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FINAL REPORT

**DATA REDUCTION AND ANALYSIS FOR THE
TRW IMP-7 PLASMA WAVE EXPERIMENT**

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FINAL REPORT
DATA REDUCTION AND ANALYSIS FOR THE
TRW IMP-7 PLASMA WAVE EXPERIMENT

The last data acquisition from IMP 7 occurred on September 30, 1978, and Figure 1 shows the low frequency magnetic field levels during this last day before retirement. During the past year we have continued to work on data analysis from IMP 7, and in the future this work will continue under the auspices of our NASA Headquarters SR&T/Data Analysis contract. Some of the tasks now under way include further analysis of magnetospheric boundaries, studies of substorm and fireball phenomena, and ISEE/IMP 7 correlations involving interplanetary transients. Thus this final report is actually only an interim progress report for the full IMP 7 data analysis program.

The actual progress during the years of Project-funded data analysis can best be appreciated by studying the publications attached in the Appendix. The highlights might be enumerated as follows:

(1) The IMP 7 interference problems were analyzed and the lessons learned on IMP were applied in the design of the ISEE 1,2, and 3 wave instruments.

(2) The measurements in the tail revealed great complexities involving substorms and fireballs and provided insight into the overall dynamics of the magnetosphere. The low levels of magnetic turbulence may be of great significance with respect to the development of tearing-mode dissipation for reconnection events.

(3) The IMP wave observations in the distant magnetosphere boundary region showed that the boundaries were quite diffuse and frequently purely-defined.

(4) On some occasions nearly simultaneous IMP 7 and 8 comparisons were used to achieve new understanding of shock structure and propagation. These studies will be continued with IMP and ISEE.

IMP 7 SEPTEMBER 30, 1978

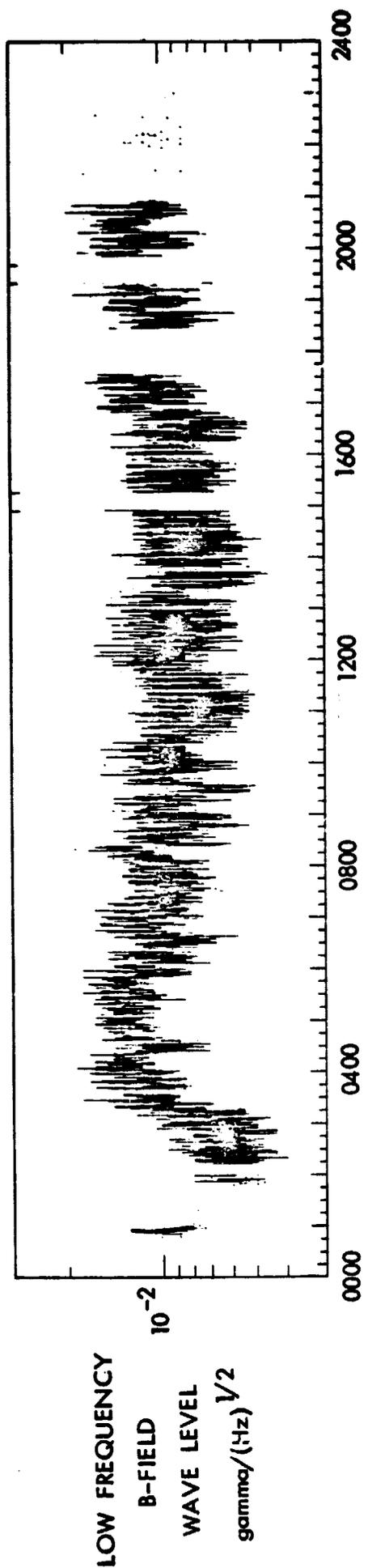


Figure 1

LOW FREQUENCY
B-FIELD
WAVE LEVEL
 $\gamma/(\text{Hz}) \sqrt{2}$
 10^{-2}

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OF POOR QUALITY

APPENDIX

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Observations of Interplanetary Plasma Waves, Spacecraft Noise, and Sheath Phenomena on IMP 7, J. Geophys. Res., 79, 73, 1974.

Plasma Wave Turbulence at Distant Crossings of the Plasma Sheet Boundaries and the Neutral Sheet, Geophys. Res. Lett., 1, 189, 1974.

Description of Reduced IMP-7 Plasma Wave Data Records Submitted to NSSDC (August 1976 Revision),

Microstructure of a Magnetotail Fireball, Geophys. Res. Lett., 4, 219, 1977.

Magnetosphere Boundary Observations along the IMP 7 Orbit. 1. Boundary Locations and Wave Level Variations, J. Geophys. Res., 82, 5171, 1977.

Wave-Particle Interaction Phenomena Associated with Shocks in the Solar Wind, Study of Travelling Interplanetary Phenomena, ed. M. A. Shea et al., D. Reidel Pub. Co., Dordrecht-Holland, 259, 1977.

Plasma Flow Pulsations in Earth's Magnetic Tail, J. Geophys. Res., 83, 2162, 1978.

Shock Systems in Collisionless Space Plasmas, Solar System Plasma Physics. Vol. III, ed. L. J. Lanzerotti et al., North-Holland Pub. Co., 5, 1979.

Variability of Plasma Sheet Dynamics, TRW Preprint No. 22751-6010-RU-00, July 1979. (Accepted for publication in J. Geophys. Res.)