PROGRAMMABLE DIGITAL MODEM

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DATA RATE RANGE AND OPERATIONAL MODES

SYMBOL RATE RANGE OF PDM:

- **1.92 - 75 MSYMBOLS/S**

OPERATIONAL MODES:

- **CONTINUOUS**
- **DEPENDENT BURST**
- **INDEPENDENT BURST**

TEST AND DEMONSTRATION EQUIPMENT

FEATURES:

- **PROVIDES MULTIPLE DATA STREAMS FOR HIGHER LEVEL FORMATS**
- **INSERTS PREAMBLES AND UNIQUE WORD STRUCTURES FOR BURST MODES**
- **GENERATES DATA AND CONTROL SIGNALS FOR INTERFERRING BURST MODULATOR**
- **PROVIDES CONTROL SIGNALS REQUIRED FOR DEMODUALTOR OPERATION**
- **MEASURES BER AND UNIQUE WORD MISS RATE**

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PROGRAMMABLE DIGITAL MODEM

PROGRAM GOALS

DEVELOPMENT OF A MODEM WHICH IS:

- PROGRAMMABLE IN THE AREAS OF MODULATION FORMAT, DATA RATE, AND OPERATIONAL MODE
- FULLY DIGITALLY IMPLEMENTED
- LOW RECURRING COST
- SMALL SIZE

MODULATION FORMATS

REQUIRED FORMATS:

- QPSK, 8-PSK, 16-PSK

OPTIONAL FORMATS:

- OFFSET QPSK
- MSK
- 16-QAM

PDM DESIGN CHALLENGES

DEMODULATOR AGC, CARRIER, AND CLOCK RECOVERY STRUCTURE:

- MUST BE ADAPTABLE TO HANDLE DIFFERENT MODULATION FORMATS
- RECOVERY BANDWIDTHS MUST SCALE WITH DATA RATE
- OPERATION AT 75 MSYMBOLS /S AND 2 SAMPLES /SYMBOL REQUIRES 150 MHZ CLOCKING
- MINIMIZE POWER AND SIZE WHILE OPERATING AT THIS SPEED

DATA FILTERING:

- REQUIRES DIGITAL IMPLEMENTATION FOR DATA RATE FLEXIBILITY
- HIGH SPEED REQUIREMENT IMPOSES COMPLEXITY LIMIT ON FILTER

OPERATIONAL MODES:

- INDEPENDENT BURST MODE REQUIRES RATE FLEXIBLE ACQUISITION ALGORITHMS

NASA
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AEROSPACE TECHNOLOGY DIRECTORATE

SESSION IV

POSTER DISPLAYS AND TECHNOLOGY REVIEWS
CHAIR: W.D. IVANCIC

J.M. OTT, FORD AEROSPACE CORP.

J.K. WONG AND E.M. MROZEK, TRW, INC.

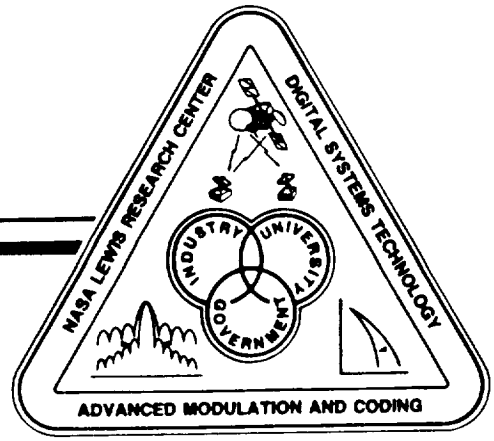
R. FANG, M. KAPPES, AND S. MILLER, COMSAT LABS

J.V. WERNLUND, HARRIS CORPORATION

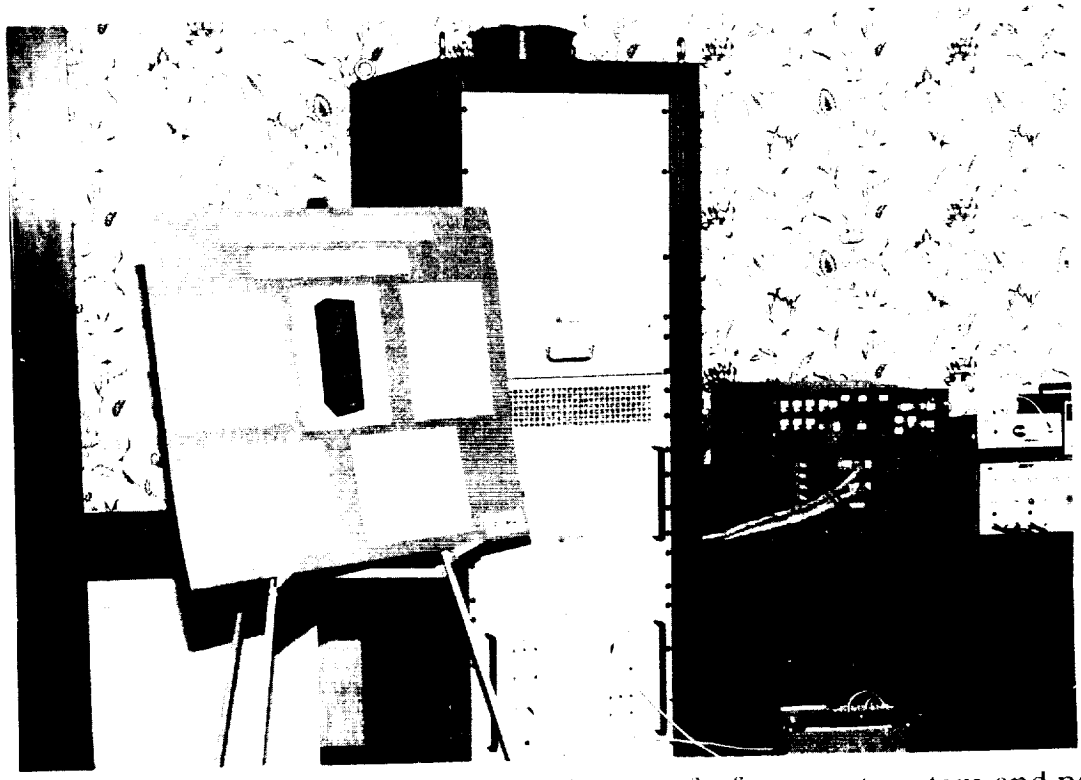
C.R. RYAN, MOTOROLA, INC.

W.W. WU, INTELSAT

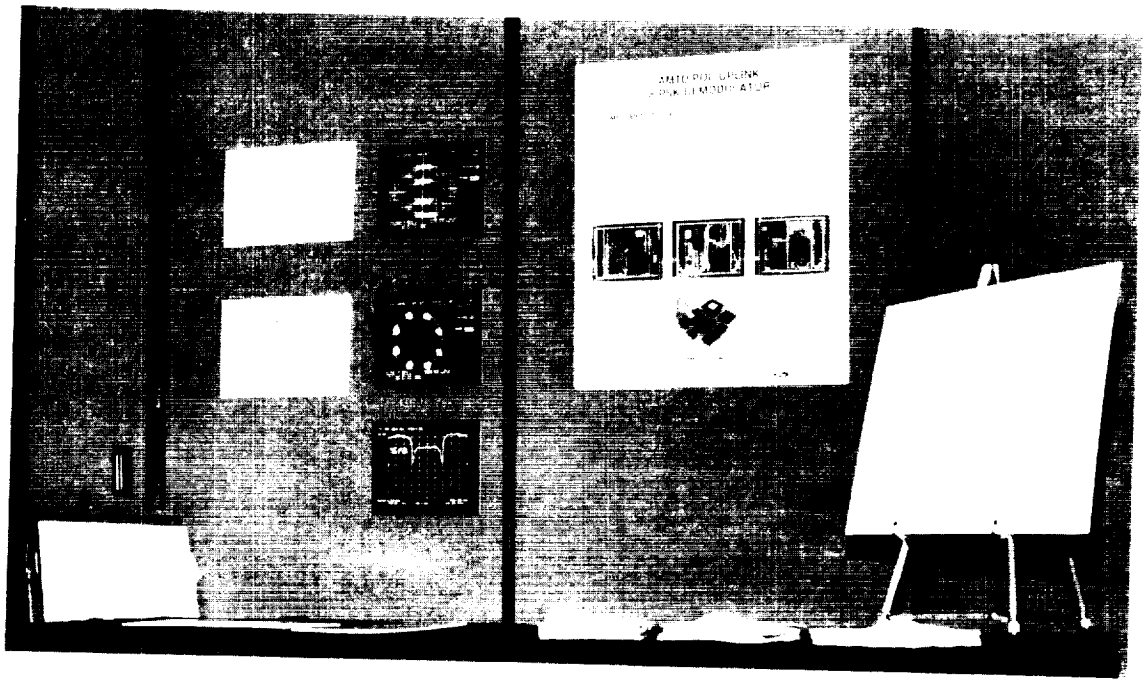
R.J. KERCZEWSKI, NASA LEWIS RESEARCH CENTER



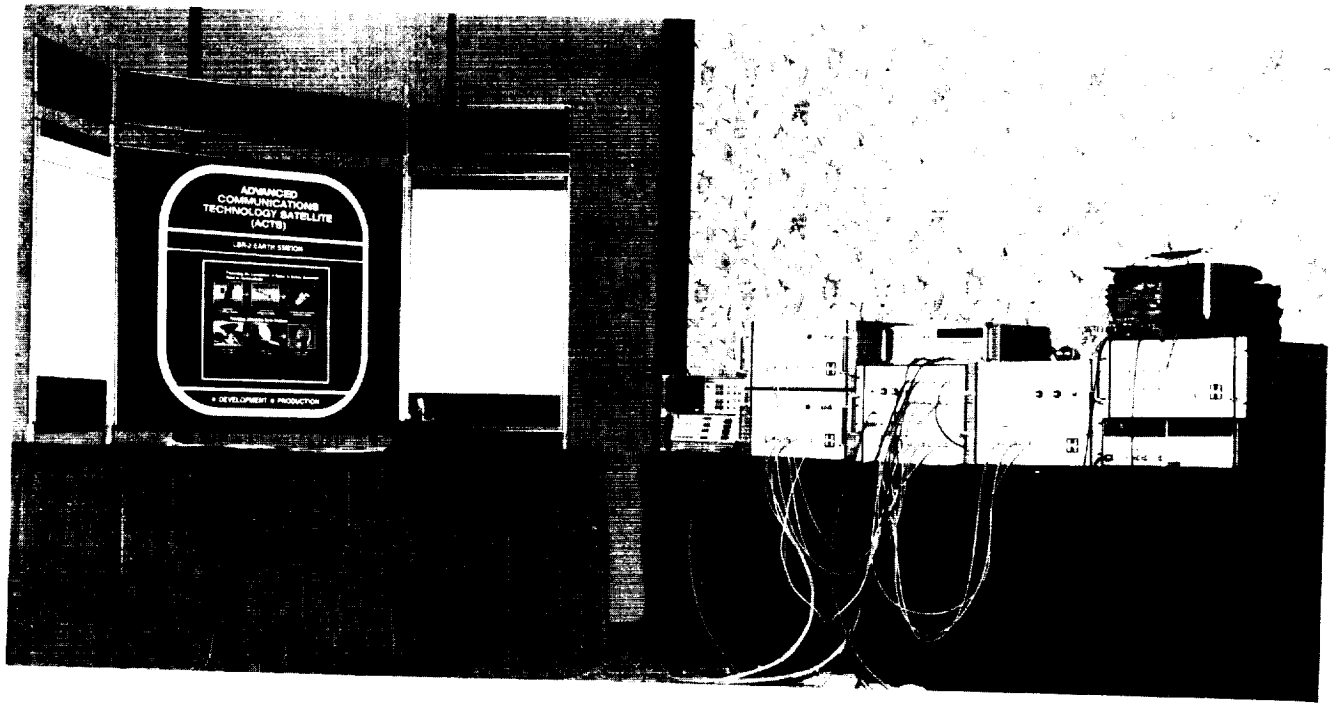
COMSAT Laboratories 225 Mb/s, Add-Compare-Select gate array test circuit and poster display.



COMSAT laboratories rate 8/9 coded 8-PSK proof-of-concept system and poster display.



Ford Aerospace 8-PSK demodulator poster display.



Harris Corporation rate 1/2 coded 16-CPFSK proof-of-concept demodulator and special test equipment and poster display for ACTS LBR-2 Earth Station.

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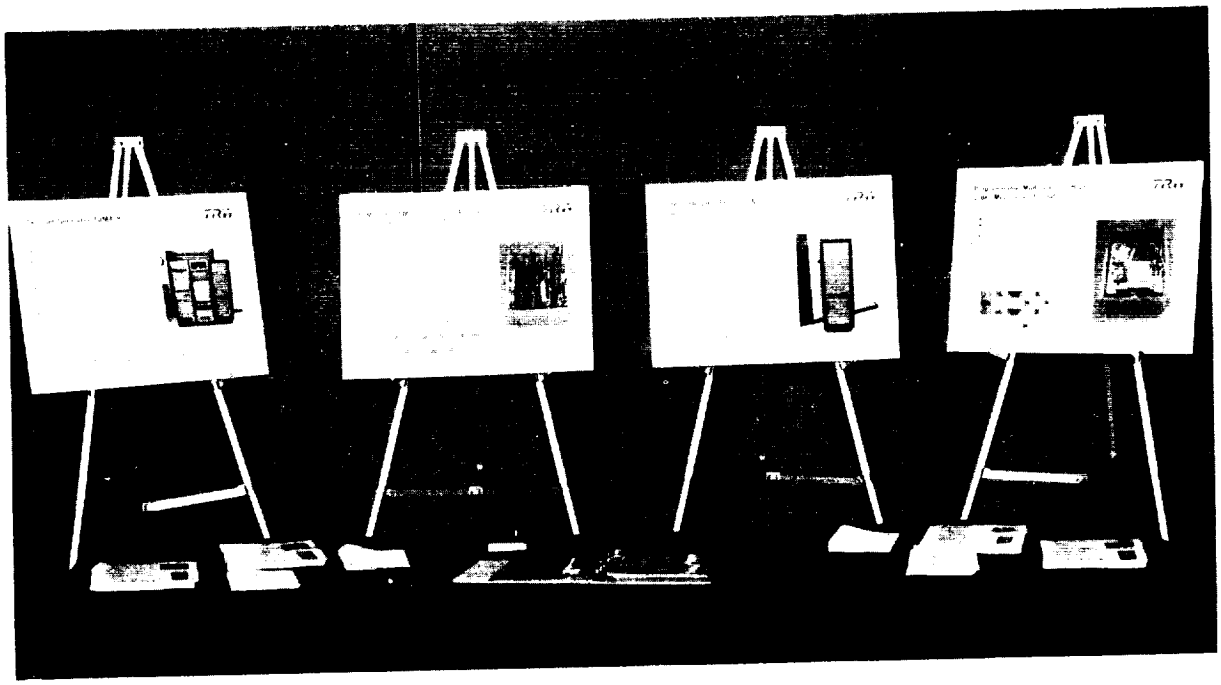
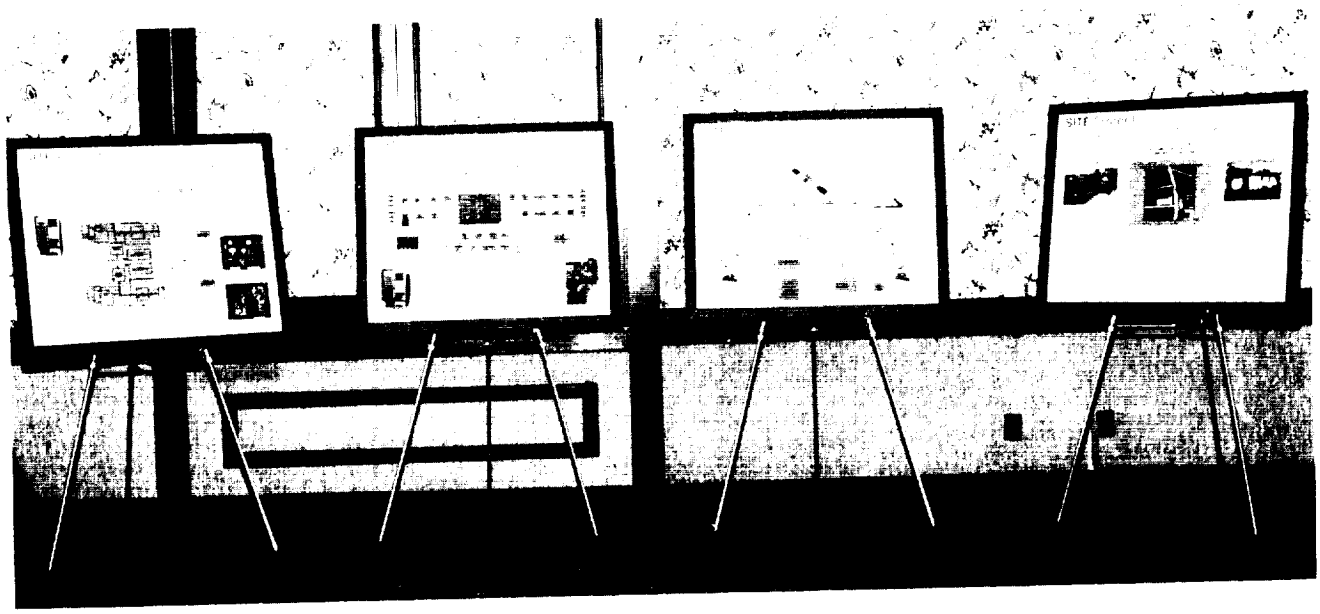


TRW Incorporated rate 3/4 coded 16 QAM posters.



NASA Lewis Research Center Systems Integration, Test and Evaluation (SITE) Project poster display.

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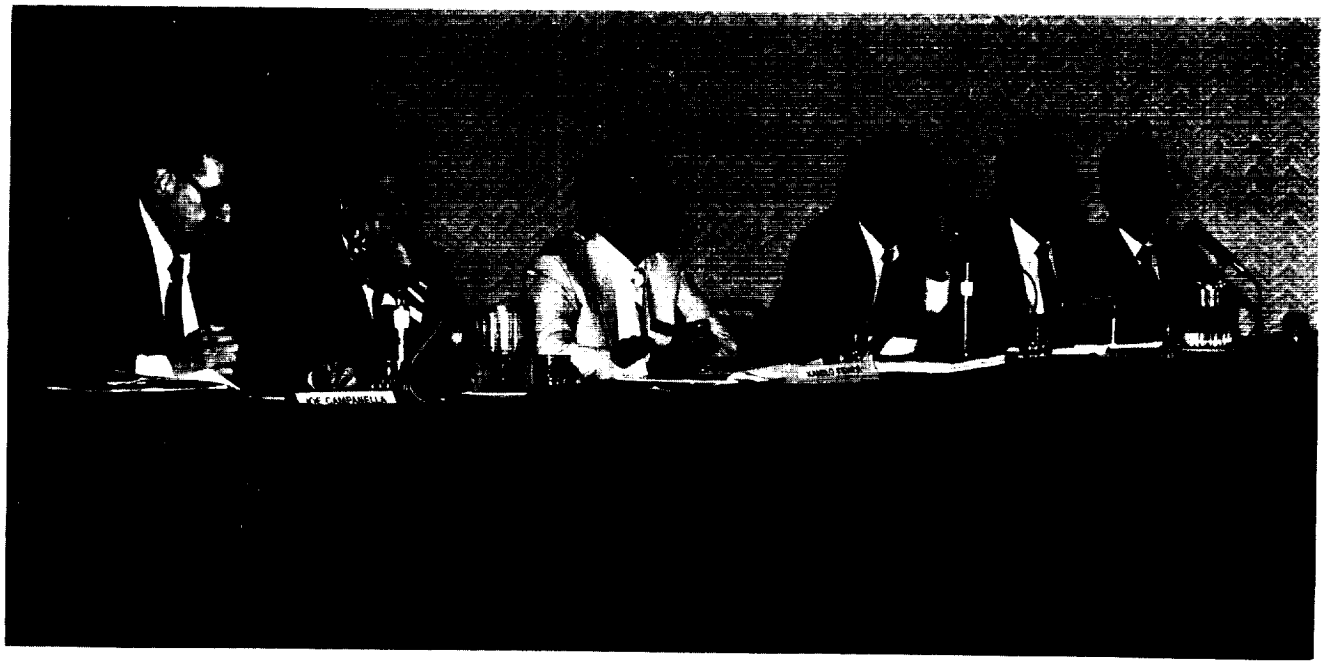
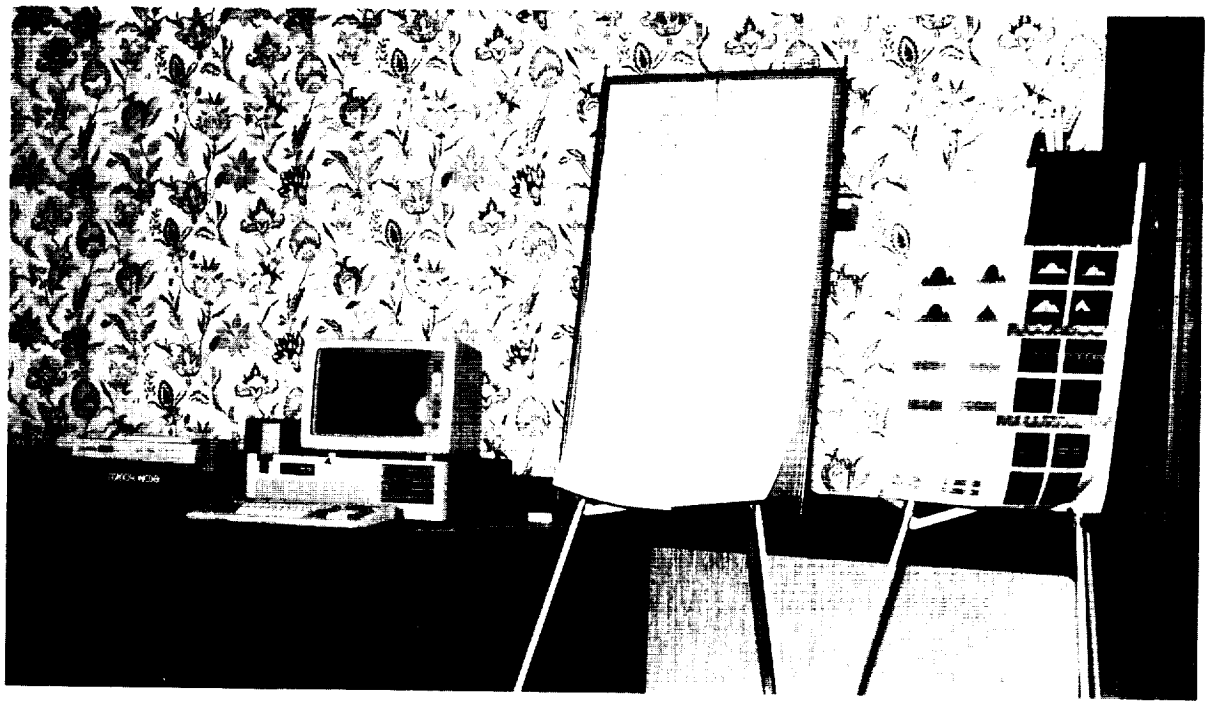


Panel Members: S. Joseph Campanella, Panel Chair (COMSAT Laboritories); Frank Amoroso (Hughes Aircraft); Kamilo Feher (University of California); Peter Liu (Cyclotomics); Carl R. Ryan (Motoroal Incorporated); Al Stern (General Electric)



Motorola Incorporated display and demonstration of computer aided design of communication systems.

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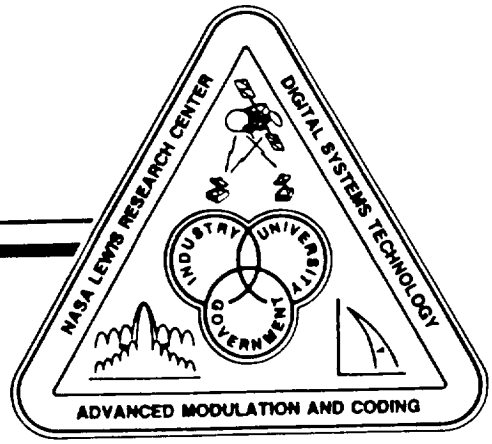
SESSION V

OTHER ADVANCED MODULATION AND CODING PROGRAMS
CHAIR: J.L. HARROLD

ATDRSS 300 MB/S MODEM PROGRAM
C.R. RYAN
MOTOROLA, INCORPORATED

MODULATION AND CODING TECHNOLOGY FOR DEEP SPACE AND SATELLITE APPLICATIONS
J.H. YUEN AND W. RAFFERTY
CALIFORNIA INSTITUTE OF TECHNOLOGY

DIGITAL SYNCHRONIZATION AND COMMUNICATION TECHNIQUES
W.C. LINDSEY
LINCOM CORPORATION



SESSION V CONTINUED

BANDWIDTH EFFICIENT CODING FOR SATELLITE COMMUNICATIONS

SHU LIN
UNIVERSITY OF HAWAII

D.J. COSTELLO, JR.
UNIVERSITY OF NOTRE DAME

W.H. MILLER, J.C. MORAKIS, AND W.B. POLAND, JR.
GODDARD SPACE FLIGHT CENTER