CHAPTER V

DATA AND RESULTS

The determination of the cross-section area of the specimens.

$$\text{Area} = \frac{\text{total weight of samples used}}{\text{specific gravity} \times \text{total length of sample}}$$

The average length of sample = 188 centimeters

To find the specific weight of the transformer grade.

weight in air = 7.3 grams

weight in water = 6.35 grams

specific gravity = 7.7

The specific gravity of the varnish coated.

weight in air = 6.7 grams

weight in water = 5.8 grams

specific gravity = 7.44

The specific weight of the tin coated

weight in air = 5.3 grams

weight in water = 4.55 grams

specific gravity = 7.1

The measuring instruments and machines details that used in the preparation the data.

Voltmeter V 303 Westinghouse type PA5 series number 19051.

Wattmeter W 206 Westinghouse type PY5 series number 18846.

Ammeter AM 04 Westinghouse type PA5 series number 17974.

Milliammeter MA 302 Weston Model 155 No. 80879.

Current transformer CT 108 Siemens.

Speedometer T 10 Smith. No. H8989.

Generator SM 305 Westinghouse 5KVA Style 1684058 for 25 and 75 cps supplied.

Generator 110V. 400 cps. 3000 rpm. for 200 cps. supplied.

For 50 cps testing the power is drawn from M.E.A.

The weight of samples were weighedin soil mechanic laboratory by the balance "OHAUS"

PROCEDURE.

The sheet steel sample were placed in the four legs of

the Epstein apparatus edge to side and vice versa. The two opposite legs are contained of the same way of cutting strips until fill the four legs. By weighing the total weight of sample, weight of sample left and then we get the weight of eample used. Connect the circuit diagram as follows:-

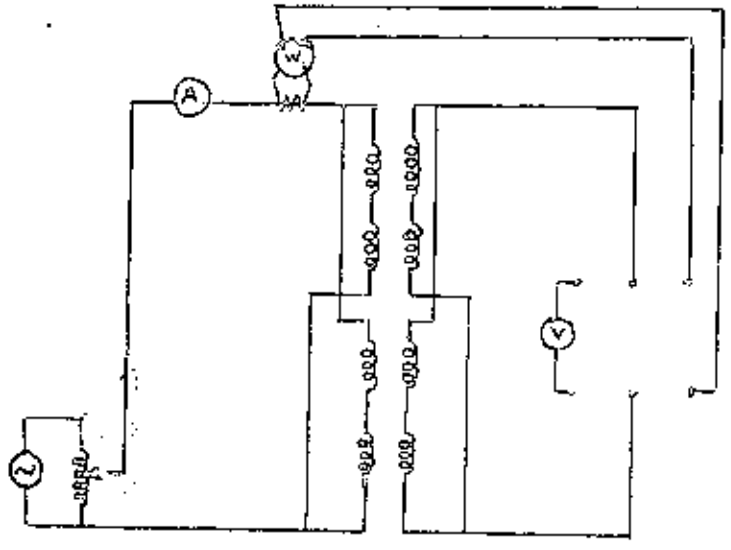

Fig. 11 Connection diagram of the experiment

The experiments yield the data and results.

Plot the maximum flux density against watt loss per kilogram in log - log paper using the ordinate as total losses per kg, the abcissa as flux density in kilogauss.

Sample of calculation.

Since $V = 4\ k\ w\ f\ AB \times 10^{-8}$ volts.

Where w = No. of turns in primary

= 2 × 400 = 800 turns for series parallel connection.

f = frequency in cps.

A = cross sectional area = $\frac{Gn}{S.l}$ cm^2

k = form factor = 1.1

Gn = total weight of sample

S = specific weight of sample

l = average total iron length = 188 cm.

Then $B = \frac{10^8 \cdot V}{4k \cdot f \cdot A \cdot w}$

$= \frac{10^8\ V}{4.44 \times A \times f \times w}$

for f = 25 cps., tin coated sample of 10405 grams:

$$B = \frac{10^8 \cdot V}{4.44 \times 7.82 \times 25 \times 800} = 144\ V,\ \text{gausses.}$$

f = 50 cps.

$$B = \frac{10^8 \cdot V}{4.44 \times 7.82 \times 50 \times 800} = 72\ V \quad \text{gausses.}$$

f = 75 cps.

$$B = \frac{10^8 \cdot V}{4.44 \times 7.82 \times 75 \times 800} = 48\ V \quad \text{gausses.}$$

for f = 200 cps.

$$B = \frac{10^8 V}{4.44 \times 7.82 \times 200 \times 800} = 18\,V \text{ gausses}$$

$$\therefore \quad W_{fe} = W - \frac{V^2}{R_{pc}}$$

V = Voltage reading

R_{pc} = Resistance of potential coil of wattmeter

= 7000 ohms at 100 volts terminals

= 14000 ohms at 200 volts terminals

W = watt meter reading

W_{fe} = iron loss

The results of calculations B and W_{fe} are shown in the data.

The sample of calculation for the value of n, k_h, and k_e

From graph Fig. 4

f_1 = 25 cps ; B_1 = 7 kilogauss. P_1 = 0.33 watt/kg.

f_2 = 50 cps ; B_2 = 14 kilogauss. P_2 = 2.6 watt/kg.

f_I = 25 cps ; B_2 = 14 kilogauss. P_3 = 1.05 watt/kg.

Substituting in the equations on page 21

$$n = 2.5$$

$$k_h = 611 \times 10^{-7}$$

$$k_e = 2040 \times 10^{-9}$$

Tin coated sample of 12071 grams

at 25 cps. round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
40	0.82	4736	18.5212	1.54
50	0.85	5920	27.393	2.27
60	0.95	7104	34.557	2.86
70	1.06	8288	43.05	3.57
80	1.2	9472	52.835	4.38
90	1.35	10656	62.593	5.17
100	1.6	11840	72.321	5.97
110	2.0	13024	83.135	6.86
120	2.6	14208	103.472	8.55
130	3.05	15392	118.99	9.8

Tin coated sample of 12071 grams

at 50 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	Watts	
40	0.66	2368	12.2712	1.01
60	0.75	3552	26.557	2.21
80	0.825	4736	39.585	3.28
100	0.9	5920	56.571	4.67
120	0.98	7104	72.972	6.04
140	1.09	8288	92.6	7.65
160	1.22	9472	114.182	9.49
180	1.42	10656	137.69	11.32
200	1.71	11840	160.145	13.3
220	2.2	13024	186.55	15.45
240	3.05	14208	210.885	17.4

Tin coated sample of 12071 grams

at 75 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
60	0.64	2370	19.557	1.62
80	0.705	3160	30.085	2.48
100	0.77	3950	46.071	3.81
120	0.83	4740	62.472	5.14
140	0.85	5530	77.10	6.38
160	0.93	6320	94.172	7.82
180	0.99	7110	112.69	9.35
200	1.05	7900	132.145	11.92
220	1.14	8690	152.55	12.63
240	1.24	9480	174.385	14.42

Tin coated sample of 12071 grams

at 200 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
90	0.48	1332	13.843	1.144
100	0.51	1480	19.071	1.58
110	0.525	1628	21.635	1.791
120	0.55	1776	29.472	2.54
130	0.57	1924	33.29	2.86
140	0.585	2072	37.1	3.07
150	0.6	2220	38.89	3.22
160	0.615	2368	45.172	3.74
170	0.63	2516	52.44	4.33
180	0.641	2664	57.69	4.77
190	0.655	2812	62.43	5.16
200	0.675	2960	67.645	5.58
210	0.682	3108	74.35	6.14
220	0.695	3256	79.05	6.57
230	0.708	3404	86.23	7.13
240	0.72	3552	91.885	7.6

Tin coated sample of 10405 grams

at 25 cps. square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
30	0.8	4320	13.8715	1.32
40	0.875	5760	21.7712	2.07
50	1.06	7200	36.643	3.50
60	1.22	8640	46.057	4.41
70	1.43	10080	58.8	5.6
80	1.75	11520	70.305	6.7
90	2.32	12960	80.843	7.7
100	3.05	14400	88.071	8.5

Tin coated sample of 10405 grams

at 50 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
40	0.69	2880	14.7712	1.41
60	0.79	4320	29.557	2.82
80	0.88	5760	44.085	4.22
100	0.99	7200	63.071	6.05
120	1.1	8640	79.972	7.65
140	1.25	10080	102.6	9.8
160	1.5	11520	125.172	12.0
180	1.85	12960	150.19	14.4
200	2.65	14400	178.145	17.1

Tin coated sample of 10405 grams

at 75 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg
volts	amperes	gausses	watts	
60	0.7	2880	22.557	2.16
80	0.76	3840	36.085	3.45
100	0.84	4800	48.871	4.68
120	0.88	5760	66.472	6.37
130	0.92	6240	73.79	7.06
140	0.95	6720	82.6	7.92
150	0.97	7200	90.39	8.62
160	1.0	7680	100.172	9.6

Tin coated sample of 10405 grams

at 200 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
80	0.5	1440	18.585	1.84
90	0.53	1620	22.343	2.24
100	0.56	1800	26.571	2.64
110	0.58	1980	30.135	3.0
120	0.6	2160	31.972	3.15
130	0.62	2340	37.79	3.74
140	0.635	2520	43.6	4.18
150	0.64	2700	50.89	4.87
160	0.67	2880	56.172	5.38
170	0.68	3060	61.94	5.94
180	0.7	3240	69.69	6.18
190	0.71	3420	75.43	7.25
200	0.72	3600	82.145	7.85
210	0.74	3780	90.85	8.7
220	0.75	3960	92.55	9.18
230	0.76	4140	94.23	9.48
240	0.78	4320	115.885	10.5

Vanish coated sample of 10909 grams

at 25 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
30	0.11	4620	1.0715	0.0982
40	0.14	6160	2.2712	0.208
50	0.2	7700	3.493	0.32
60	0.39	9240	4.557	0.418
70	0.43	10780	6.3	0.588
80	0.7	12320	7.585	0.694
90	1.25	13860	9.843	0.902
100	2.6	15400	12.071	1.12

Vanish coated of 10909 grams

at 50 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
40	0.09	3080	2.0212	0.184
50	0.1	3850	2.643	0.242
60	0.12	4620	3.807	0.348
70	0.13	5390	4.8	0.44
80	0.16	6160	6.085	0.557
90	0.19	6930	6.843	0.628
100	0.22	7700	8.071	0.74
110	0.27	8460	10.135	0.926
120	0.34	9240	11.972	1.098
130	0.41	10010	13.79	1.263
140	0.52	10780	15.1	1.384
150	0.72	11550	17.39	1.591
160	0.97	12320	19.172	1.75
170	1.37	13090	21.94	2.01
180	2.00	13860	24.19	2.21
190	2.6	14630	25.93	2.38

Vanish coated sample of 10909 grams

at 75 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
60	0.1	3078	3.307	0.305
80	0.11	4104	4.585	0.42
100	0.13	5130	6.571	0.605
120	0.15	6156	8.972	0.822
140	0.19	7182	12.6	1.156
160	0.25	8208	15.172	1.385
180	0.3	9234	17.69	1.62
200	0.41	10260	22.145	2.03
220	0.55	11286	26.55	2.43
240	0.68	12312	30.885	2.84

Vanish coated of 10909 grams

at 200 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
40	0.045	772	0.5212	0.0478
60	0.055	1158	1.557	0.142
80	0.068	1544	3.085	0.283
100	0.079	1930	4.071	0.373
120	0.084	2316	5.972	0.548
140	0.09	2702	7.6	0.696
160	0.097	3088	9.172	0.84
180	0.1035	3474	11.69	1.07
200	0.113	3860	13.645	1.252
220	0.121	4246	16.55	1.51
240	0.128	4632	18.885	1.716

Vanish coated sample of weight 9259 grams

at 25 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
20	0.1	3380	0.9429	0.102
30	0.13	5070	1.7915	0.194
40	0.2	6760	2.9212	0.314
50	0.32	8450	4.493	0.486
60	0.55	10140	5.857	0.634
70	1.2	11830	7.55	0.816
80	2.5	13520	9.485	1.14
90	5.4	15210	11.843	1.28

Vanish coated sample of 9259 grams

at 50 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
40	0.11	3380	2.2712	0.245
50	0.12	4225	3.343	0.36
60	0.14	5070	4.557	0.493
70	0.18	5915	5.3	0.573
80	0.22	6760	6.585	0.71
90	0.26	7605	8.343	0.9
100	0.36	8450	10.331	1.114
110	0.47	9295	12.135	1.31
120	0.66	10140	13.972	1.51
130	0.94	10985	15.79	1.705
140	1.5	11830	18.6	2.01
150	2.35	12675	20.89	2.26
160	3.65	13520	22.672	2.45
170	5.3	14365	23.94	2.59
180	6.85	15210	25.69	2.77

Vanish coated of 9259 grams

at 75 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
50	0.09	2815	2.321	0.25
60	0.1	3378	3.744	0.403
70	0.11	3941	4.65	0.503
80	0.12	4504	5.043	0.544
90	0.13	5067	5.923	0.638
100	0.16	5630	7.287	0.785
110	0.18	6193	8.635	0.934
120	0.21	6756	9.972	1.07
130	0.25	7319	11.79	1.273
140	0.29	7882	13.1	1.415
150	0.34	8445	14.89	1.613
160	0.41	9008	17.12	1.85
170	0.5	9571	18.74	2.02
180	0.61	10134	21.39	2.31
190	0.78	10697	23.43	2.52
200	1.0	11260	26.145	2.82
210	1.33	11823	28.85	3.12
220	1.72	12386	31.55	3.42
240	2.47	12949	34.885	3.76

Vanish coated sample of 9259 grams

at 200 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
40	0.0475	844	0.2712	0.0293
60	0.060	1266	0.557	0.0602
80	0.070	1688	1.595	0.1724
100	0.080	2110	2.821	0.305
120	0.084	2532	3.972	0.43
140	0.0925	2954	5.1	0.552
160	0.099	3376	7.172	0.774
180	0.107	3798	8.19	0.885
200	0.114	4220	9.643	1.04
220	0.122	4642	11.05	1.195
240	0.129	5064	12.885	1.394

4% Silicon steel transformer grade sample of 11188 grams at 25 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
40	0.06	5840	0.7712	0.069
50	0.1	7300	1.893	0.17
60	0.14	8760	2.307	0.206
70	0.21	10220	3.3	0.296
80	0.32	11680	4.085	0.366
90	0.52	13140	5.343	0.478
100	1	14600	6.571	0.587
110	2	16060	8.635	0.773
120	3.4	17520	9.472	0.848

4% Silicon sheet steel transformer grade of 11188 grams

at 50 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
70	0.08	5110	2.3	0.206
80	0.09	5840	3.085	0.276
90	0.1	6570	3.843	0.343
100	0.11	7300	4.321	0.387
110	0.13	8030	5.335	0.478
120	0.16	8760	5.972	0.535
130	0.2	9490	6.79	0.608
140	0.245	10220	7.6	0.68
150	0.3	10950	8.39	0.752
160	0.38	11680	9.172	0.82
170	0.495	12410	11.44	1.02
180	0.7	13140	12.69	1.133
190	0.99	13870	14.43	1.294
200	1.48	14600	15.645	1.4
210	2.1	15330	17.35	1.53
220	2.93	16060	18.55	1.66
230	3.85	16790	20.73	1.854

4% Silicon sheet steel sample of 11188 grams

at 75 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
70	0.03	3409	2.05	0.184
80	0.04	3896	2.335	0.211
90	0.05	4383	2.843	0.255
100	0.07	4870	3.571	0.318
110	0.08	5357	4.635	0.415
120	0.09	5844	4.972	0.446
130	0.1	6331	5.79	0.517
140	0.11	6818	6.1	0.547
150	0.12	7305	6.89	0.616
160	0.13	7792	7.672	0.688
170	0.14	8279	8.19	0.732
180	0.16	8766	8.94	0.802
190	0.19	9253	9.93	0.892
200	0.21	9740	11.645	1.05
210	0.25	10227	12.35	1.106
220	0.29	10714	14.05	1.26
230	0.32	11201	15.23	1.367
240	0.38	11688	16.385	1.463

4% Silicon sheet steel sample of 11188 grams

at 200 cps round coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
60	0.032	1098	0.057	0.0051
80	0.041	1464	0.585	0.0524
100	0.044	1830	1.321	0.118
120	0.05	2196	1.672	0.15
140	0.056	2562	2.3	0.206
160	0.0625	2928	2.672	0.238
180	0.0685	3299	3.19	0.286
200	0.074	3660	4.045	0.36
220	0.080	4026	5.05	0.453
240	0.086	4392	5.885	0.527

4% Silicon sheet steel sample of 9553 grams

at 25 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
40	0.10	6800	1.5212	0.159
50	0.14	8500	2.393	0.25
60	0.22	10200	3.307	0.346
70	0.36	11900	4.3	0.45
80	0.5	13600	5.835	0.61
85	0.7	14450	6.215	0.65
90	1.75	15300	6.843	0.715
95	1.8	16150	8.31	0.868
100	2.7	17000	8.571	0.896
110	4.9	18700	11.135	1.165

4% Silicon sheet steel sample of 9553 grams

at 50 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
50	0.03	4250	2.393	0.251
70	0.045	5950	3.55	0.372
90	0.12	7650	5.343	0.558
110	0.19	9350	7.635	0.8
130	0.3	11050	9.29	0.969
140	0.4	11900	11.1	1.16
150	0.56	12750	13.39	1.38
160	0.95	13600	14.172	1.48
170	1.55	14450	16.94	1.77
180	2.3	15300	18.69	1.96
190	3.3	16150	20.43	2.14

4% Silicon sheet steel sample of 9553 grams

at 75 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
50	0.02	2835	1.643	0.172
70	0.05	3969	2.3	0.241
90	0.09	5103	3.843	0.42
110	0.1	6237	6.135	0.643
130	0.12	7371	8.29	0.866
140	0.13	7938	9.1	0.95
150	0.15	8505	10.39	1.075
160	0.18	9072	12.172	1.273
170	0.21	9639	12.44	1.3
180	0.24	10206	12.69	1.33
190	0.29	10773	14.93	1.558
200	0.34	11340	16.645	1.742
210	0.4	11907	17.35	1.813
220	0.51	12474	21.05	2.2
230	0.65	13041	22.83	2.38
240	0.86	13608	25.885	2.71

4% Silicon sheet steel sample of 9553 grams

at 200 cps square coil

Impressed voltage	Current	Maximum flux density	Watt loss of iron	Watt loss/kg.
volts	amperes	gausses	watts	
60	0.036	1278	1.557	0.163
70	0.041	1491	1.8	0.189
80	0.045	1604	2.335	0.244
90	0.049	1817	2.343	0.246
100	0.053	2030	2.571	0.268
110	0.057	2243	3.385	0.353
120	0.061	2456	3.722	0.38
130	0.0645	2669	4.54	0.475
140	0.068	2882	5.35	0.56
150	0.070	3095	6.39	0.66
160	0.073	3308	7.422	0.78
170	0.074	3521	8.44	0.885
180	0.080	3834	8.94	0.935
190	0.0835	4047	10.43	1.09
200	0.087	4260	11.145	1.162
210	0.0905	4473	11.85	1.24
220	0.0935	4686	12.05	1.26
230	0.0963	4899	13.23	1.38
240	0.0995	5112	14.885	1.56

4% Silicon steel transformer grade sample of 11188 grams at 25 cps round coil

Impressed voltage	Current	Ampere turns	Watt loss of iron	Watt loss/kg.
volts	amperes		watts	
40	0.06	48	0.7712	0.069
50	0.1	80	1.893	0.17
60	0.14	112	2.307	0.206
70	0.21	168	3.3	0.296
80	0.32	256	4.085	0.366
90	0.52	416	5.343	0.478
100	1	800	6.571	0.587
110	2	1600	8.635	0.773
120	3.4	3520	9.472	0.848

4% Silocon sheet steel transformer grade of 11188 grams

at 50 cps round coil

Impressed voltage	Current	Ampere turns	Watt loss of iron	Watt loss/kg.
volts	amperes		watts	
70	0.08	64	2.3	0.206
80	0.09	72	3.085	0.276
90	0.1	80	3.843	0.343
100	0.11	88	4.321	0.387
110	0.13	104	5.335	0.478
120	0.16	128	5.972	0.535
130	0.2	160	6.79	0.608
140	0.245	196	7.6	0.68
150	0.3	240	8.39	0.752
160	0.38	304	9.172	0.82
170	0.495	396	11.44	1.02
180	0.7	630	12.69	1.133
190	0.99	792	14.43	1.294
200	1.48	1184	15.645	1.4
210	2.1	1680	17.35	1.53
220	2.93	2344	18.55	1.66
230	3.85	3080	20.73	1.854

4% Silicon sheet steel sample of 11188 grams

at 75 cps round coil

Impressed voltage	Current	Ampere turns	Watt loss of iron	Watt loss/kg.
volts	amperes		watts	
70	0.03	24	2.05	0.184
80	0.04	32	2.335	0.211
90	0.05	40	2.843	0.255
100	0.07	56	3.571	0.318
110	0.08	64	4.635	0.415
120	0.09	72	4.972	0.446
130	0.1	80	5.79	0.517
140	0.11	88	6.1	0.547
150	0.12	96	6.89	0.616
160	0.13	104	7.672	0.688
170	0.14	112	8.19	0.732
180	0.16	128	8.94	0.802
190	0.19	152	9.93	0.892
200	0.21	168	11.645	1.05
210	0.25	200	12.35	1.106
220	0.29	232	14.05	1.26
230	0.32	256	15.23	1.367
240	0.38	304	16.385	1.463

4% Silicon sheet steel sample of 9959 grms

at 25 cps square coil

Secondary voltage	Current	Ampere turns	Watt loss of area	Watt loss/kg.
volts	Amperes		watts	
40	0.10	80	1.5212	0.159
50	0.14	112	2.393	0.25
60	0.22	176	3.307	0.346
70	0.36	288	4.3	0.45
80	0.5	400	5.335	0.01
85	0.7	560	6.215	0.65
90	1.75	1400	6.843	0.715
95	1.8	1440	8.31	0.868
100	2.7	2160	8.574	0.895
110	4.9	4320	11.135	1.163

4% Silicon sheet steel sample of 9553 grams

at 50 cps square coil

Impressed voltage	Current	Ampere turns	Watt loss of iron	Watt loss/kg.
volts	amperes		watts	
50	0.03	24	2.393	0.251
70	0.045	36	3.55	0.372
90	0.12	96	5.343	0.558
110	0.19	152	7.635	0.8
130	0.3	240	9.29	0.969
140	0.4	320	11.1	1.16
150	0.56	448	13.39	1.38
160	0.95	760	14.172	1.46
170	1.55	1240	16.94	1.77
180	2.3	1840	18.69	1.96
190	3.3	2640	20.43	2.14

4% Silicon sheet steel sample of 9553 grams

at 75 cps square coil

Impressed voltage	Current	Ampere turns	Watt loss of iron	Watt loss/kg.
volts	amperes		watts	
50	0.02	16	1.643	0.172
70	0.05	40	2.3	0.241
90	0.09	72	3.843	0.42
110	0.1	80	6.135	0.643
130	0.12	96	8.29	0.866
140	0.13	104	9.1	0.95
150	0.15	120	10.39	1.075
160	0.18	144	12.172	1.273
170	0.21	168	12.44	1.3
180	0.24	192	12.69	1.33
190	0.29	232	14.93	1.538
200	0.34	272	16.645	1.742
210	0.4	320	17.35	1.813
220	0.51	408	21.05	2.2
230	0.65	520	22.83	2.38
240	0.86	688	25.885	2.71

To find the hysteresis loop of the sample.

Connect the circuit as shown below:

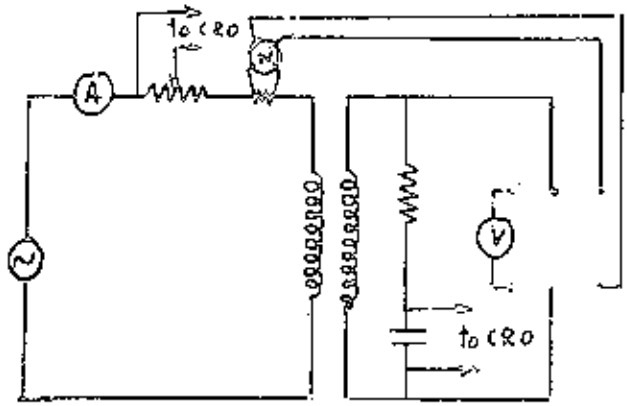

Fig. 12. Connection diagram.

The photograph below is the hysteresis loop for 50 cps of varnish coated sheet steel sample.

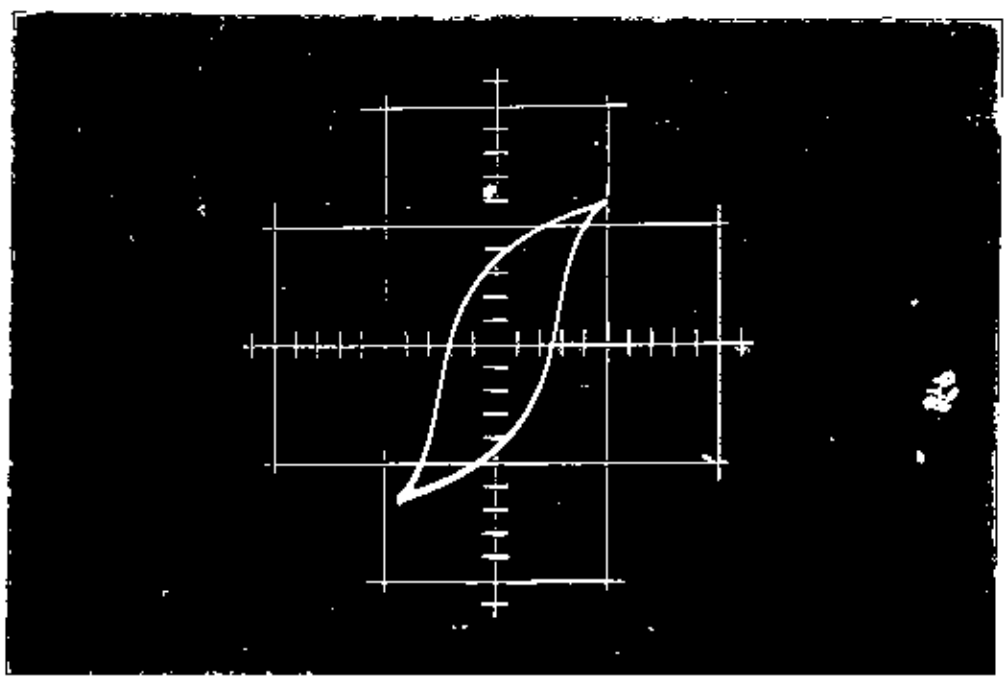

Fig. 13. The hysteresis loop.

Discussion and Conclusions

The results from test data and graph Fig. 7 shows that the iron losses of the test specimen when tested with the round coil test set and the square coil test set are not equal at the same magnetomotive force and frequency. The iron loss of the specimen when tested with the round coil test set is slightly less than that when tested with the square one, because the number of leakage flux in the round coil is greater than that in the square coil. This results in less flux density in the tested specimen.

It is seen from graphs Fig. 1 to 6 that the iron loss at the same flux density is low at low frequency and increases as the frequency increased. This checked to the theory. Besides, the meaeuring instruments used in performing the experiments have low quality and the measuring ranges are not low enough to carry out the lower values of the characteristic curves. However, the author has tried his best to cover as many experiments as the equipments are available.

Whenever the Epstein apparatus laboratory is completed, it can be recommended to cover the experiments on the separation of the loss for electrical machine laboratory.