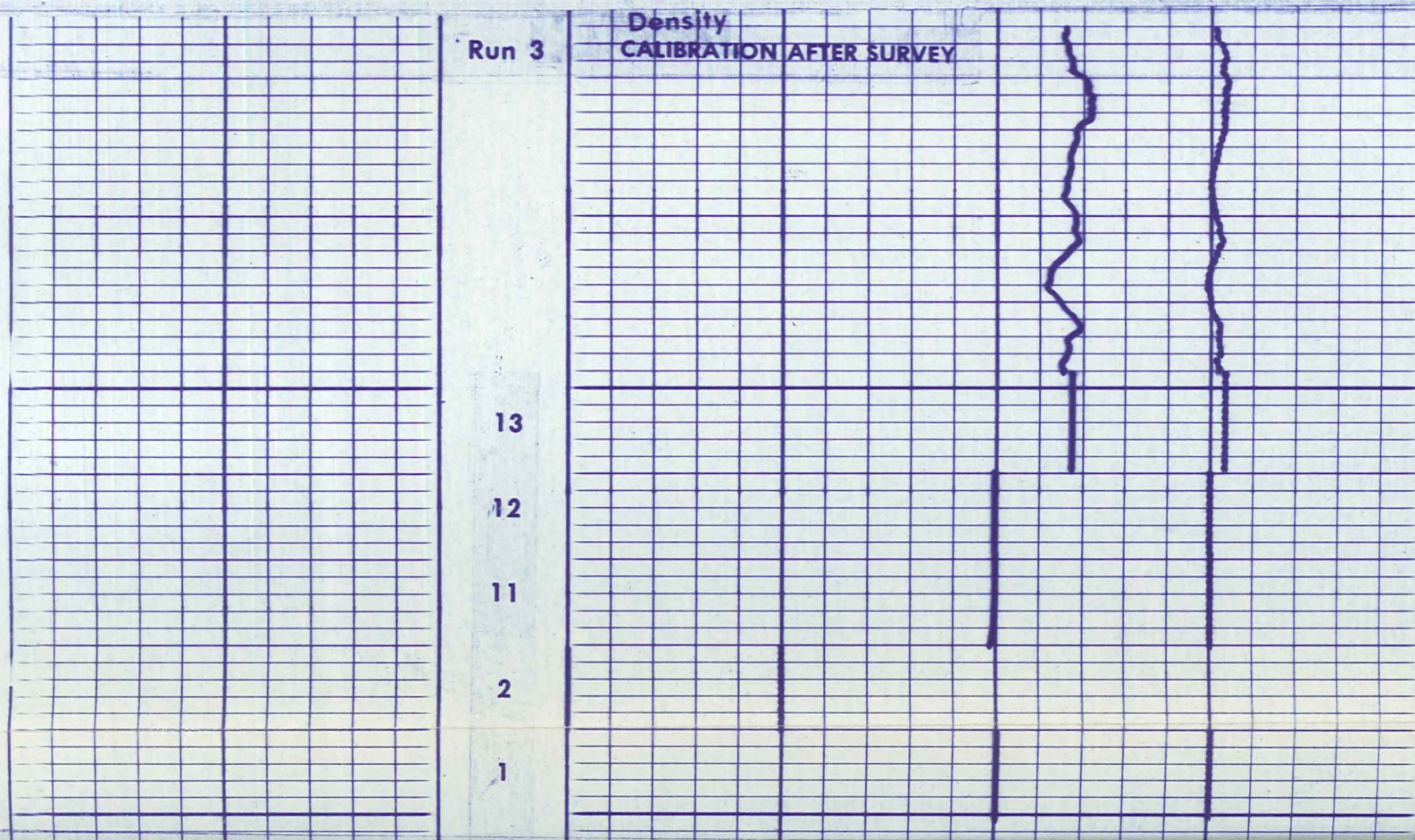
SHOP SUMMARY

PERFORMED: 79/08/30
 PROGRAM FILE: SHOP (VERSION 14.4 79/ 6/ 1)

PGTE DETECTOR CALIBRATION SUMMARY

FFDC	NFDC	BLOCK		JIG		UNITS
		MEASURED	CALIBRATED	MEASURED	CALIBRATED	
		431	337	417	326	CPS
		805	528	790	518	CPS

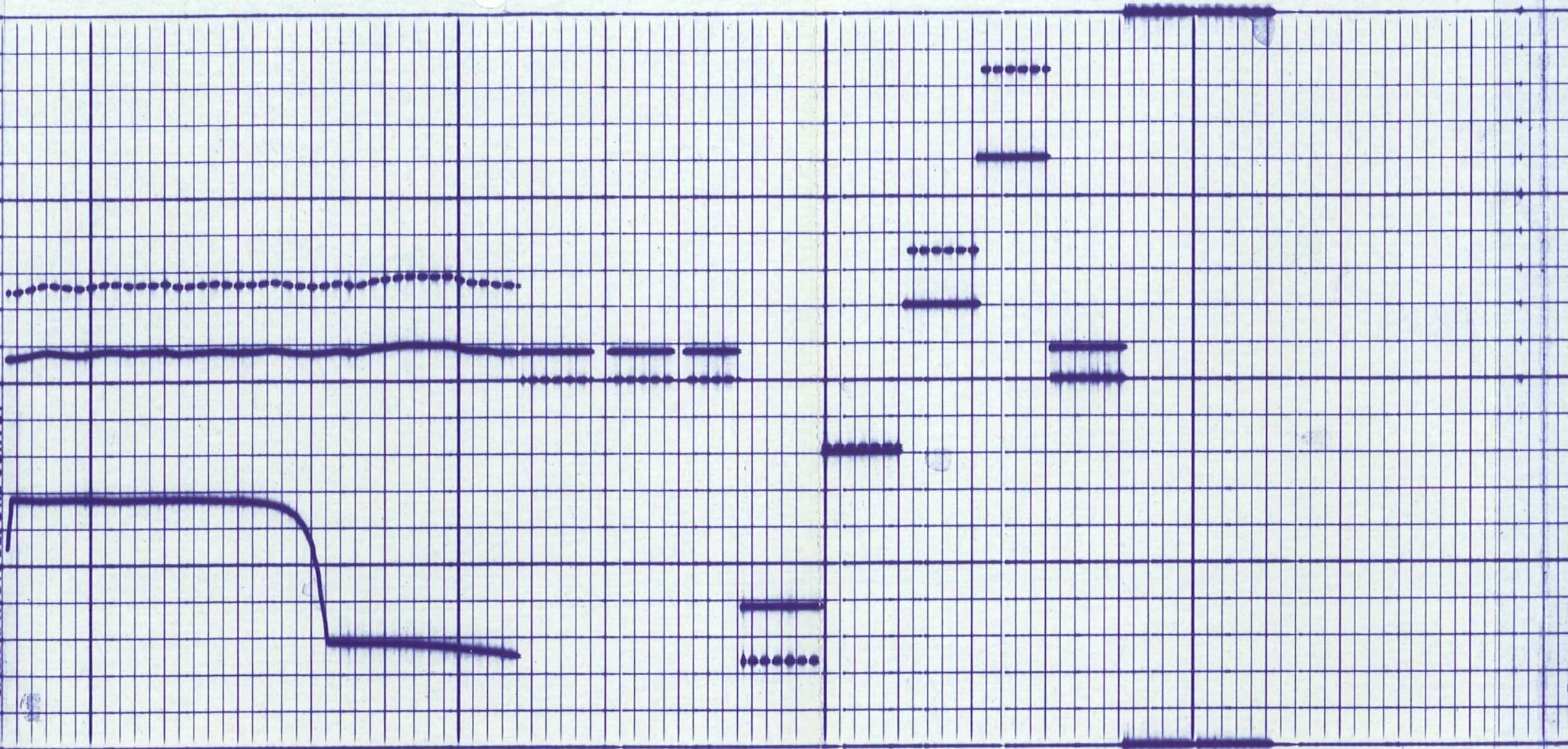
(PGS:392 , PDH:208 , GSR:5153 , SFT:1177)



L.C.M.H.S. 10-11

13
12
11
2
1

Neutron
CALIBRATION BEFORE SURVEY



8

7

6

5

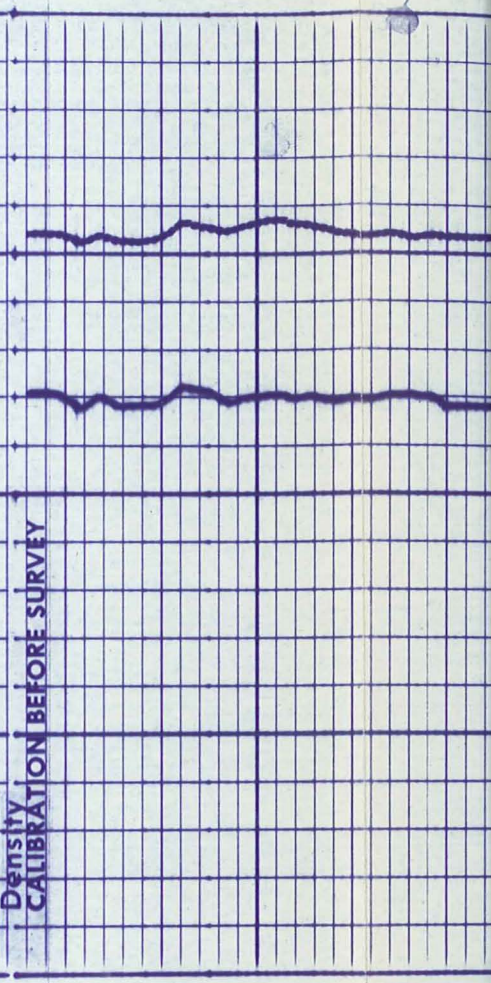
4

3

2

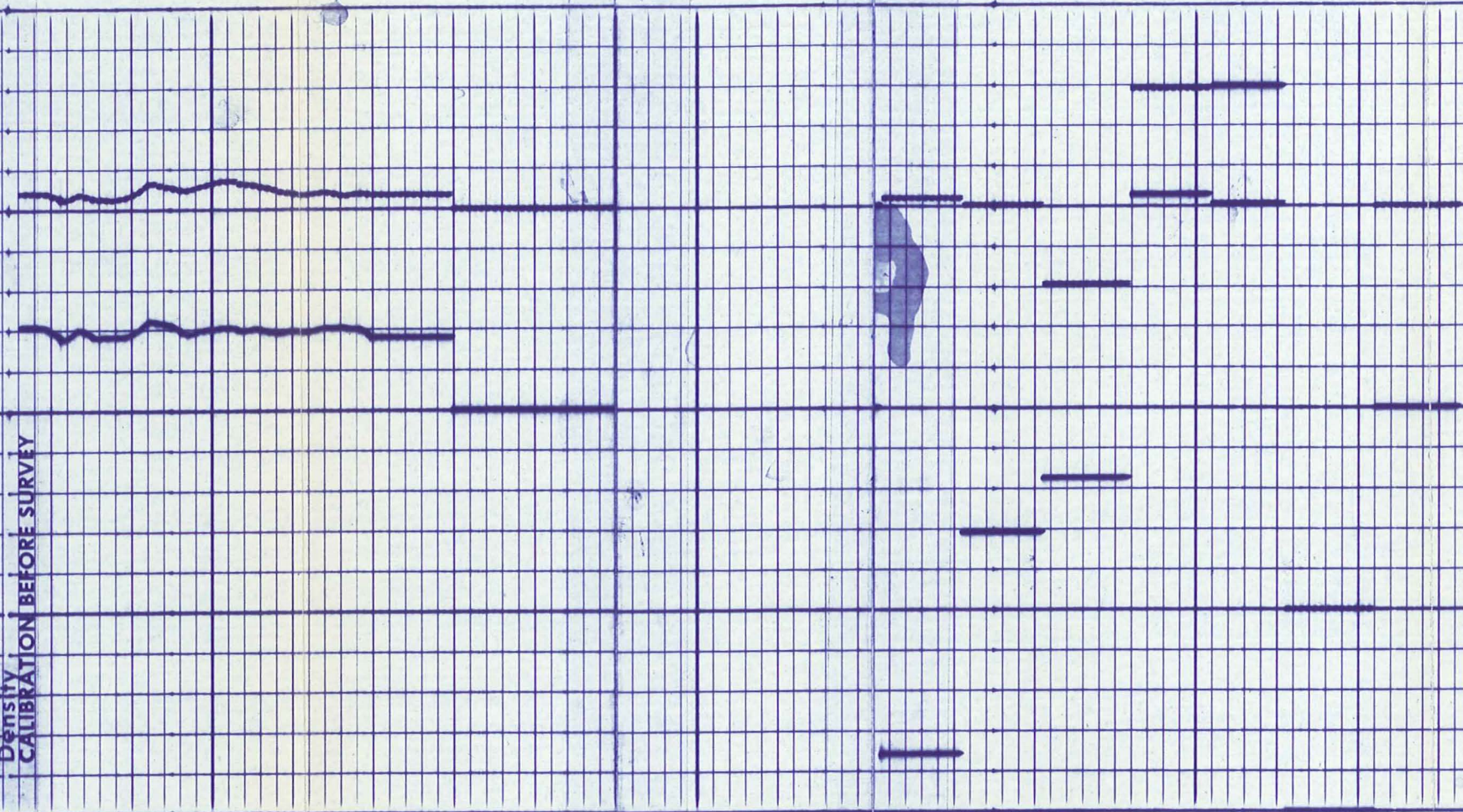
1

Density
CALIBRATION BEFORE SURVEY



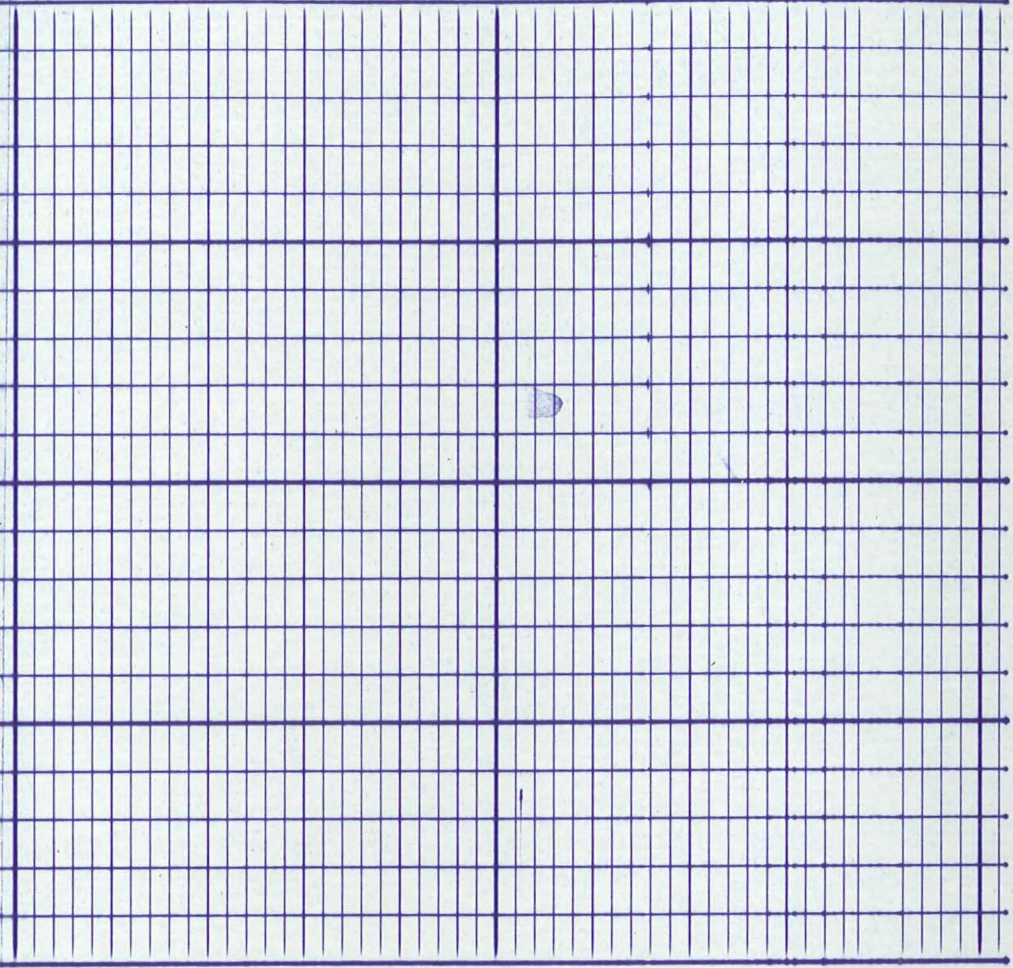
13

Density CALIBRATION BEFORE SURVEY



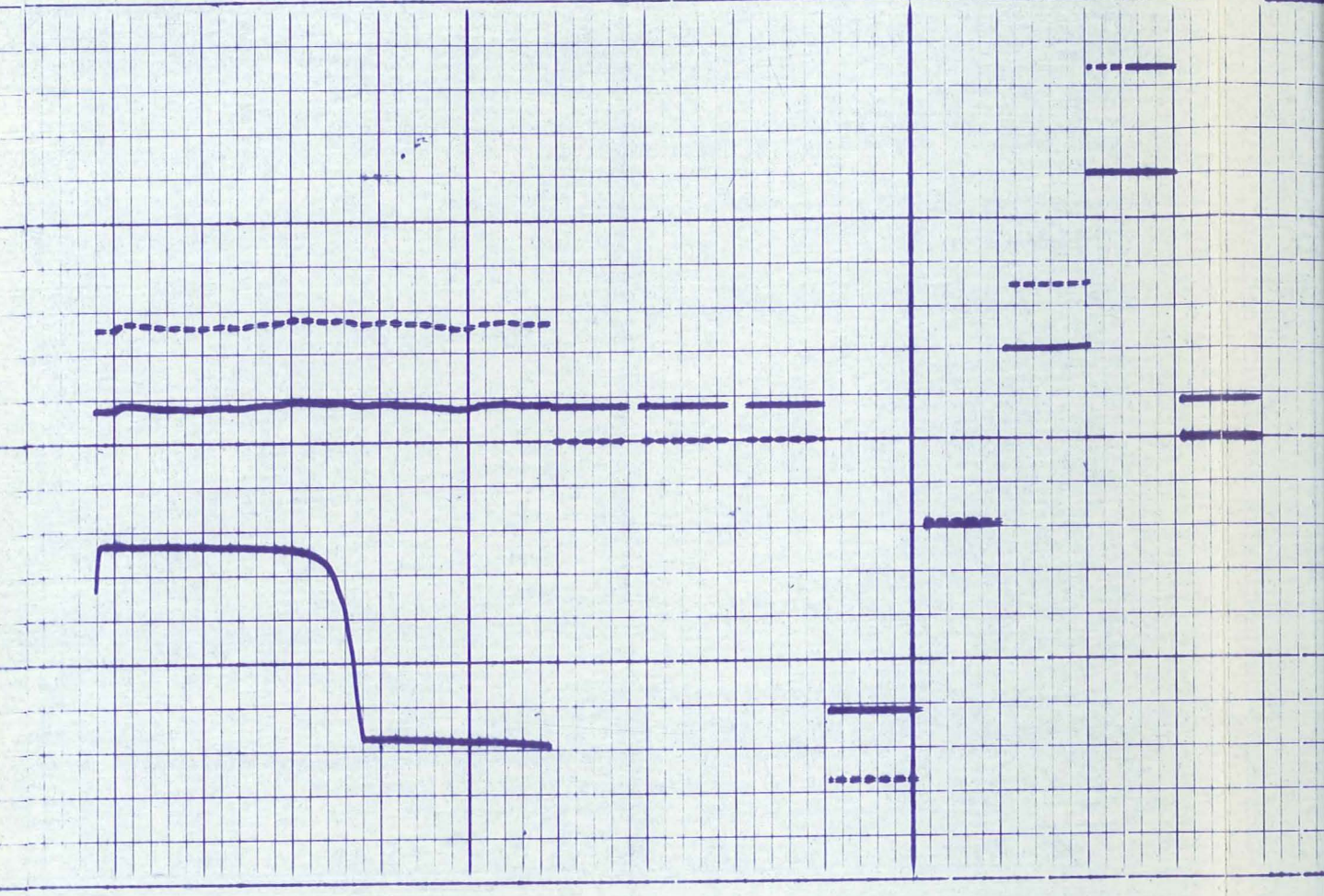
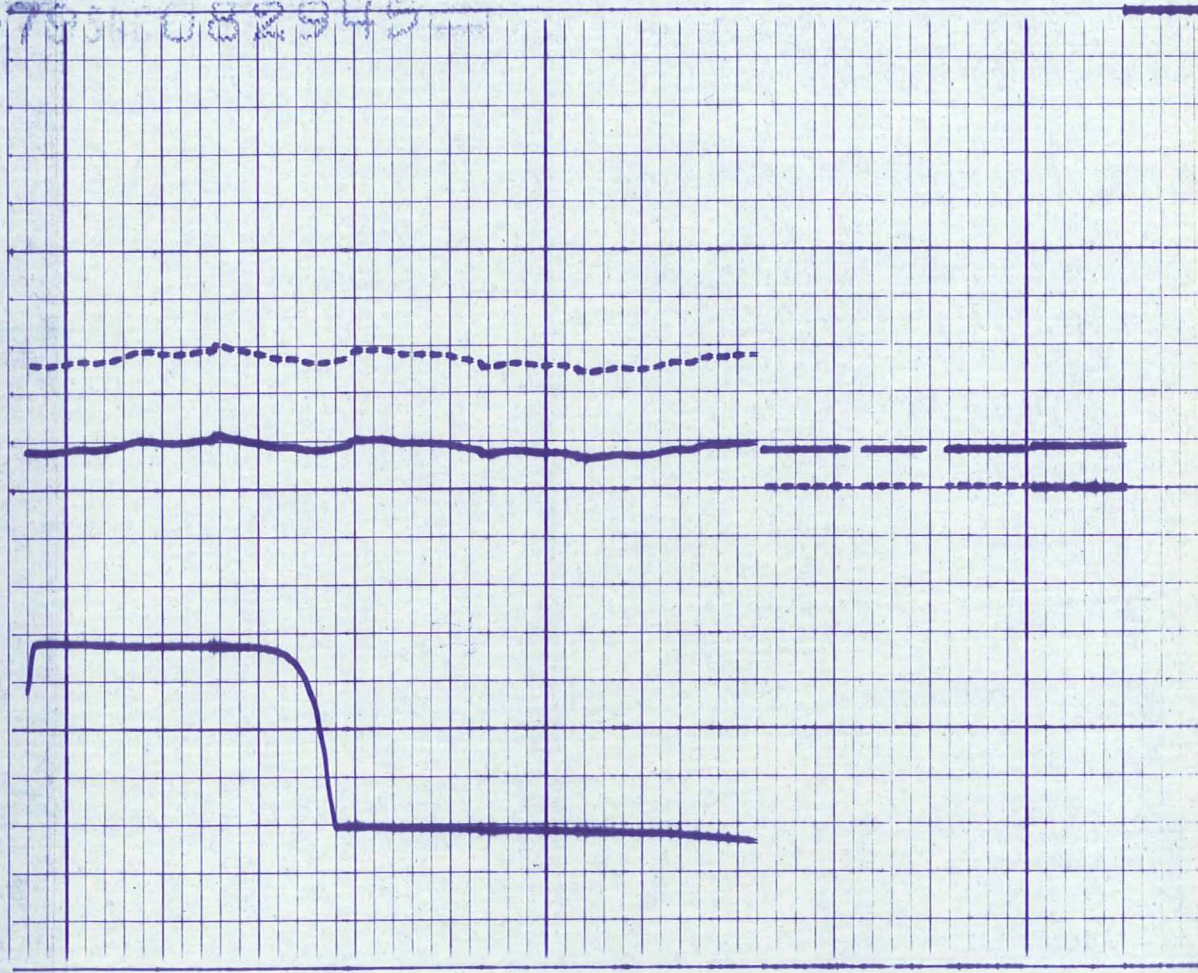
13
12
11
10
9
8
7
6
5
4
3
2
1

G. P. SURFACE CALIBRATION



6
5
4
3
1

11-07-75 082940



5 4 3 1

8 7 2 1

8A 7A 6 5 4 3 2 1

6
5
4
3
2
1

COMPENSATED NEUTRON CALIBRATION CODING

1. MECHANICAL ZERO							
2. RECORDED SENSITIVITY (THRU MEMORIZER IF USED)							
RATIO		OH POROSITY			CH POROSITY		
		LS <input type="checkbox"/>	SS <input type="checkbox"/>	DOL <input type="checkbox"/>	SS <input type="checkbox"/>	LS <input type="checkbox"/>	
P	3. 1	1.6	4.9	-0.2	2.4	0.1	
A	4. 2	15.6	19.7	8.1	13.0	9.0	
N	5. 3	30.5	36.0	25.2	29.1	24.1	
E	6. 4	45.4	53.1	47.5	47.4	43.2	
L	7. POROSITY NORMALIZED WITH CNB-A IN PLACE					SEPTEMBER 7, 1979	
T	7A. TOOL IN NCT-B					CNC-A 1208	
E	8. LOG POSITION WITH CNB-A IN PLACE					CNB-AB 1192	
S	8A. LOG POSITION WITH TOOL IN NCT-B					RATIO 2.32	
T						FCNL-145	
						NCNL-336	
		OH	CH				
		LS 18	SS 22.2	DOL 10.4	SS 15.3	LS 11.2	
		2.17					
		RATIO (NORMALIZED) = RATIO (NCT-B) RATIO LOG					

FORMATION DENSITY COMPENSATED CALIBRATION CODING

1. MECHANICAL ZERO		SEPTEMBER 5, 1979		8. MECHANICAL ZERO CALIPER	
2. RECORDER SENSITIVITY		ORANGE SET		9. 8" RING	
PANEL TEST		PGS-EC 426		10. 12" RING	
	FDC LIQUID	PGC-G 260		11. TOOL CALIBRATE #1 SET $\rho = 2.50$	
POS	ρ	$\Delta\rho$	PDH-E 253	12. TOOL CALIBRATE #2 SET $\Delta\rho = .00$	
3. # 1	2.92	.00	SFT 106-1241	13. LOG POSITION $\rho = 2.59, \Delta\rho = .015$	
4. # 2	2.78	+.14	P ₁ - 111.4		
6. # 3	2.42	-.10	P ₂ - 209.7		
6. # 4	2.35	.00	SOURCE 5199		
7. # 5	2.08	.01			

GAMMA RAY CALIBRATION CODING

- | | | |
|--------------------|-------------------------|--------------------------------|
| 1. MECHANICAL ZERO | 3. RECORDER SENSITIVITY | 5. BACKGROUND |
| 2. ELECTRICAL ZERO | 4. MEMORIZER ADJUSTMENT | 6. CALIBRATE - SOURCE IN PLACE |

CALIBRATION RECORD

COMPANY	_____ THERAML POWER COMPANY _____	SCHL. FR	_____ 9680 _____
WELL	_____ DIXIE FEDERAL 66-21 _____	SCHL. TD	_____ -- _____
FIELD	_____ DIXIE VALLEY _____	DRLR. TD	_____ 9780 _____
COUNTY	_____ CHURCHILL _____	STATE	_____ NEVADA _____
		Elev:	KB _____ 3453 _____
			DF _____ 3452 _____
			GL _____ 3430 _____