CHAPTER VI

TEST AND RESULTS

The automatic voltage regulator was tested in order to ensure that the design and construction of the regulator are adequate to meet the required specifications.

The alternator used in this test has the following name plate rating.

THAI GENERATOR

MODEL	TG 10 A		
KVA	12.5	PHASE	1
RPM	1500	VOLT	110/220
AMP	45	CYCLE	50

6.1 Separately Excited Voltage Regulation Test

This test was conducted in order to find the voltage regulation of the alternator itself without the using of an automatic voltage regulator. Figure 6.1 shows the testing circuit diagram of this test. The load was varied in steps from noload to full load of the alternator while speed of prime-mover and field current of the alternator are kept constant as they are at noload.

The load of the alternator used in this test was resistive load (PF = 1.0) and the results taken from this measurement on voltage regulation are shown in Figure 6.3. and the corresponding field current are shown in Fiouse 6.4.

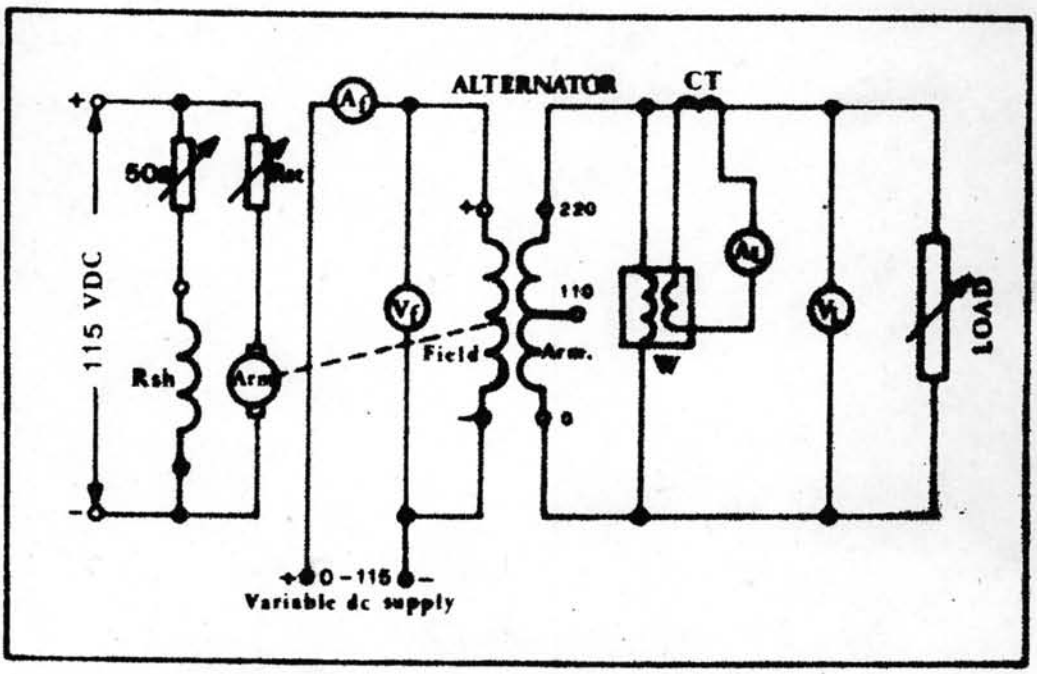

Figure 6.1 : Separately Excited Voltage Regulation Test Circuit.

6.2 Regulated Voltage Regulation Test

(Prime-mover Speed Constant)

In this test, the automatic voltage regulator was put-in to provide a self-excite regulated system. The test circuit diagram is illustrated in Figure 6.2.

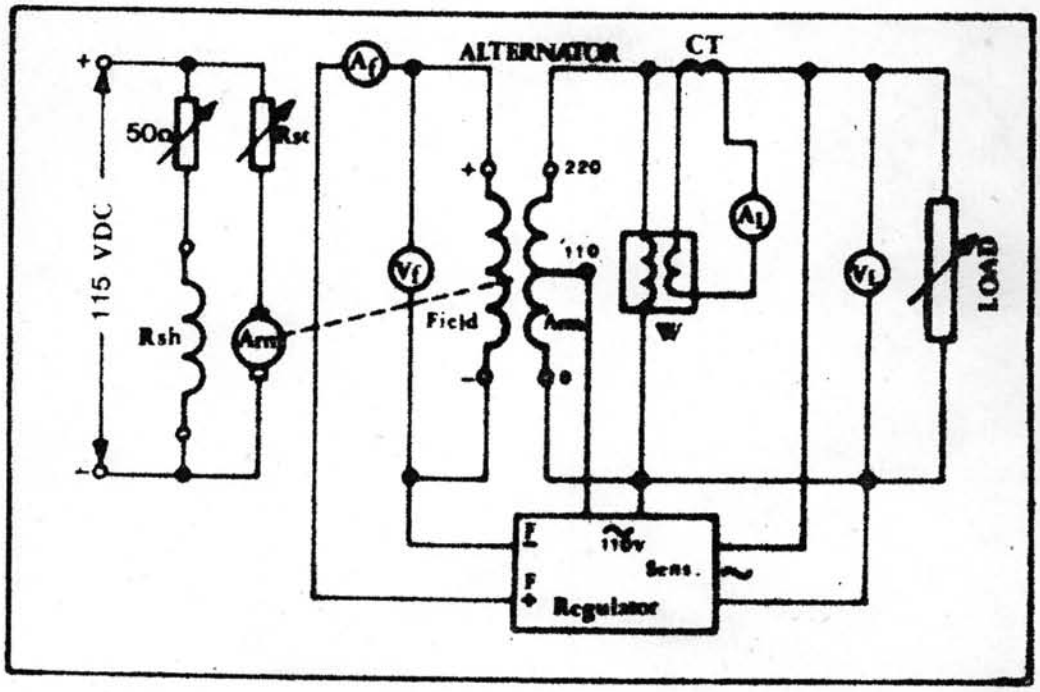

Figure 6.2 : Closed Loop Control Voltage Regulation Test Circuit.

The load of the alternator used in this test comprised of both resistance and inductance in order to provide the load with various power factor and also the load was varied in steps from noload to full load while the speed of the prime-mover was kept constant at the rated speed (1500 rpm). The test results obtained from this measurement on voltage regulation are shown in Figure 6.3. and the corresponding field current are shown in Fig 6.4.

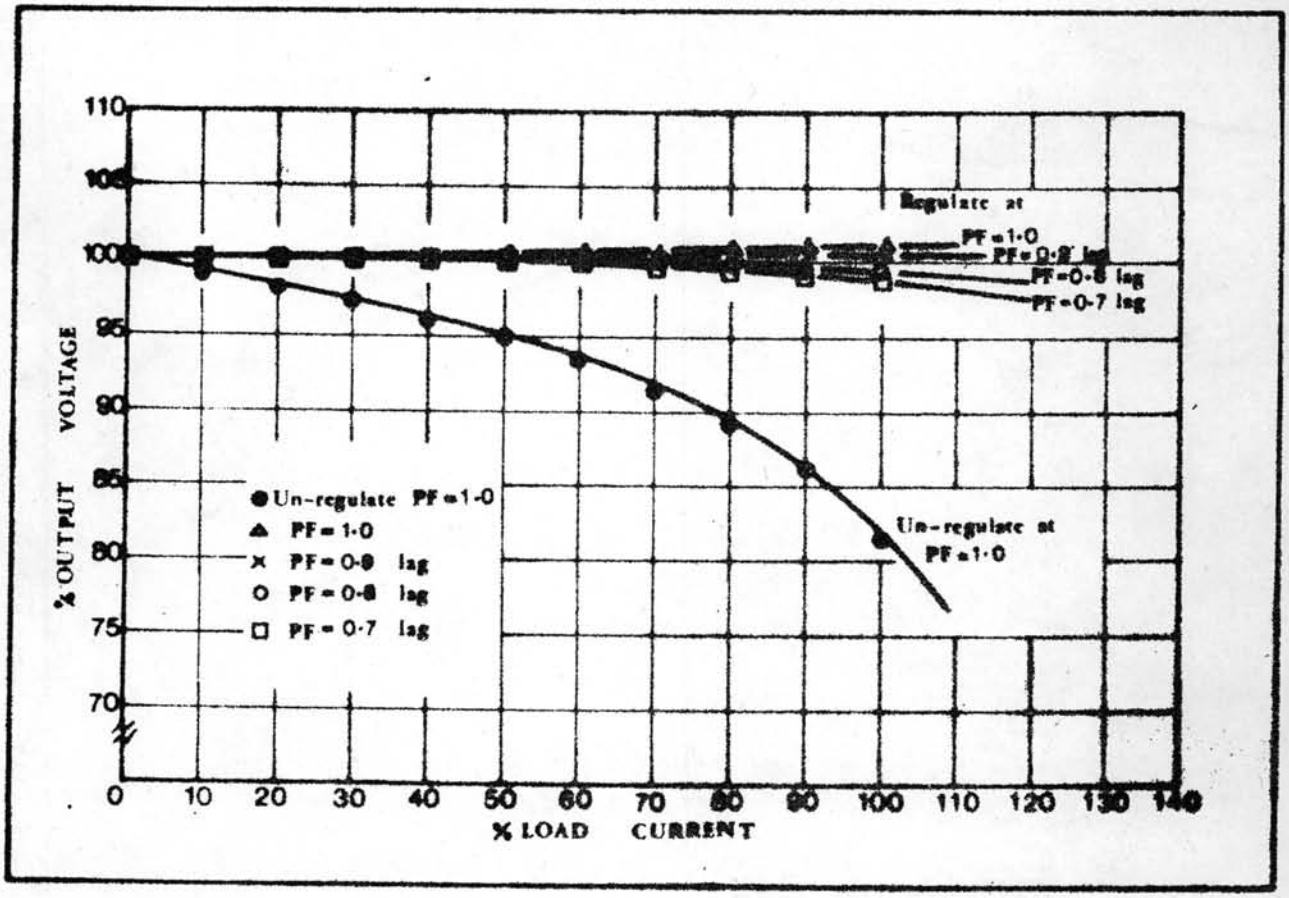

Figure 6.3 : Comparison of Voltage Regulation Curves.

It can be seen from Figure 6.3 that the regulation when the system accompanied with the automatic voltage regulator is much better than that of when there is no regulator in the system. The bow-down of the regulation curves in Fig.6.3 when the load power factor decreased is due to the armature reaction of the alternator. It is therefore, the lower the load power factor, the larger the armature reaction.

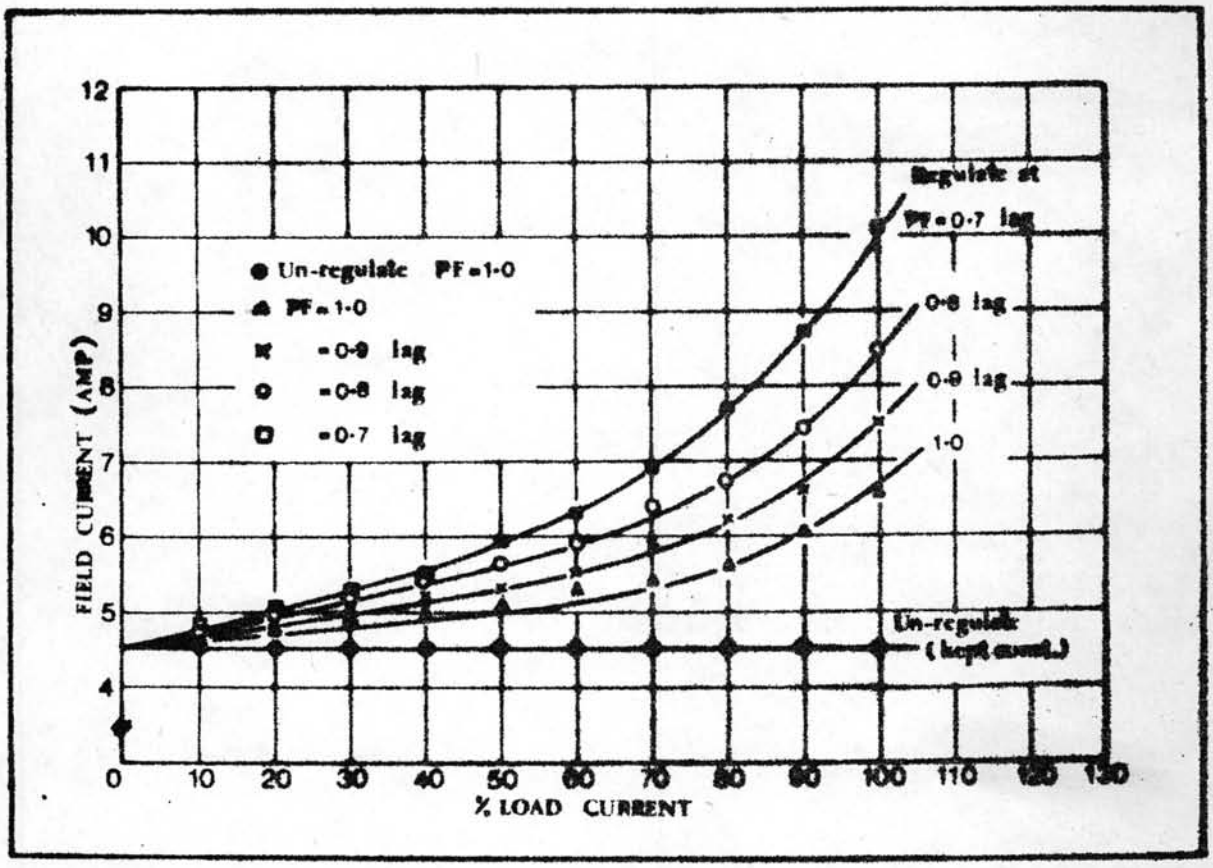

Figure 6.4 : Field Current VS. Load Current Curves.

6.3 Regulated Voltage Regulation Test

(Constant Load, Speed Varies)

This test was performed in order to determine the voltage regulation by keeping alternator load constant at full load and vary the prime-mover speed gradually so that load voltage at various prime-mover speed can be recorded. The results obtained from this test are illustrated in Figures 6.5 and 6.6.

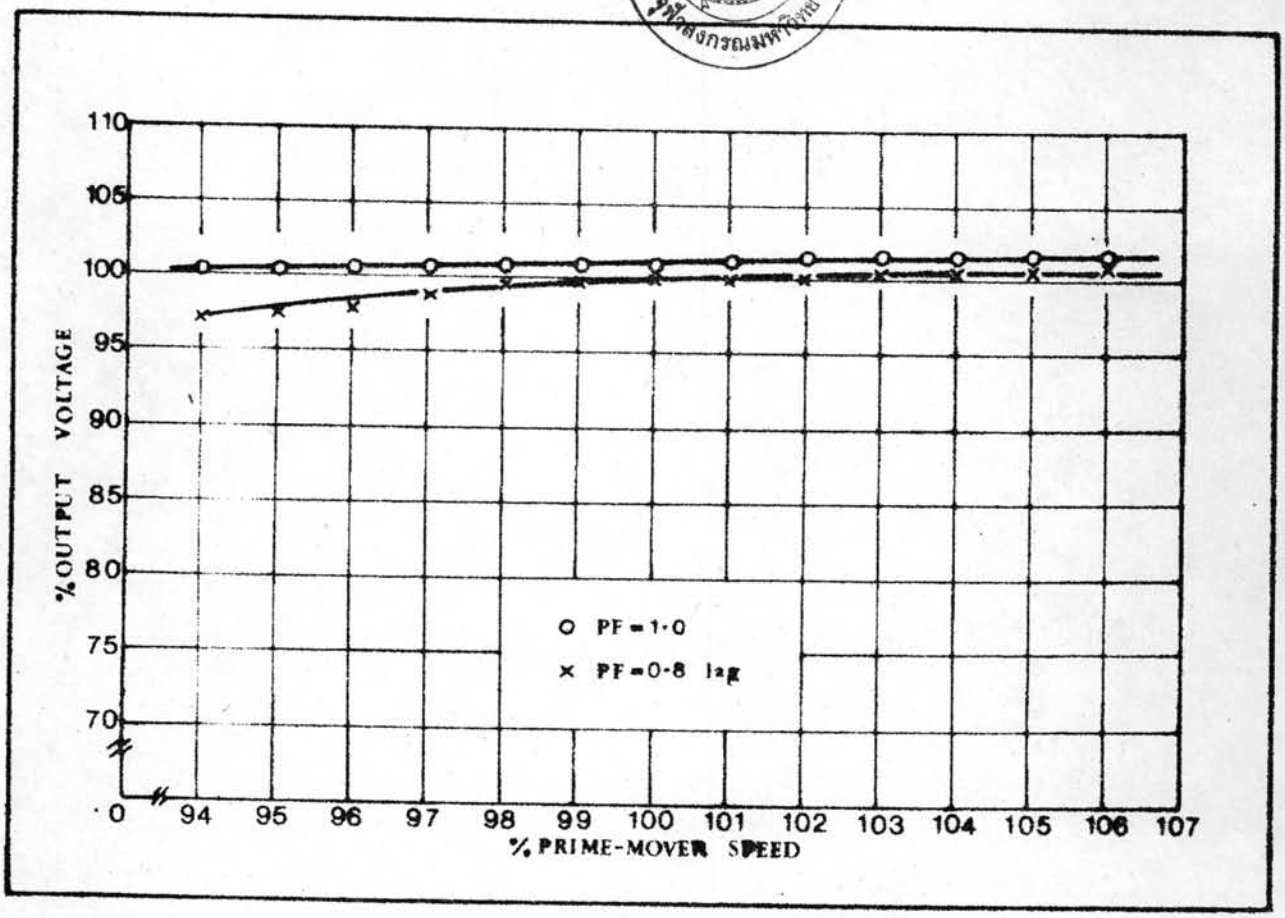

Figure 6.5 : Voltage Regulation When Varying Prime-mover Speed.

It can be seen from Figure 6.5 that the alternator output voltage is increased when the speed of the prime-mover is increased. This is due to the fact that lower excitation is required when the speed of the prime-mover increased.

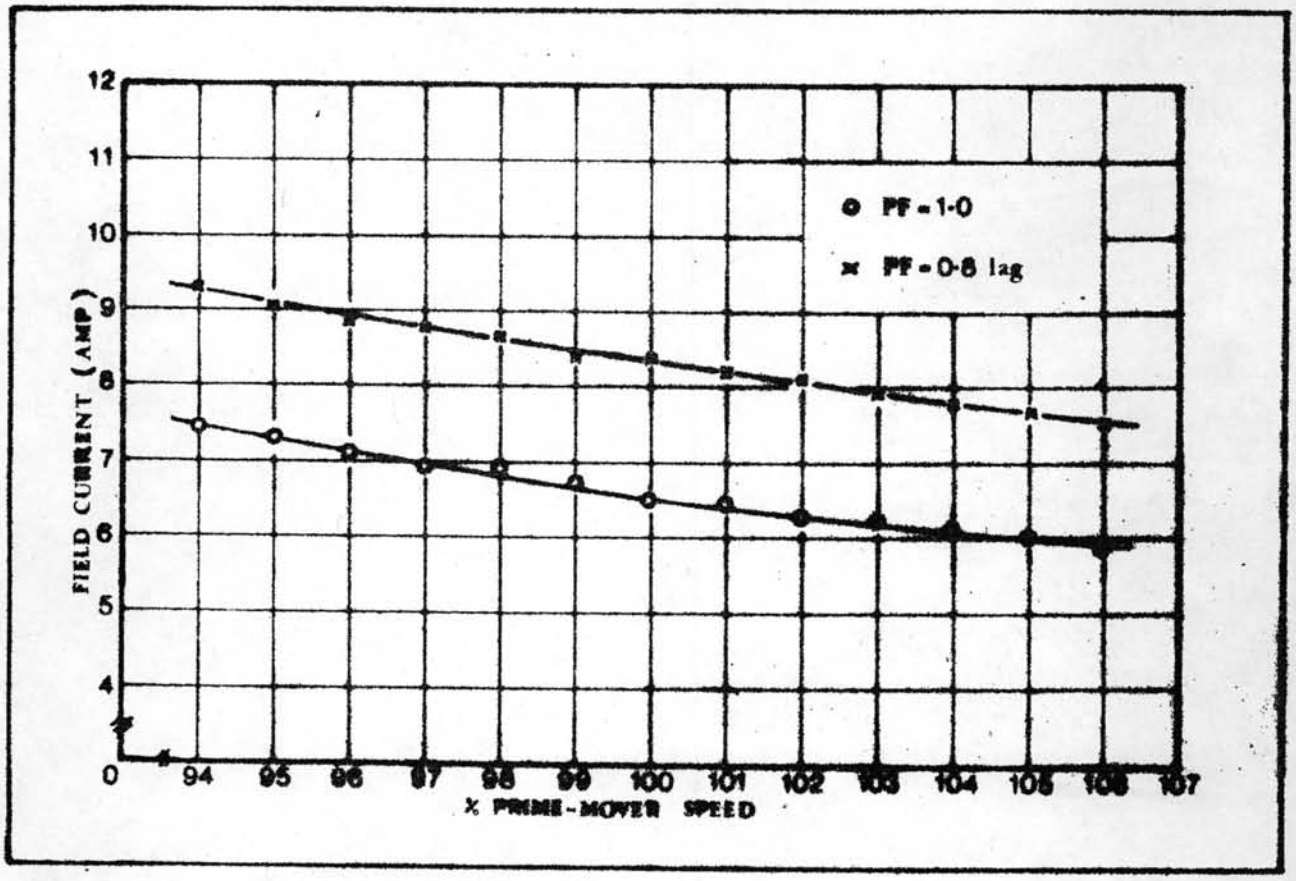

Figure 6.6 : Field Current VS. Speed Curves

6.4 Transient Load Test

This test was performed in order to examine the voltage fluctuation and response time of the voltage regulator. Testing circuit diagram for this test is the same as Figure 6.2.

In this test, the rated alternator load was suddenly applied to the alternator and left until the system came to steady state, and then disconnected the load and again left until the system came to steady state. The load voltage and current during the connecting and disconnecting of the load were recored by a UV recorder. The voltage fluctuation and

response time can be determined from the recording paper.

The results obtained from this test is shown in Figure 6.7.

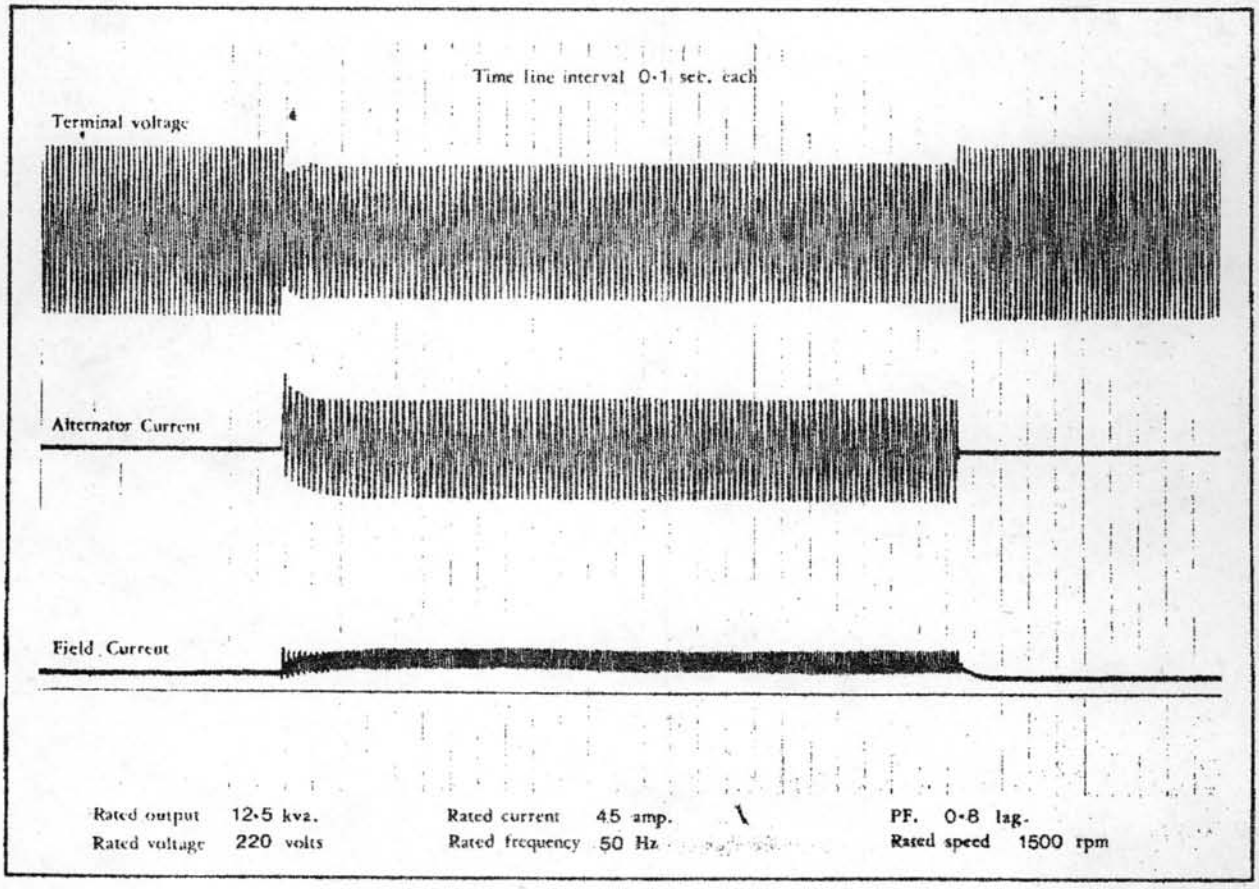

Figure 6.7 : Transient Characteristic at Rated Load.

The load voltage and current waveforms recorded on separately excited and closed-loop control (accompanied with voltage regulator) systems are illustrated in Figure 6.8 and 6.9 respectively.

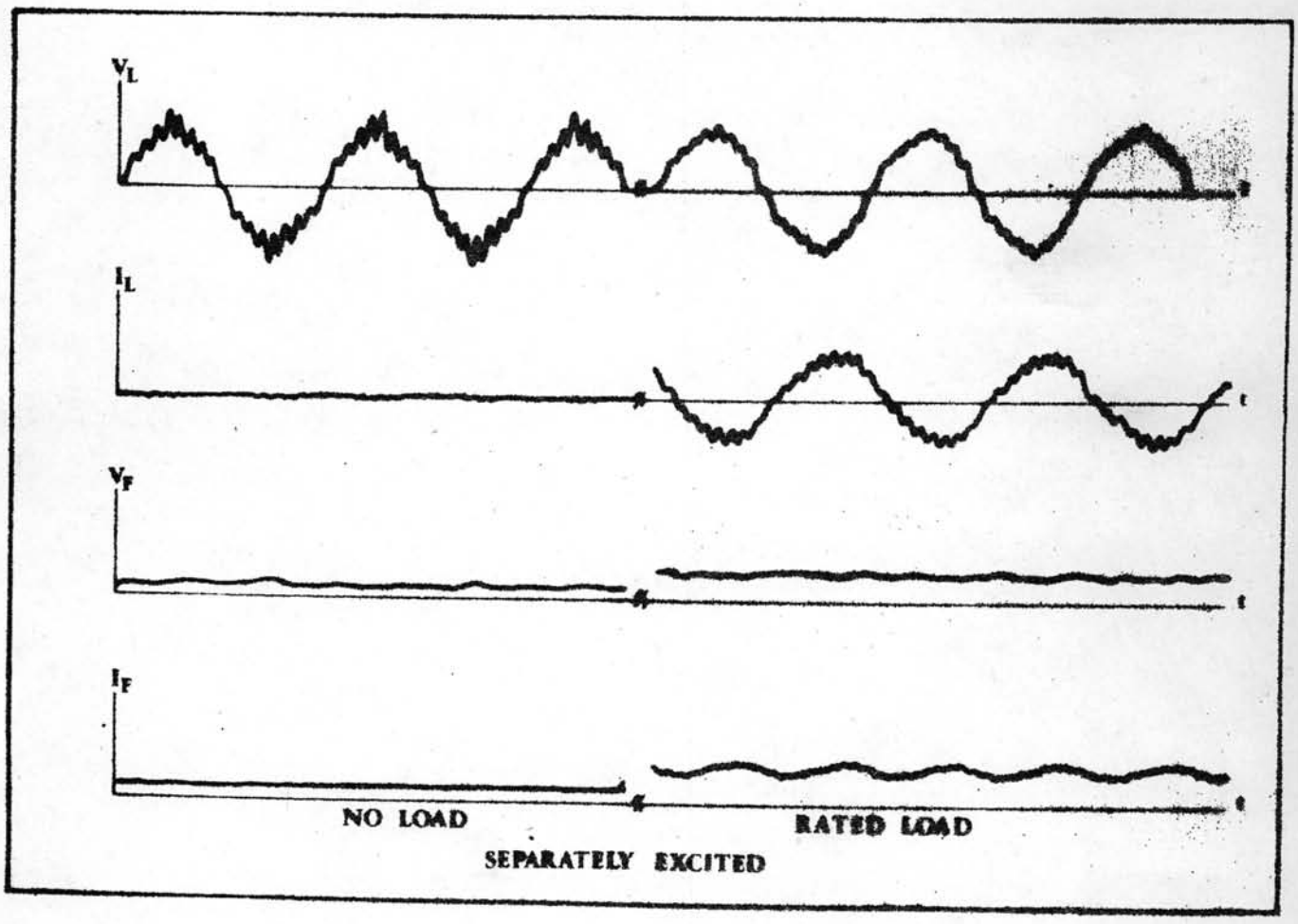

Figure 6.8 : Separately Excited Waveforms.

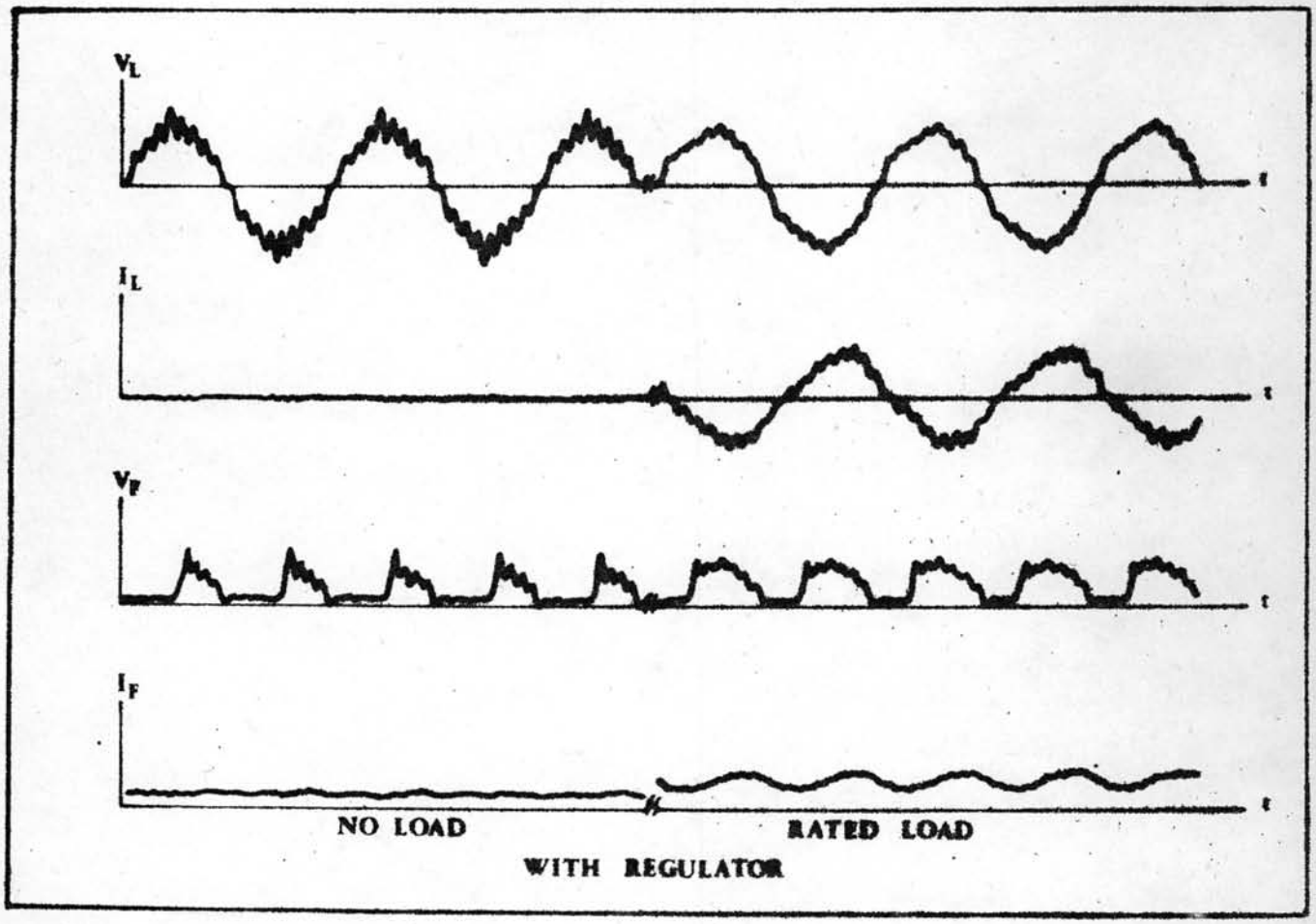

Figure 6.3 : Closed-loop Control Waveforms (With voltage regulator).