CHAPTER 5

SUMMARY AND CONCLUSION

The present work was proposed to test and to put in working order a conventional ionosonde and to modify it as a digisonde. Software development was done under simulated condition. For this purpose an old ionosonde (Model 1005 W Swedish make) has been acquired from IIG, Bombay on long term loan basis. It was put in operation at the Shivaji University after repairs with assistance of colleagues in the Department of Physics. The operation of ionosonde has been tested on dummy load antenna. For obtaining ionospheric reflections from F layer instead of broad band antenna set-up which is still to be erected , the folded dipole antenna tuned to 10 MHz is constructed and used. This antenna works satisfactorily from 7.5 to 15 MHz for obtaining reflections from F layer in the daytime. The photographic film recording system is replaced by a computer system. The real world data acquisition in BAND IV (6.75 to 20.25 MHz) is achieved and displayed as the "A" scope.

Software development has been made under simulated condition for which a single board computer subsystem is programmed to simulate ionosonde output consisting of a ground pulse and ionospheric echoes. A typical ionogram is scaled and a variable delay is used in the subsystem programming for the sake of simulation.

The '**integrated system**' configuration is established using ionosonde, computer with hardware and a single board computer. Separate software is developed for integrated system and is described in this dissertation.

Chapter I deals with the discovery of ionosphere as a background information. Chapman theory explains the ionospheric layer formation. The structure of ionosphere and the magneto ionic theory of radio wave propagation and the Appleton-Hartee formula of refractive index are explained in the last part of chapter.

Ground based techniques of ionospheric exploration are reviewed in chapter II. The details of study techniques with fixed frequency and swept frequency modes are explained. Absorption measurements, partial reflection,ionospheric drifts and MST radar are important techniques using fixed frequency. In swept frequency techniques ionosonde is found useful for the study of the electron density profile, real height analysis, variation in electron density profile due to diurnal, seasonal, solar cycle and geographical situations. The ionosonde and its description is given at the end of chapter.

PC hardware, interfacing devices and single board computer subsystem is given in detail in chapter III. In PC hardware, overview of the useful things like PC I/O channel and I/O memory map is explained. The add on card (ADC) is described with its specification. The need of single board computer and its description is furnished at the end.

Chapter IV is devoted to the two part of software programs. In the first part the programs are developed for special investigation with fixed frequency, where as in the second part programs are developed to produce an ionogram, which represents transmitted frequency against the height of the reflection level in the ionosphere (simulated with the subsystem explained in

chapter III).

THe results of the first part software i.e. 'A' scope display (the hard copy shown in fig 5.a). shows that the ground pulse is followed by three reflections at 7.5 MHz.

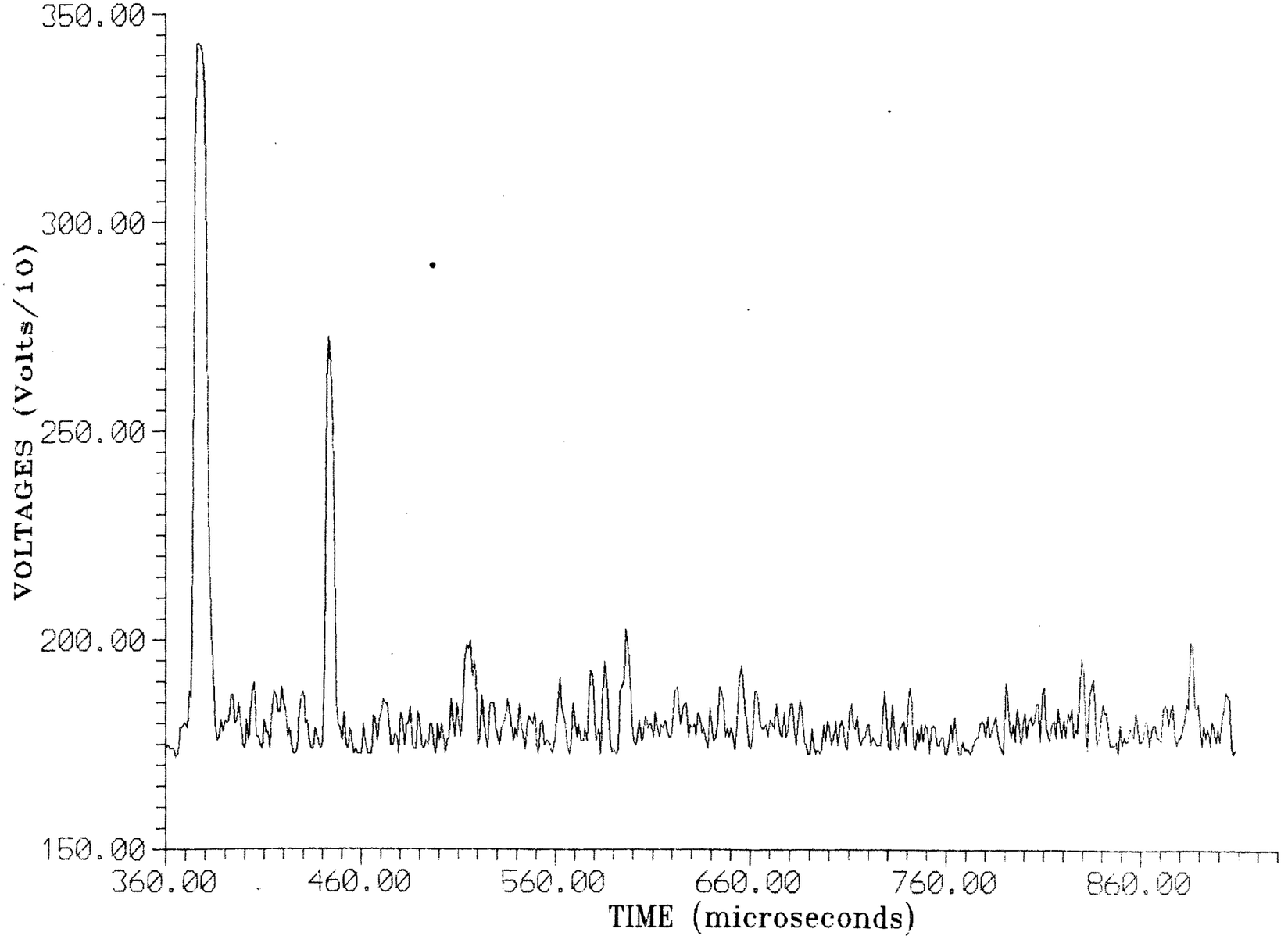
In fig 5.b at 8 MHZ the split occurs at first reflection i.e. of ordinary and extraordinary waves. In second echo the time difference is doubled between ordinary and extraordinary reflected waves.

In fig 5.c the second echo disappears as the frequency is approaching the critical frequency of F region.

In fig 5.d the time period is chosen to show multiple echoes.

Finally, in the second part of software, the ionogram is produced under simulation. The result is shown in fig 5.e, which was the primary aim of this dissertation.

In conclusion, it can be said that, we have successfully brought an old ionosonde in working condition, developed necessary software to produce an ionogram under simulated condition and demonstrated the working of entire integrated system, This can now be called a digisonde, an equipment that produces an ionogram by digital electronics instead of by photographic process.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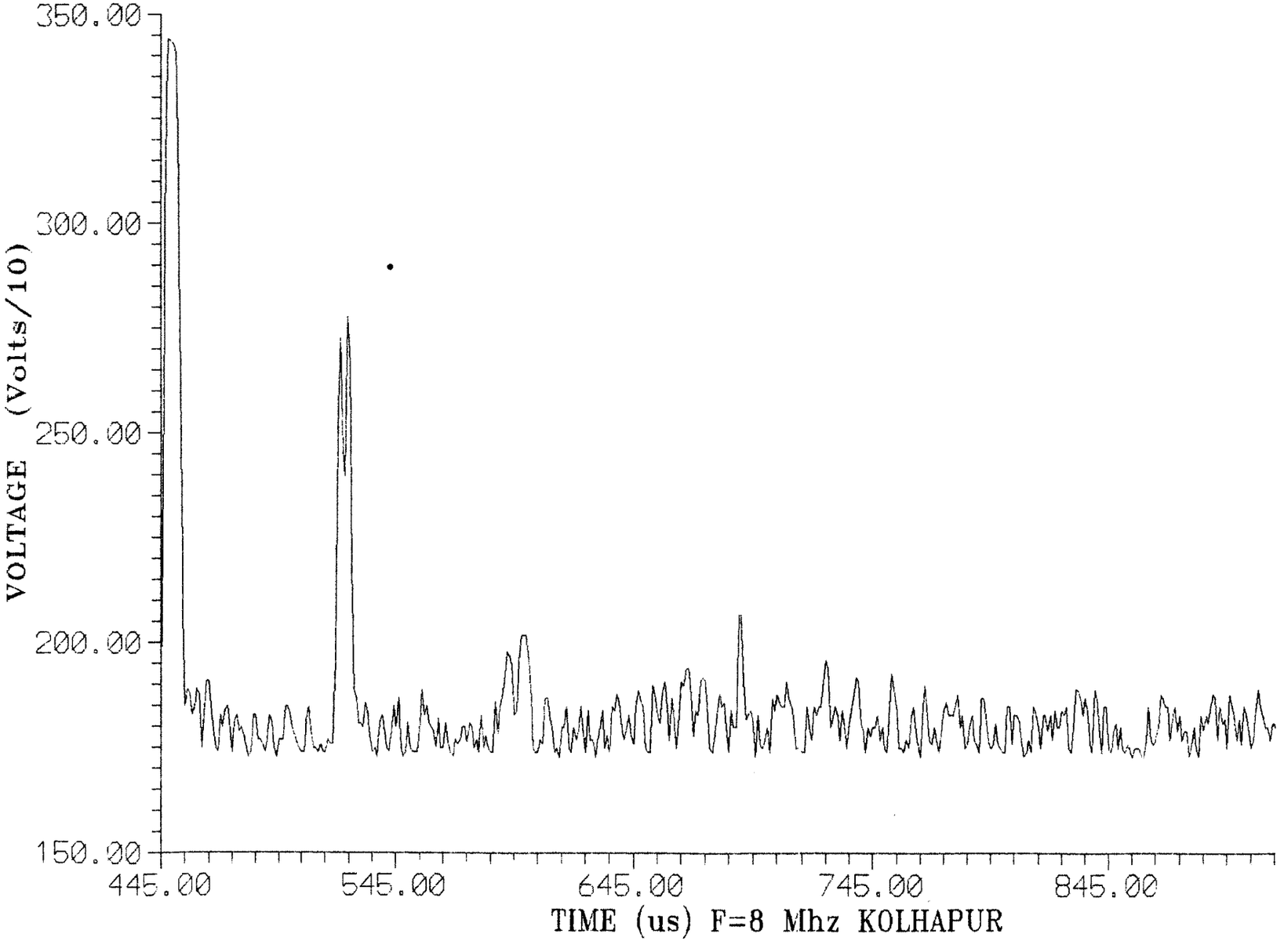
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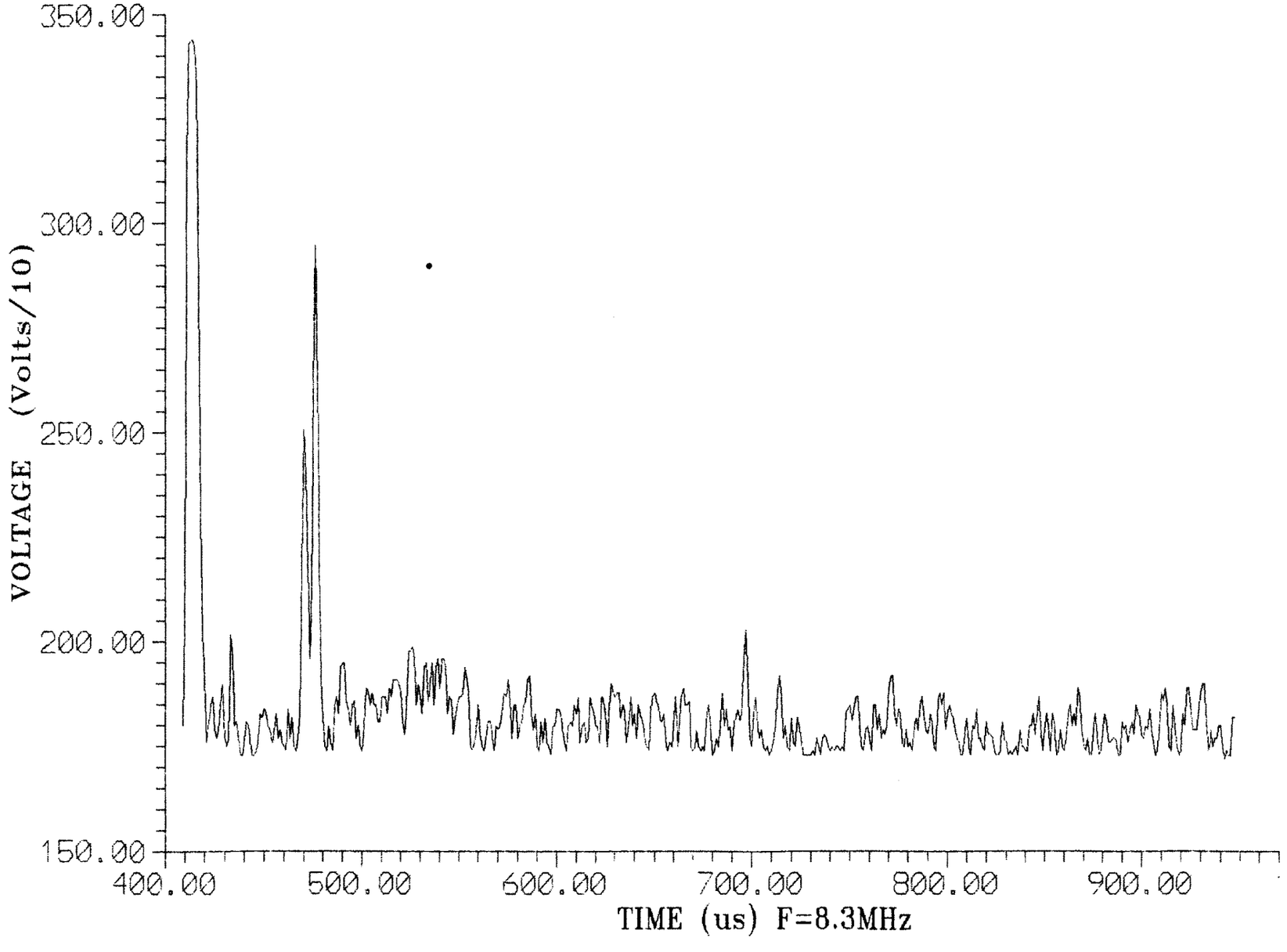
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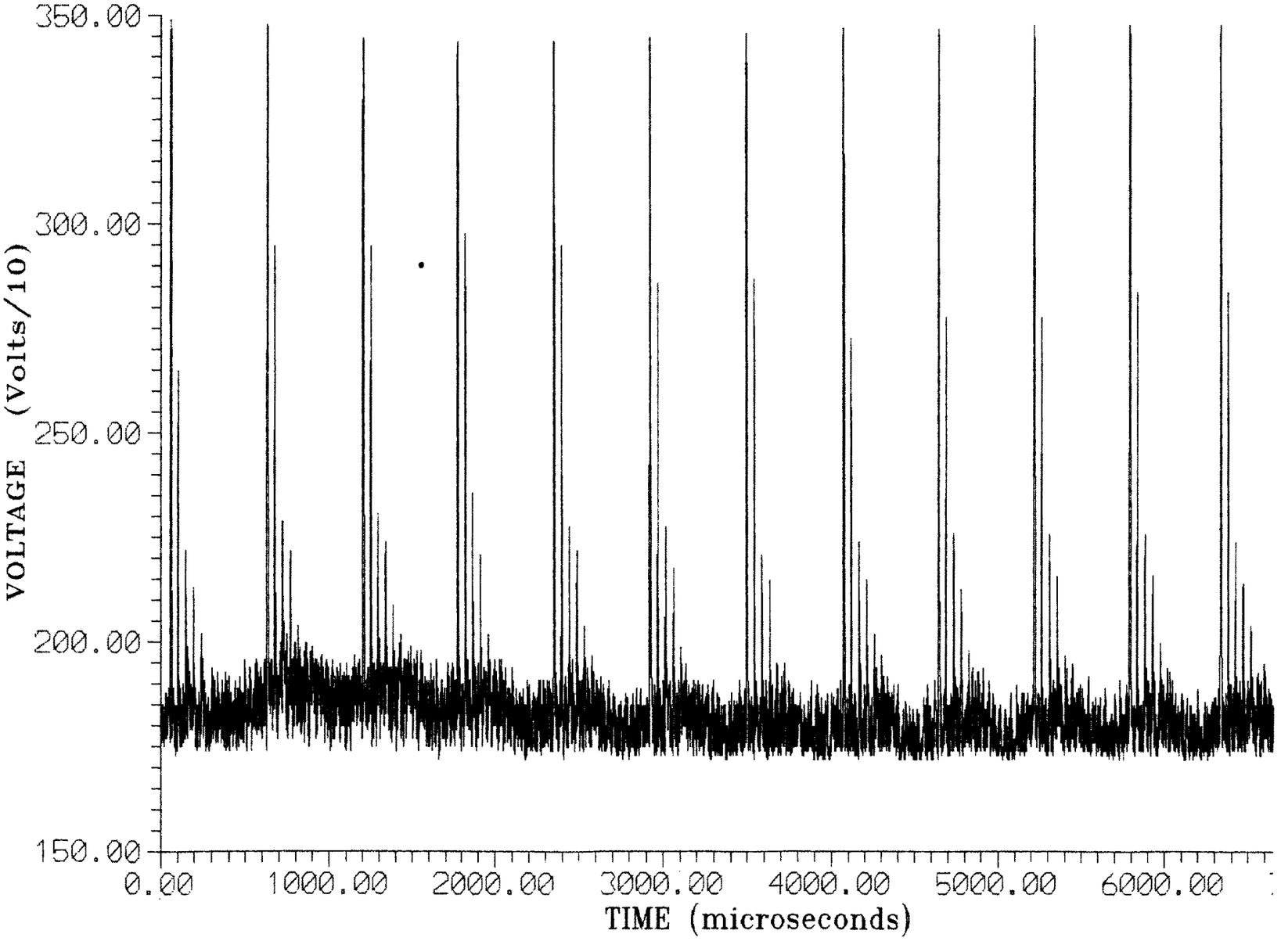
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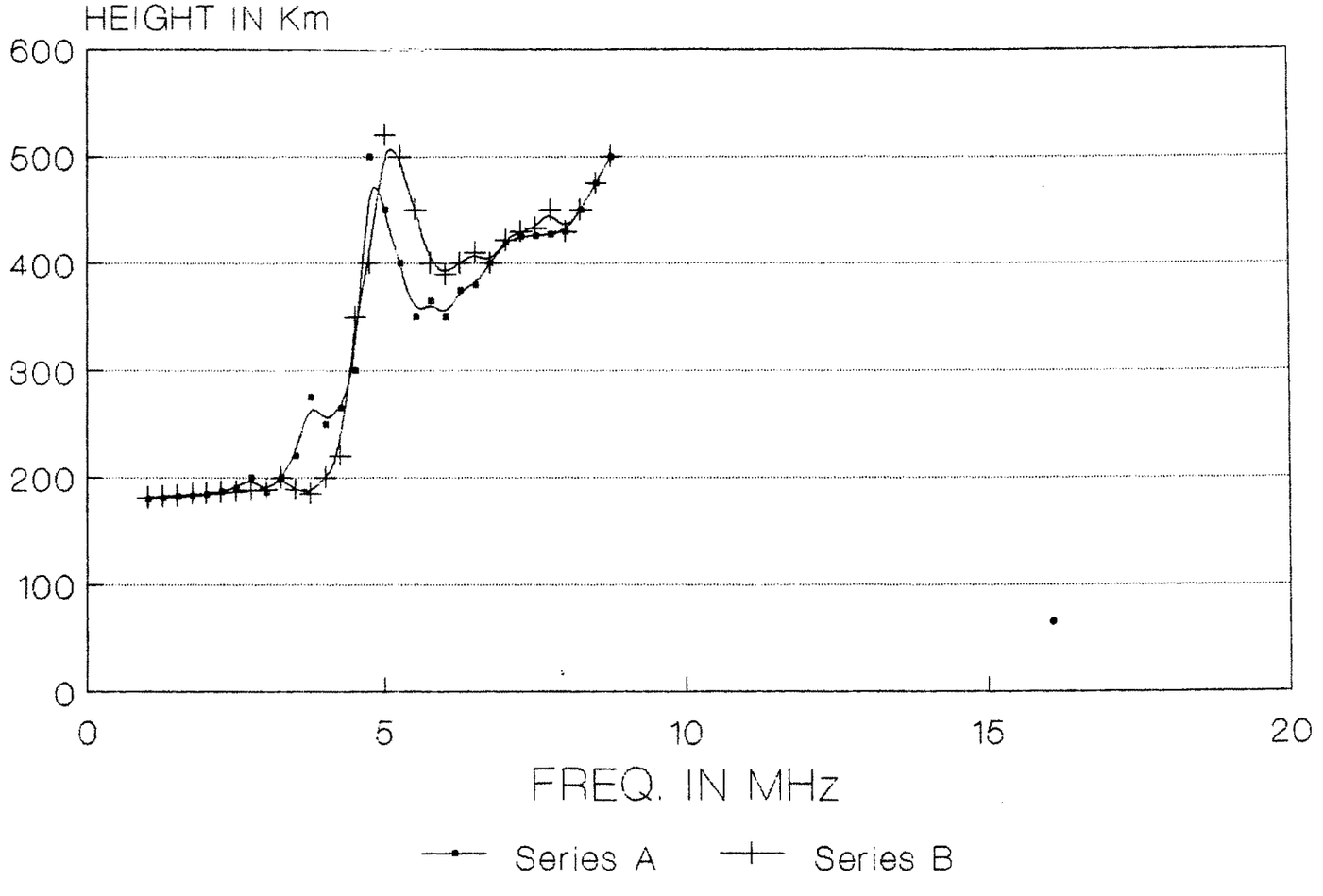
PANORAMIC



FREQUENCY