

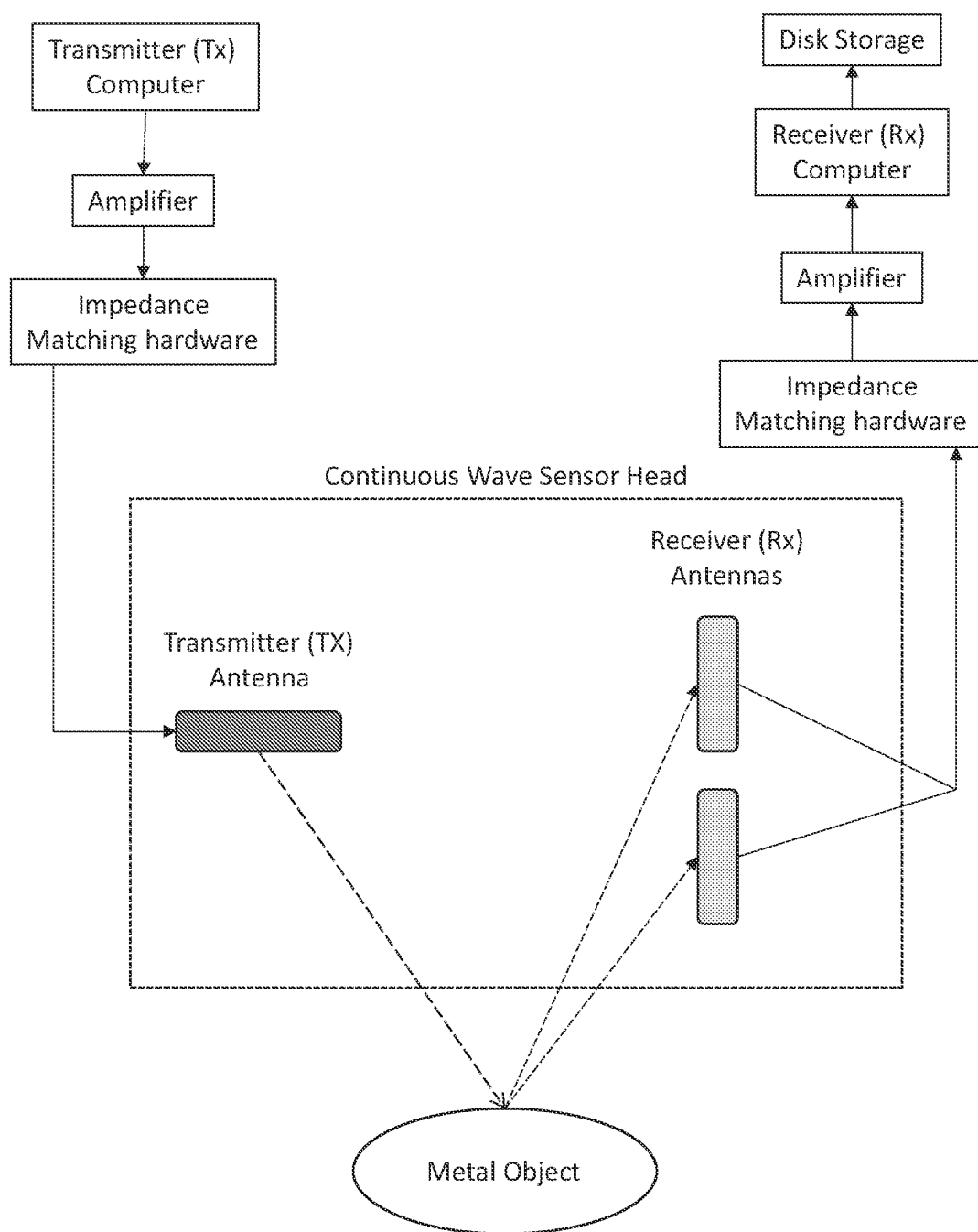


FIG. 1A

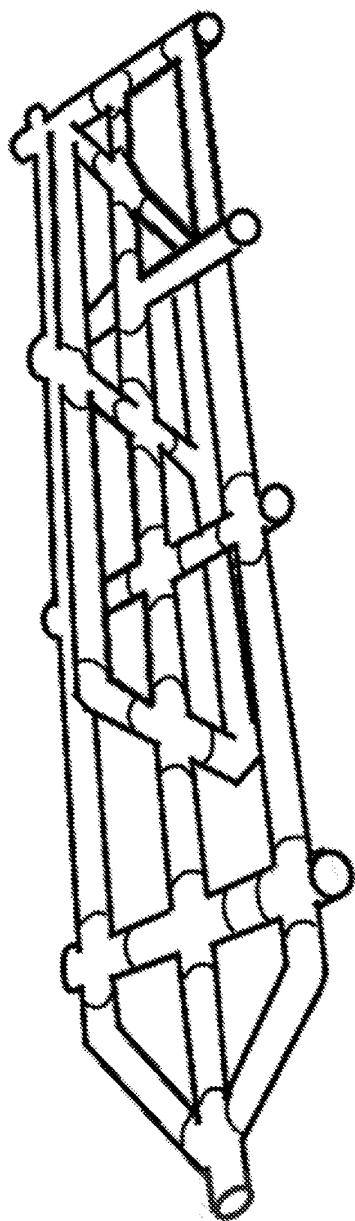
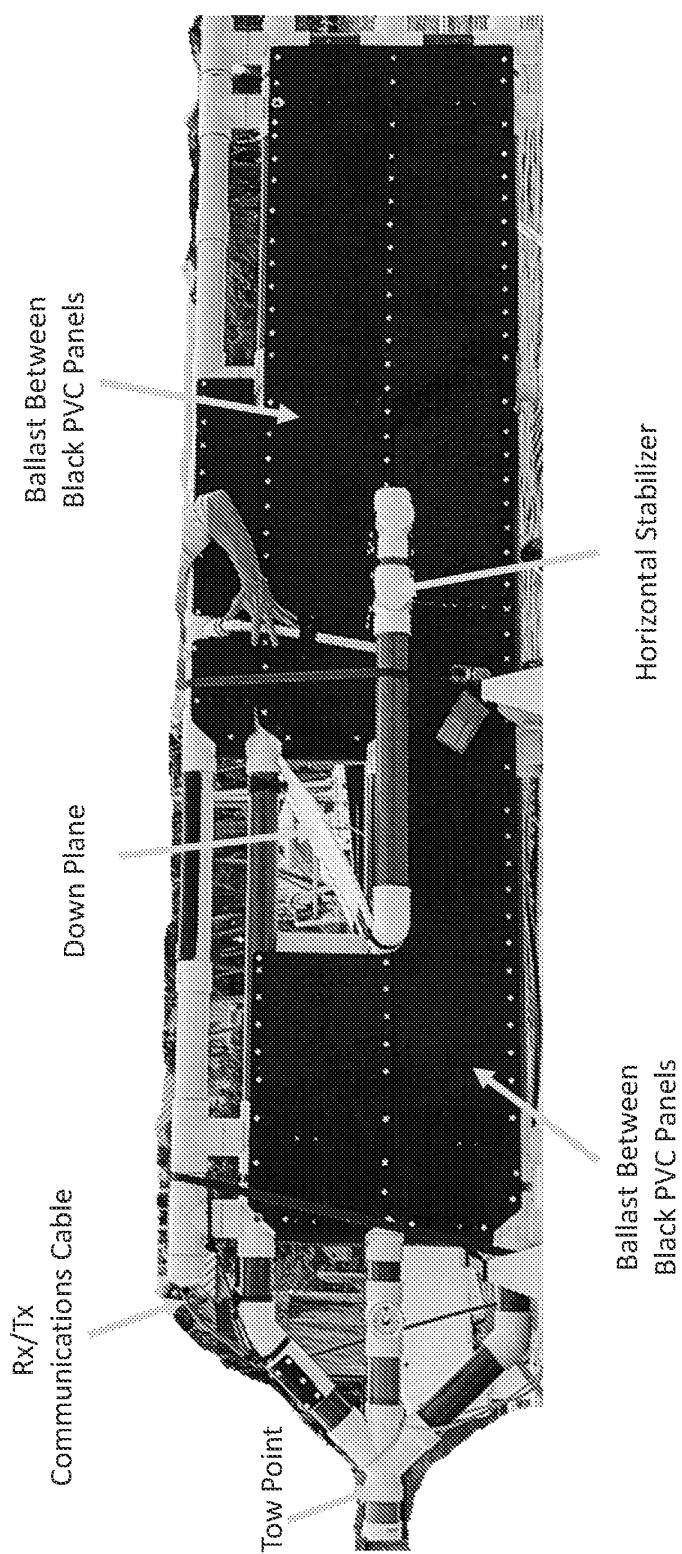


FIG. 1B



U
I
G
L

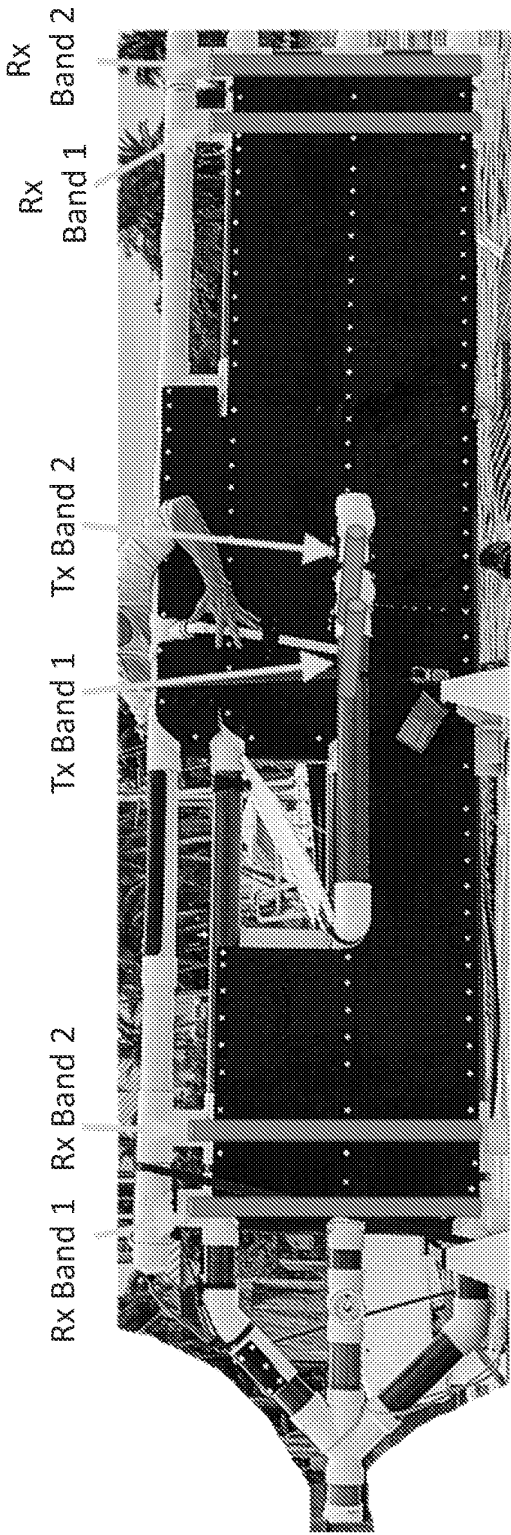


FIG. 1D

FIG. 1E

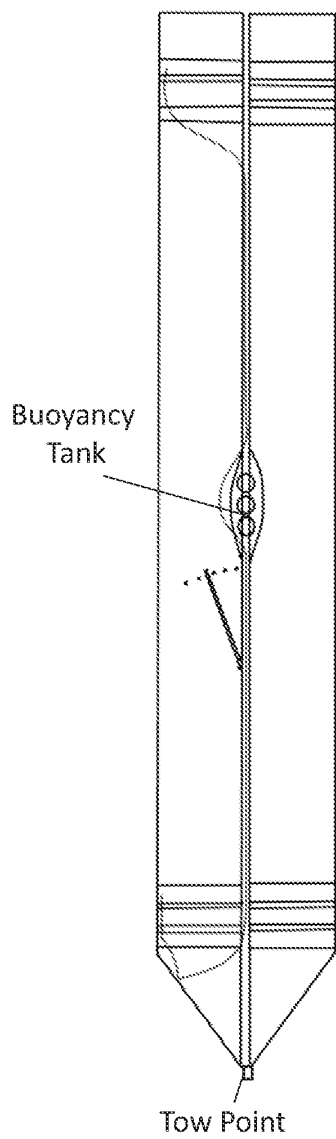


FIG. 1F

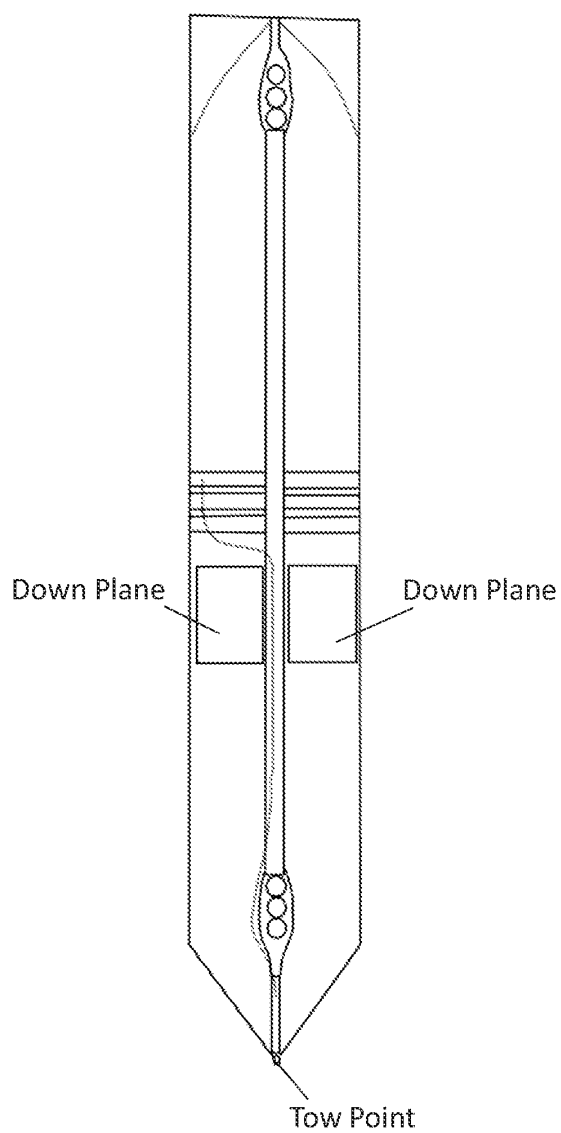
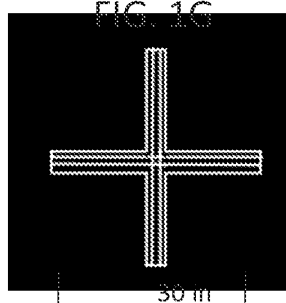


FIG. 1G



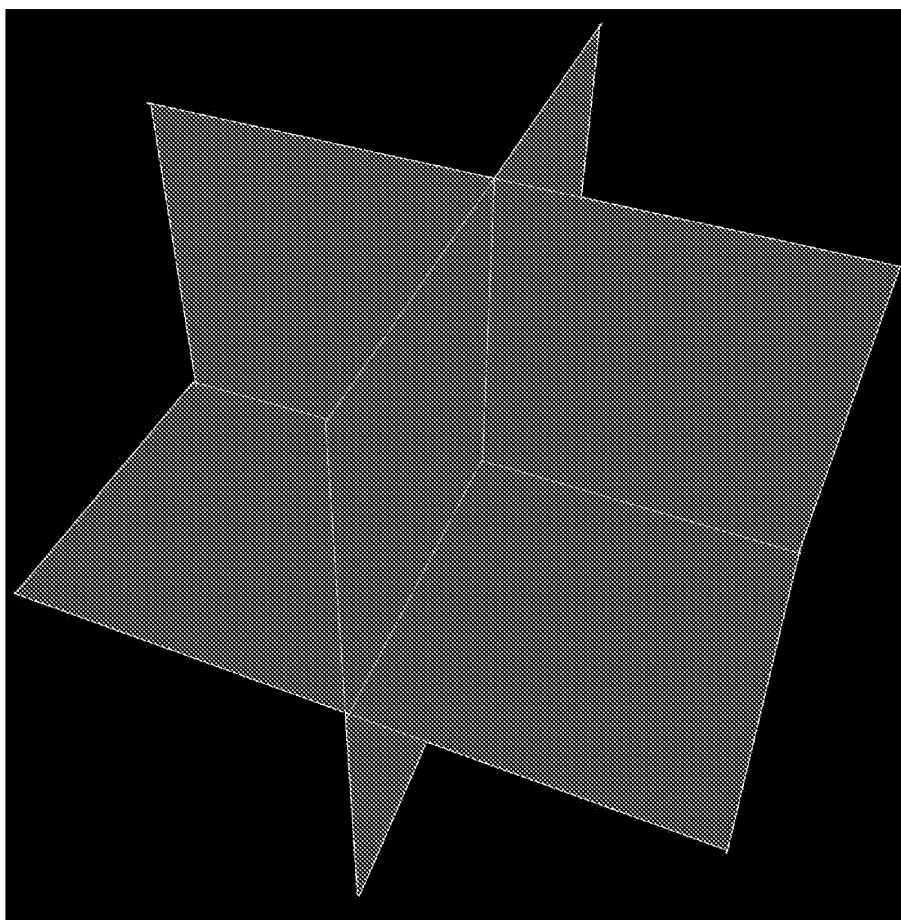


FIG. 1H

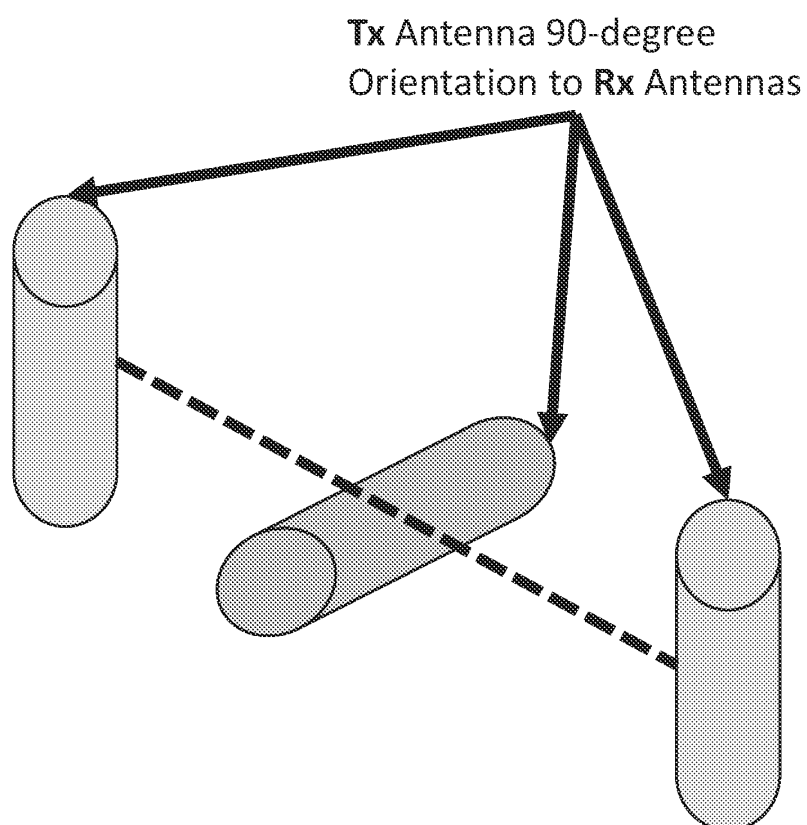


FIG. 2

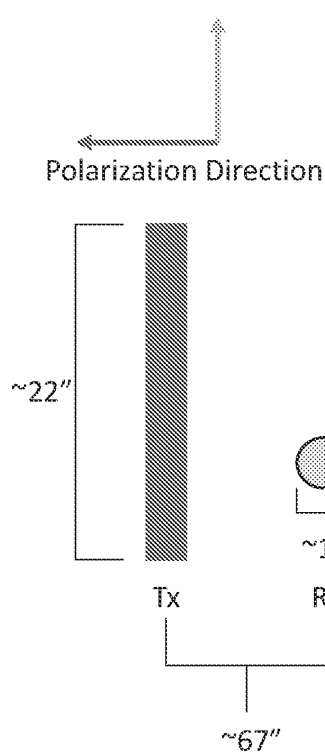


FIG. 3A

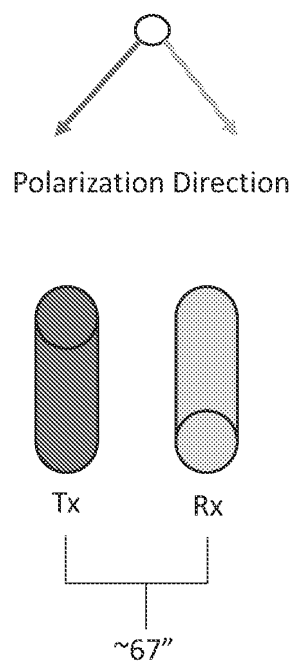
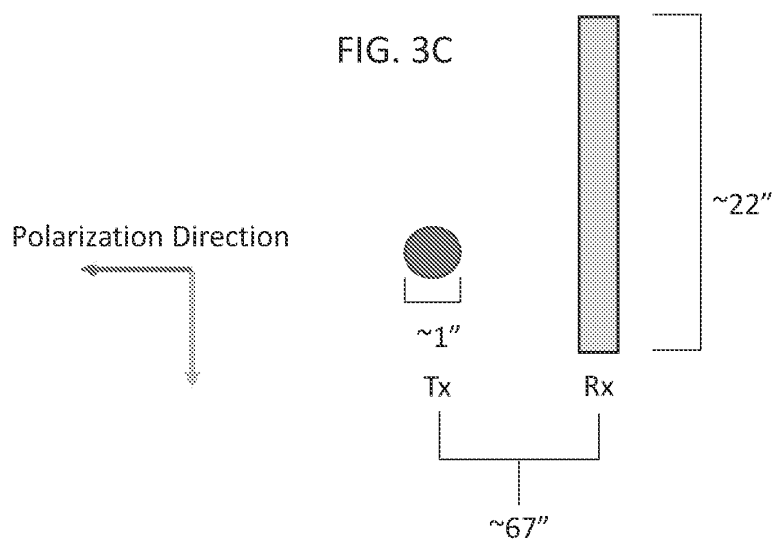


FIG. 3B



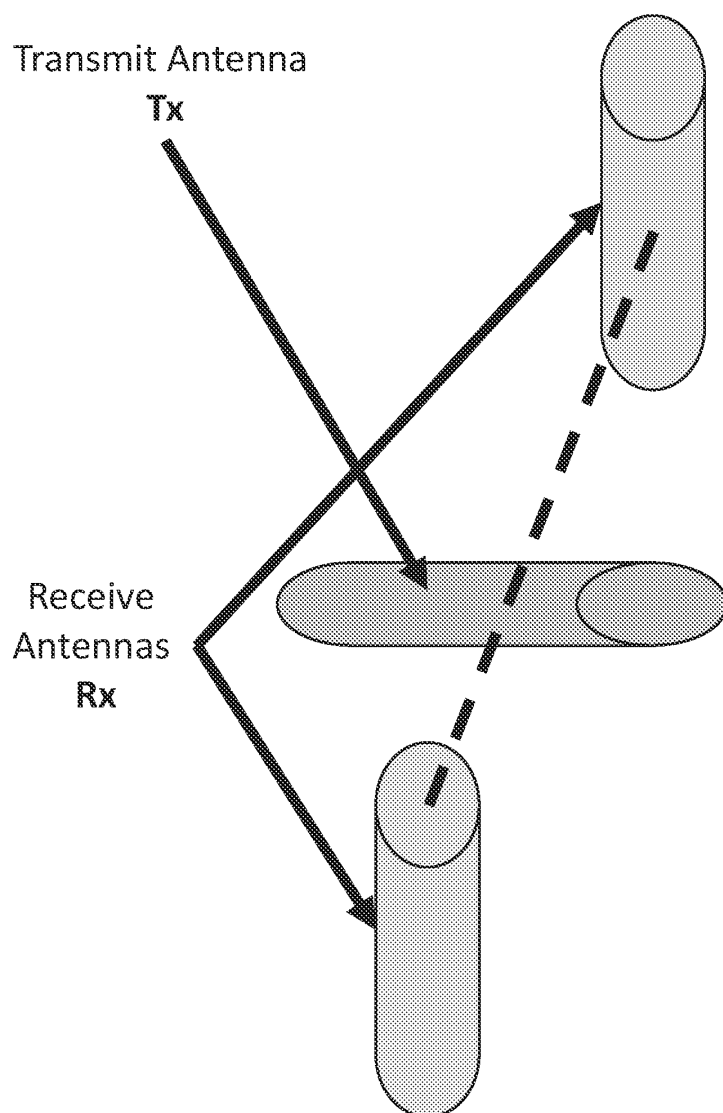


FIG. 4

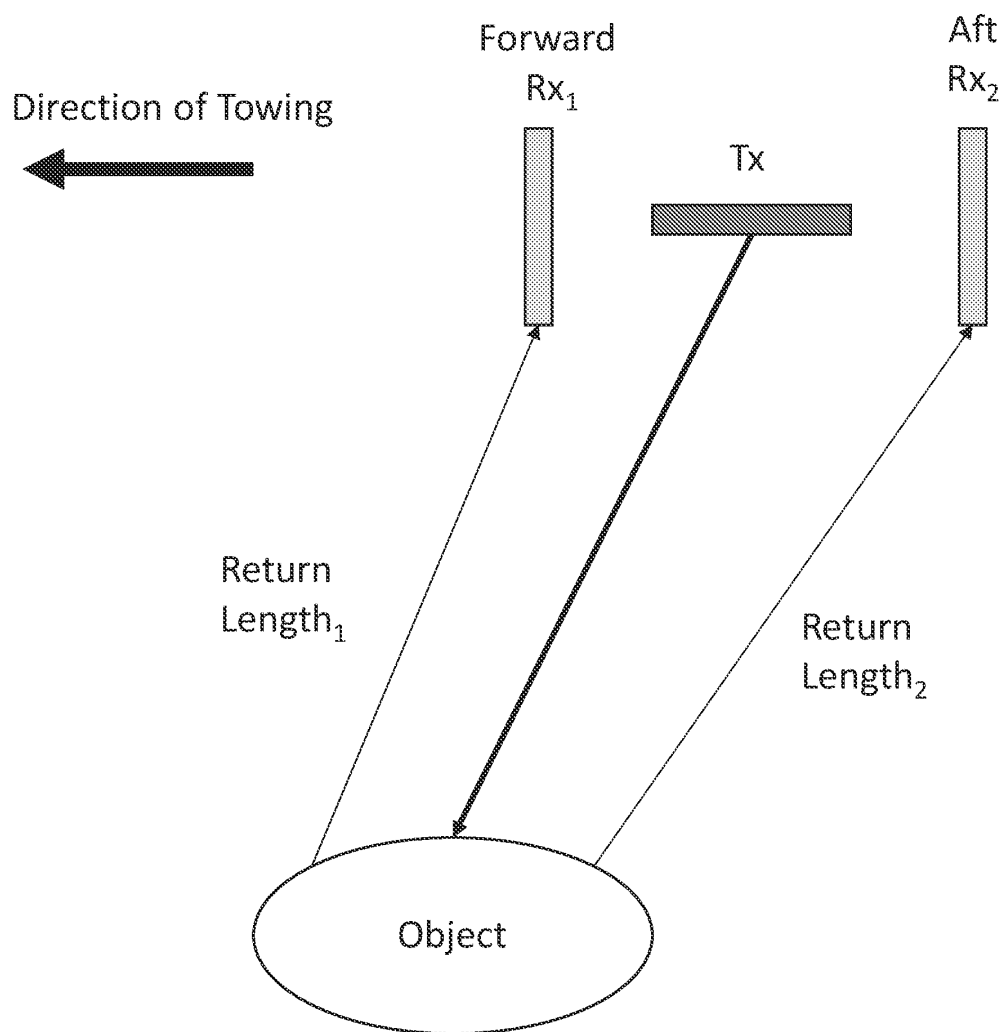


FIG. 5

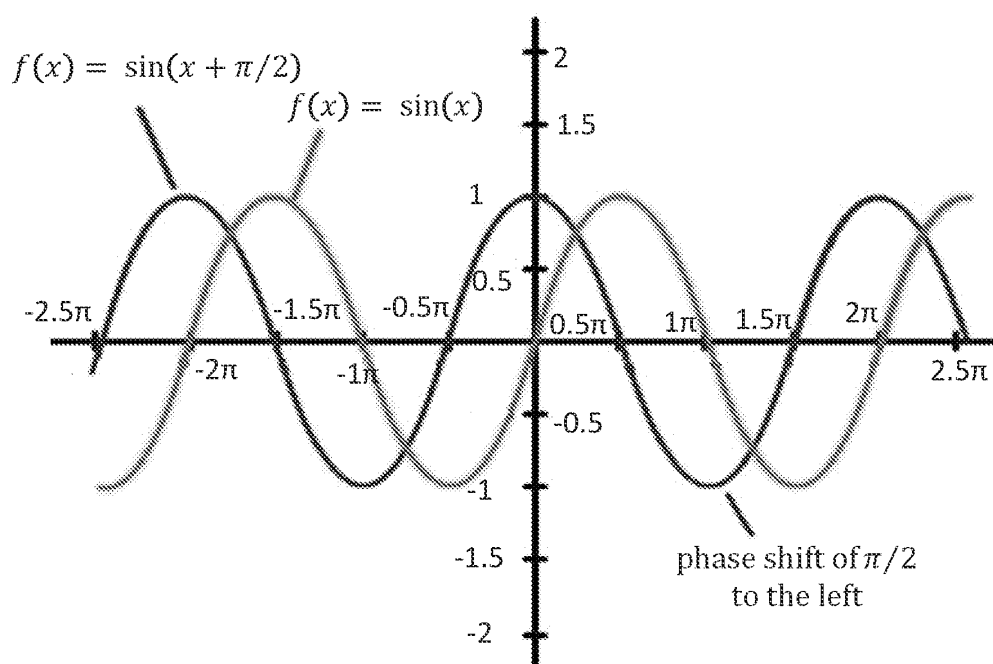


FIG. 6

Variance in Signal Strength
between Rx₁ & Rx₂

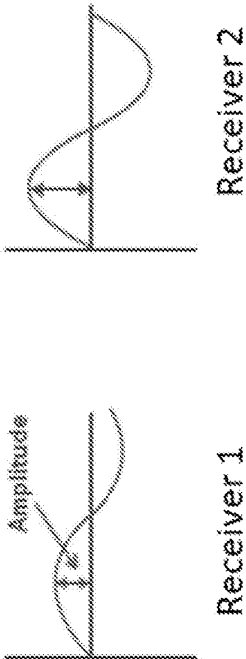


FIG. 7A

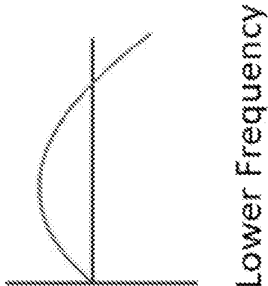


FIG. 7C

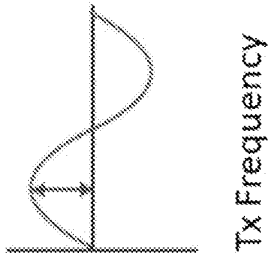


FIG. 7D

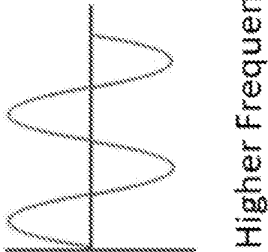


FIG. 7E

Variance in Frequency (Doppler)

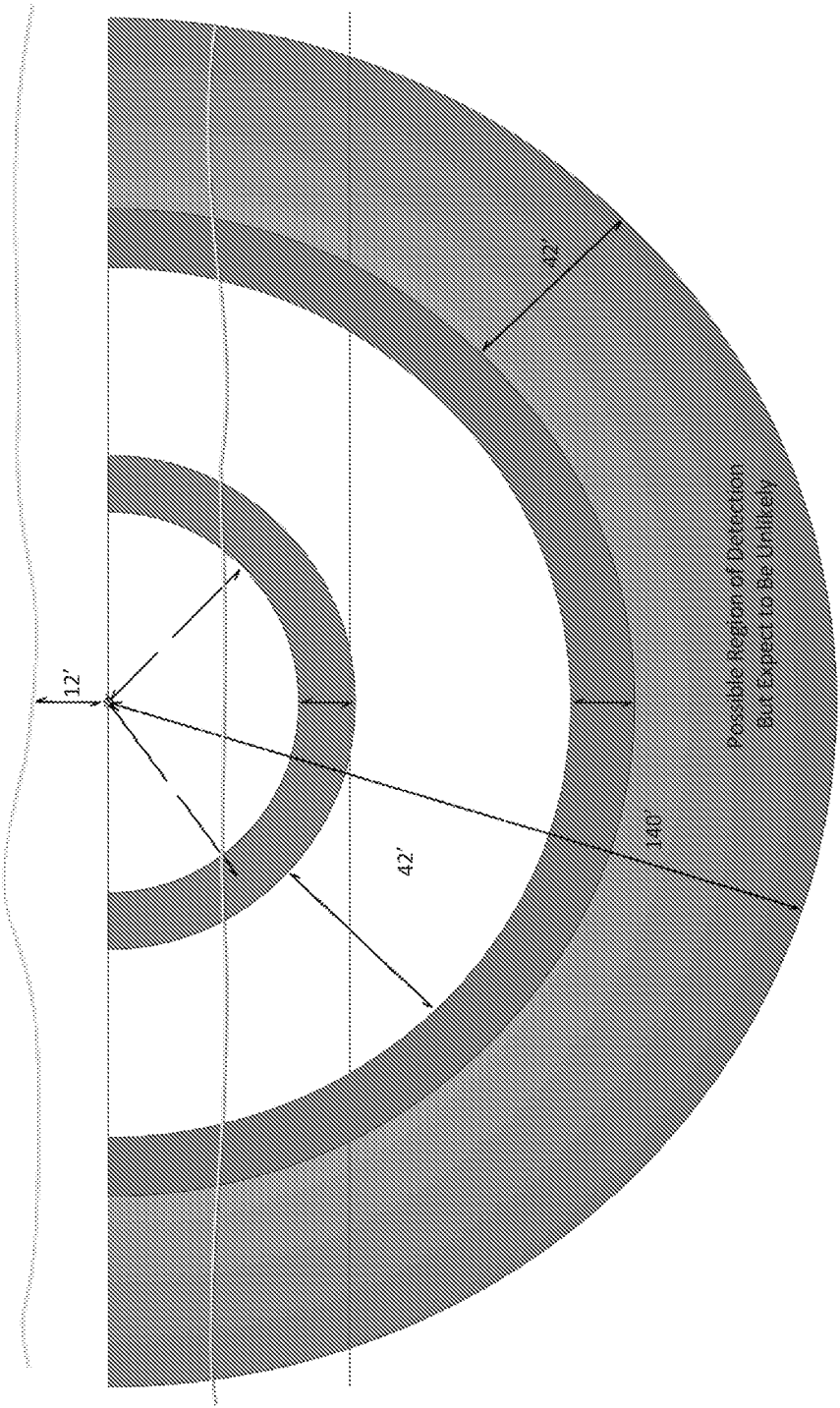
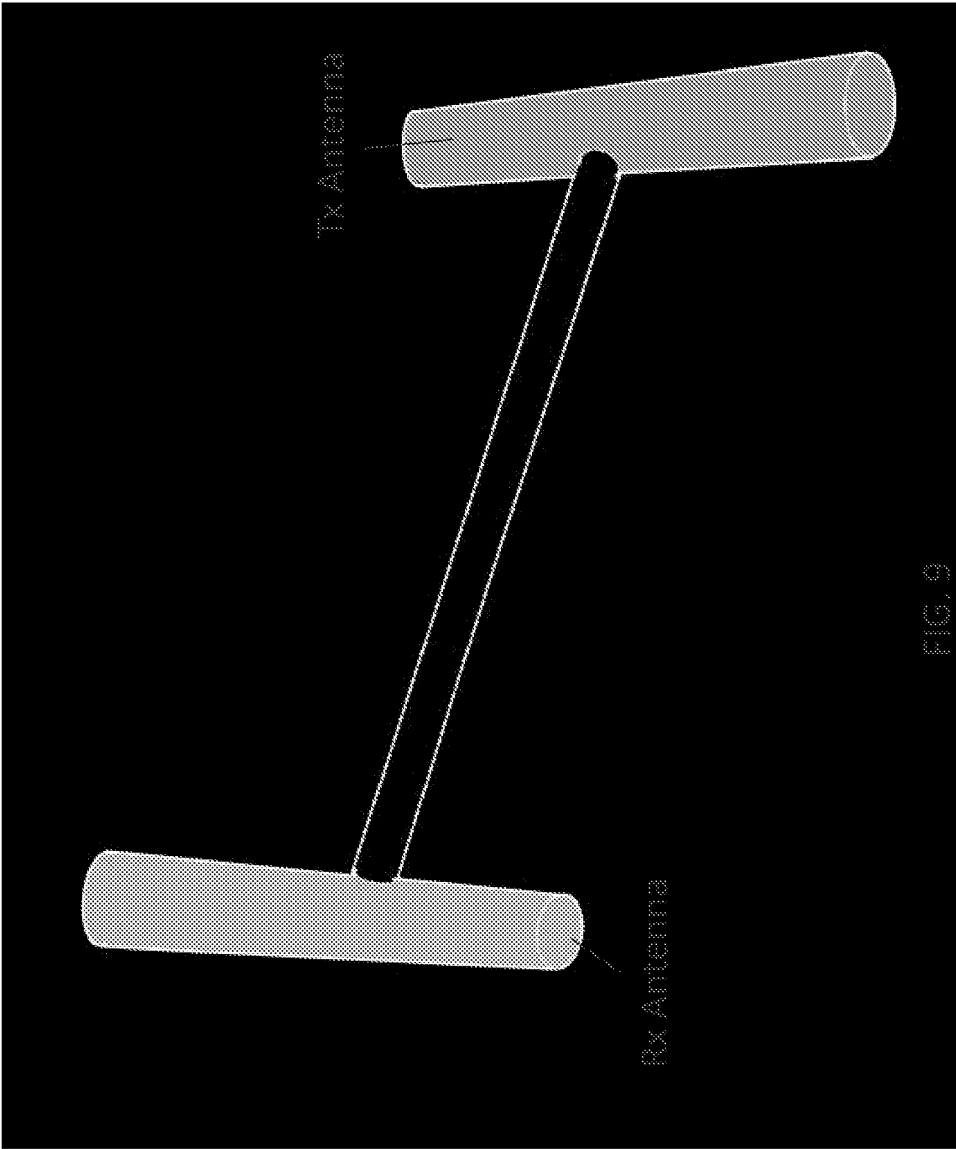


FIG. 8



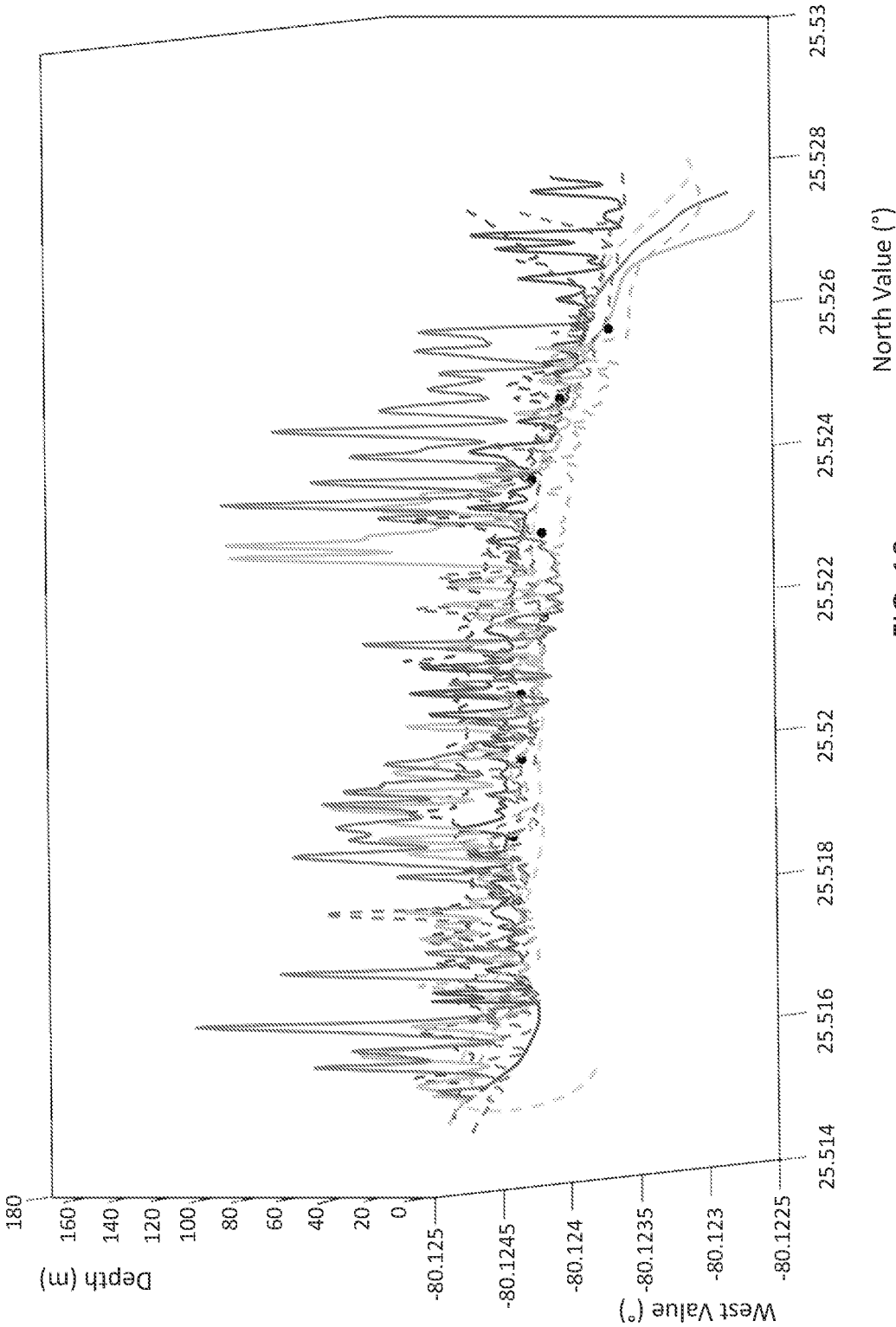


FIG. 10

FIG. 11A

Boat & Dingy Speed

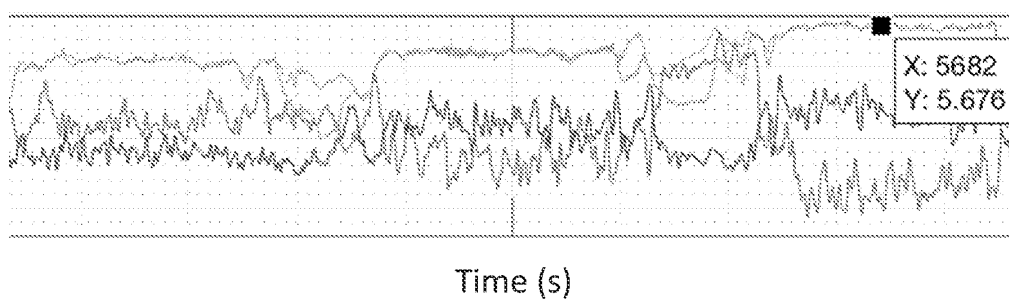


FIG. 11B

Energy Product

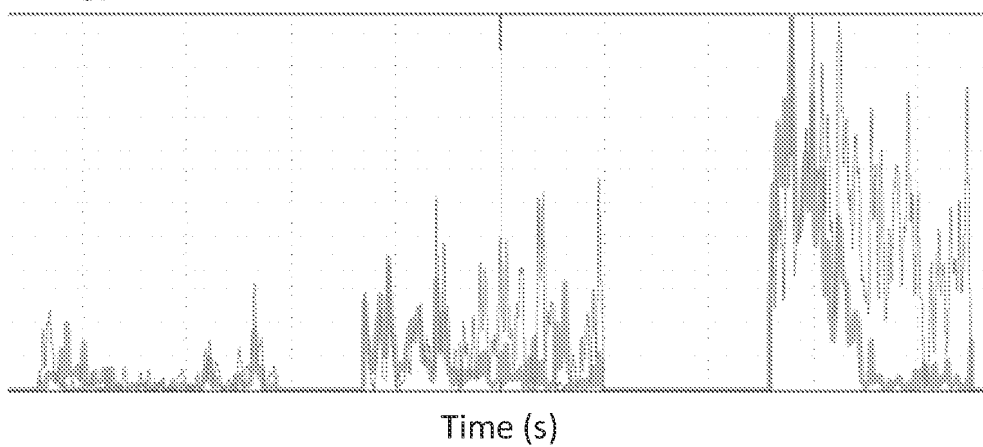


FIG. 11C

Antenna Signal Strength

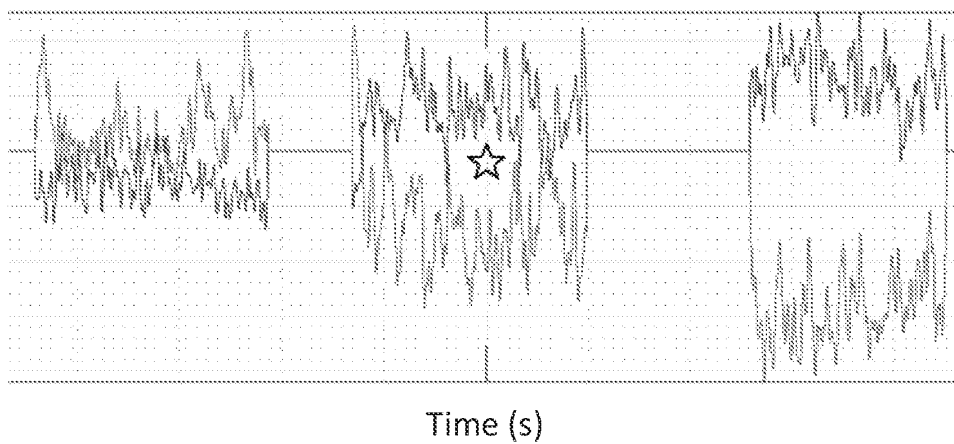
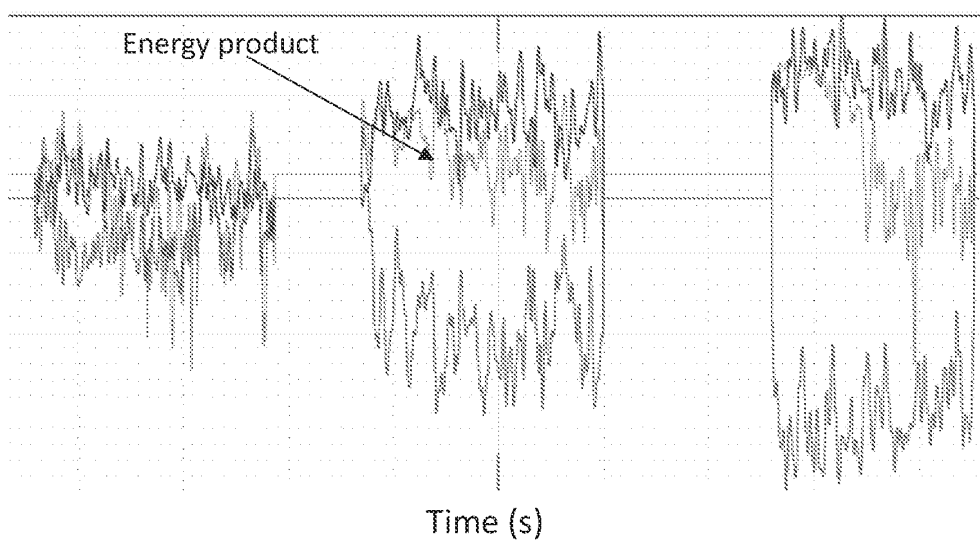


FIG. 11D

Fore and Aft Antenna Energy Product



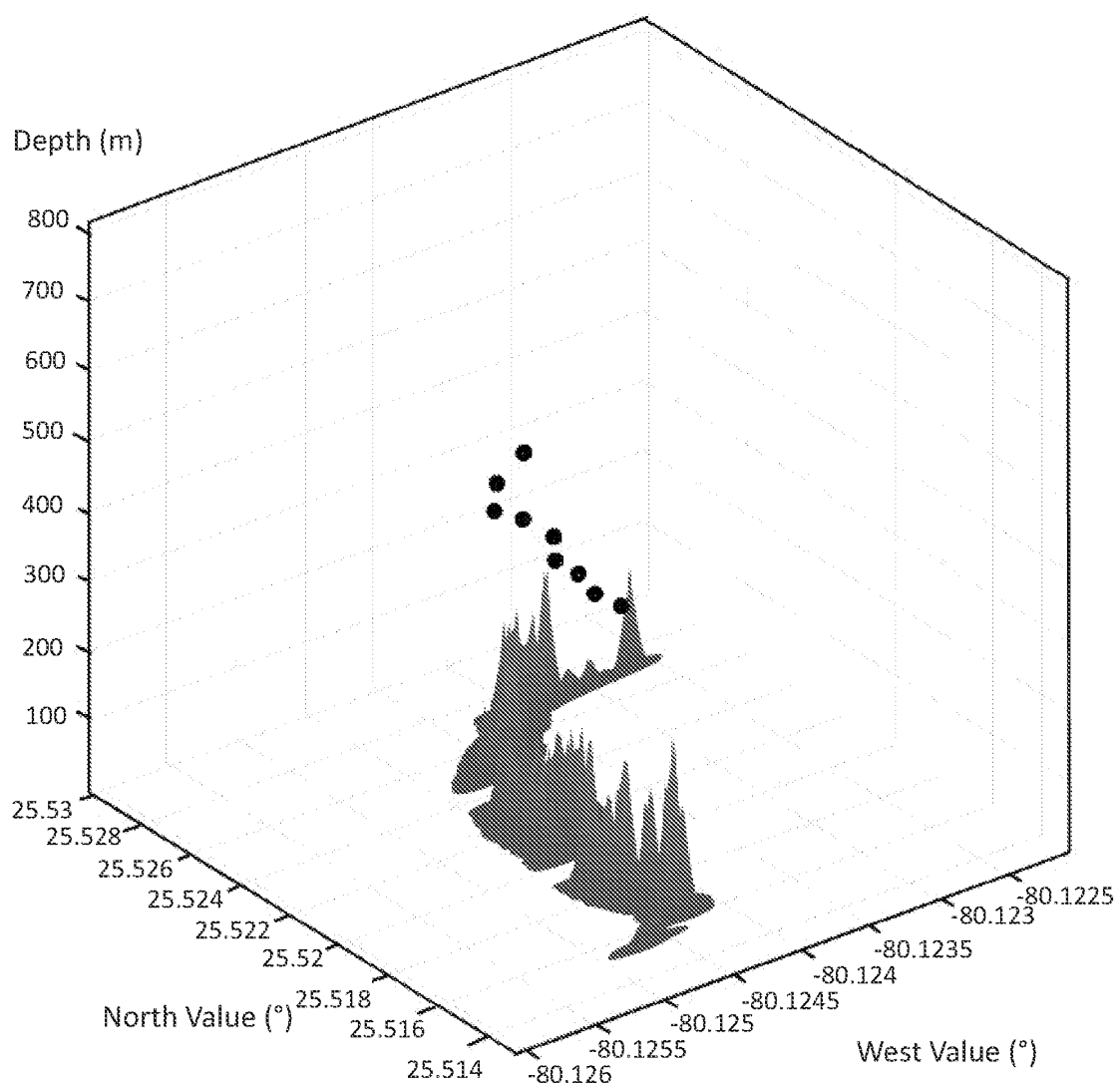


FIG. 12A

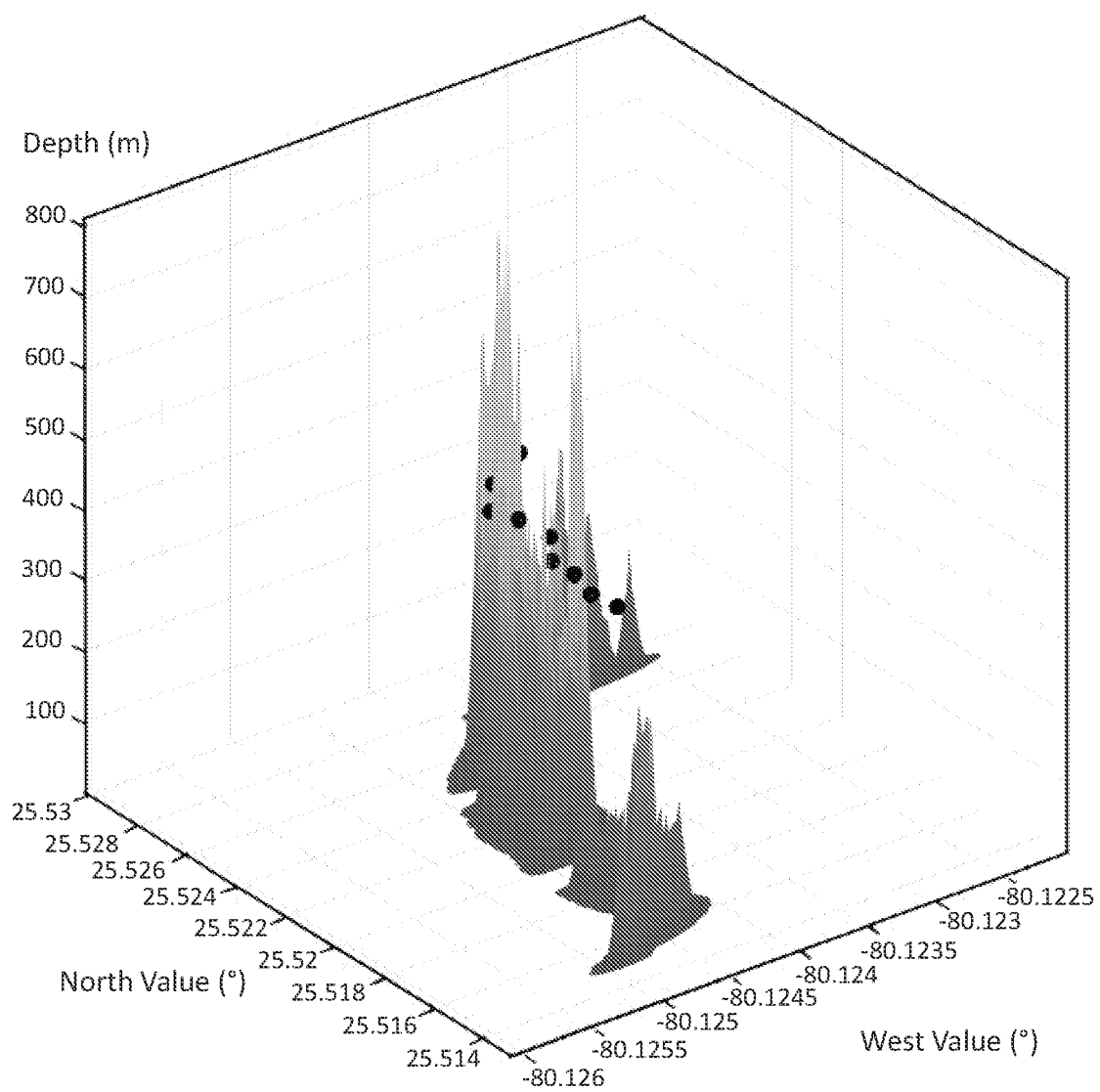


FIG. 12B

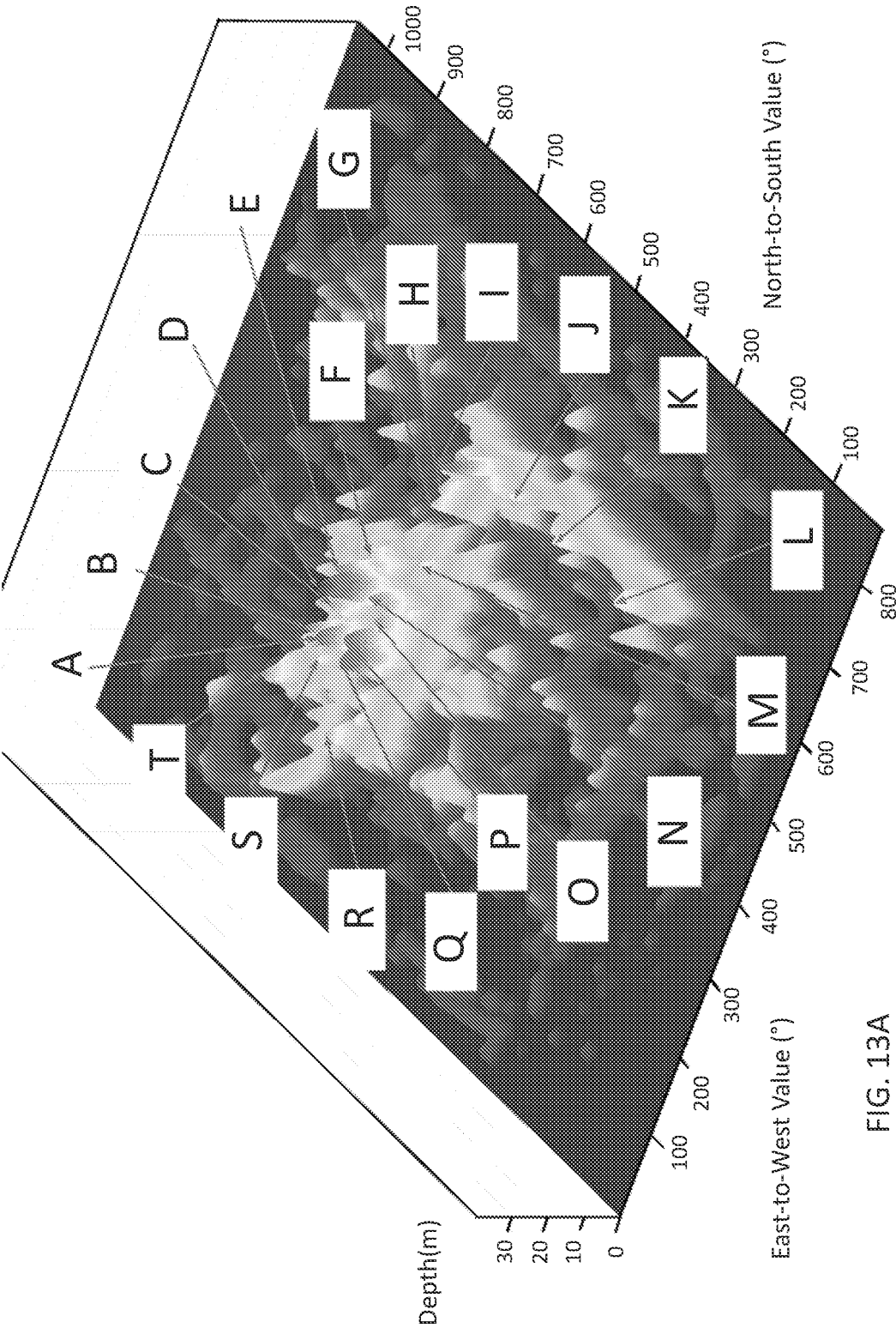


FIG. 13A

	North Value (°)	West Value (°)	Depth (m)
A	24.46314408	81.9536605	32.687
B	24.46342287	81.95370989	31.178
C	24.46331495	81.95335421	28.946
D	24.4630991	81.95299853	39.20
E	24.46333292	81.95291948	30.527
F	24.46312607	81.95260332	27.61
G	24.46253248	81.9515758	27.916
H	24.46250550	81.9513584	28.032
I	24.46234360	81.94098301	33.850
J	24.46165112	81.95090400	24.173
K	24.46078777	81.95089416	26.270
L	24.45966362	81.95089422	26.449
M	24.46256956	81.95230694	25.790
N	24.46275736	81.95289974	30.164
O	24.46259548	81.93530874	29.748
P	24.46273039	81.95341351	33.279
Q	24.46259549	81.95357159	35.243
R	24.46276639	81.95462976	27.735
S	24.4633869	81.9540653	25.268
T	24.46384557	81.95457934	29.876

FIG. 13B

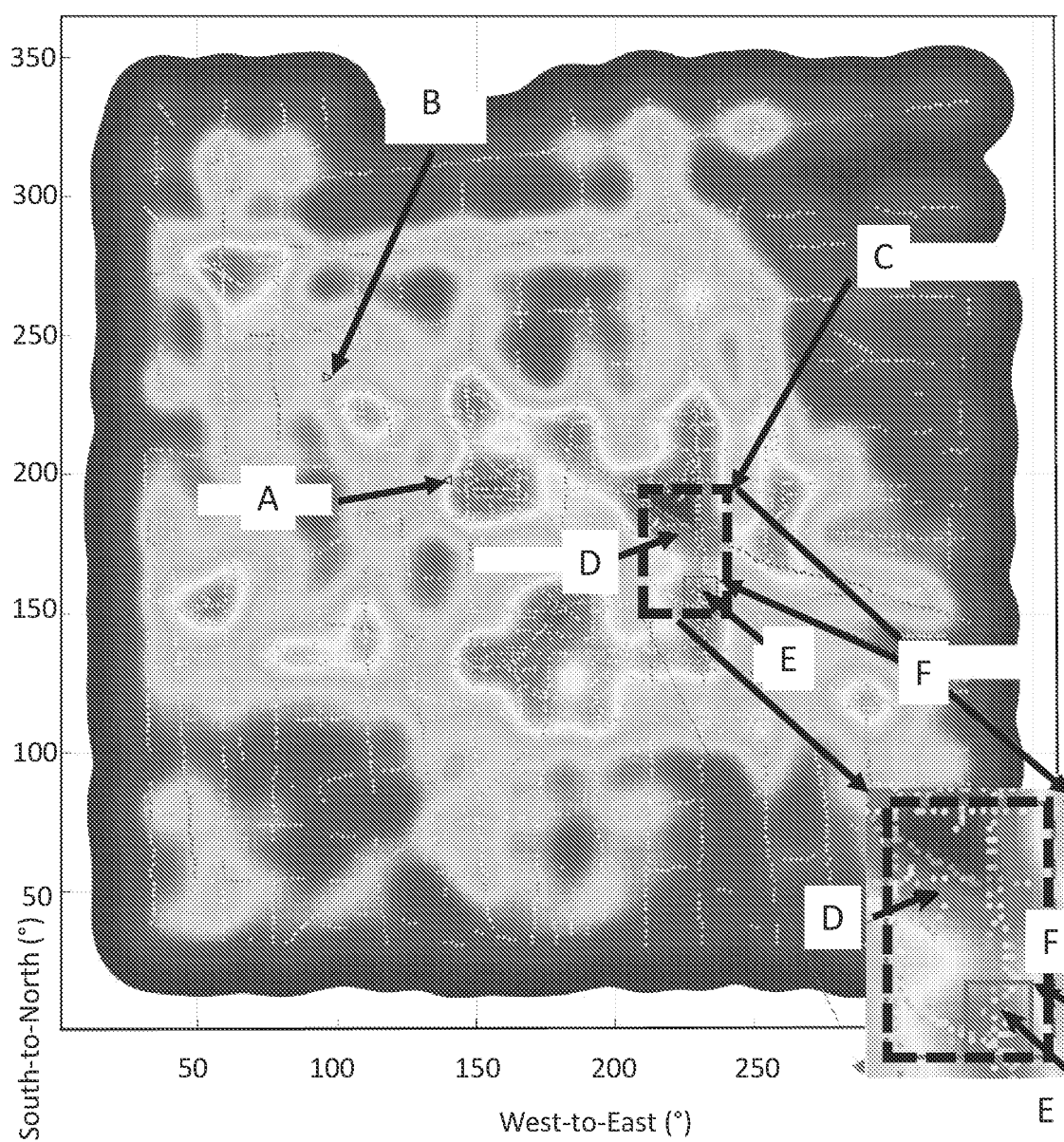


FIG. 14A

	South-to-North Value (°)	West-to-East Value (°)
A	198	130
B	260	80
C	198	230
D	170	220
E	225	155
F	245	190

FIG. 14B

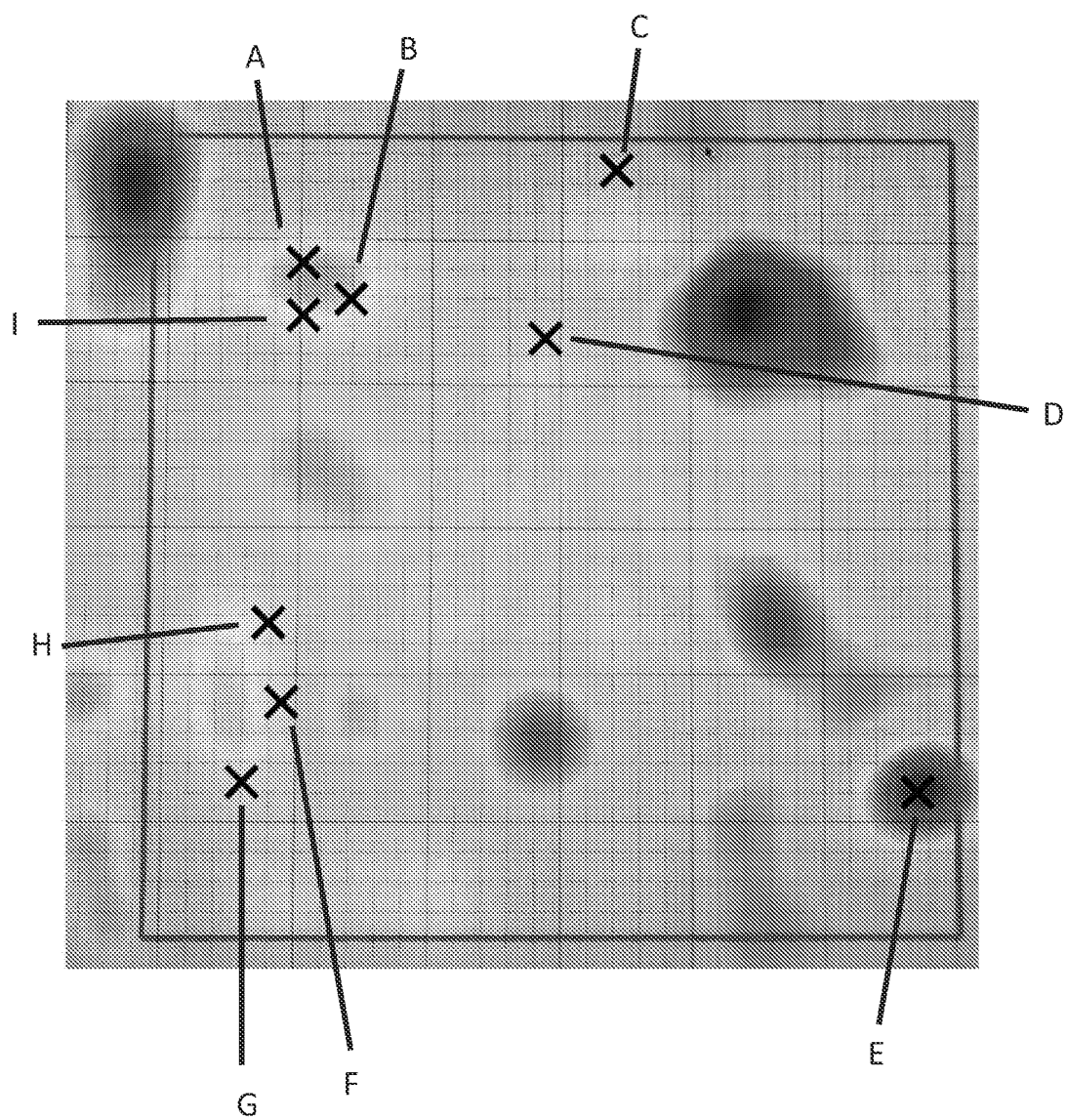


FIG. 15A

	North Value (°)	West Value (°)	North	West
A	25.529219	80.127794	25° 31.778	80° 7.609
B	25.529804	80.126822	25° 31.788	80° 7.609
C	25.529183	80.127077	25° 31.751	80° 7.625
D	25.527537	80.125656	25° 31.652	80° 7.538
E	25.527888	80.128038	25° 31.673	80° 7.682
F	25.527645	80.128203	25° 31.659	80° 7.692
G	25.528095	80.128128	25° 31.686	80° 7.688
H	25.529197	80.127968	25° 31.752	80° 7.678
I	25.529381	80.128003	25° 31.763	80° 7.680

FIG. 15B

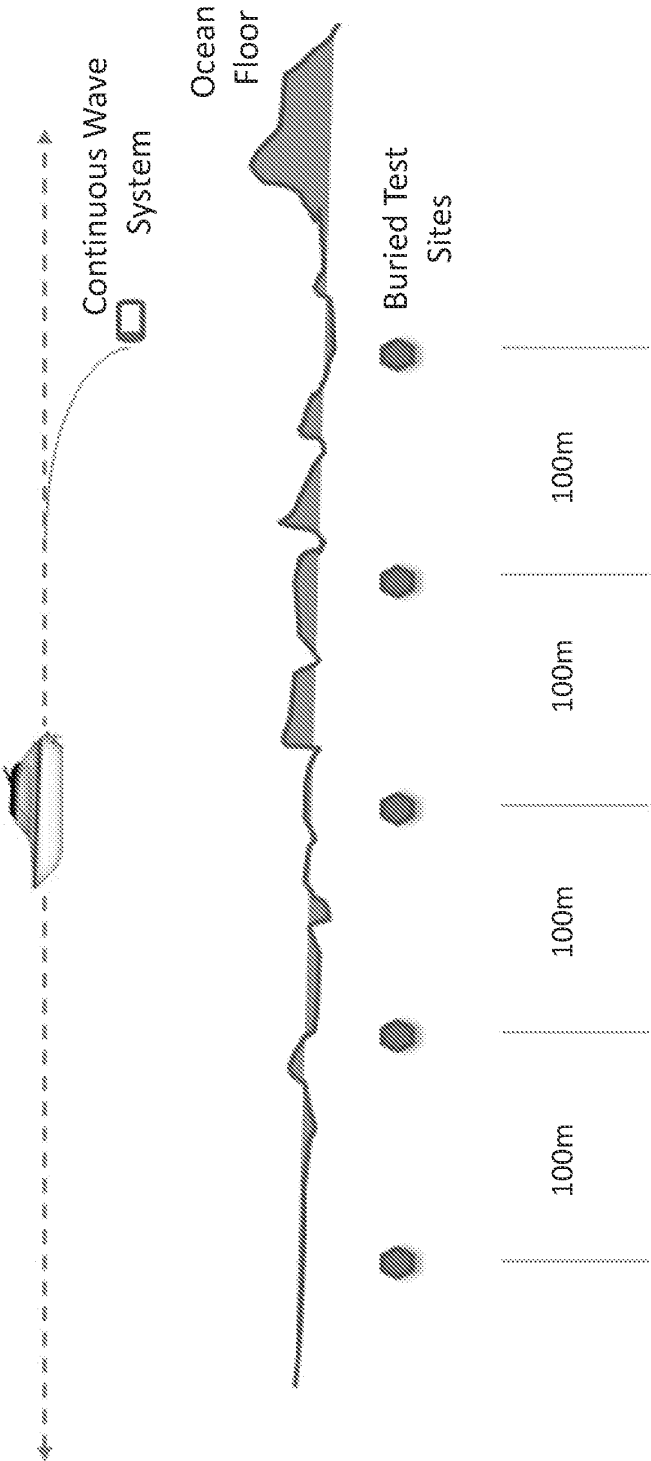


FIG. 16A

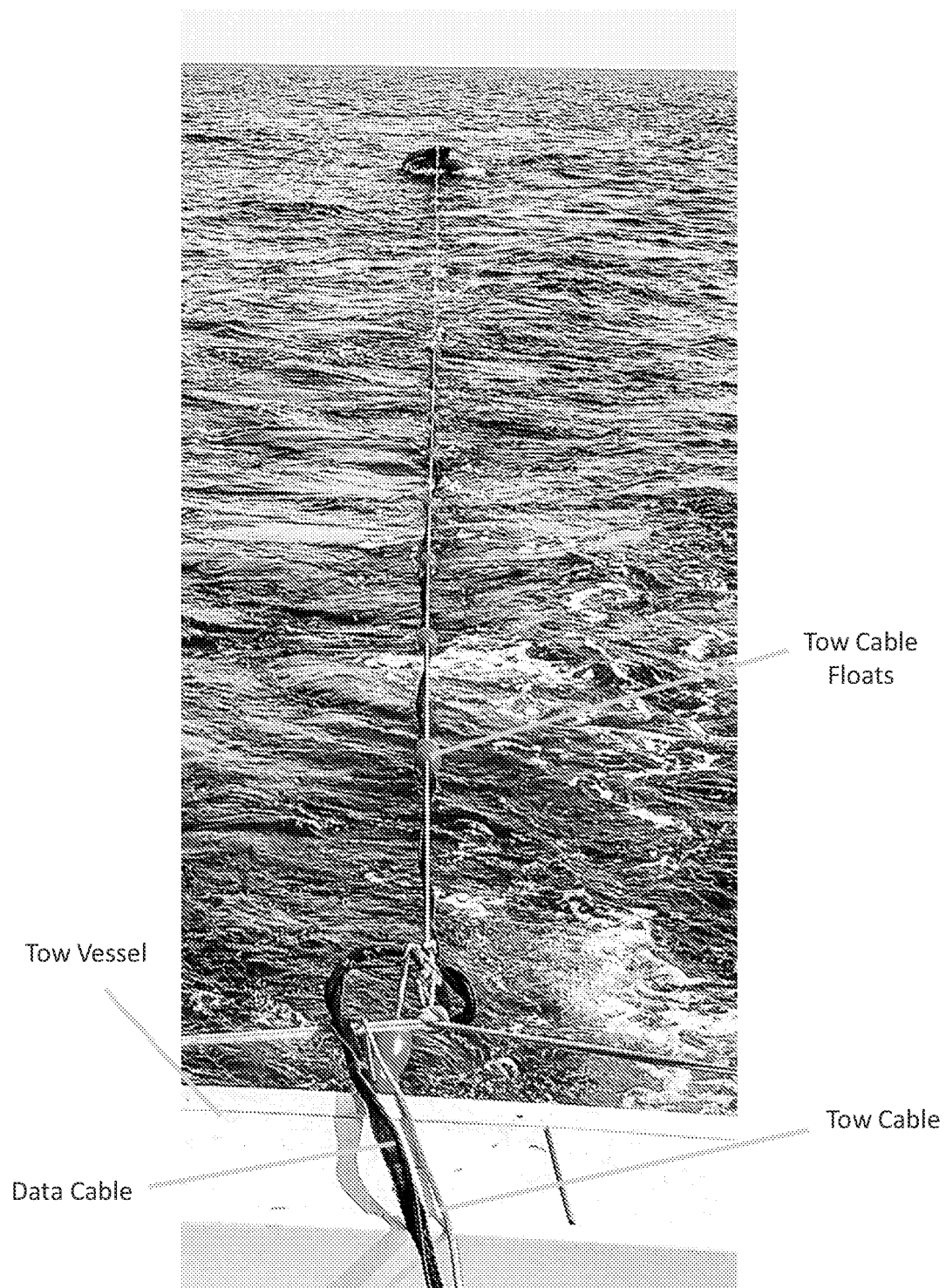


FIG. 16B

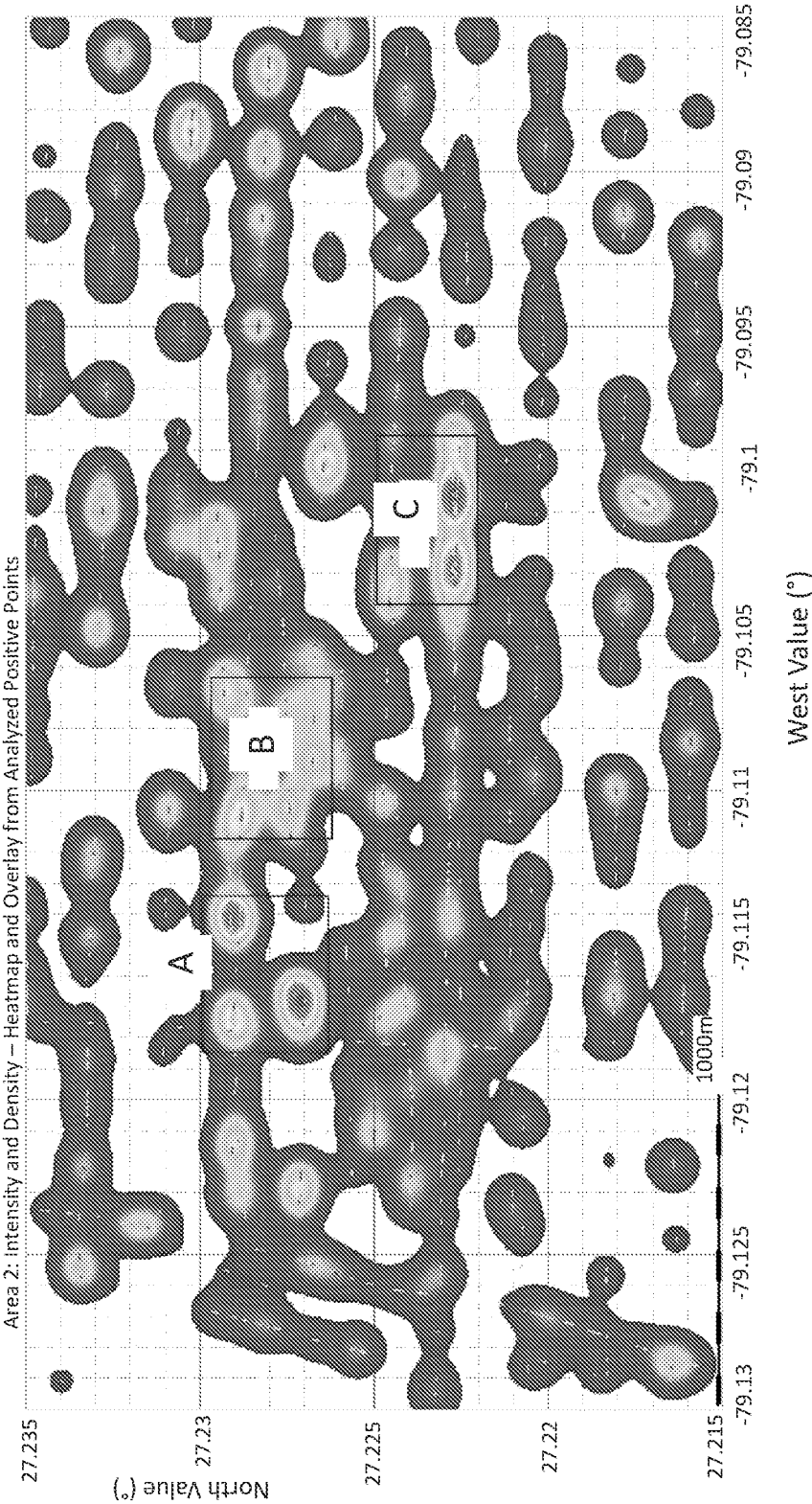


FIG. 17A

	Priority Zone
A	1
B	2
C	3

FIG. 17B

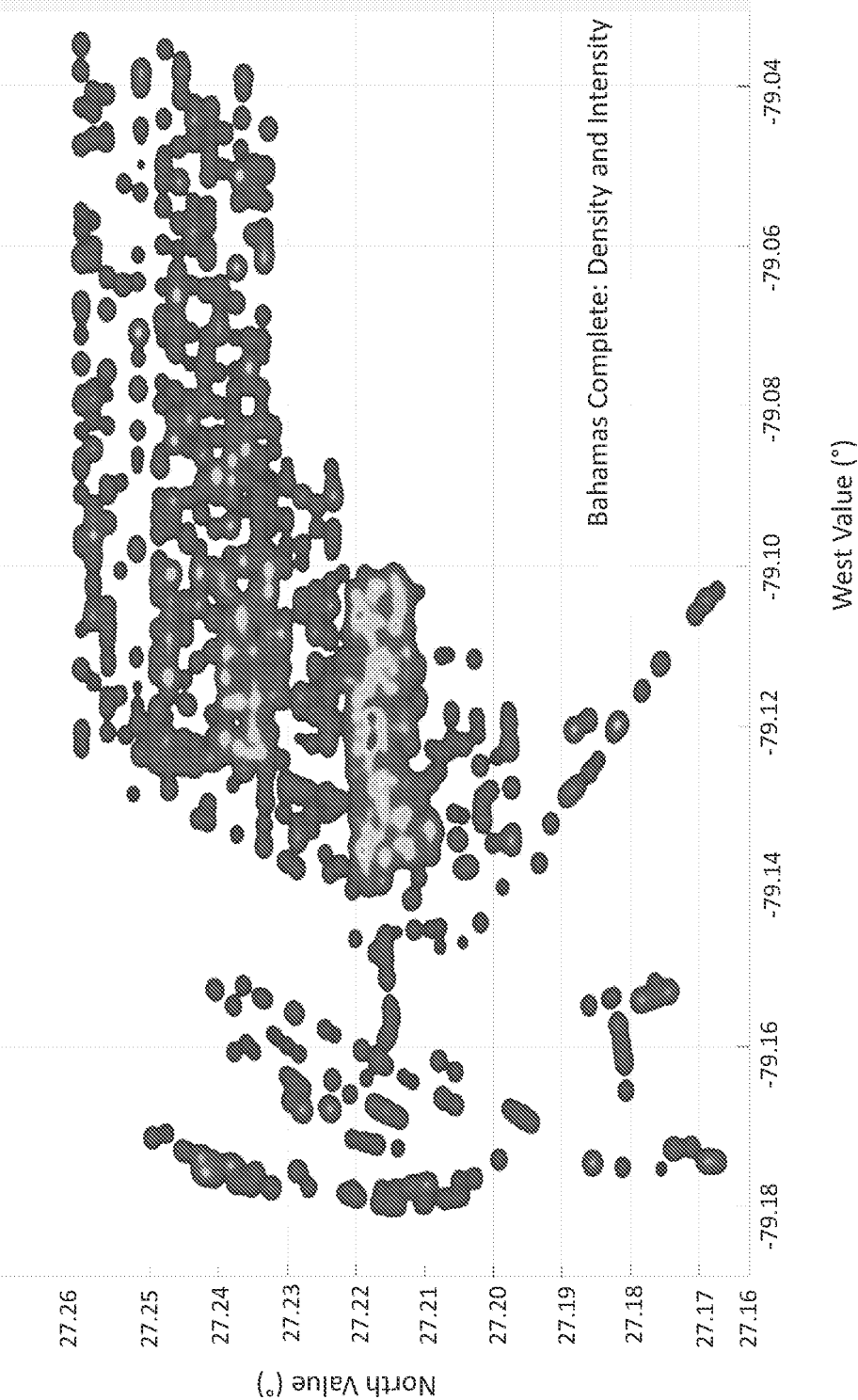


FIG. 18

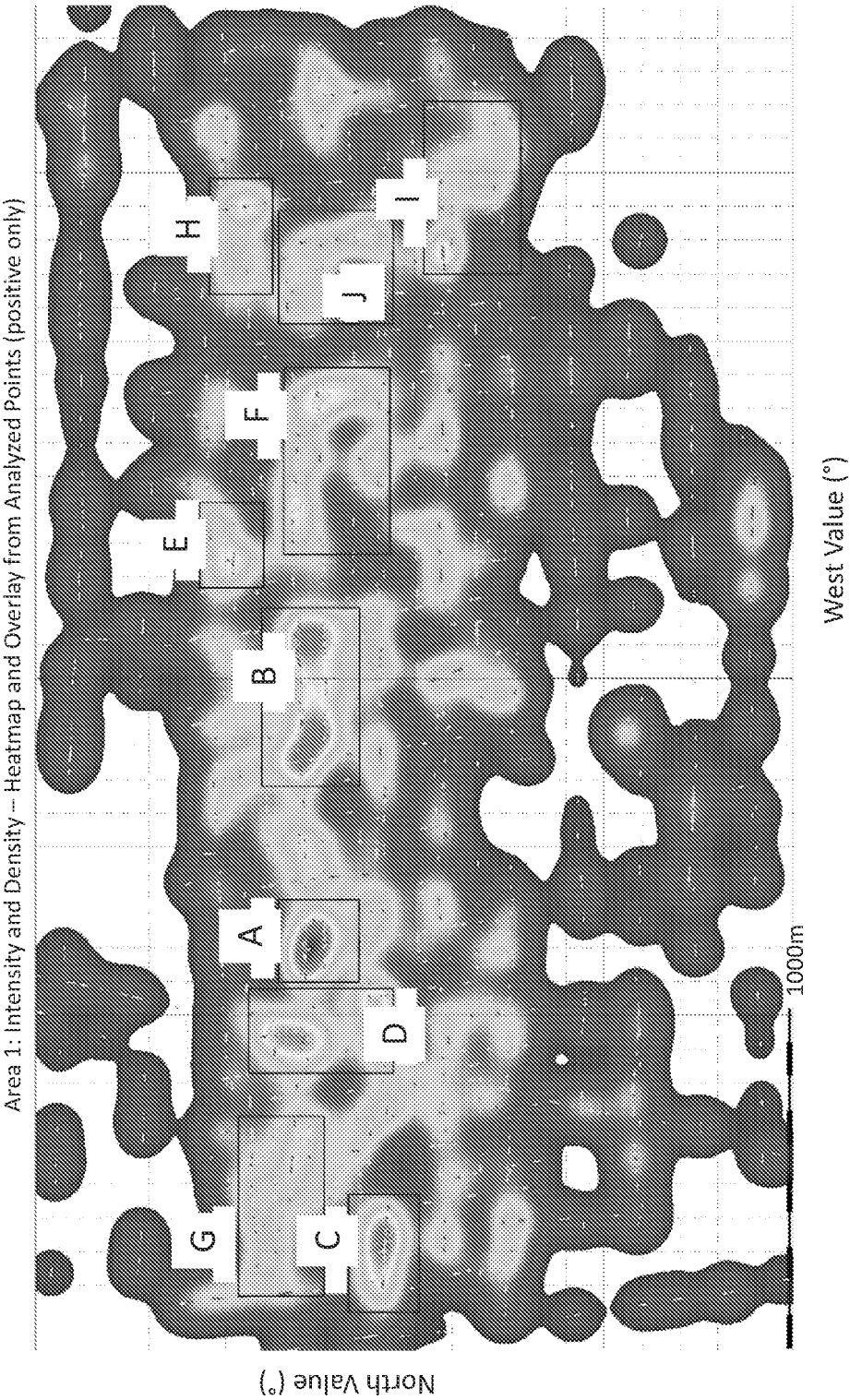


FIG. 19A

	Priority Zone
A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
I	9
J	10

FIG. 19B

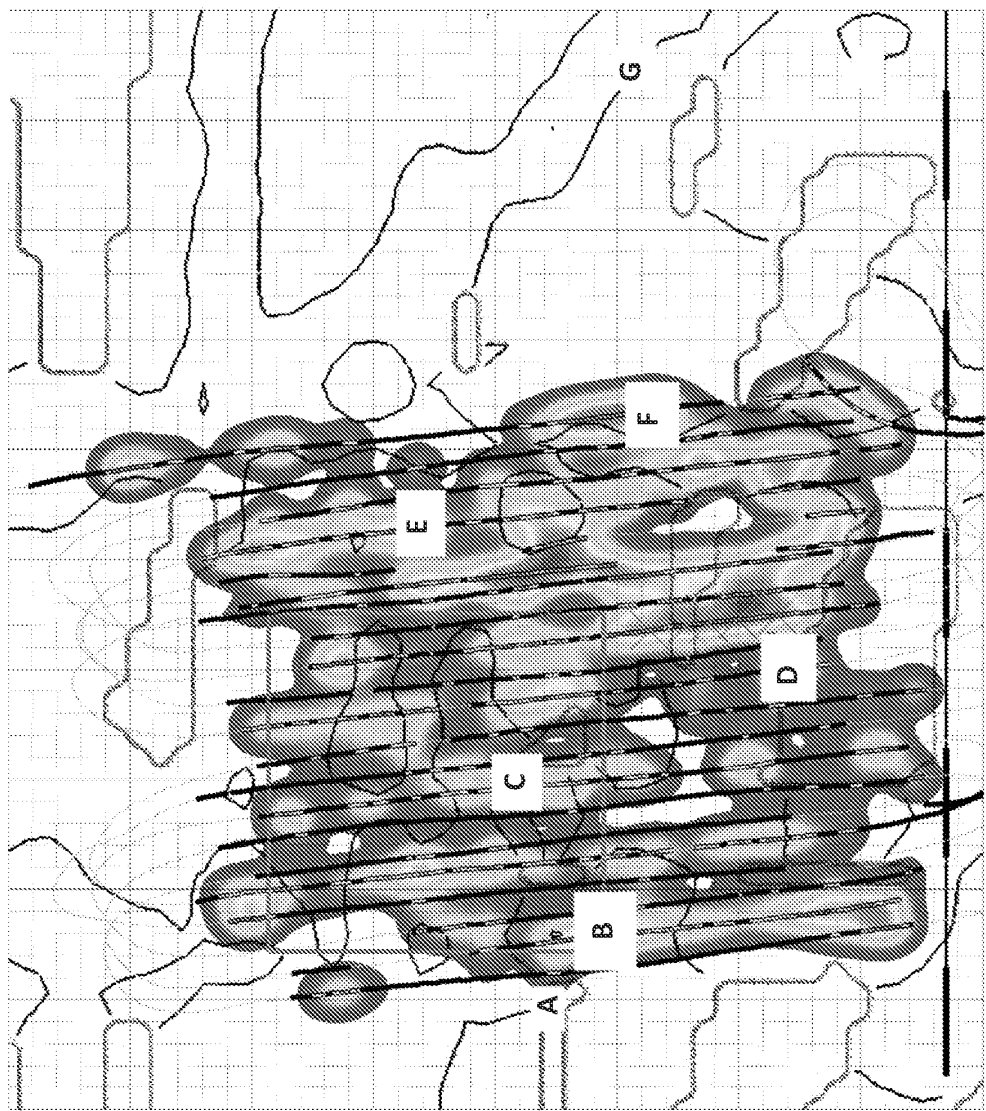


FIG. 20A

	North Value (°)	West Value (°)
A	25.529219	-80.1278
B	25.527	-80.1285
C	25.5278	-80.1269
D	25.5255	-80.126
E	25.5286	-80.1253
F	25.5267	-80.1243

FIG. 20B

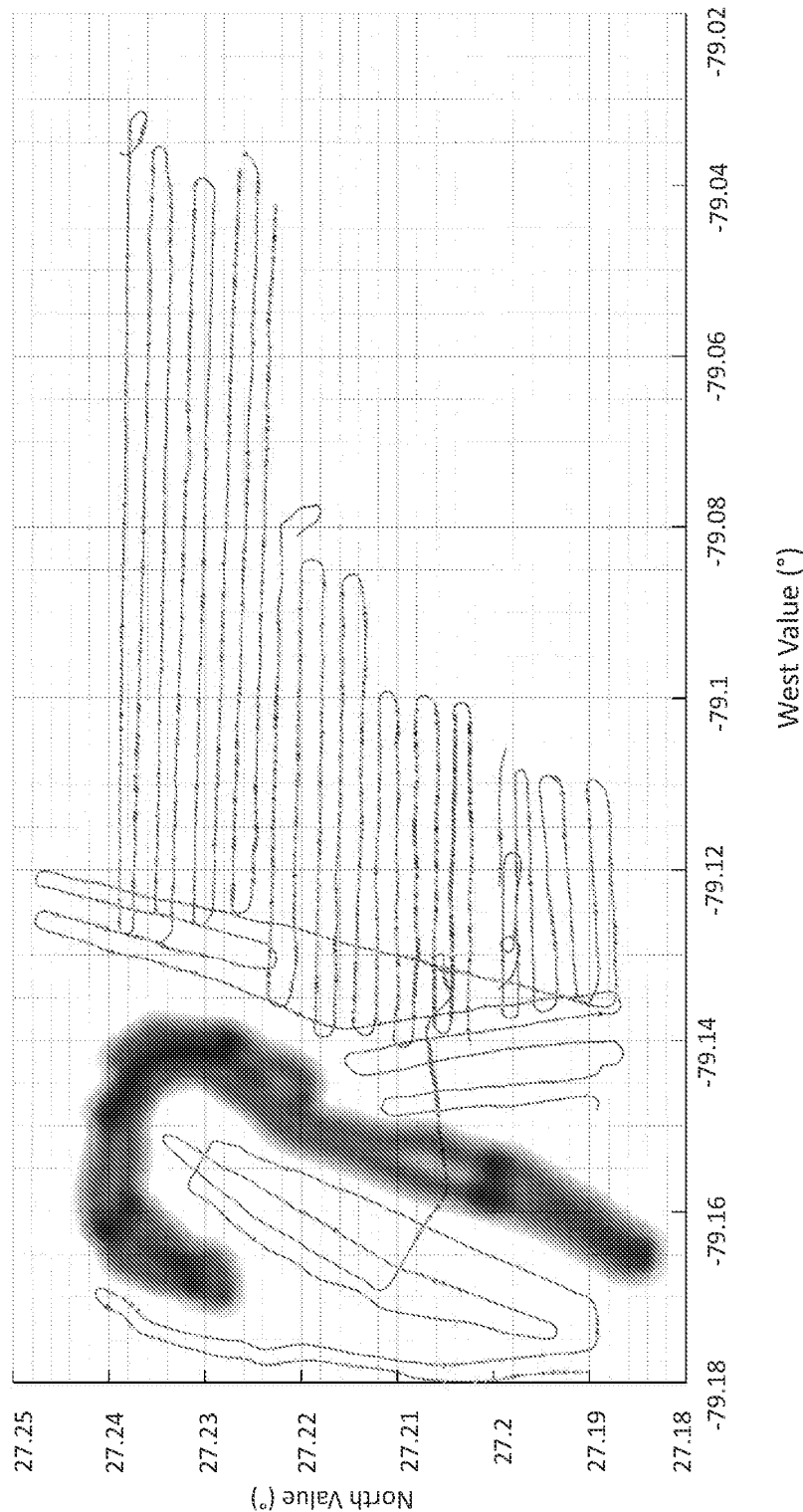


FIG. 21A

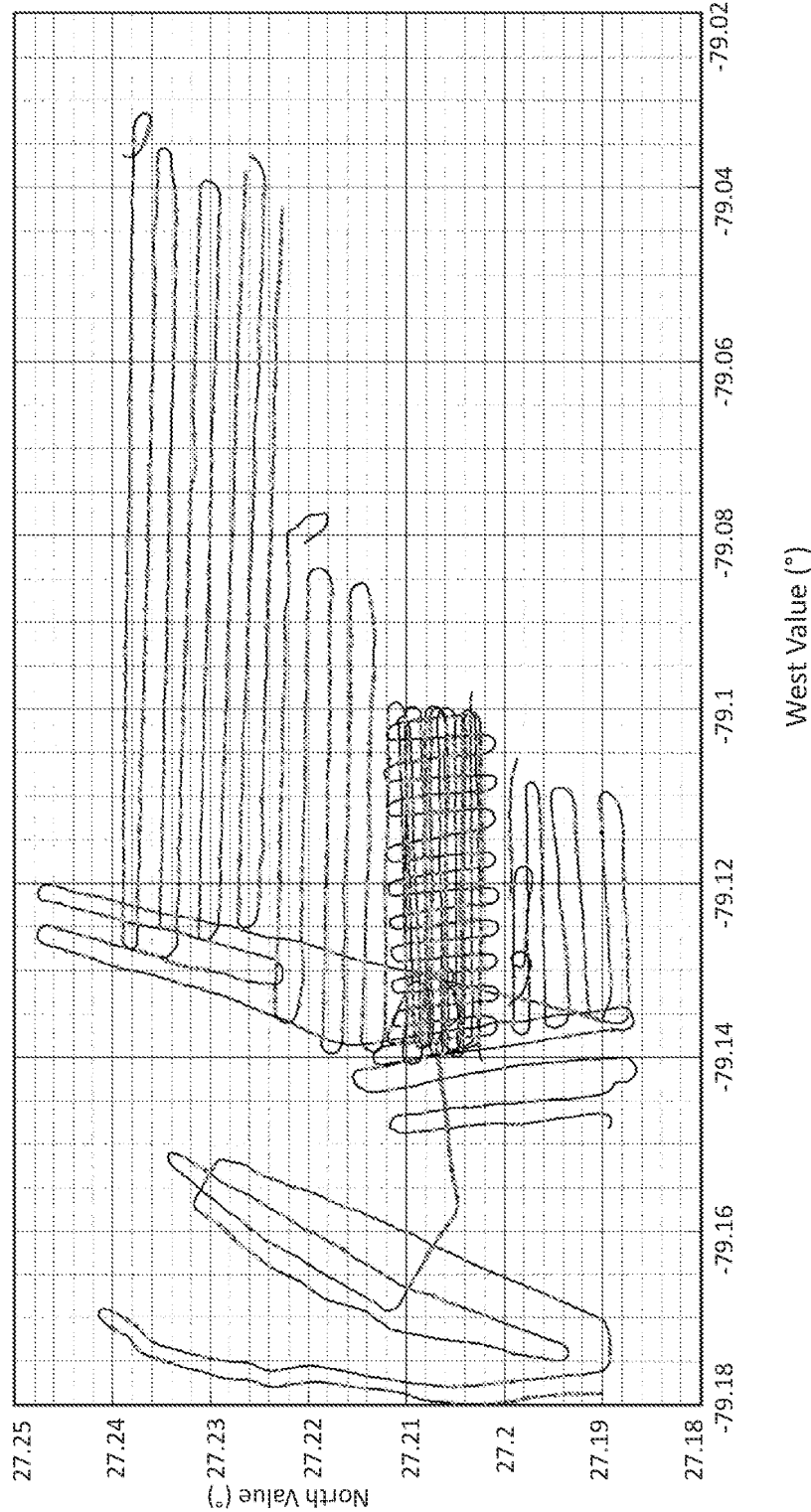


FIG. 21B

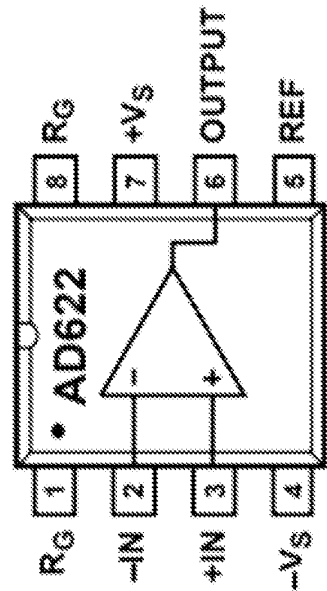


FIG. 22B

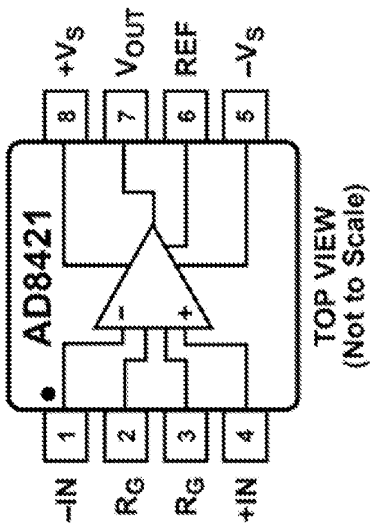
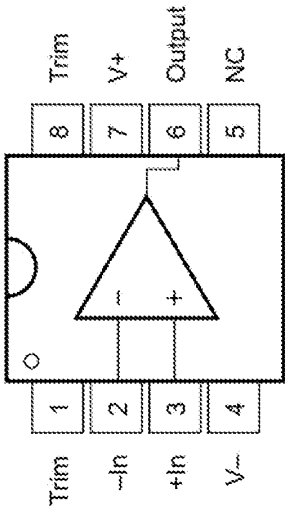


FIG. 22C

FIG. 22D
OPA227, OPA228: P or D Package
8-Pin PDIP or 8-Pin SOIC
Top View



DIP-8, SO-8
NC = Not Connected

TL071x D, P, and PS Package
4-Pin SOIC, PDIP, SO

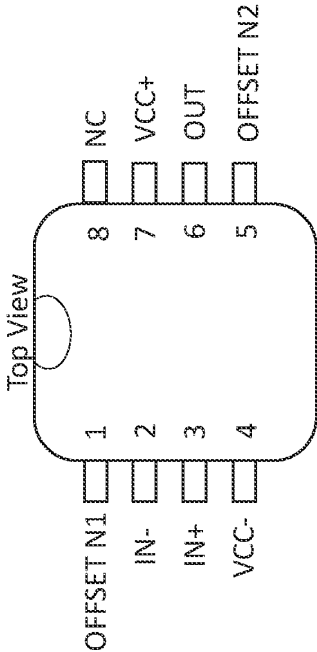


FIG. 22E

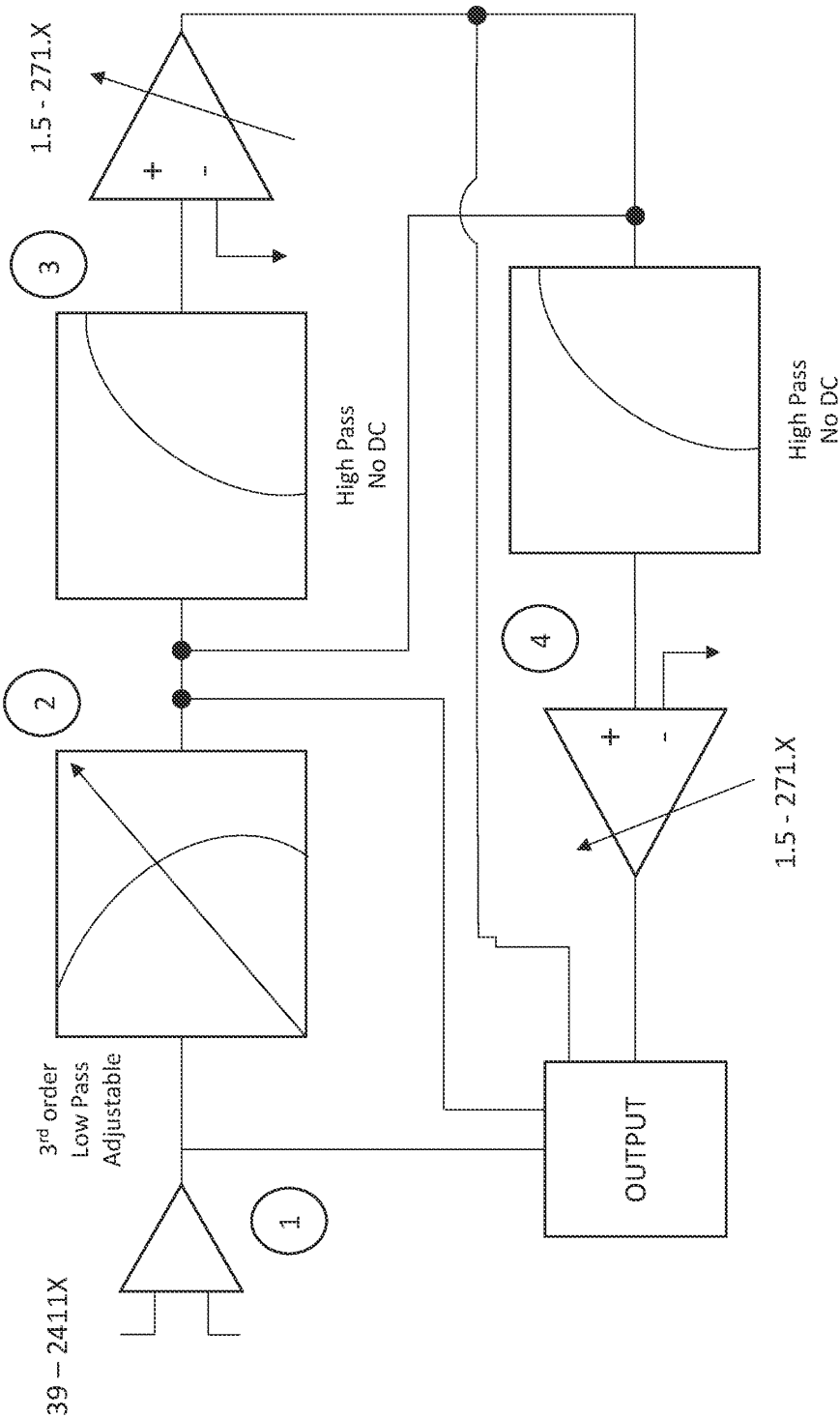


FIG. 22F

Primary Gain Stage

R_1 (Ω)	R_4(Ω)	A (increase in Voltage)	Gain (dB)
1,000,000	100,000	21.00	26.44
1,000,000	10,000	201.00	46.06
10,000,000	100,000	201.00	46.06
1,000,000	1,000	2001.00	66.02
10,000,000	10,000	2001.00	66.02
1,000,000	100	200001.00	86.02
10,000,000	1,000	200001.00	86.02
10,000,000	100	2000001.00	106.02

FIG. 23

Secondary Gain Stage

Stage Settings (Ω)	R ₃ (Ω)	R ₂ (Ω)	A (increase in Voltage)	Gain (dB)
10k 15k 20k 33k 47k 75k	3,551	10,000	0.36	-8.99
10k 15k 20k 33k 47k	3,728	10,000	0.37	-8.57
10k 15k 20k 33k	4,049	10,000	0.40	-7.85
10k 15k 20k	4,615	10,000	0.46	-6.72
10k 15k	6,000	10,000	0.60	-4.44
10k 20k	6,667	10,000	0.67	-3.52
10k 33k	7,674	1,000	0.77	-2.30
10k 47k	8,246	10,000	0.82	-1.68
10k 75k	8,824	10,000	0.88	-1.09
10k	10,000	10,000	1.00	0.00
15k	15,000	10,000	1.50	3.52
20k	20,000	10,000	2.00	6.02
33k	33,000	10,000	3.30	10.37
47k	47,000	10,000	4.70	13.44
75k	75,00	10,00	7.50	17.50

FIG. 24

Stage 1 Setting (Ω)	1M Ω & 100k Ω	1M Ω & 10k Ω	1M Ω & 1k Ω
Stage 2 Setting	26.44	46.06	66.02
10k 15k 20k 33k 47k 75k	17.45	37.07	57.03
10k 15k 20k 33k 47k	17.87	37.49	57.45
10k 15k 20k 33k	18.59	38.21	58.17
10k 15k 20k	19.73	39.35	59.31
10k 15k	22.01	41.63	61.59
10k 20k	22.92	42.54	62.50
10k 33k	24.15	43.76	63.73
10k 47k	24.77	44.39	64.35
10k 75k	25.36	44.98	64.94
10k	26.44	46.06	66.02
15k	29.97	49.59	69.55
20k	32.46	52.08	72.05
33k	36.81	56.43	76.40
47k	39.89	59.51	79.47
75k	43.95	63.57	83.53

FIG. 25

Gain Calculations

Stage Setting (Ω)	R_3(Ω)	R_2(Ω)	A (increase in Voltage)	Gain (dB)
	10,000	10,000	1.00	0.00
	15,000	10,000	1.50	3.52
	20,000	10,000	2.00	6.02
	33,000	10,000	3.30	10.37
	47,000	10,000	4.70	13.44
	75,000	10,000	7.50	17.50
10k 15k	6,000	10,000	0.67	-4.44
10k 20k	6,666.67	10,000	0.67	-3.52
10k 33k	7,674.42	10,000	0.77	-2.30
10k 47k	8,245.61	10,000	0.82	-1.68
10k 75k	8,823.53	10,000	0.88	-1.09
10k 15k 20k	4,615.38	10,000	0.46	-6.72
10k 15k 20k 33k	4,049.08	10,000	0.40	-7.85
10k 15k 20k 33k 47k	3,727.92	10,000	0.37	-8.57
10k 15k 20k 33k 47k 75k	3,551.39	10,000	0.36	-8.99

FIG. 26

Stage 1 Setting (Ω)	1, 7, 6 (Ω)	1, 7, 5 (Ω)	1, 7, 4 (Ω)
Stage 2 Setting	26.44	46.06	66.02
Switch ON: 1, 2, 3, 4, 5, 6	17.45	37.07	57.03
Switch ON: 1, 2, 3, 4, 5	17.87	37.49	57.45
Switch ON: 1, 2, 3, 4	18.59	38.21	58.17
Switch ON: 1, 2, 3	19.73	39.35	59.31
Switch ON: 1, 2	22.01	41.63	61.59
Switch ON: 1, 3	22.92	42.54	62.50
Switch ON: 1, 4	24.15	43.76	63.73
Switch ON: 1, 5	24.77	44.39	64.35
Switch ON: 1, 6	25.36	44.98	64.94
Switch ON: 1	26.44	46.06	66.02
Switch ON: 2	29.97	49.59	69.55
Switch ON: 3	32.46	52.08	72.05
Switch ON: 4	36.81	56.43	76.40
Switch: ON: 5	39.89	59.51	79.47
Switch ON: 6	43.95	63.57	83.53

FIG. 27

Resistance Values(Ω)	Total Resistance(Ω)	Gain (A)	dB	Dip
20,000	20,000	3.53	10.94	1
15,000	15,000	4.37	12.80	2
10,000	10,000	6.05	15.64	3
4,700	4,700	11.74	21.40	1 & 2
3,300	3,300	16.30	24.25	1 & 3
1,500	1,500	34.67	30.80	2 & 3
750	750	68.33	36.69	4
470	470	108.45	40.70	1 & 4
330	330	154.03	43.75	2 & 4
100	100	506.00	54.08	5
50	50	1,011.00	60.10	3 & 4
20,000 15,000	8,571.43	6.89	16.77	1 & 5
20,000 10,000	6,666.67	8.58	18.66	2 & 5
20,000 4,700	3,805.67	14.27	23.09	3 & 5
20,000 3,300	2,832.62	18.83	25.50	4 & 5
20,000 1,500	1,395.35	37.19	31.41	6
20,000 750	722.89	70.86	37.01	1 & 6
20,000 330	459.21	110.97	40.90	2 & 5
20,000 100	99.50	508.53	54.13	3 & 6
20,000 50	49.98	1,013.53	60.12	4 & 6

FIG. 28A

Resistance Values(Ω)	Resistance(Ω)	Gain (A)	dB	Dip
15,000 10,000	6,000	9.42	19.48	5 & 6
15,000 4,700	3,578.68	15.11	23.59	7
15,000 3,300	2,704.92	19.67	25.88	1 & 7
15,000 1,500	1,363.64	38.03	31.60	2 & 7
15,000 750	714.29	71.70	37.11	3 & 7
15,000 470	455.71	111.81	40.97	4 & 7
15,000 330	322.90	157.40	43.94	5 & 7
15,000 100	99.34	509.37	54.14	6 & 7
15,000 50	49.83	1,014.37	60.12	8
10,000 4,700	3,197.28	16.79	24.50	1 & 9
10,000 3,300	2,481.20	21.35	26.59	2 & 9
10,000 1,500	1,304.35	39.72	31.98	3 & 8
10,000 750	697.67	73.38	37.31	4 & 8
10,000 470	448.90	113.50	41.10	5 & 8
10,000 330	319.46	159.08	44.03	6 & 8
10,000 100	99.01	511.05	54.17	9
10,000 50	49.75	1,016.05	60.14	2 & 9
4,700 3,300	1,938.75	27.05	28.64	3 & 9
4,700 1,500	1,137.10	45.41	33.14	4 & 9
4,700 750	646.79	79.08	37.96	5 & 9

FIG. 28B

Resistance Values(Ω)	Resistance(Ω)	Gain (A)	dB	Dip
4,700 330	308.35	164.77	44.34	6 & 9
4,700 100	97.92	516.74	54.27	7 & 9
4,700 50	39.47	1,021.74	60.19	8 & 9
3,300 1,500	1,031.25	49.97	33.97	10
3,300 750	611.11	83.64	38.45	1 & 10
3,300 470	411.41	123.75	41.85	2 & 10
3,300 330	300.00	169.33	44.57	3 & 10
3,300 100	97.06	521.30	54.34	4 & 10
3,300 50	49.25	1,026.30	60.23	5 & 10
1,500 750	500.00	102.00	40.17	6 & 10
1,500 470	357.87	142.11	43.05	7 & 10
1,500 330	270.49	187.70	45.47	8 & 10
1,500 100	93.75	539.67	54.64	9 & 10
1,500 50	49.39	1,044.67	60.38	11
750 470	288.93	175.78	44.90	1 & 11
750 330	229.17	221.36	46.90	2 & 11
750 100	82.46	613.45	55.76	3 & 11
750 50	46.68	1,078.33	60.66	4 & 11
470 330	193.88	261.48	48.35	5 & 11
470 100	82.46	613.45	55.76	6 & 11
470 50	45.19	1,118.45	60.97	7 & 11
330 100	76.74	659.03	56.38	8 & 11
330 50	43.42	1,164.03	61.32	9 & 11
100 50	33.33	1,516.00	63.61	10 & 11

FIG. 28C

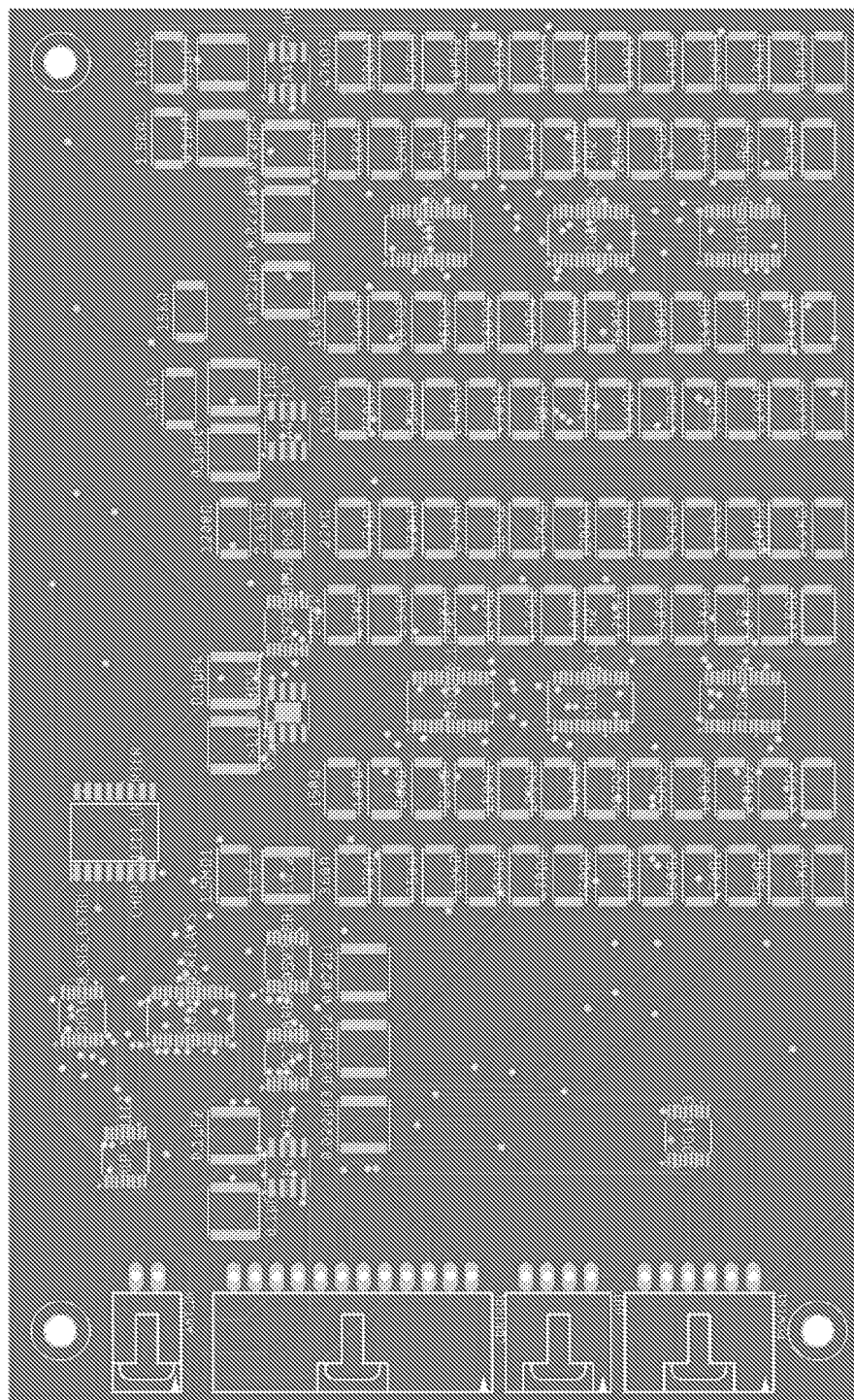


FIG. 29

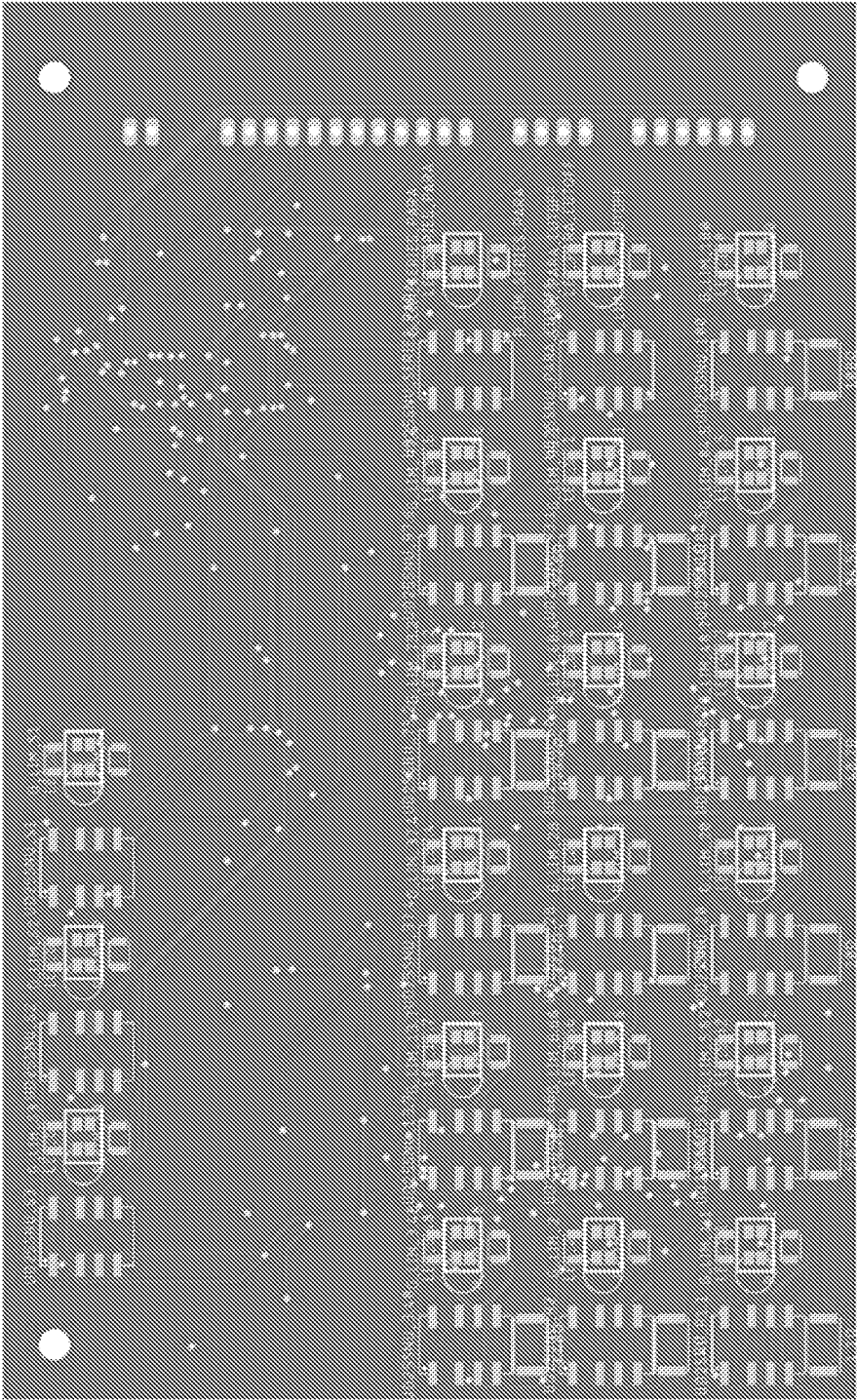


FIG. 30

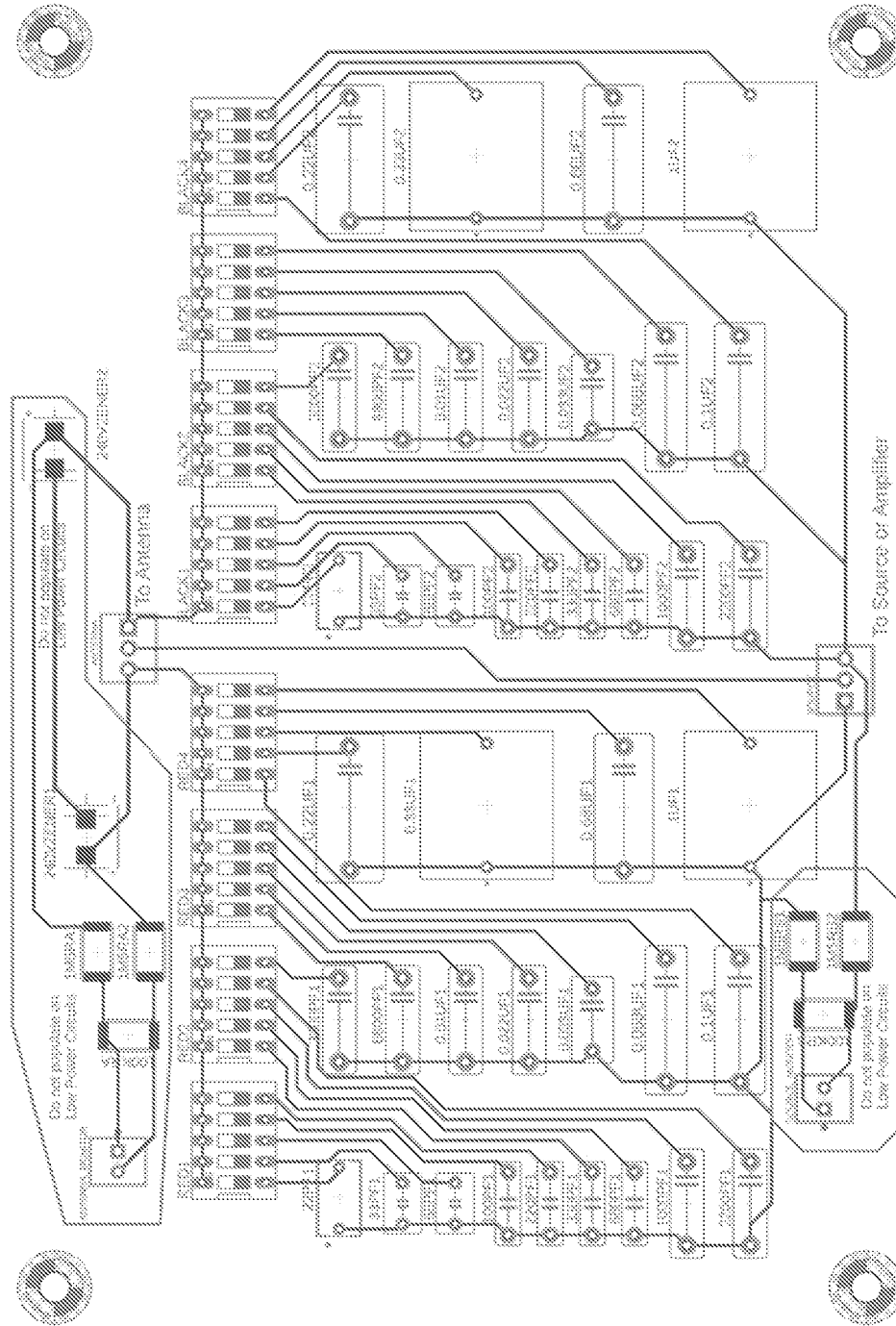
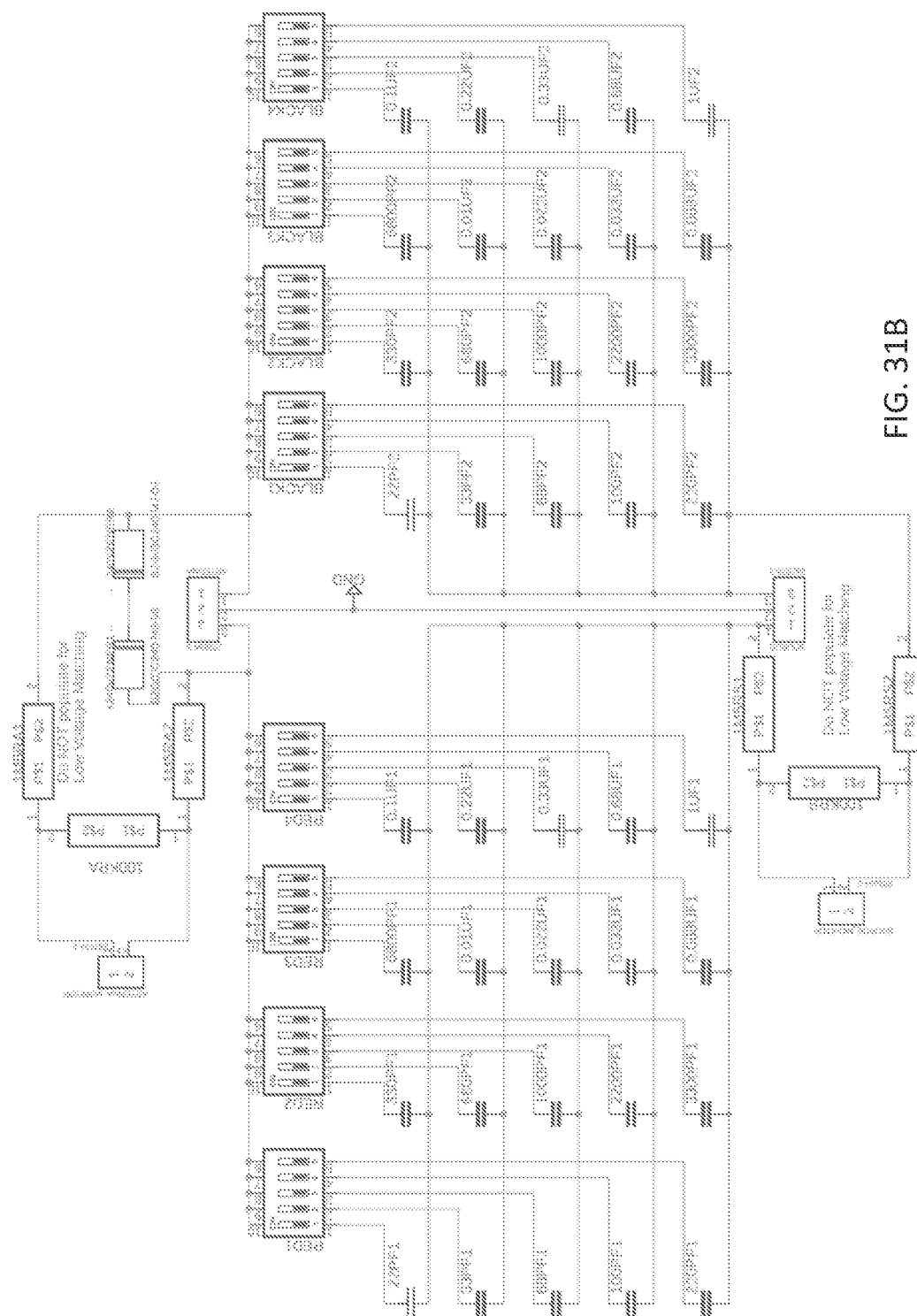


FIG. 31A



ELG 318

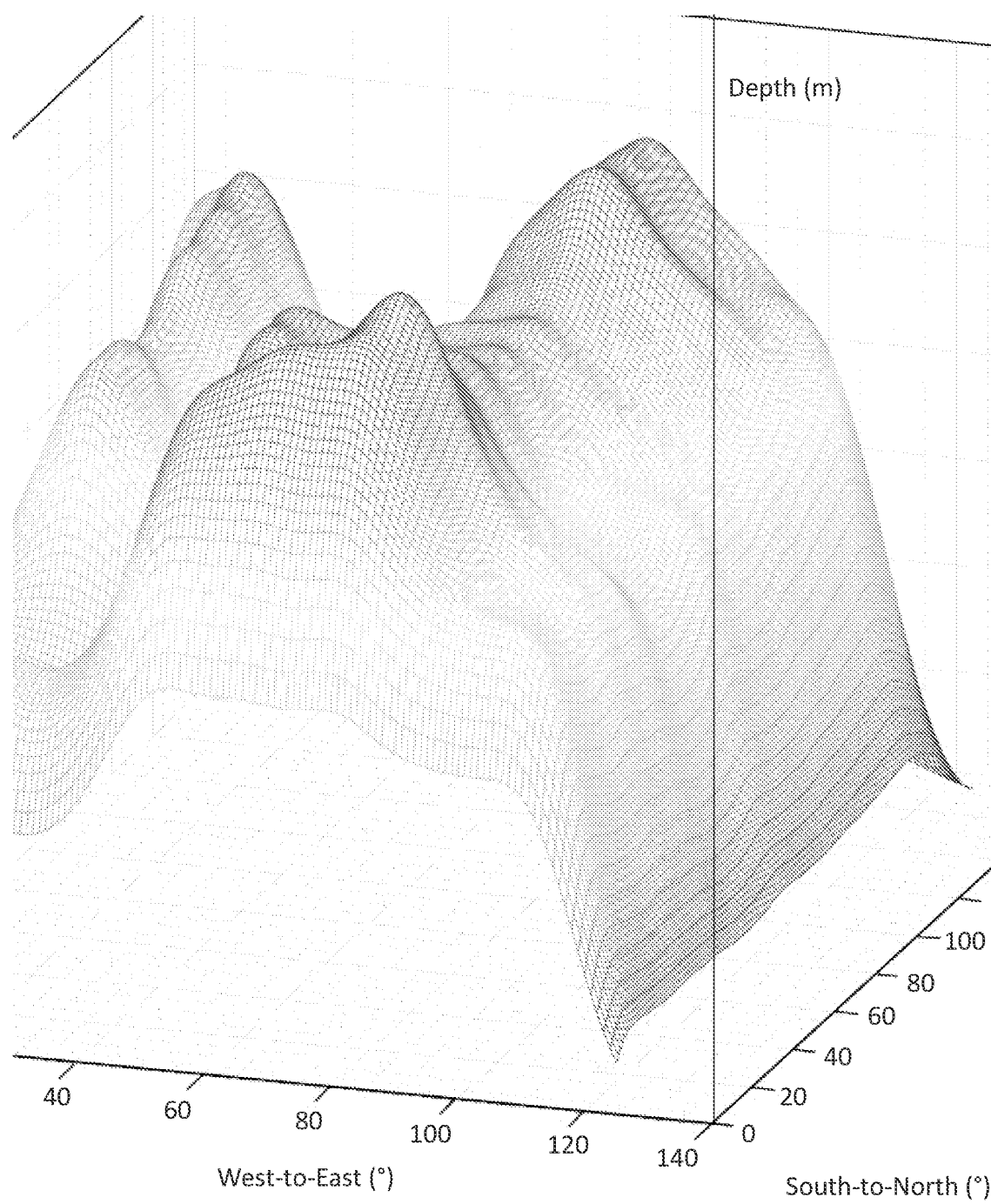


FIG. 32

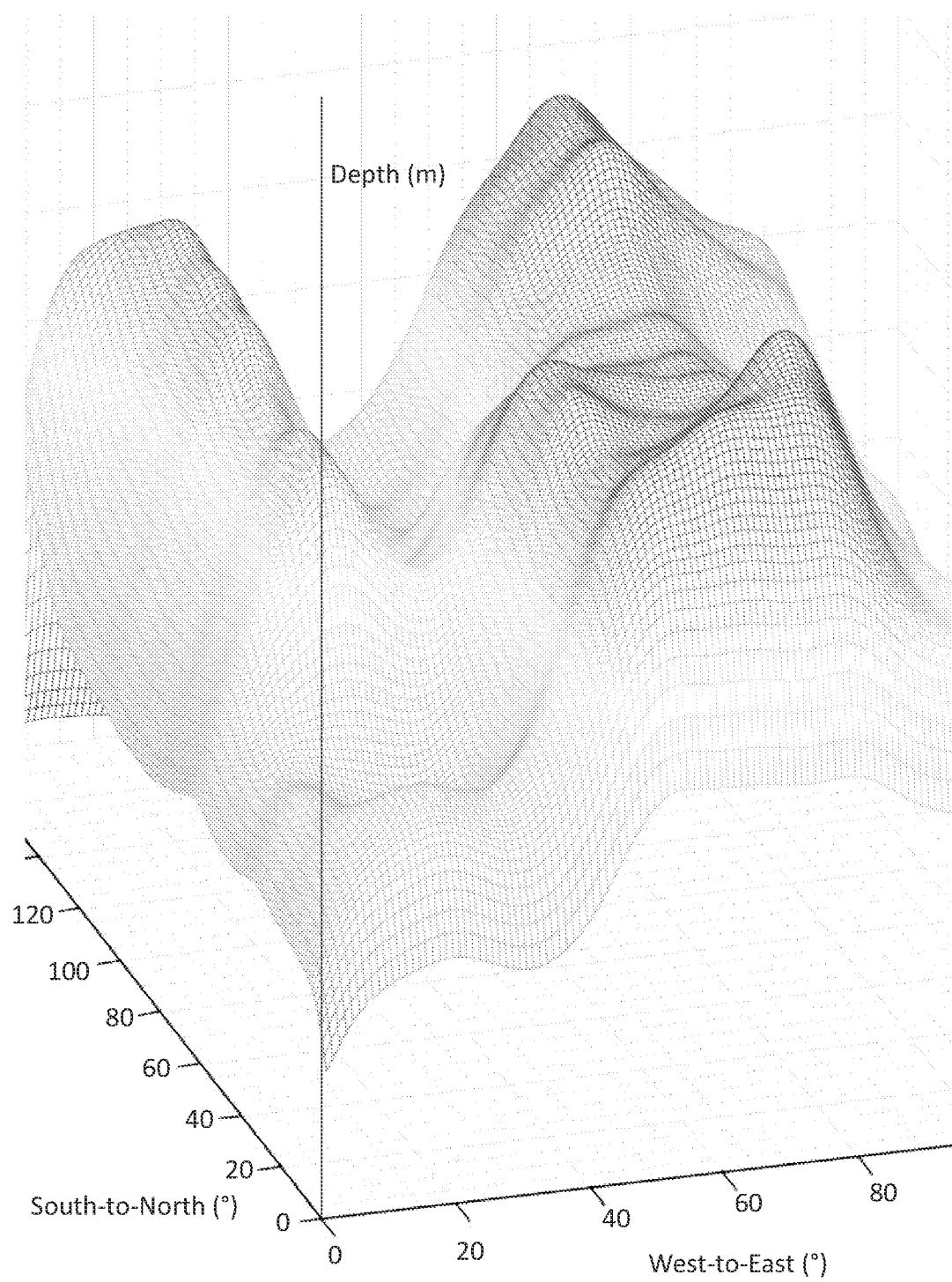


FIG. 33

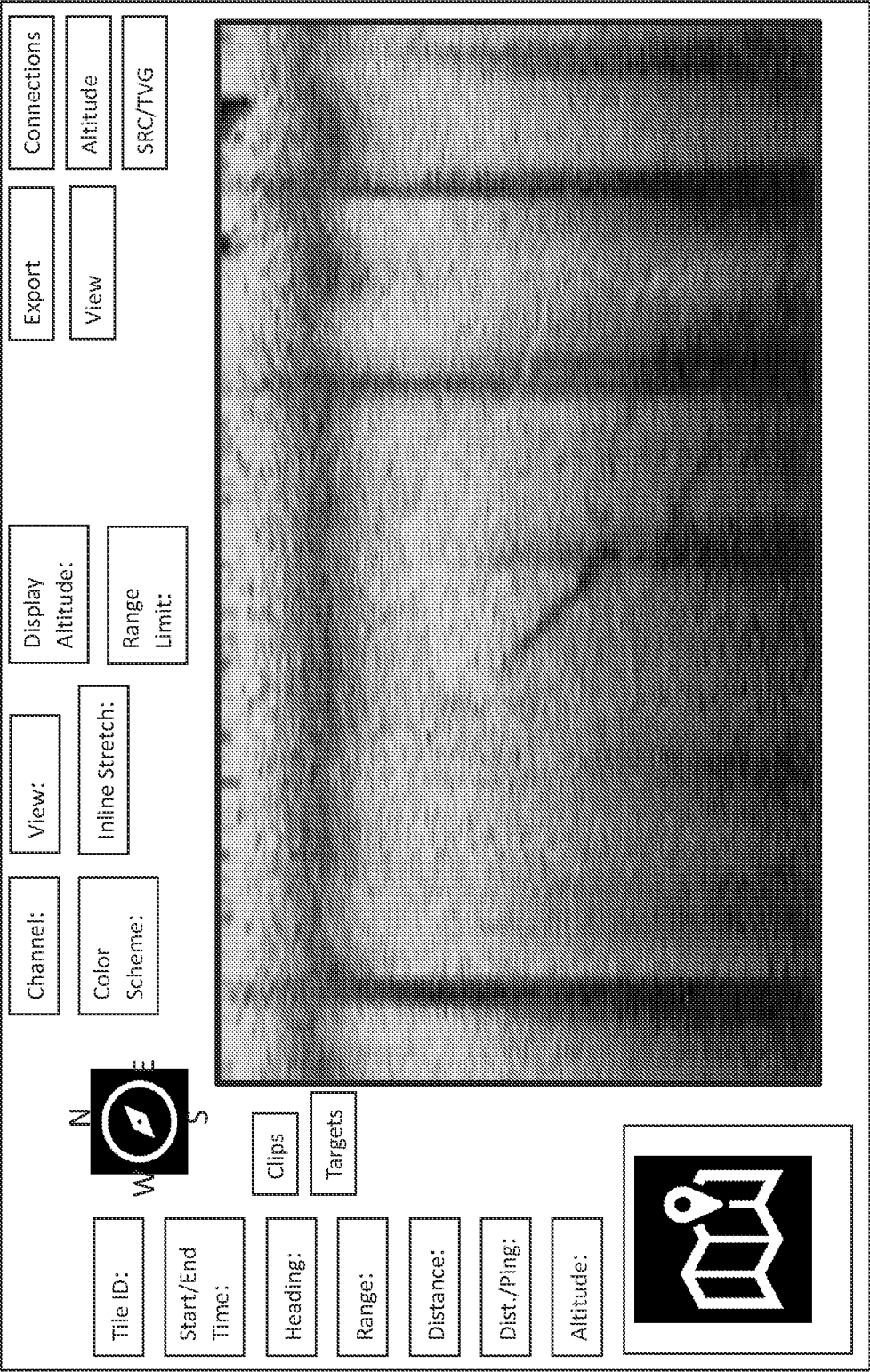


FIG. 34

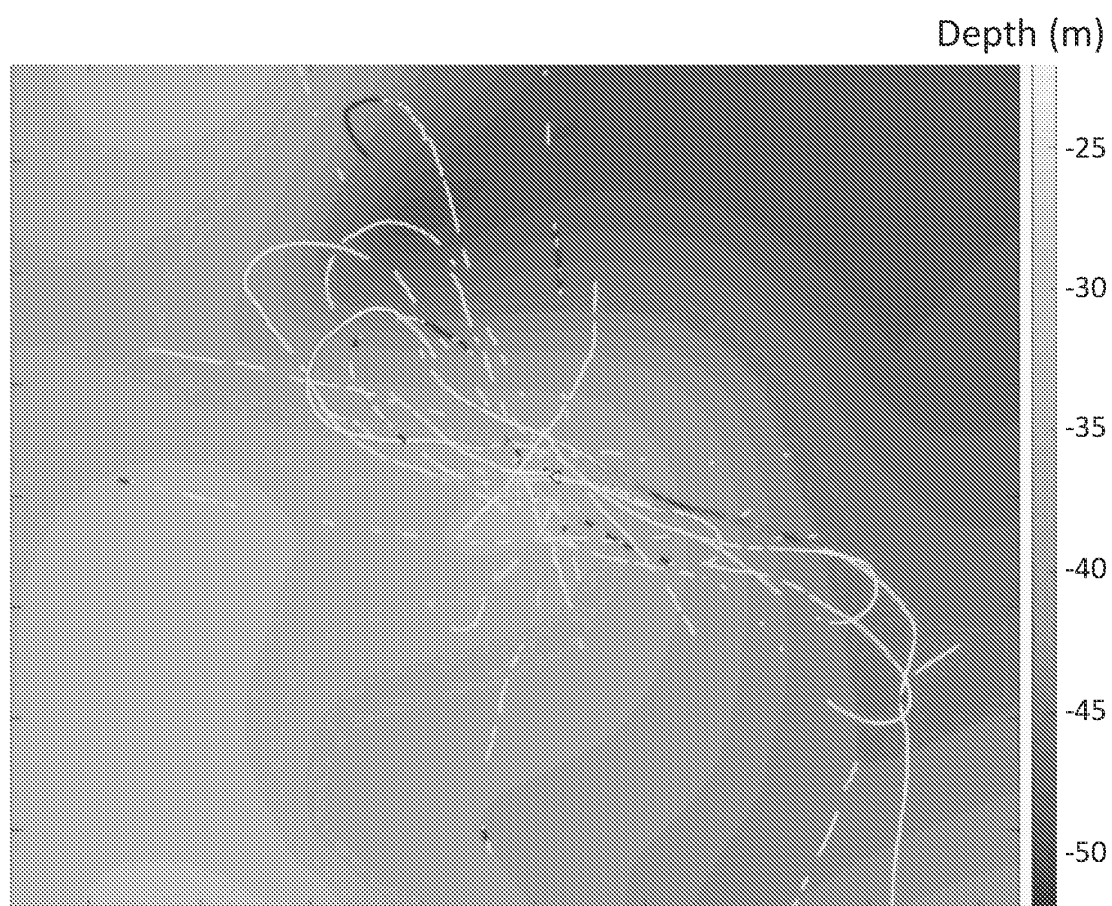


FIG. 35

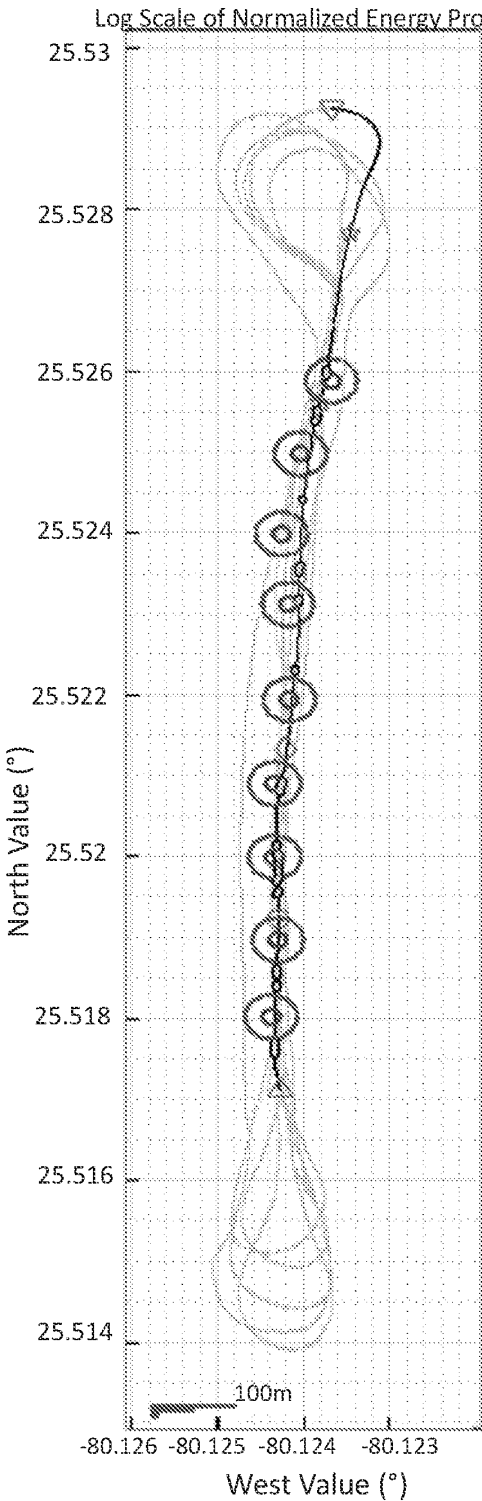


FIG. 36A

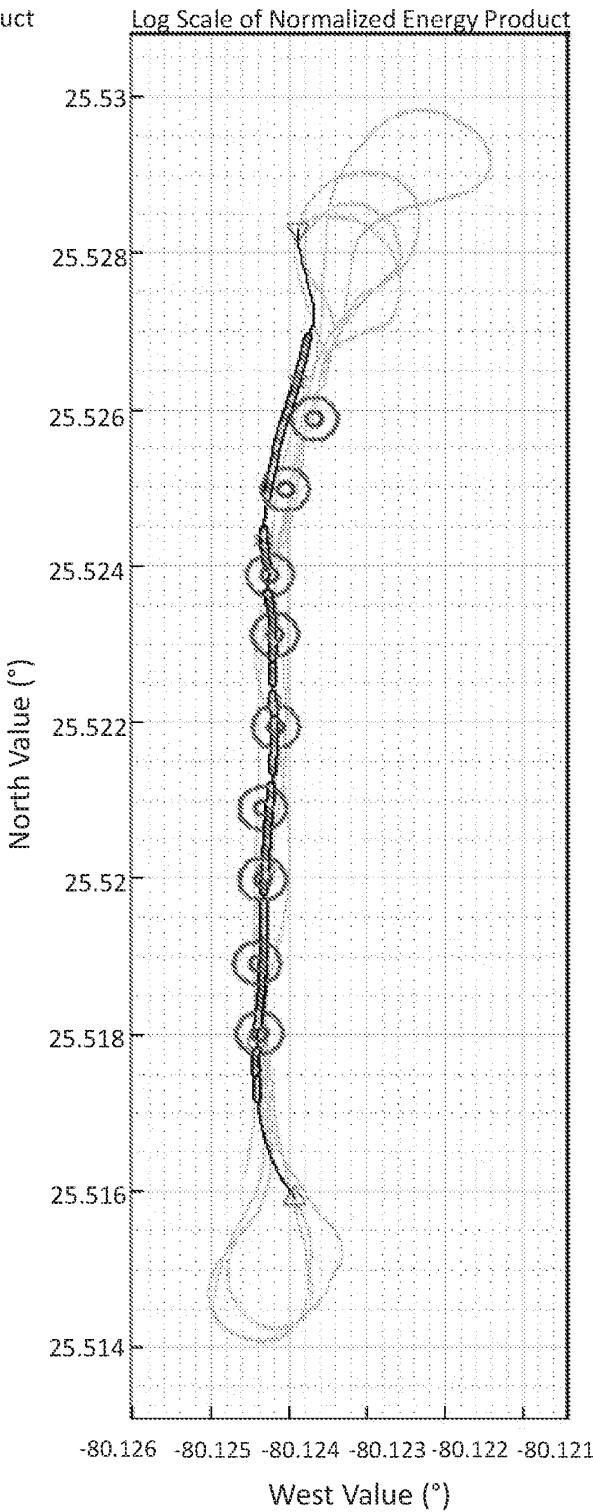
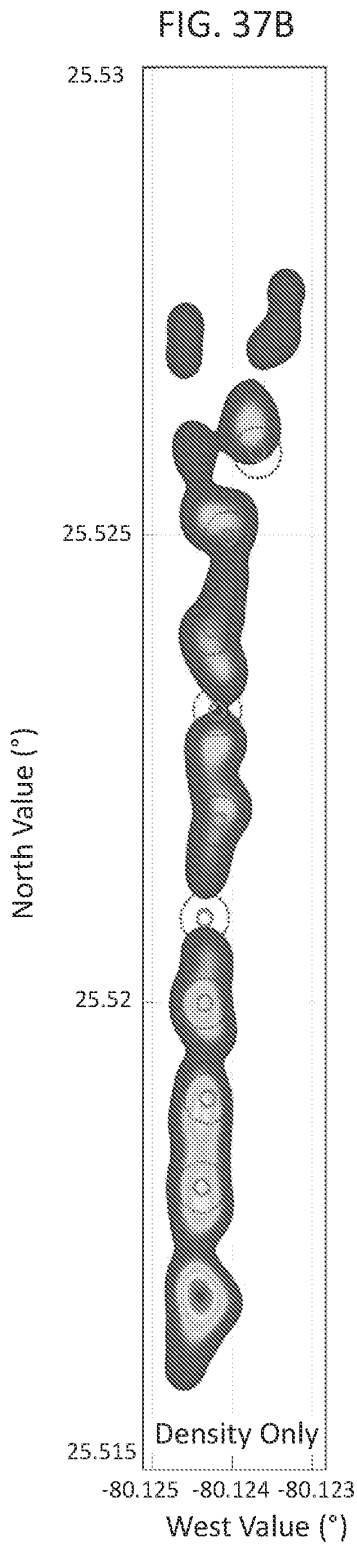
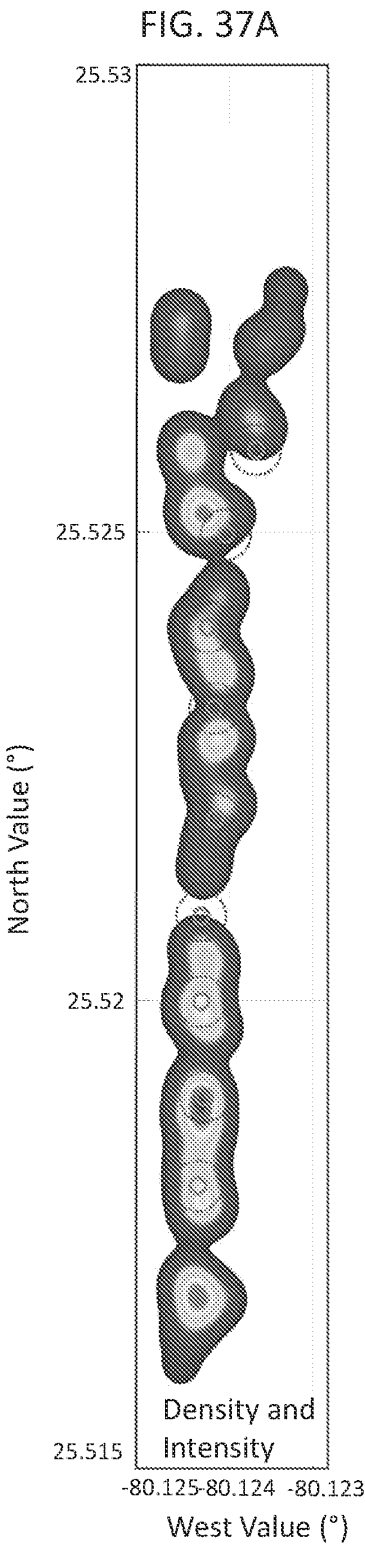


FIG. 36B



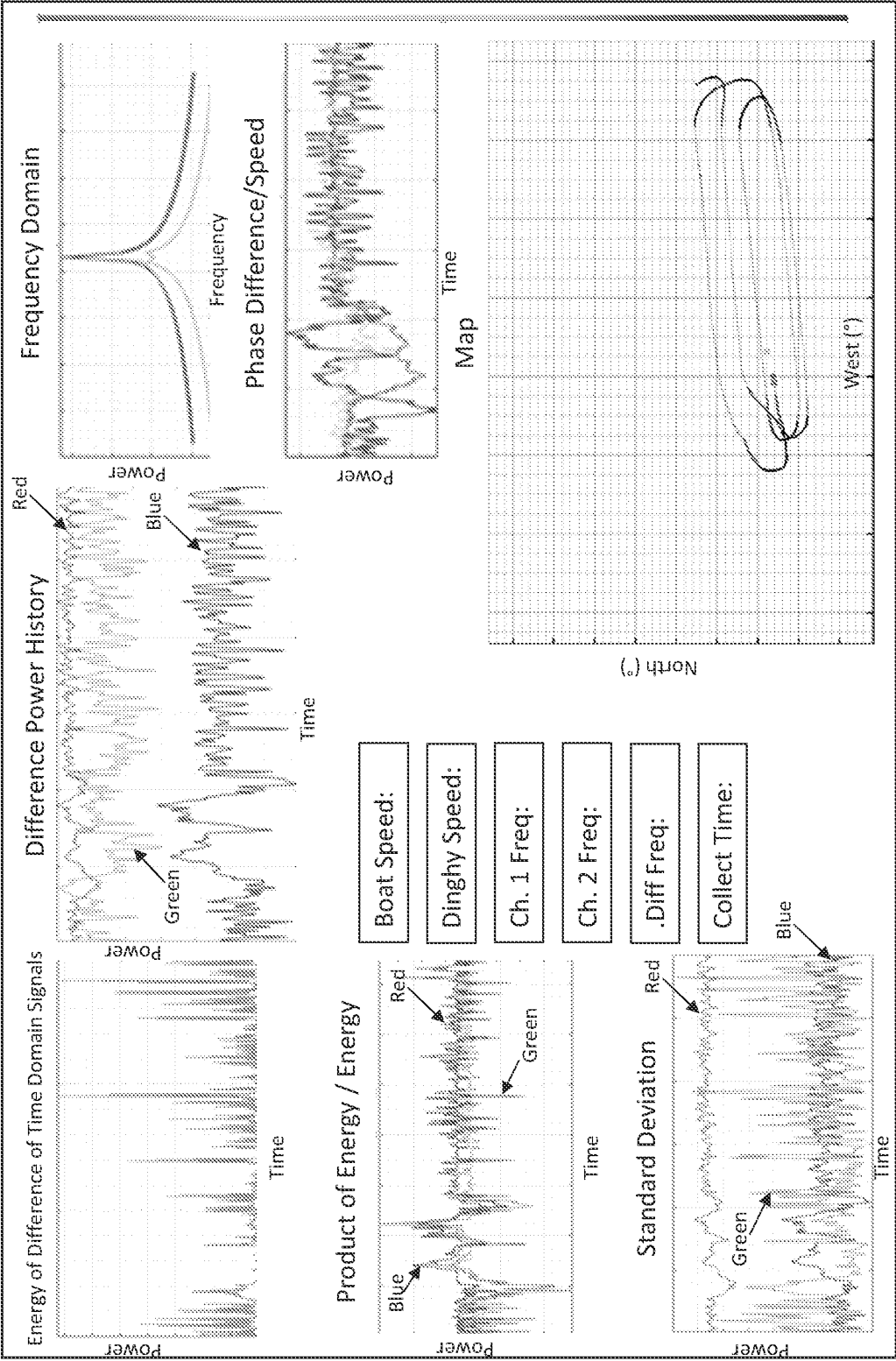


FIG. 38

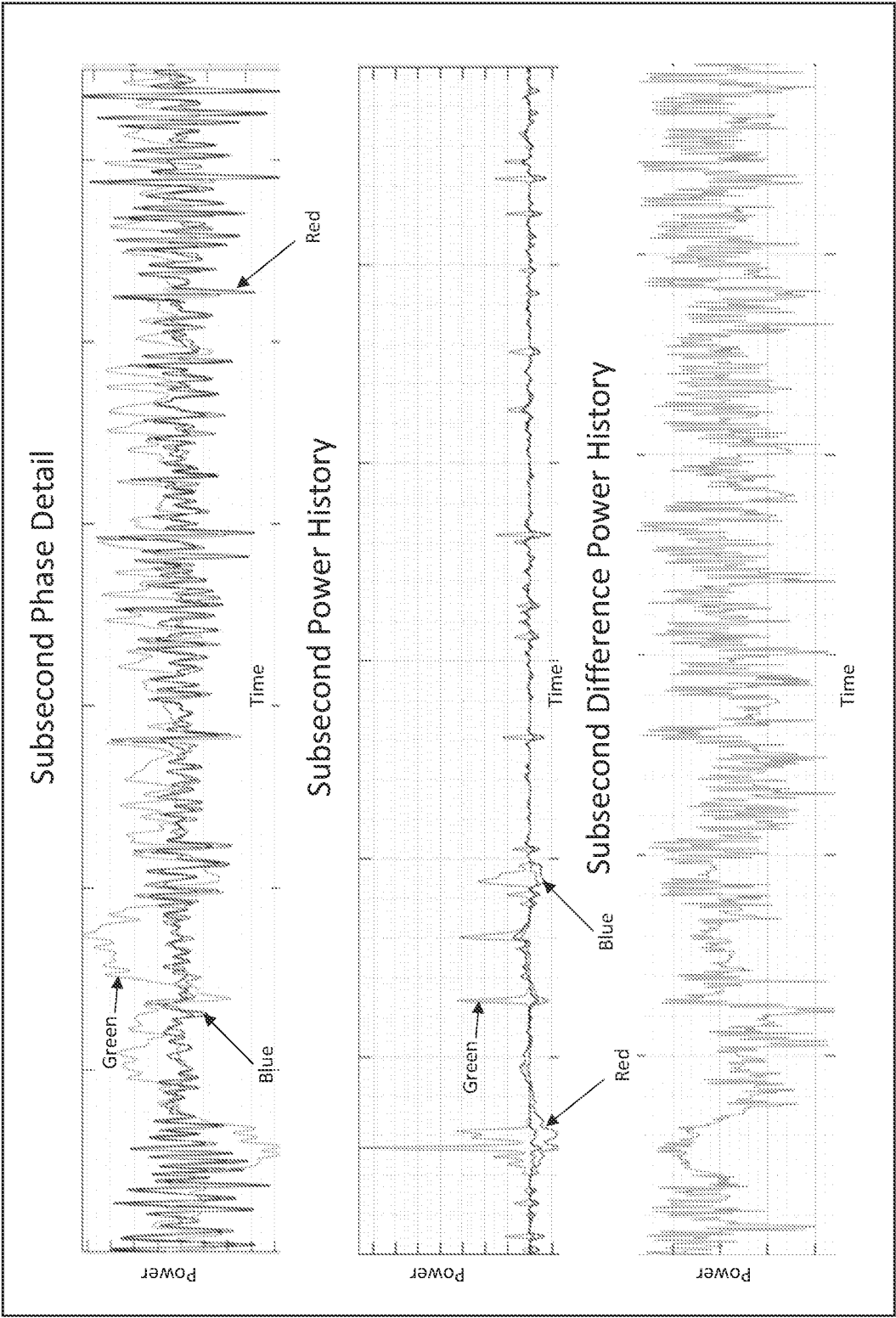
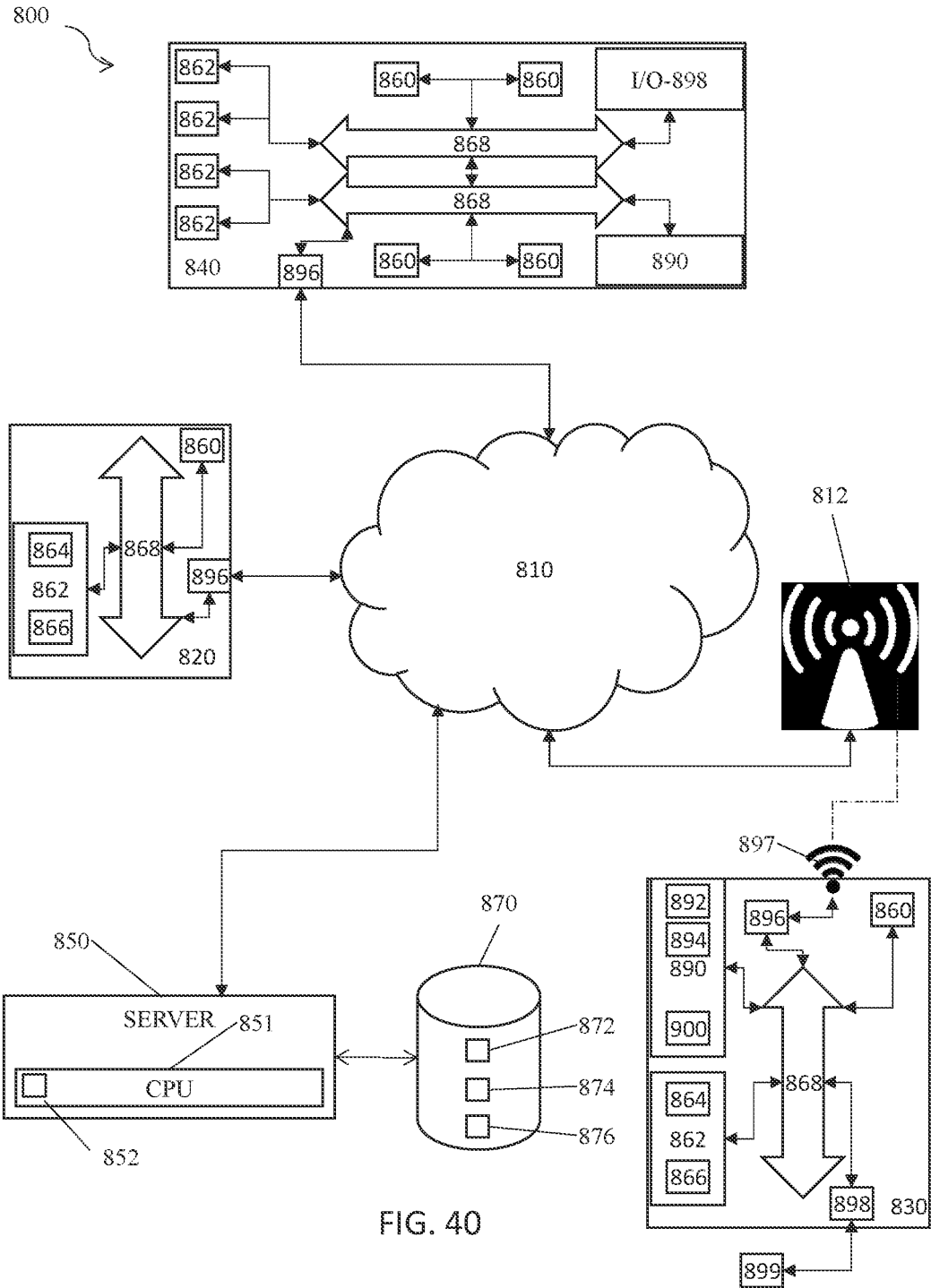


FIG. 39



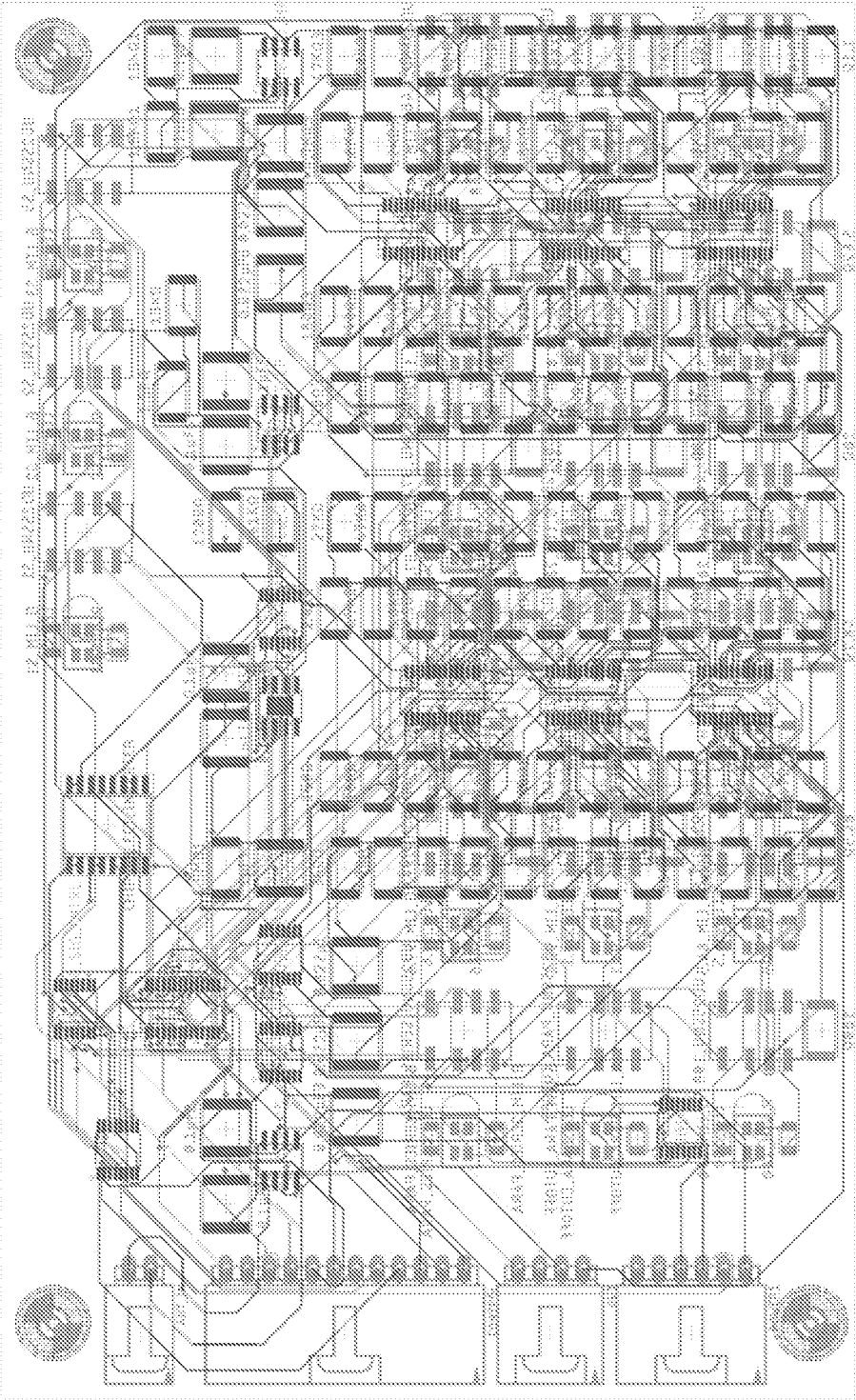


FIG. 41

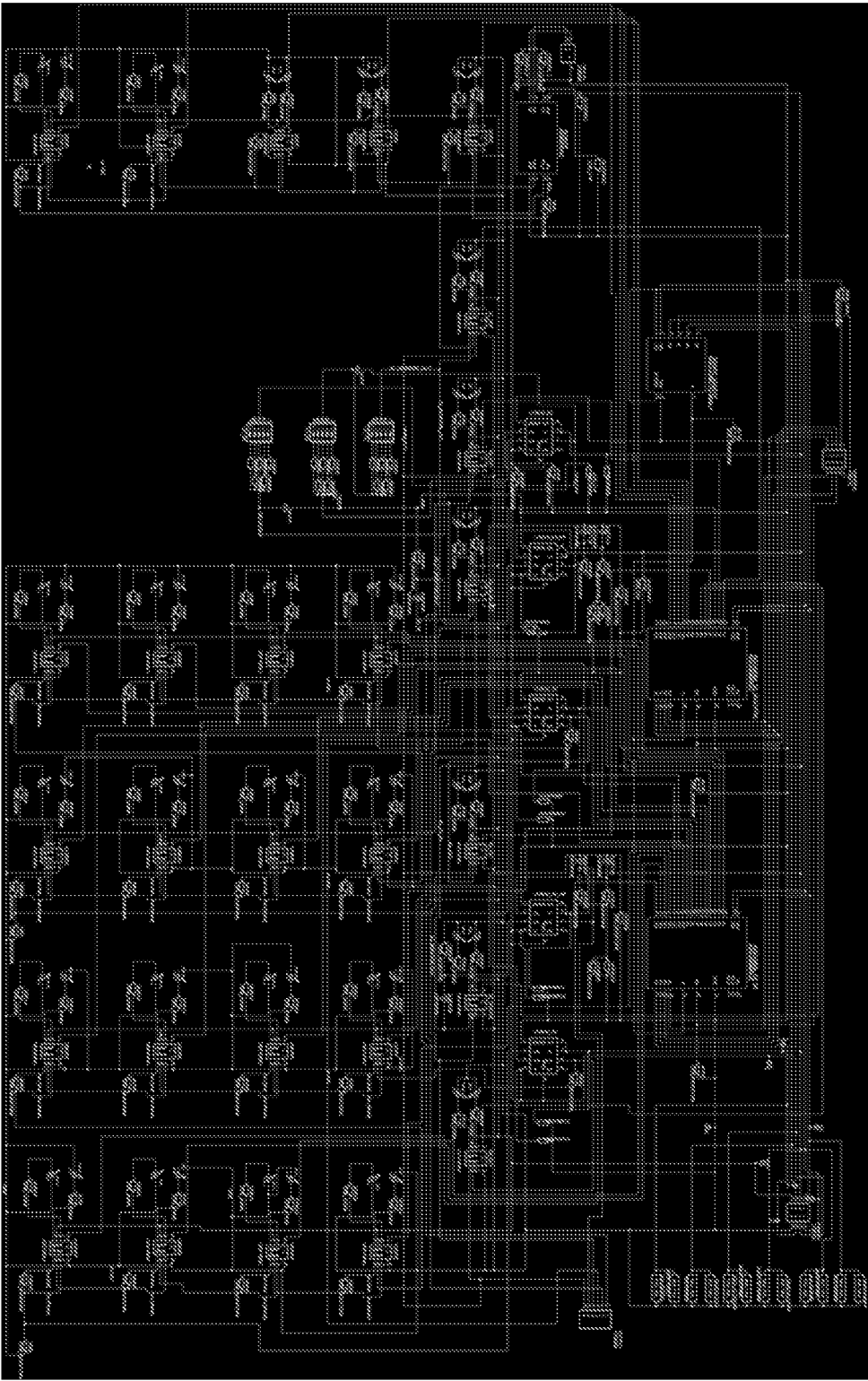


FIG. 42

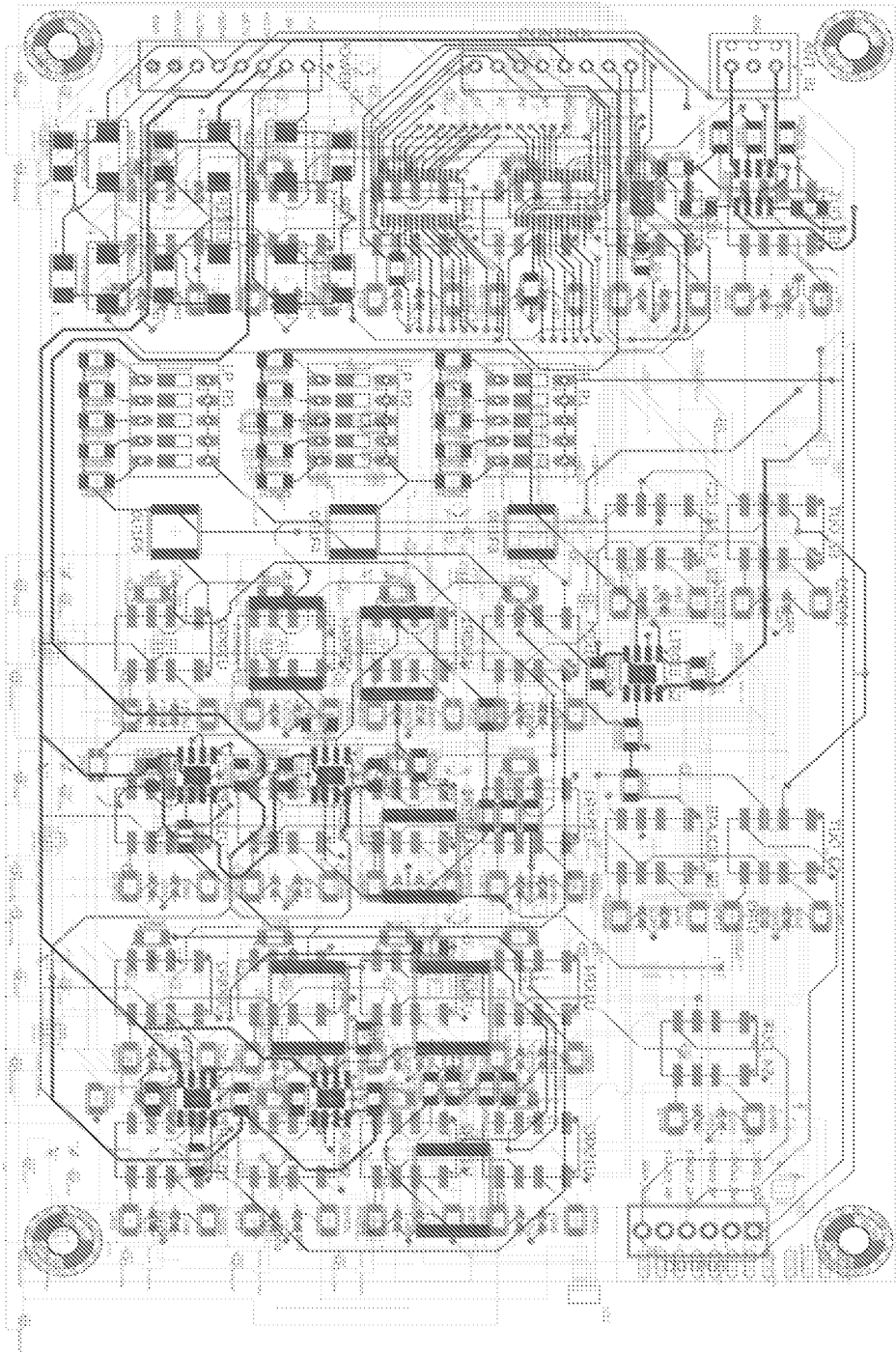


FIG. 43

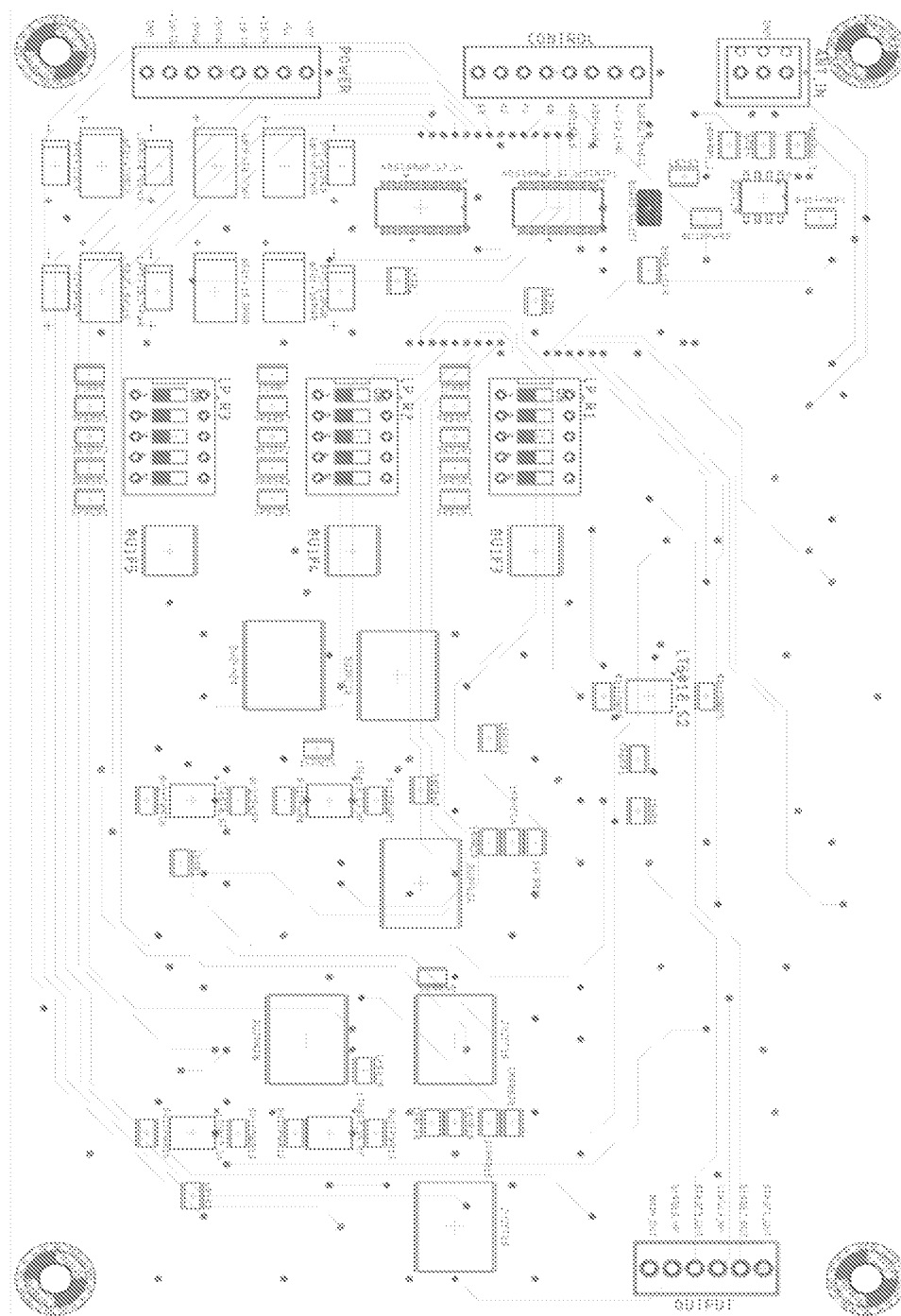


FIG. 44

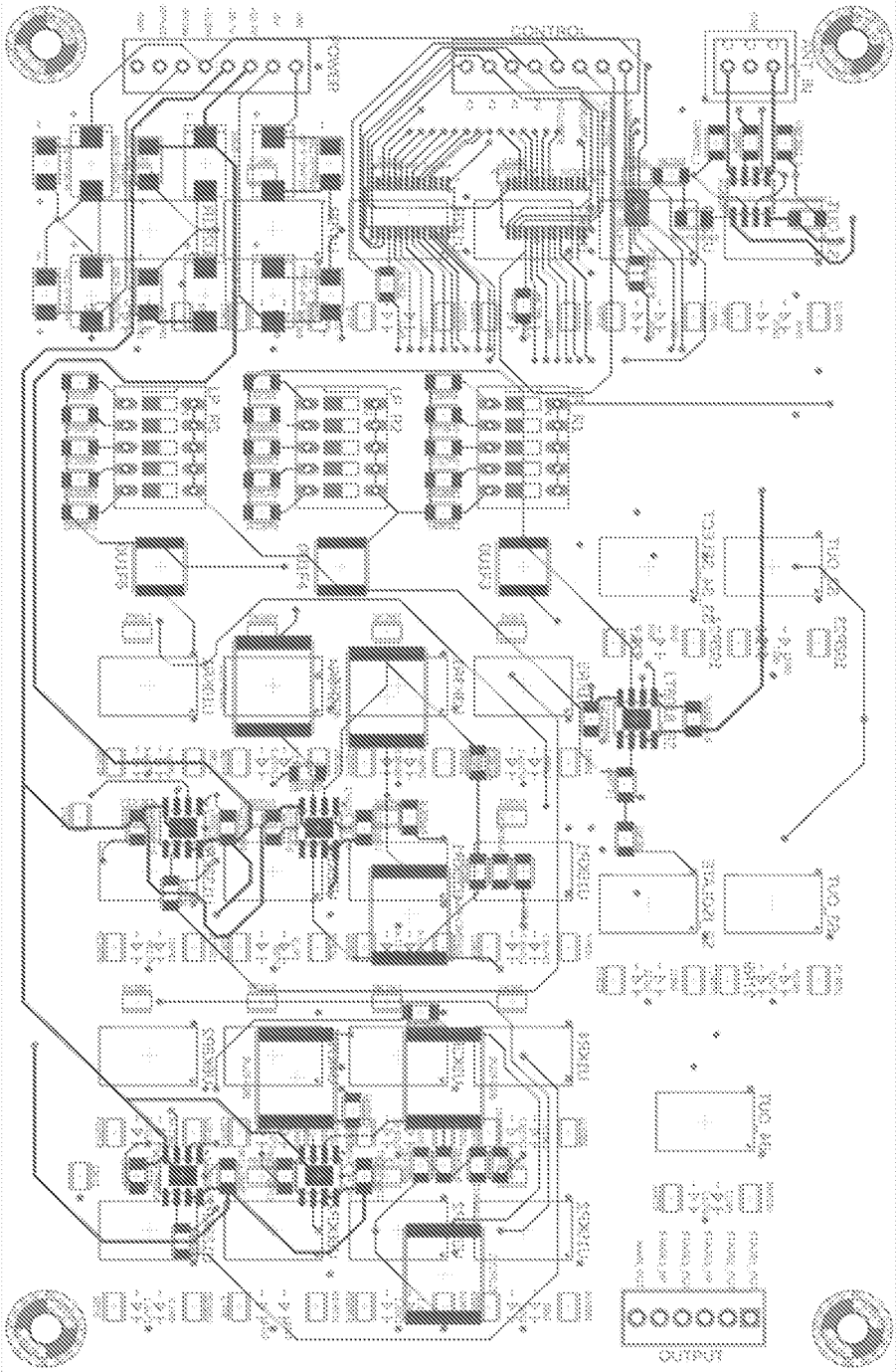


FIG. 45

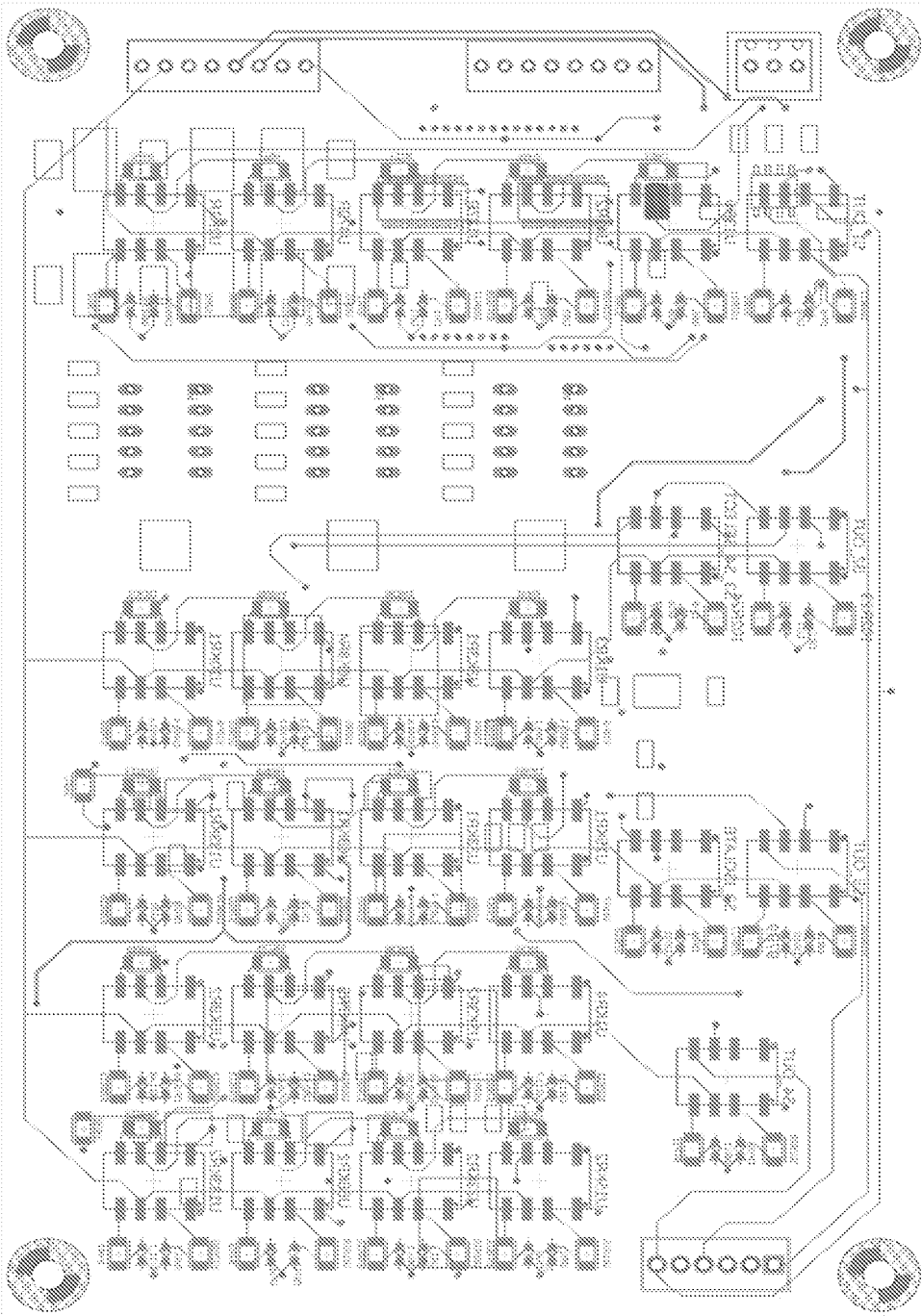


FIG. 46