



**Mains Voltage Measurements at NPL
in Buildings 1 and 5**

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ABSTRACT

NPL is to apply for NAMAS accreditation of its measurement services, as part of the environmental requirements of this the mains voltage supplied to laboratories has to be shown not to adversely affect instrumentation powered by it. To aid this process a series of measurements made of the mains voltage amplitude and frequency in various laboratories in buildings 1 and 5 at NPL is presented in this report.

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Approved on behalf of the Managing Director, NPL
by Dr T G Blaney, Director, Centre for Electromagnetic and Time Metrology.

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1 INTRODUCTION

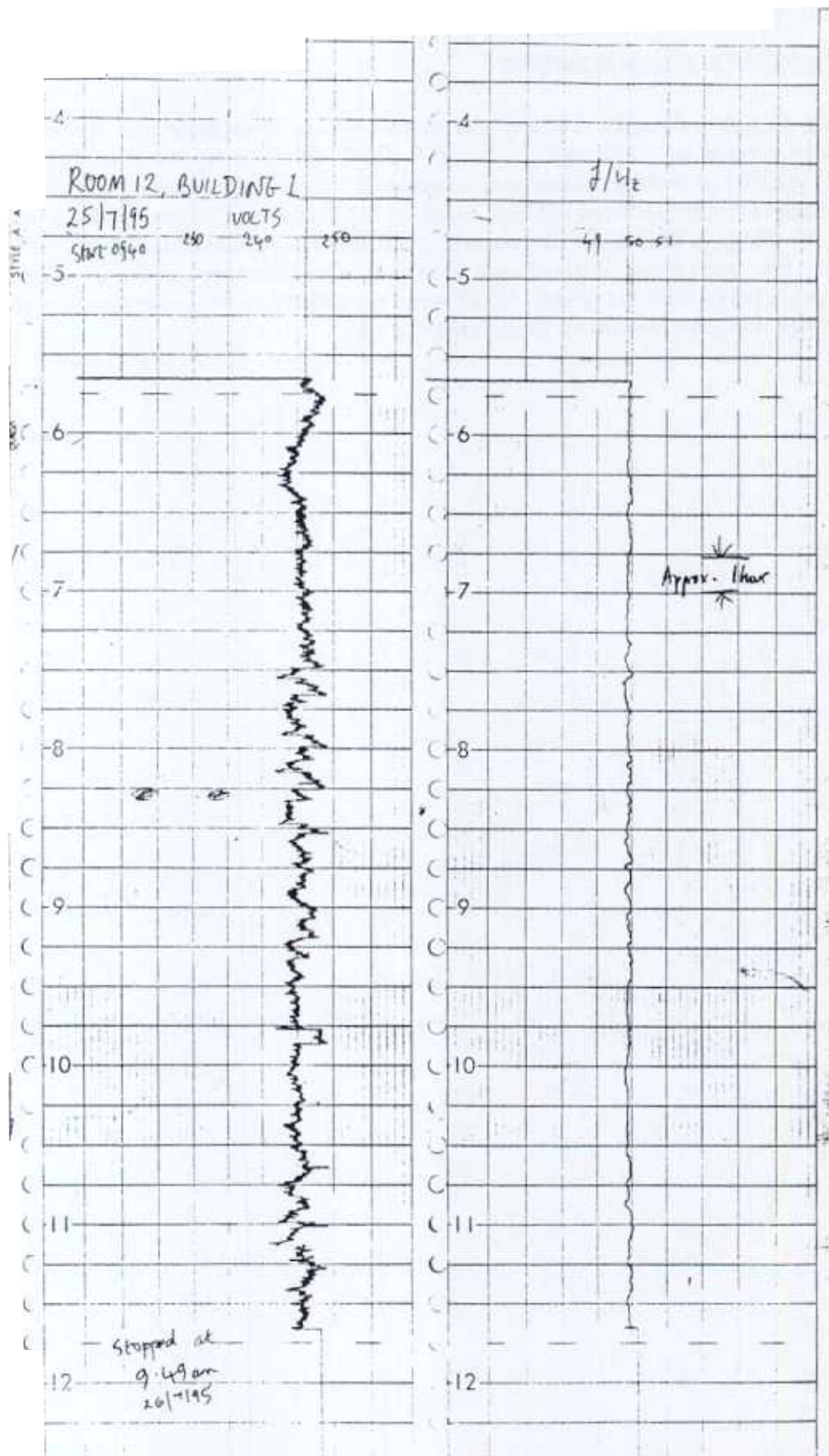
As part of the environmental requirements of NAMAS accreditation, measurement service providers need to ensure that the mains voltage supplied to their laboratory is satisfactory. This means that the amplitude, variation in amplitude and frequency of the mains used to power both his own and customer's equipment should not adversely affect their performance.

2 METHOD OF MEASUREMENT

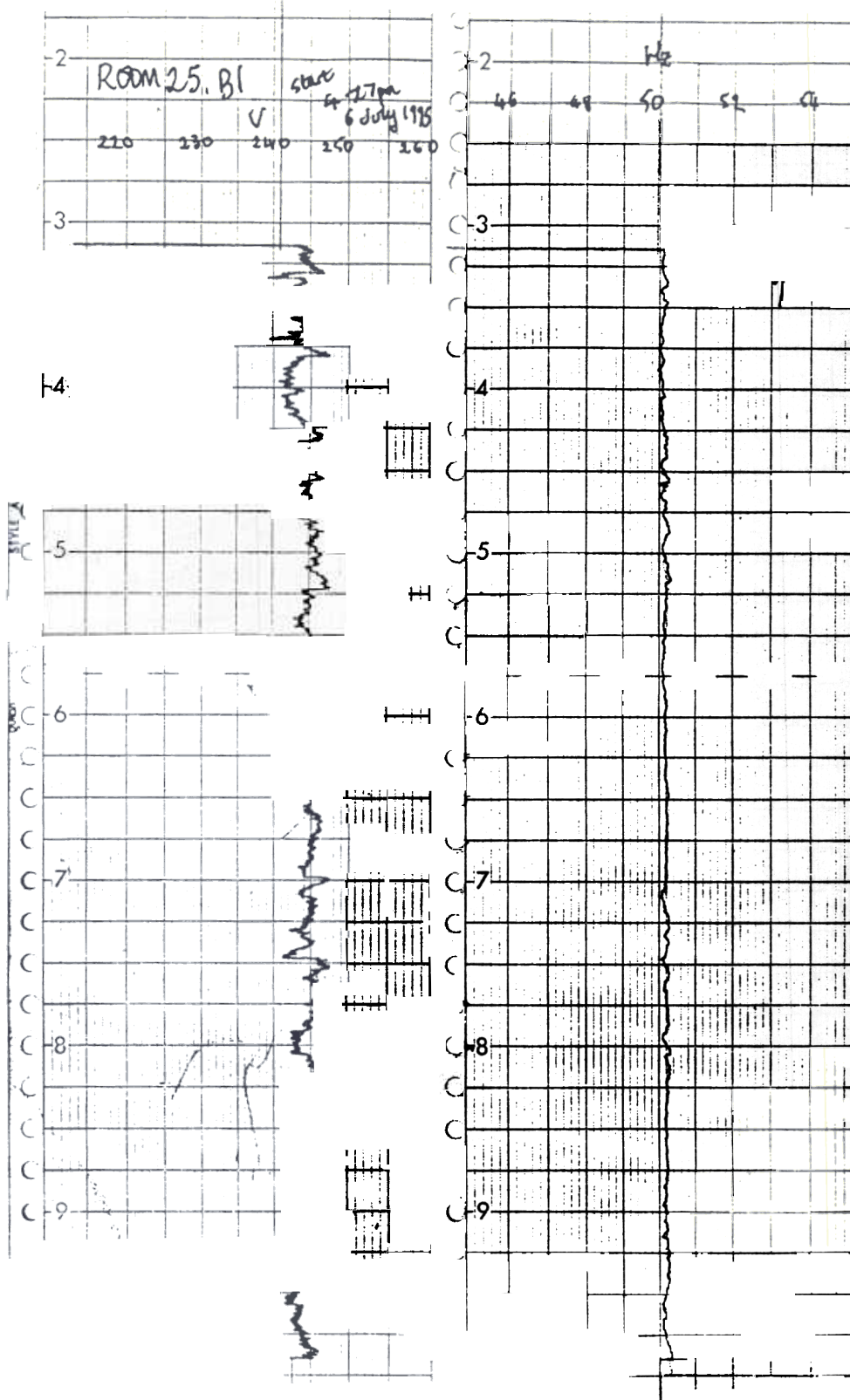
For periods of approximately one day the mains voltage amplitude and frequency were monitored in various laboratories in buildings 1 and 5. In all laboratories (except room 112, building 5) where just a single phase was available it was monitored using a Rustrak mains recorder (model DLVRF serial no. R054YJ). In room 112, building 5, where all three phases are available, the phase to which the 13A sockets are connected was monitored using the above instrument. The amplitudes of the other two phases were monitored at the same time using another Rustrak mains recorder (model DLVR serial no. R080YL) which has two input channels. The recordings made are shown on the following pages.

3 RESULTS

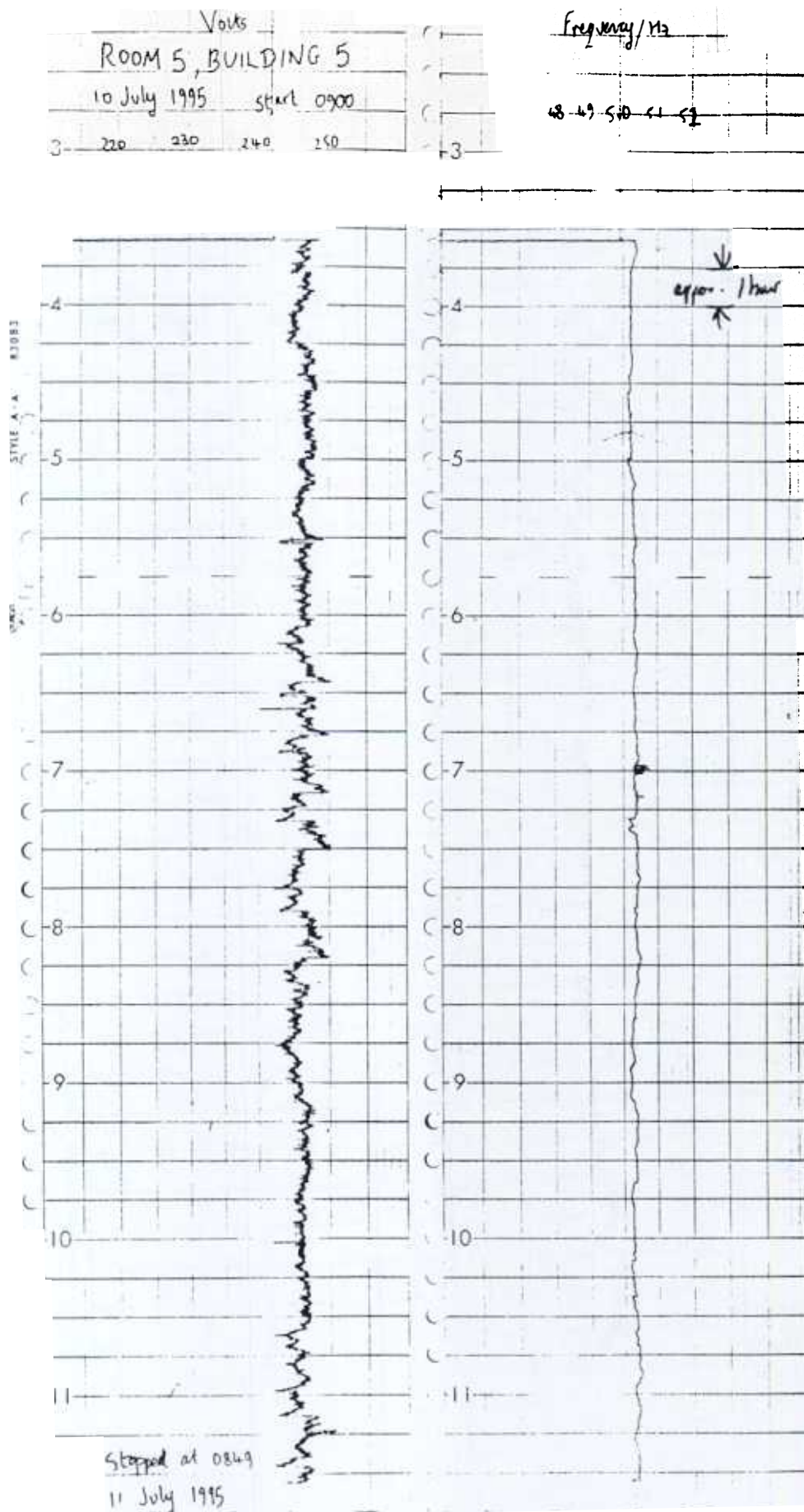
ROOM 12, BUILDING 1
(09:40 on 25/7/95 to 09:49 on 26/7/95)



ROOM 25, BUILDING 1
16:47 on 6/7/95 to 15:15 on 7/7/95)



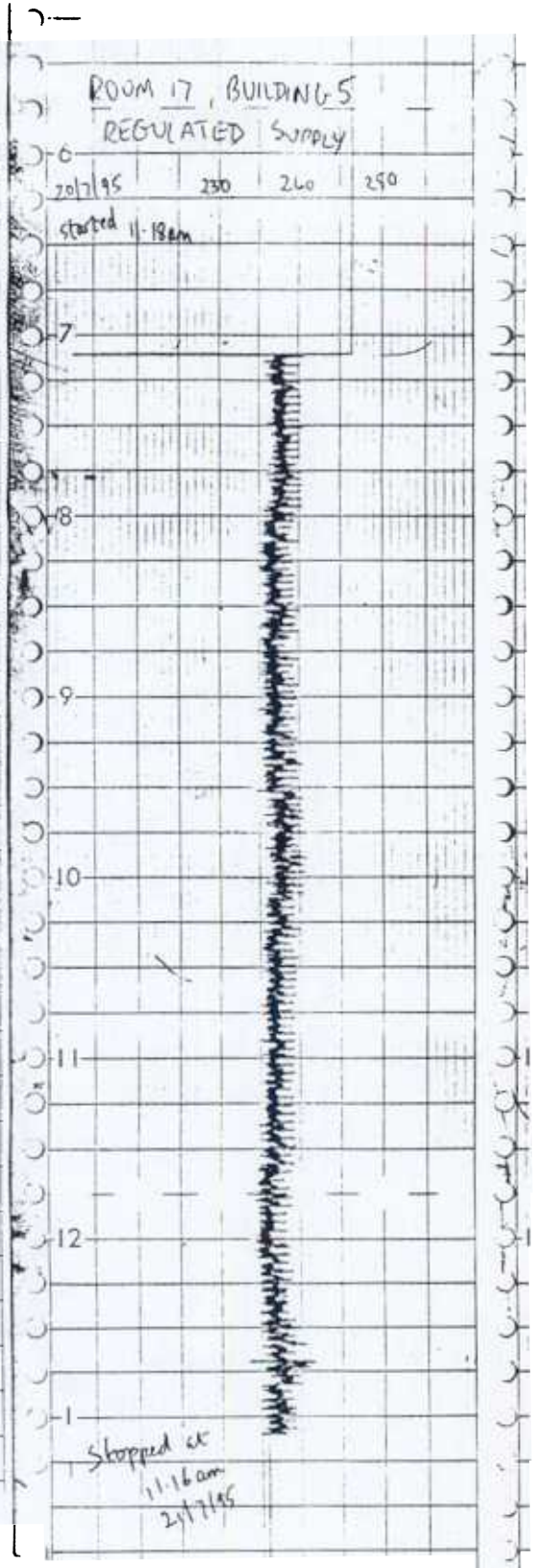
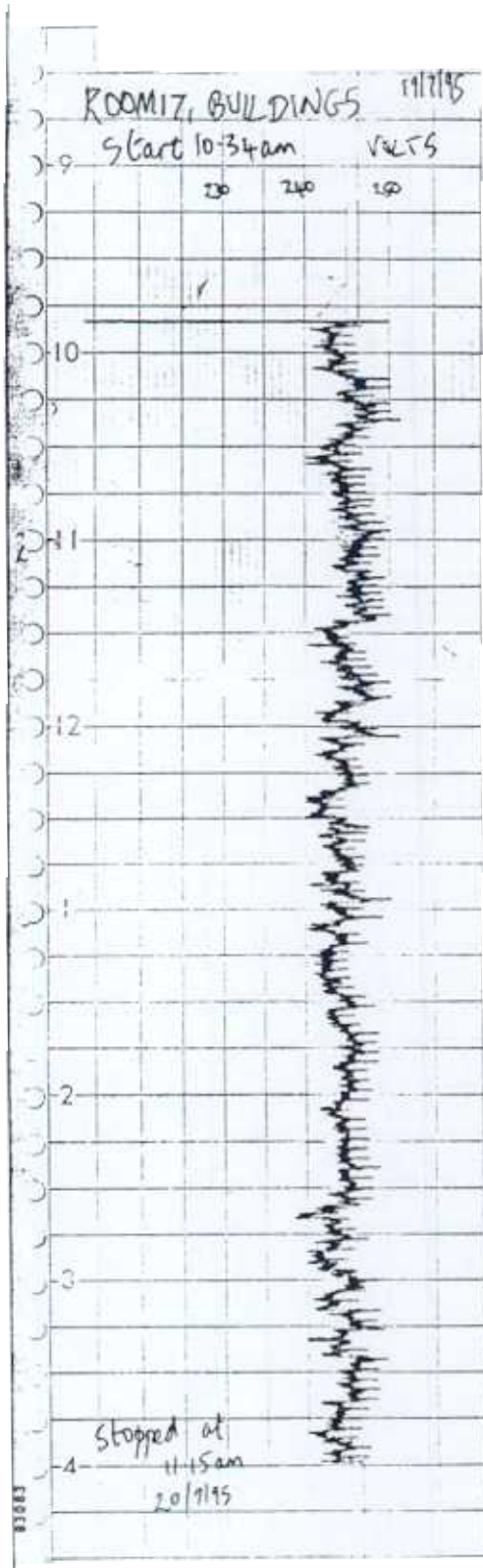
ROOM 5, BUILDING 5
(09:00 on 10/7/95 to 08:49 on 11/7/95)



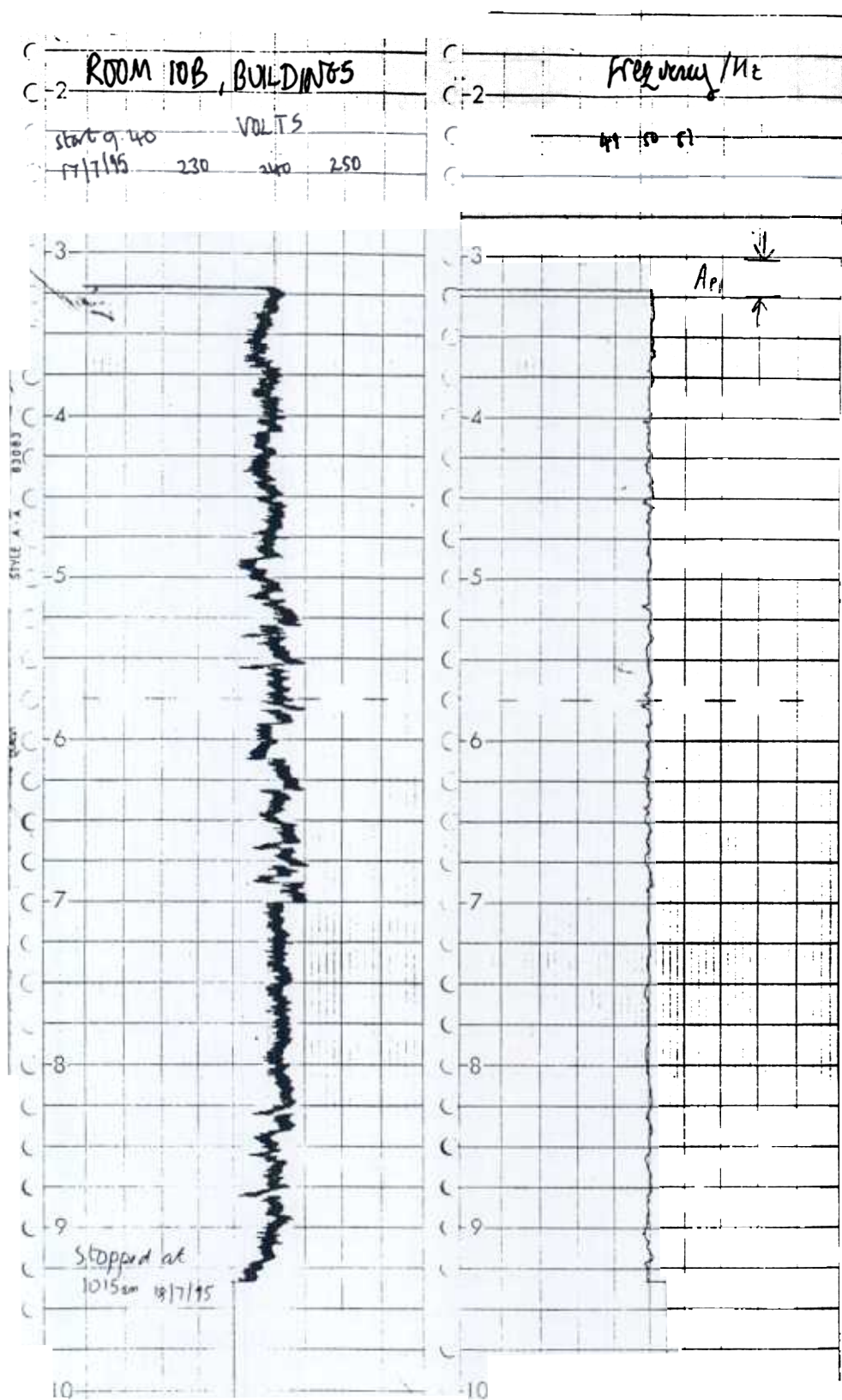
ROOM 17, BUILDING 5

UNREGULATED SUPPLY
(10:43 on 19/7/95 to 11:15 on 20/7/95)

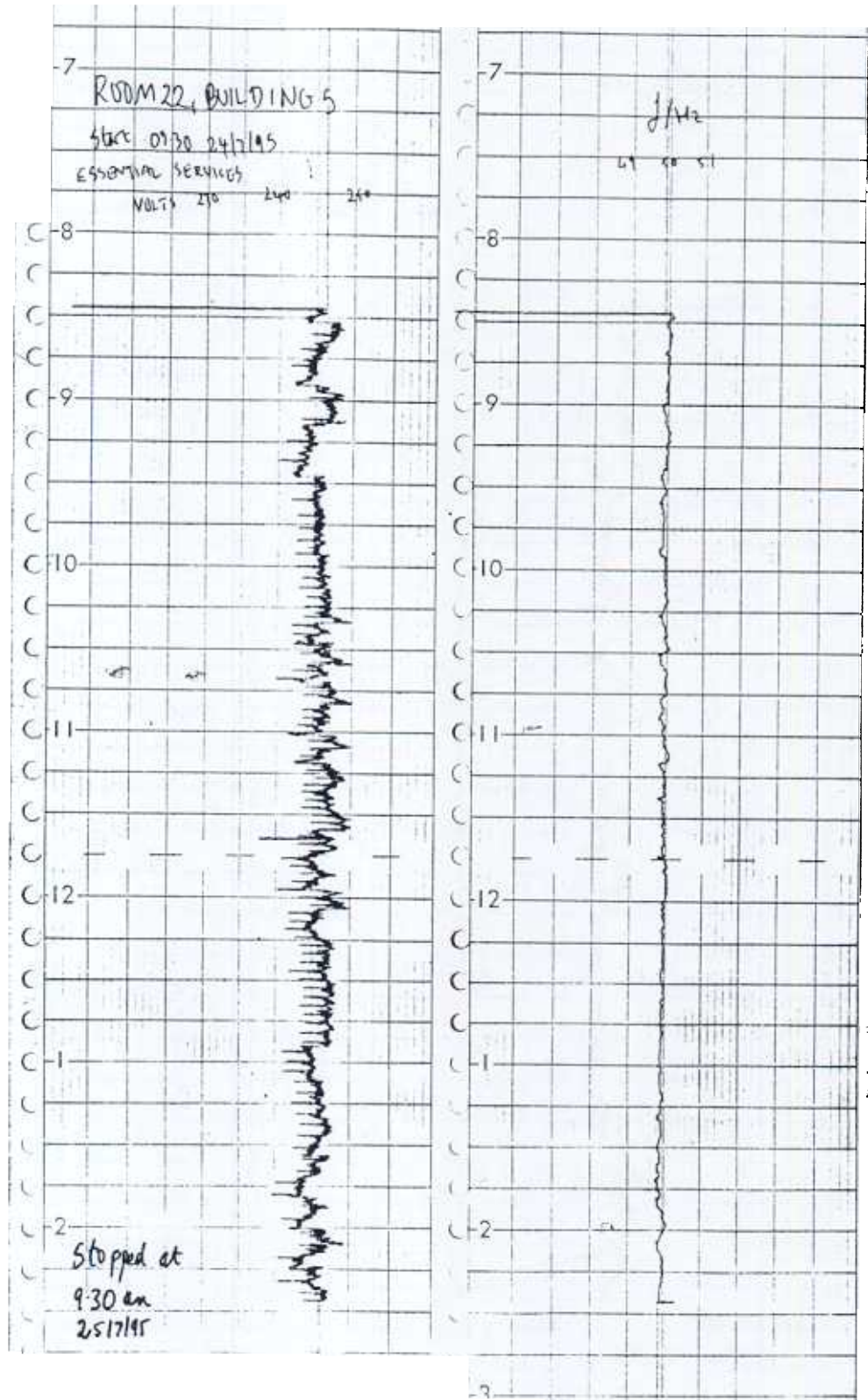
REGULATED SUPPLY
(11:18 on 20/7/95 to 11:16 on 21/7/95)



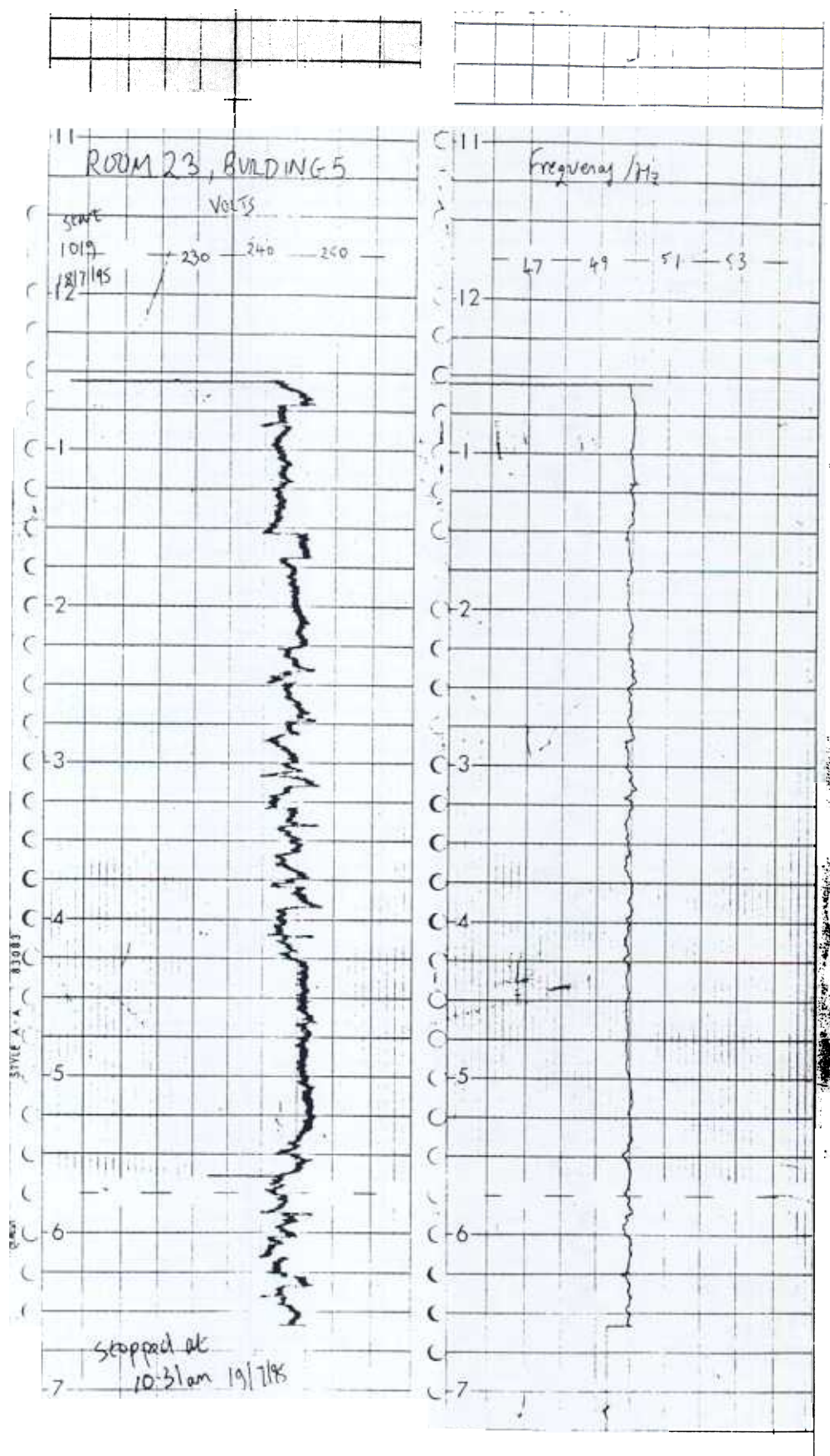
ROOM 10B, BUILDING 5
(09:40 on 17/7/95 to 10:15 on 18/7/95)



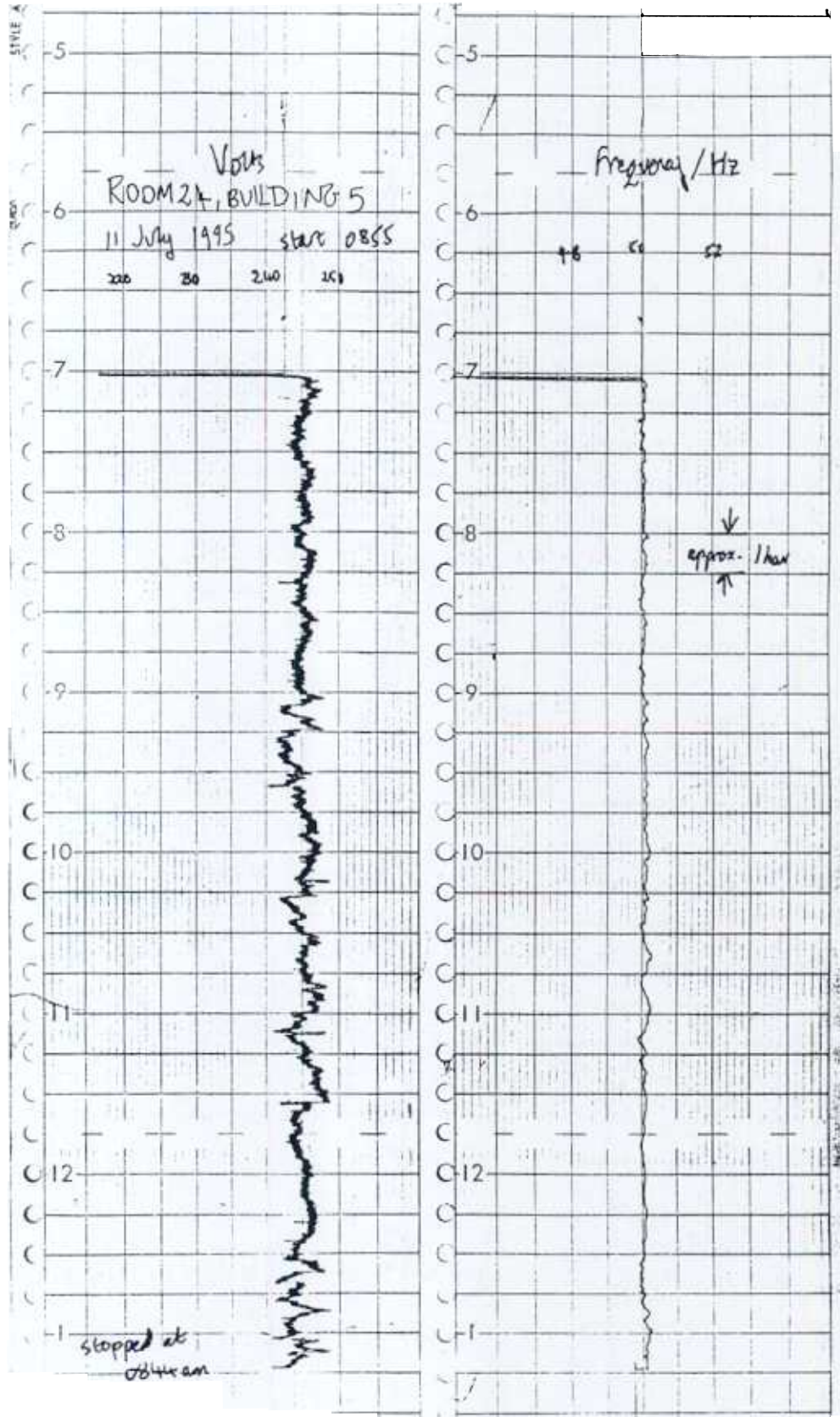
ROOM 22, BUILDING 5
09:30 on 24/7/95 to 09:30 on 25/7/95)



ROOM 23, BUILDING 5
(10:19 on 18/7/95 to 10:31 on 19/7/95)



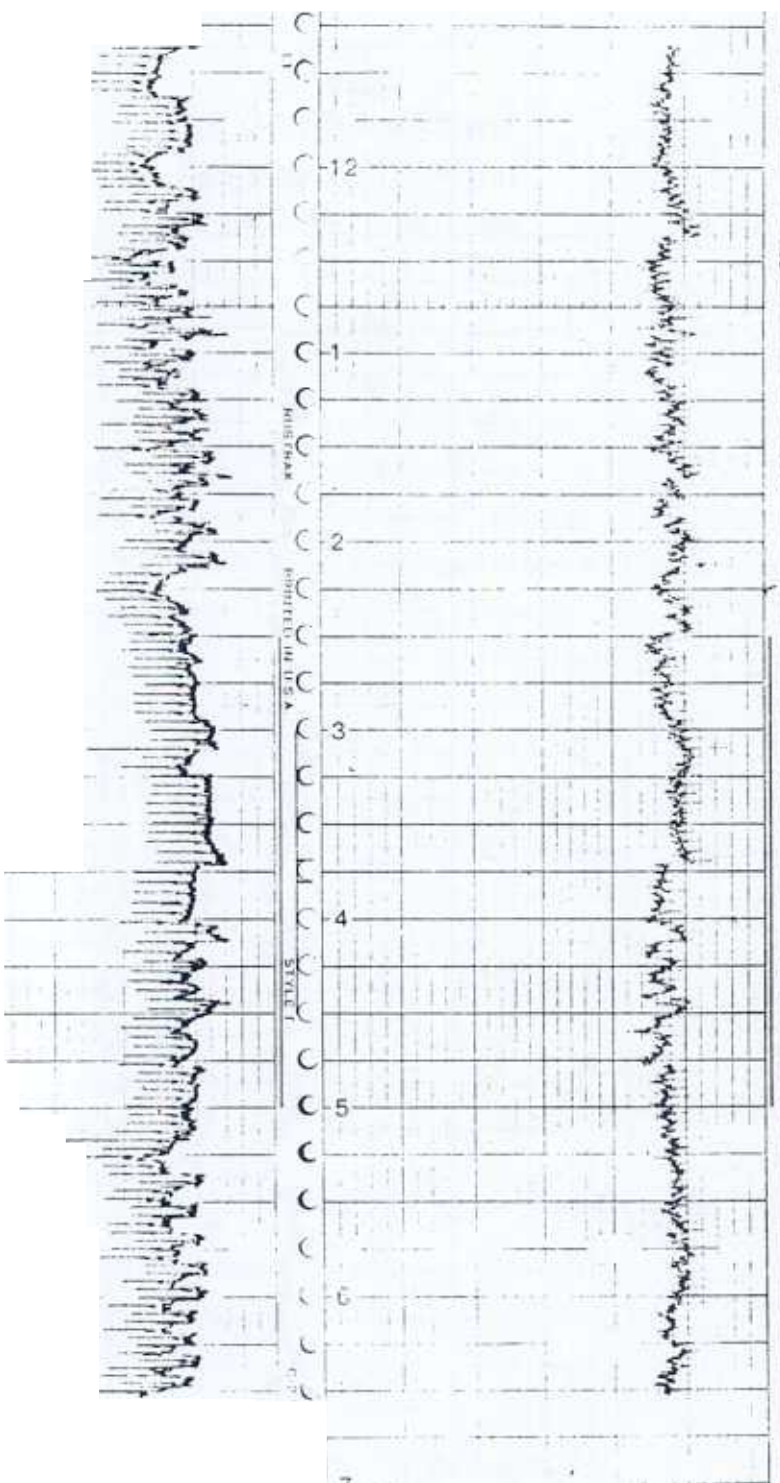
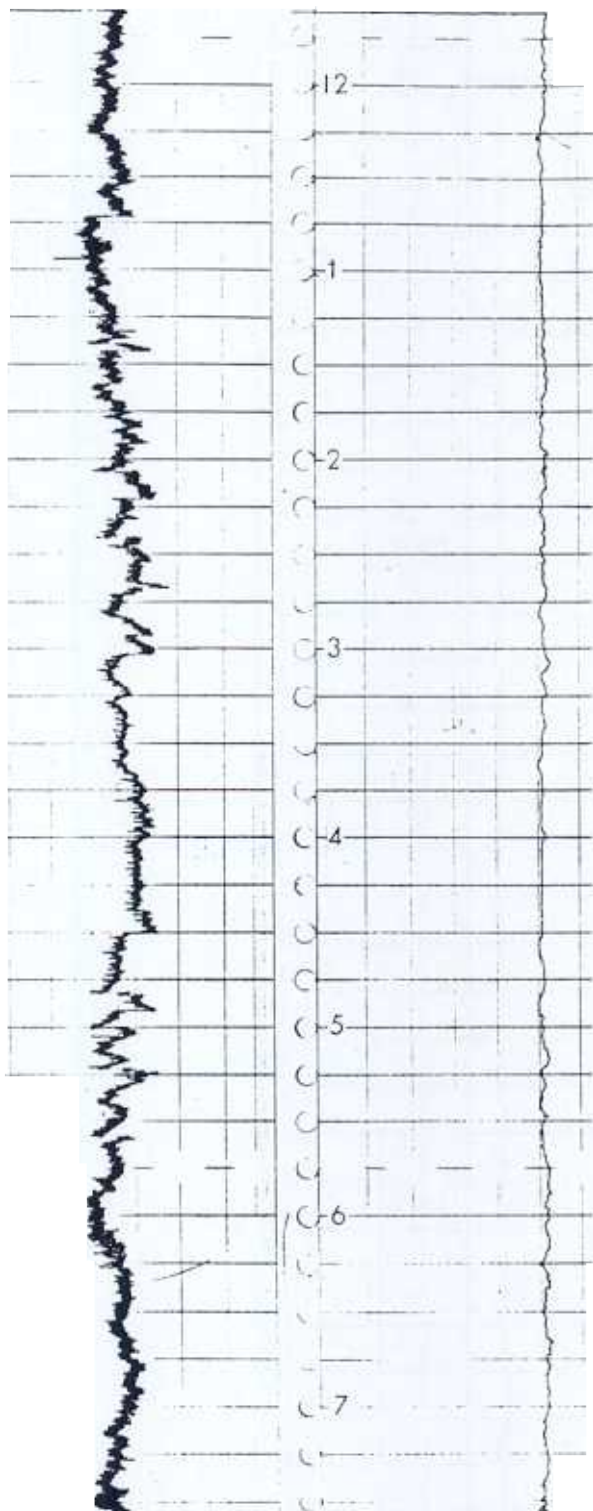
ROOM 24, BUILDING 5
(08:55 on 11/7/95 to 08:44 on 12/7/95)



ROOM 112, BUILDING 5

PHASE A
(11:15 on 5/7/95 to 16:05 on 6/7/95)

PHASE B PHASE C
(11:20 on 5/7/95 to 16:05 on 6/7/95)



4 SUMMARY OF RESULTS

Laboratory	Minimum voltage/V	Maximum voltage/V	* Mean voltage/V	Spikes	Mean f/Hz
Room 12, Building 1	241	249	245	No	49.9
Room 25, Building 1	239	248	244	No	50.2
Room 5, Building 5	240	250	247	No	50.3
Room 10B, Building 5	236	245	241	No	50.0
Room 17, Building 5					
Unregulated	239	251	245	+ve ~3V	50.0
Regulated	234	241	238	+ve ~2V	50.0
Room 22, Building 5	238	250	246	-ve ~3V	49.9
Room 23, Building 5	240	248	244	No	49.9
Room 24, Building 5	241	249	245	No	50.1
Room 112, Building 5					
Phase A	239	249	244	-ve ~1V	50.1
Phase B	232	254	244	-ve ~8V	--
Phase C	242	254	248	+ve ~2V	--

* The mean voltage is not simply an average of the minimum and maximum voltage but is an estimation of the time averaged voltage (i.e. voltage spikes of short duration do not contribute significantly to its value).

5 CONCLUSION

The mains voltage supplied to various laboratories in buildings 1 and 5 has been monitored and recorded over periods of 1 day. The above table summarises the variations in amplitude and the mean frequency of oscillation.