

JOURNAL
OF THE
COMMUNICATIONS RESEARCH LABORATORY

Vol. 39 No. 1 1992

CONTENTS

Feature

- Status of Tropical Rainfall Measuring Mission (TRMM)
..... *By K. Okamoto* 3

Special Issue

- Research and Development on Time and Frequency Standard at CRL
..... (For detailed Contents see last page)

Departments

- Foreword 1
- Summaries of Recent Papers by CRL Personnel
Published in Japanese 203
- Abstracts of Recent Papers Published in the
Issues of "Rev. Commun. Res. Lab." (in Japanese) 217
- List of Recent Papers by CRL Personnel Published
in Foreign Languages 219

Special Issue

Research and Development on Time and Frequency Standard at CRL

CONTENTS

I. Introduction	By K. Yoshimura	9
II. Atomic Frequency Standards		
II.1 Introduction	By K. Nakagiri	15
II.2 Cesium Beam Primary Frequency Standard	By K. Nakagiri, M. Shibuki, M. Kajita, N. Kotake, and K. Sebata	23
II.3 Development of Hydrogen Masers	By H. Saito, Y. Ohta, and J. Umezu	43
II.4 An Optically Pumped Cesium Beam Frequency Standard	By J. Umezu, T. Maeno, H. Saito, and Y. Ohta	53
II.5 Development of Stored Ion Techniques	By S. Urabe and H. Imajo	63
III. Frequency and Time Comparison		
III.1 Introduction	By F. Takahashi	75
III.2 Time Comparison via the GPS	By A. Yamamoto, M. Imae, H. Kunimori, C. Miki, E. Kawai, K. Imamura, and F. Takahashi	79
III.3 Two-Way Time Transfer via a Geostationary Satellite	By K. Imamura and F. Takahashi	91
III.4 Precise International Time Comparison via Geostationary Meteorological Satellite (GMS)	By C. Miki, T. Morikawa, and M. Uratsuka	101
III.5 Precise Time Comparison with Very Long Baseline Interferometry	By T. Yoshino, S. Hama, and H. Kiuchi	109
III.6 Satellite Laser Time Synchronization and Other Technique	By H. Kunimori, F. Takahashi, Y. Abe, M. Imae, and A. Yamamoto	117
IV. Dissemination of Time Signal and Standard Frequency		
IV.1 Introduction	By T. Sato	133
IV.2 Time and Frequency Measurement and Time Keeping System	By M. Shibuki, M. Aida, T. Sato, N. Kotake, and K. Sebata	135

IV.3 Transmitting Systems for JJY & JG2AS	<i>By M. Yamanishi, A. Otsuka, and T. Sato</i>	143
IV.4 Dissemination by Means of TV Signals, Loran-C and GPS	<i>By M. Aida, T. Sato, and C. Miki</i>	161
IV.5 Experiment on Dissemination by Broadcasting Satellite	<i>By T. Sato, M. Aida, A. Otsuka, and Y. Saito</i>	169
IV.6 Dissemination by Means of Telephone Lines	<i>By M. Aida, C. Miki, and T. Sato</i>	175
V. Studies on Precision Time and Frequency Measurements		
V.1 Introduction	<i>By K. Yoshimura</i>	183
V.2 Precision Time and Frequency Measurements		
1. Frequency Stability Measures		
2. Frequency Stability Measurements		
3. Superconducting Cavity Stabilized Oscillators	<i>By B. Komiyama and K. Yoshimura</i>	187
V.3 Studies on Atomic Time Scale Algorithms	<i>By K. Yoshimura</i>	195
VI. Conclusion	<i>By K. Uchida</i>	199
VII. Editor's notes	<i>By K. Nakagiri</i>	201