## CONTENTS

Host Chapter: National Capital; Program Committee; and Transactions Staff ........................................ VII
1983-84 Presidential Theme: Growth and Improved Technology through International Cooperation by Richard P. Perry ........................................ VIII
The 1983 Annual Meeting ............................................................................................................................... X
Plenary Address: The Forgotten Fundamentals of the Energy Crisis by Albert A. Bartlett ................................ XII
Summaries of Technical Sessions, Symposiums, Seminars, and Forums ..................................................... XXXII

### FIRST TECHNICAL SESSION

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2762</td>
<td>The Decremented Average Ground-Temperature Method for Predicting the Thermal Performance of Underground Walls</td>
<td>J.M. Ackridge and J.F.J. Poulos</td>
<td>49</td>
</tr>
<tr>
<td>2763</td>
<td>Withdrawn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2764</td>
<td>Correlations for Convective Heat Transfer from Room Surfaces</td>
<td>E.F. Altmayer, A.J. Gadgil, F.S. Bauman, and R.C. Kammerud</td>
<td>61</td>
</tr>
</tbody>
</table>

### SECOND TECHNICAL SESSION

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2765</td>
<td>Simplified Static-Regain Duct Design Procedure</td>
<td>S. Chun-Lun</td>
<td>78</td>
</tr>
<tr>
<td>2766</td>
<td>Withdrawed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2767</td>
<td>Computer-Aided Design of a Grinding Booth for Large Castings</td>
<td>M.D. Zarouri, R.J. Heinsohn, and C.L. Merkle</td>
<td>95</td>
</tr>
<tr>
<td>2768</td>
<td>Numerical Computation of Trajectories and Concentrations of Particles in a Grinding Booth</td>
<td>M.D. Zarouri, R.J. Heinsohn, and C.L. Merkle</td>
<td>119</td>
</tr>
<tr>
<td>2769</td>
<td>A Design Procedure for Estimating Air Intake Contamination from Nearby Exhaust Vents (RP-204)</td>
<td>D.J. Wilson</td>
<td>136</td>
</tr>
</tbody>
</table>

### THIRD TECHNICAL SESSION

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2770</td>
<td>Total Energy Center Wellington Hospital Design of Systems and Services</td>
<td>A.C. Pande</td>
<td>153</td>
</tr>
<tr>
<td>2772</td>
<td>Tobacco Smoke Odor Control—Development of a Test Model (RP-238)</td>
<td>F. Jarke, W. Stepp, and H.J. O'Neill</td>
<td>186</td>
</tr>
<tr>
<td>2773</td>
<td>Air Quality in Public Buildings with Health Related Complaints</td>
<td>T.D. Sterling, E. Sterling, and H.D. Dimich-Ward</td>
<td>198</td>
</tr>
<tr>
<td>2774</td>
<td>Analysis of Indoor Air Acceptability Data from a Public Buildings Ventilation Study</td>
<td>A. Dravnieks</td>
<td>213</td>
</tr>
<tr>
<td>2775</td>
<td>Utilization of Condenser Heat for Desiccant Dehumidifiers in Supermarket Applications</td>
<td>N.L. MacDonald</td>
<td>225</td>
</tr>
</tbody>
</table>

### FOURTH TECHNICAL SESSION

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2776</td>
<td>The Impact of Lighting Fixtures on Heating and Cooling Loads—Mathematical Model (RP-231)</td>
<td>H.D. Ball and D. Green</td>
<td>236</td>
</tr>
<tr>
<td>2777</td>
<td>The Impact of Lighting Fixtures on Heating and Cooling Loads—Application to Design (RP-231)</td>
<td>H.D. Ball</td>
<td>259</td>
</tr>
<tr>
<td>2778</td>
<td>Applying the Techniques of Process Control to the HVAC Process</td>
<td>B.G. Liptak</td>
<td>288</td>
</tr>
<tr>
<td>2779</td>
<td>Simple Design Method for Shading Devices and Passive Cooling Strategies Based on Monthly Average Temperatures</td>
<td>B.J. Novell</td>
<td>308</td>
</tr>
<tr>
<td>2780</td>
<td>The Solar House</td>
<td>J.I. Starobin and L. Starobin</td>
<td>317</td>
</tr>
</tbody>
</table>
FIFTH TECHNICAL SESSION

2781 The Effect of Garment Design on the Thermal Insulation Values of Clothing (RP-317) by E.A. McCullough, B.W. Jones, and P.J. Zbikowski .................................................. 327
2782 Heat Flow Characteristics of Single and Multiple Layer Fabrics by K.S. Grise, G.C. Goswami, and C.B. Hassenbeohler, Jr. ................................................................. 353
2783 Modeling of a Residential Thermostat and the Duty Cycle of a Compressor-Driven HVAC System by N.V. Nguyen and V. Goldschmidt ......................................................... 361
2785 The Effect of Draft Hood Design on the Seasonal Efficiency of Gas-Fired Appliances (RP-242) by D.W. DeWerth ................................................................. 383

SIXTH TECHNICAL SESSION

2787 Simulation Model of a Vapor Compression Refrigeration System by H. Yasuda, S. Tobra, and C.H.M. Machielsen ................................................................. 408
2788 A Solid Alternative to Oil-Impregnated Capacitors by D.E. Koechl ................................................................. 426
2789 Simulation Parameters and Methods of Finding Equilibrium Statepoints in Refrigerant Systems by S.D. Goldstein ................................................................. 436
2790 A Mathematically Complete Analysis of Plate-Fin Heat Exchangers by S.D. Goldstein ................................................................. 447

SEVENTH TECHNICAL SESSION

2791 An Experimental Study of Flow Patterns During Condensation Inside a Horizontal Tube by T.N. Tandon, H.K. Varma, and C.P. Gupta ................................................................. 471
2792 A Study of Water Vapor Transmission through Insulation under Steady State and Transient Conditions by L.R. Glicksman and S. Katsenelenbogen ................................................................. 483
2793 Formulations for the Thermodynamic Properties of the Saturated Phases of H₂O from 173.5 K to 473.5 K (RP-216) by R.W. Hyland and A. Wexler ................................................................. 500
2794 Formulations for the Thermodynamic Properties of Dry Air from 173.5 K to 473.5 K, and of Saturated Moist Air from 173.5 K to 372.5 K, at Pressures to 5 MPa (RP-216) by R.W. Hyland and A. Wexler ................................................................. 520
2795 Formulations for Thermodynamic Properties of Moist Air at Low Pressures as Used for Construction of New ASHRAE SI Unit Psychrometric Charts (RP-257) by R.B. Stewart, R.T. Jacobsen, and J.H. Becker ................................................................. 536

EIGHTH TECHNICAL SESSION

2796 Energy Considerations in Hot-Gas Defrosting of Industrial Refrigeration Coils (RP-193) by W.F. Stoecker, J.J. Lux, Jr., and R.J. Kooy ................................................................. 549
2797 A Multiple (Solar, Air, and Water) Source Heat Pump for Cold Climates (RP-247) by K.I. Krakow and S. Lin ................................................................. 574
2798 A Computer Model for the Simulation of Multiple Source Heat Pump Performance (RP-247) by K.I. Krakow and S. Lin ................................................................. 590
2799 Toward an Efficient Operation of a Series Solar Heat Pump System by T.Y. Bong ................................................................. 617
2800 A Generalized Computer Program for Analysis of Mixture Refrigeration Cycles by H.A. Connon ................................................................. 628

SOCIETY BUSINESS

ASHRAE Officers, Directors, Committeemen, Staff ................................................................. 643
ASHRAE Technical Committees and Task Groups ................................................................. 646
1983-84 ASHRAE Standards Project Committees ................................................................. 655
ASHRAE Past Meetings ................................................................. 659
Society Presidents ................................................................. 660
ASHRAE Honors and Awards ................................................................. 661
ASHRAE International Associates ................................................................. 666
In Memorium, July 1982 to June 1983 ................................................................. 667

Index of Technical and Symposium Papers, Volume 89, Parts 2A and 2B ................................................................. 669

VI
CONTENTS

Host Chapter: National Capital; Program Committee; Transactions Staff ........................................ VII
Summaries of Technical Sessions, Symposiums, Seminars, and Forums .......................................... VIII

DC-83-1 DISTRICT HEATING SYSTEMS IN EUROPE
  Growth and Development of District Heating in Finland by O.A. Seppanen and U. Kilpinen ........ 5
  District Heating Systems with Alternative Energy Sources by L. Astrand .......................... 19
  The Situation and Development of the District Heating System in West Germany and Berlin by K. Kromm ................................................................. 31
  Present Status and Development Trends of District Heating in Hungary by I. Papp ........... 55
  Development of Advanced Design, Insulation, and Installation Practices for Hot Water District Heating Piping by R. Huovilainen .................................................. 71
  Lausanne District Heating System—Particularities, Rates, and Exergy Considerations by P. Suter 85

DC-83-2 LARGE-SCALE APPLICATIONS OF INFRARED SENSING
  Applications of Aerial Thermography for Residential Energy Analysis by S.J. Treado and D.M. Burch 95
  Trends in Quantitative Aerial Thermography by J.R. Schott and E.P. Wilkinson ................ 102
  Thermography—A Diagnostic Tool to Locating Wet Insulation in Built-up Roofing Systems by A.H. Knehans and P.E. Styer ................................................................. 112
  Thermal Images of 4,000 Buildings in Oak Creek, WI, Using Ground-Based, Mobile Infrared Scanning Equipment by D.W. Baraniak ......................................................... 118

DC-83-3 AIR INFILTRATION MODEL VALIDATION—PART 1
  The Air Infiltration Center's Program of Model Validation by M.W. Liddament .................. 129
  Field Verification of the Air Infiltration Model Used in the Computer Program ENCORE by S. Usvlokk ................................................................. 146
  A Detailed Examination of the LBL Infiltration Model Using the Mobile Infiltration Test Unit by M.P. Modera, M.H. Sherman, and P.A. Levin .................................................. 157

DC-83-4 AIR INFILTRATION MODEL VALIDATION—PART II
  A Comparison of Measured and Predicted Infiltration Rates by A.K. Persily and G.T. Linteris .... 183
  Development of the Air Infiltration Model for the Energy Performance Design System by C.P. Crall ................................................................. 201
  Correlating Measured Infiltration for Wind from a Single Direction by D.J. Wilson and W. Pittman 211

DC-83-5 IS THERE A GOOD REASON WHY ALL EMC SYSTEMS DO NOT SPEAK THE SAME LANGUAGE?
  Software Aspects of Energy Management Systems by R.D. Stinaff ................................ 231
  The Structure of Energy Management Systems by D.E. Miller ............................................ 239
  Data Communications in Energy Management and Control Systems: Issues Affecting Standardization by H.M. Newman ................................................................. 249

DC-83-6 CONDENSIBLE GASES IN THE EFFLUENT AIR FOR MODERATE TEMPERATURES
  The Effect of Moderate Temperature Effluents on Selected Materials Used in Air-to-Air Energy Recovery Equipment—Commercial Offices and Restaurants by K. Tangri, A.H. Yegneswaran, and P. Giese ................................................................. 284