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TESTING AND STATUS OF AA DC SEPTA RESERVES

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1. INTRODUCTION

Since the start-up of the ACOL machine has now been completed successfully, a programme has been undertaken to determine the spares situation and performance of the reserve d.c. septa for the AA. Modifications have been made to the magnet coils which include improvements to the interlock protection system, updated temperature monitoring of the coil and increased reliability of the hydraulic circuit. Two reserve coils have now been prepared and power tested and are now in a condition allowing rapid replacement in AA in the event of an existing coil failure.

2. HYDRAULIC TEST

Coil No. 2			Coil No. 5		
Flow (l/min)	ΔP (bars) Upper Coil	ΔP (bars) Lower Coil	Flow (l/min)	ΔP (bars) Upper Coil	ΔP (bars) Lower Coil
20	5.4	5.0	20	2.85	3.75
27.5	7.25	7.75	27.5	6.92	8.45
30.0	8.4	8.8	30.0	6.92	8.45
32.5	10.25	10.55	32.5	8.38	9.65
35.0	11.9	12.9	35.0	10.2	11.2
37.5	13.85	14.8	37.5	12.6	13.3

TABLE 1

3. POWER TEST

Both coils have now been tested at 4000 Amps D.C. without any problems. The temperatures of the coil were recorded and are listed in Table 2.

The hottest points recorded were on the septum conductor close to the cooling water output connections.

Turn No.	Coil 2 Temperature (°C) Rear Conductor	Septum	Coil 5 Temperature (°C) Rear Conductor	Septum
1 Top	43	49.5	44	57
2	40	51	38	58
3	38.5	50.5	38	60
4	38.5	53.5	38	59
5	36.5	52	38	60
6	41.5	47.5	41	56
7	39.5	49.5	39	56
8	40.5	47	38	55
9	40.5	50	36.5	58
10 bottom	45.5	52	37	63
* Flow 37.5 L'min, Water Input Temp. 22°C, Water Outlet Temp. 42°C				

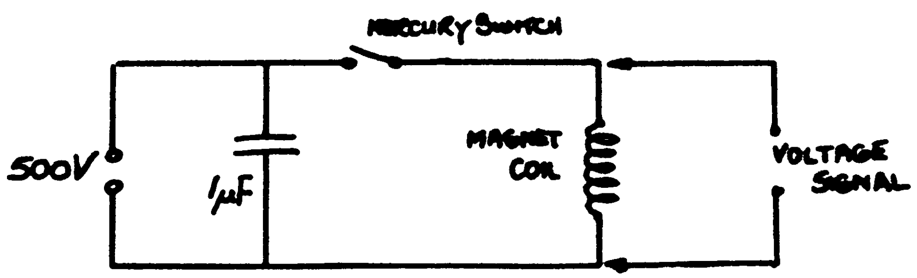
TABLE 2.

Coil No. 2 operates at a lower temperature as a result of modifications made to the hydraulic circuit increasing water flow to the septum blade and decreasing the temperature differential across the conductors.

The voltage was recorded at the magnet terminals for various levels of current to establish the coil resistance. These figures are shown in Table 3. The inductance of the coil has also been estimated by carrying out a capacitor discharge test and recording the damped frequency response. A basic circuit diagram is attached showing component values together with signals for each coil.

Current (Amps)	Coil 2 Volts	Resistance	Coil 5 Volts	Resistance
	(V)	($\Omega \times 10^{-3}$)	(V)	($\Omega \times 10^{-3}$)
1000	6.545	6.54	6.21	6.21
2000	13.148	6.68	13.246	6.62
3000	20.411	6.8	20.382	6.79
4000	27.47	6.9	28.28	7.07

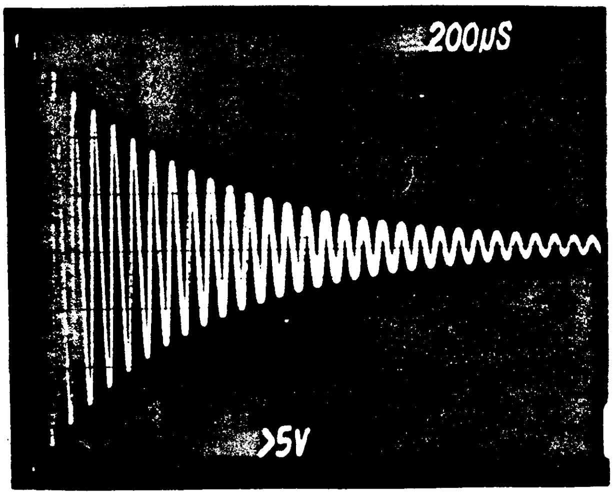
TABLE 3



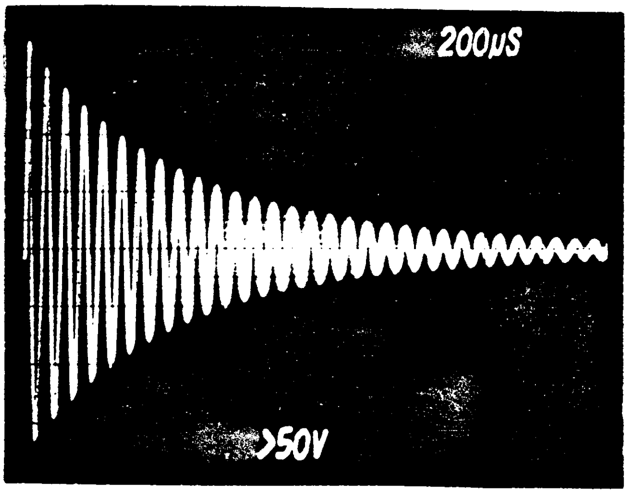
TEST CIRCUIT

The photos below show the frequency response to a capacitor discharge across the coil terminals using the circuit shown.

Coil No. 2 V = 500 Volts



Coil No. 5 V = 500 Volts



From $f = \frac{1}{2\pi\sqrt{LC}}$ *the inductance of both coils has been calculated and is,*

Coil No. 2, L = 108.8 µH

Coil No. 5, L = 114.2 µH

Distribution :

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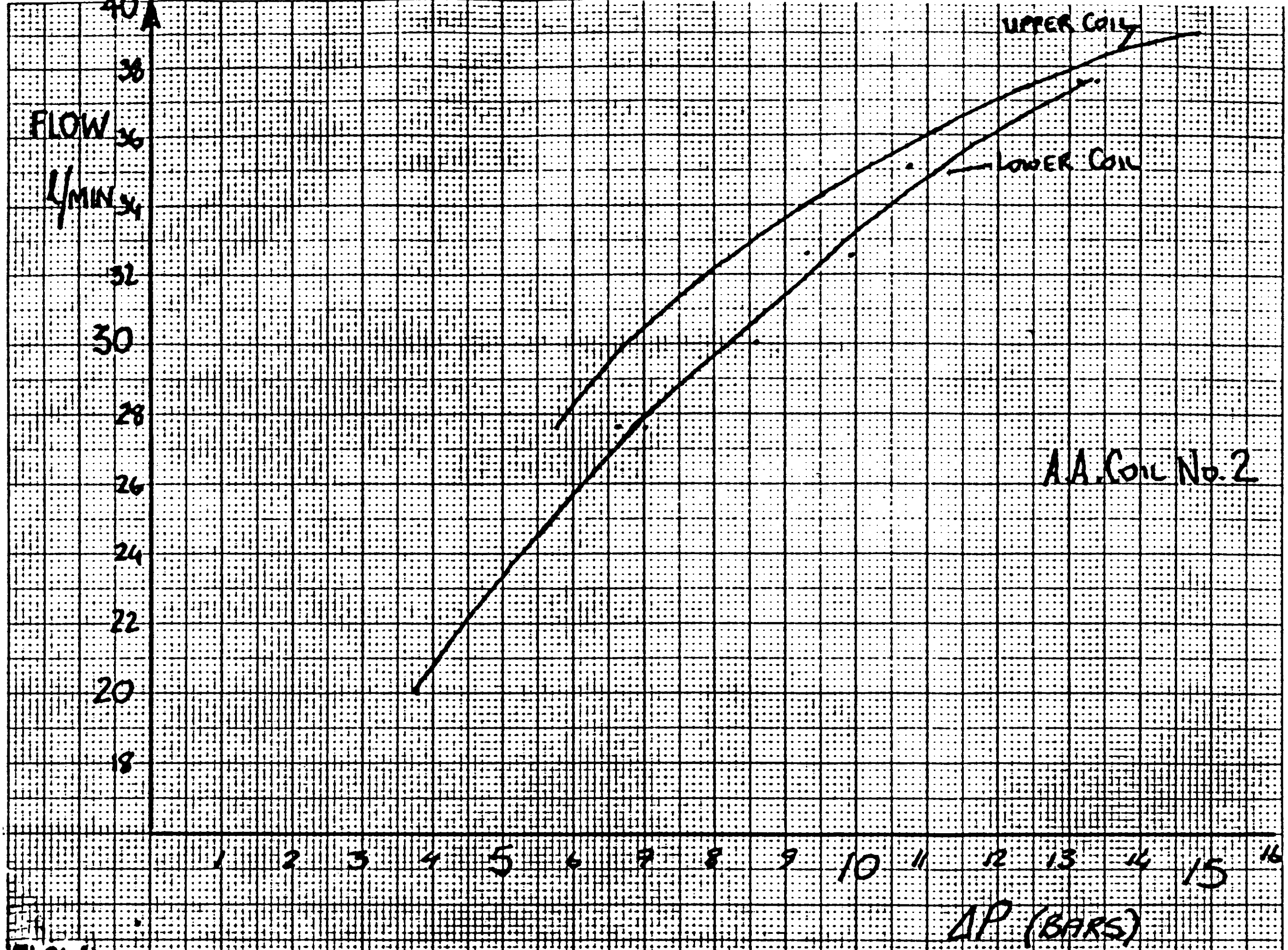
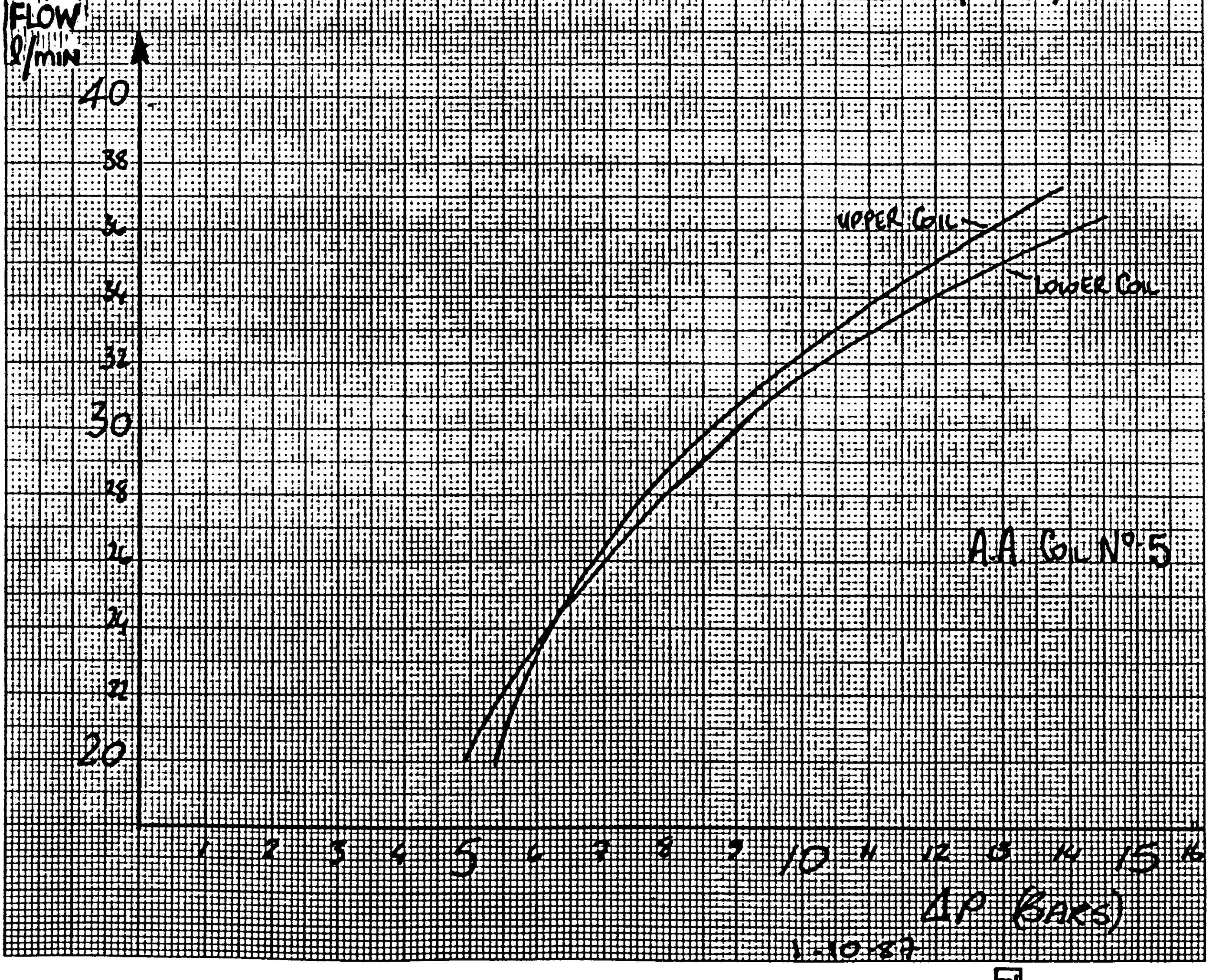
D. Simon
R. Valbuena
B. Williams


FLOW l/MIN
UPPER COIL
LOWER COIL
A.A. COIL No. 2
ΔP (BARS)


FLOW l/MIN
UPPER COIL
LOWER COIL
A.A. COIL No. 5
ΔP (BARS)
1-10-87