CHAPTER V

MEASUREMENTS

5.1 Apparatus

1. Sound level meter type 3282 Yokogawa Electric work

   LTD. Tokyo, Janpan.

2. Takeda Riken Universal Counter TR 5589 L

3. Scope CD 1642 Solartron

4. Signal generator Trio Agr 202

5. Electronic Voltage Meter 168 Kikusui Electronic

   Corp. Japan.

5.2 Measurement on The Constant Phase Shift Network

We use Lissajous figure to find the phase difference between two outputs of the phase shift networks for various frequencies then compare the result with the calculated phase angle from Eq.(4.11) The results are shown in Fig. 5.1- Fig. 5.2

The characteristics of the constant 90 degrees phase difference network are

$$f_{01} \quad = \quad 743 \text{ Hz}$$

$$Q_1 \quad = \quad 0.2405$$

$$f_{02} \quad = \quad 3500 \text{ Hz}$$

$$Q_2 \quad = \quad 0.2352$$

Angle in degree*

f_{Hz}	$\phi_1 = 2\tan^{-1} Q_1\left[\dfrac{f_{o1}}{f} - \dfrac{f}{f_{o1}}\right]$	$\phi_2 = 2\tan^{-1} Q_2\left[\dfrac{f_{o2}}{f} - \dfrac{f}{f_{o2}}\right]$	$\phi_2-\phi_1$ Calculated phase difference	Experimental phase difference	Discrepancy
50	148.60	173.04	24.5	20.4	− 4.1
60	142.66	171.66	29.0	20.0	− 9.0
70	136.87	170.27	33.4	26.2	− 7.2
80	131.27	168.89	37.6	30.2	− 7.4
90	125.86	167.51	41.7	30.7	−11.0
100	120.65	166.14	45.5	40.1	− 5.4
200	79.31	152.61	73.3	68.1	− 5.2
300	53.00	139.69	86.7	84.2	− 2.5
400	35.21	127.59	92.4	85.7	− 6.7
500	22.13	116.41	94.3	89.8	− 4.5
600	11.83	100.59	88.8	87.2	− 1.6
700	3.28	96.95	93.7	90.0	− 3.7
800	−4.07	88.58	92.7	90.0	− 2.7
900	−10.60	81.02	91.6	90.0	− 1.6
1000	−16.50	74.20	90.7	90.0	− 0.7
2000	−58.33	30.99	89.3	90.0	+ 0.7
3000	−84.71	8.33	93.0	95.1	+ 2.1
4000	−102.69	−7.21	95.5	95.9	+ 0.4
5000	−115.44	− 19.45	96.0	95.9	− 0.1
6000	−124.80	− 29.80	95.0	94.0	− 1.0
7000	−131.90	− 38.88	93.0	93.6	+ 0.6
8000	−137.42	− 47.00	90.4	90.4	0.0
9000	−139.56	− 54.36	85.2	90.3	+ 5.1
10000	−145.49	− 61.07	84.4	85.1	+ 0.7
20000	−162.41	−105.00	57.4	60.2	+ 2.8

Fig. 5.1 Data of Measured Phase Angle in Phase Shift Circuit.
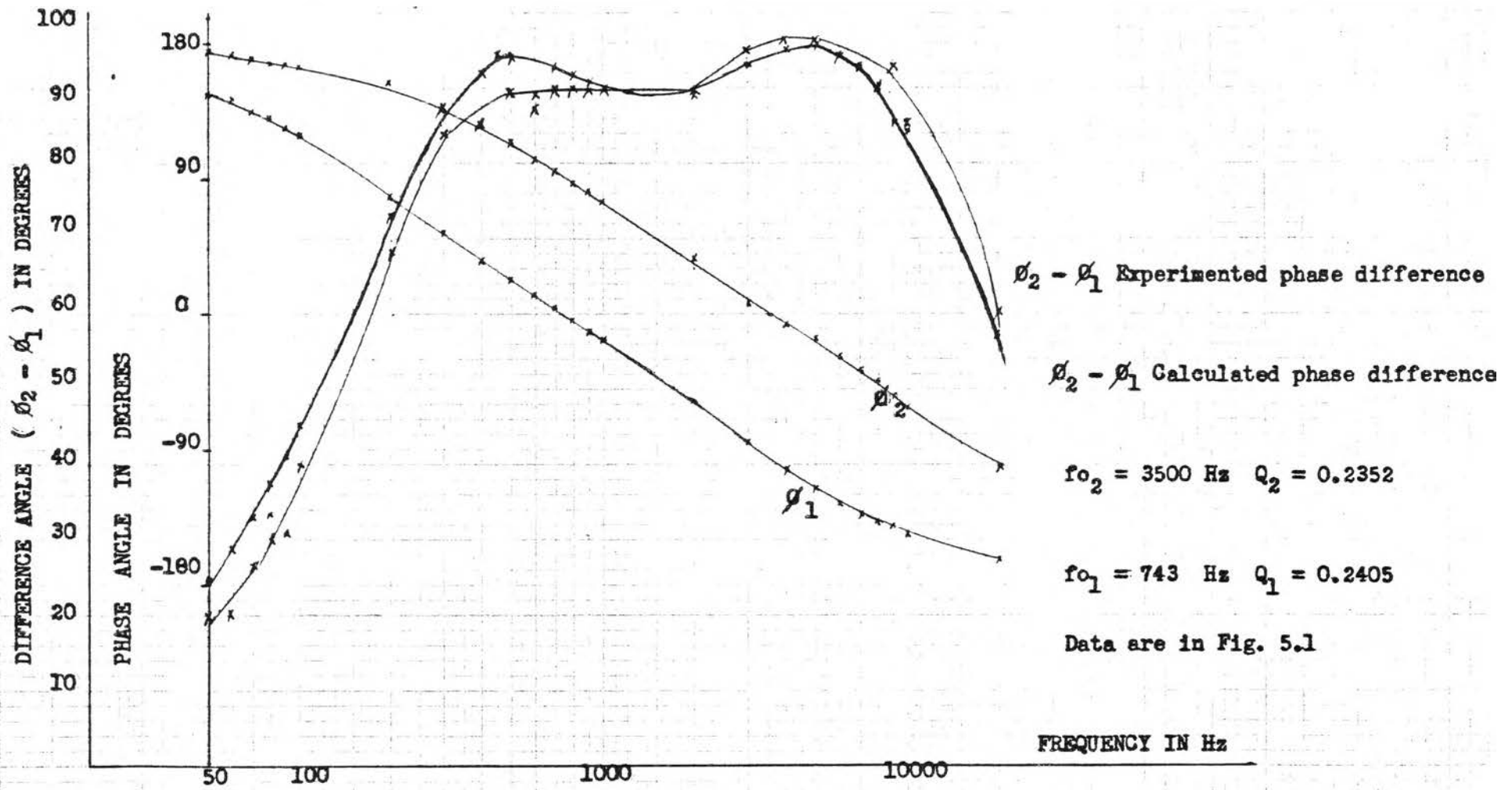
Fig. 5.2 Graph of Measured Phase Angle in Phase Shift Circuit

$\emptyset_2 - \emptyset_1$ Experimented phase difference

$\emptyset_2 - \emptyset_1$ Calculated phase difference

$fo_2 = 3500$ Hz $\quad Q_2 = 0.2352$

$fo_1 = 743$ Hz $\quad Q_1 = 0.2405$

Data are in Fig. 5.1

5.3   The Measurement on the Quadrature Signal Generator

We make the measurement of the frequency at the two outputs of the quadrature signal generator.   The result is shown in Fig. 5.3.

Terminal	Calculated frequency Hz	Measured frequency Hz	Discrepancy Hz
e_o	5.89	4.3	1.59
e_3	5.89	4.3	1.59

Fig. 5. 3   Data of Frequency in Quadrature Signal Generator

We use Lissajous figure to find the phase difference between two output .   The result is   90   degrees phase difference.