

'The Human Habitat—1994' Will Keynote 1970 Semiannual Meeting in San Francisco

A LOOK into the future will be the theme for ASHRAE's 1970 Semiannual Meeting to be held January 19-22 at the San Francisco-Hilton Hotel, San Francisco. The keynote address, to be presented at the Plenary Session by ASHRAE Presidential Member William L. McGrath, will be *The Human Habitat—1994*. Mr. McGrath's address will culminate the Society's celebration of its 75th anniversary.

Approximately 75 papers will be presented at the four Technical Sessions and 17 Symposiums during the four-day meeting. In addition, there will be five off-the-record Forums.

- Symposiums will cover:
 - Air Transport of Fresh Meat
 - Direct Contact Refrigerant Freezing of Foods
 - Pre-cooling Fruits and Vegetables
 - Reciprocating Refrigeration Compressor

- Flow Measurement—Parts I and II
- Domestic Refrigerator and Room Air Conditioner
- Survival Shelter Problems—Parts I and II
- Temperature and Humidity Control for Man and Products
 - Heat Pumps
 - Printing Plant Air Conditioning
 - Comparative Analysis of Packaged and Central System Refrigeration
 - Fire Hazards in Buildings
 - Human Factors
 - District Chilled Water Systems
 - Fan Application
 - Cooling Towers
 - Air Pollution

- Forums will be held on:
- Motor Installation used in Hermetic Systems
 - Freeze Protection on Liquid Chilling Packages
 - Domestic Refrigerator and Room

Air Conditioner

- Air Pollution Control

Technical Session papers vary from Development and Evaluation of a General Method for Design of Small Acoustic Filters; to An Investigation of Refrigerants for Single-Stage Centrifugal Water Chillers; to Moisture Permeation of Clothing—A Factor Governing Thermal Equilibrium and Comfort; to Effect of Irrigation on Humidity at Three Air Force Bases, Southwest United States.

President William G. Hole will report on the Society's activities at the Monday Welcome Luncheon on January 19 and three high awards—F. Paul Anderson, Honorary Member and ASHRAE-Alco—will be conferred at the banquet on Tuesday evening.

Acting as host is the Golden Gate Chapter; General Chairman is Joseph E. Murray.

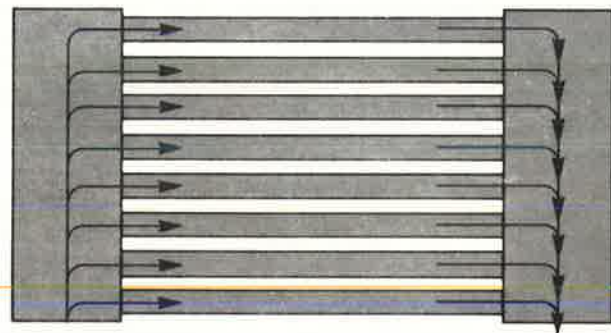
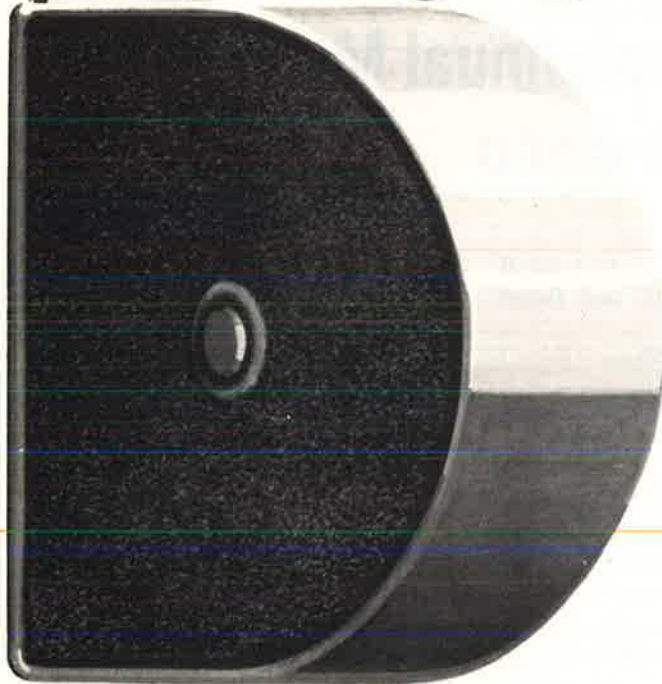
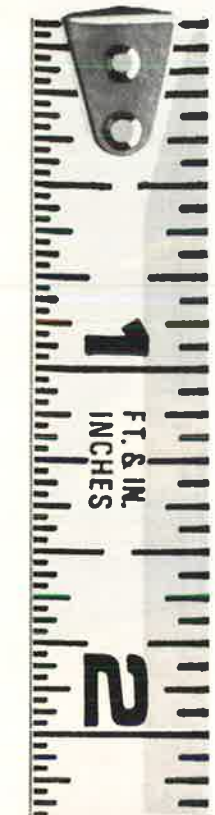
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Joseph E. Murray, right, General Chairman of the 1970 Semiannual Meeting, and Thomas E. Brewer, Past President of the host Golden Gate Chapter, shake hands in front of San Francisco's City Hall. Mr. Brewer is President of the Western Air Conditioning Industries Assn which is sponsoring the Western Air Conditioning Exposition, to be held concurrently with ASHRAE's meeting

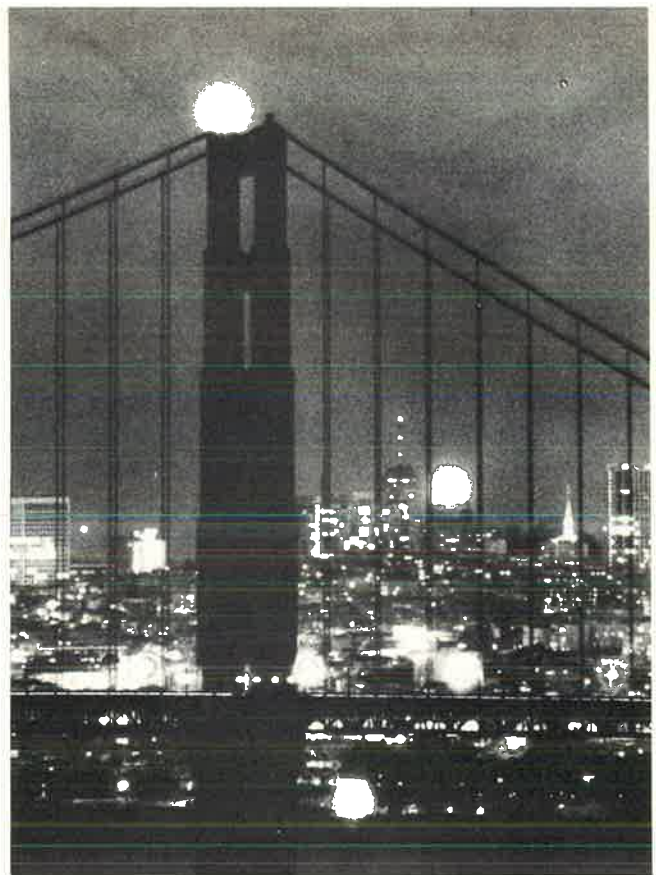
'A Look into the Future' Will Keynote 1970 Semiannual Meeting in San Francisco

MORE than 1000 members and guests are expected to attend ASHRAE's 1970 Semiannual Meeting, January 19 to 22, at the San Francisco-Hilton Hotel, San Francisco. ASHRAE Presidential Member William L. McGrath will keynote the future-directed theme with his Plenary Session address: The Human Habitat - 1994.

Approximately 75 papers will cover a broad scope of the challenges confronting heating, refrigerating and air-conditioning engineers - Air Transport of Fresh Meat; Survival Shelter Problems; Temperature and Humidity Control for Man and Products; Heat Pumps; Reciprocating Refrigeration Compressors; Fire Hazards in Buildings; Flow Measurement; Cooling Towers; Human Factors; Fan Applications; Air Pollution - to name but a few.

ASHRAE President William G. Hole will report on the Society's activities at the luncheon on Monday, January 19; and on Tuesday evening, honors and awards will be conferred upon members selected for their service to the public, the Society and their profession.

Program: ASHRAE 1970 Semiannual Meeting



PLENARY SESSION

Keynote Speaker: WILLIAM L. MC GRATH, exec vice pres, Carrier Air Cond Co, Syracuse, N.Y.

Subject: The Human Habitat - 1994

FIRST TECHNICAL SESSION

Chairman: T.J. WHITE, district mgr, American-Standard Industries, San Mateo, Calif.

Some Effects of Particle Size on Measurements of Fine Airborne Particulates - N.G. ZIESSE, grad student and G.W. PENNY, prof, Carnegie-Mellon Univ., Pittsburgh, Pa.

Development and Evaluation of a General Method for Design of Small Acoustic Filters - DR. W.S. GATLEY, assoc prof, Mech & Aerospace Engrg, Univ. of Missouri, Rolla Mo., and DR. R. COHEN Herrick Labs, Purdue University, W. Lafayette, Ind.

SECOND TECHNICAL SESSION

Chairman: J.L. IBISON, cons engr, Houston Tex.

Computer Calculation of the Theoretical Performance Properties of Fluorocarbon Refrigerants - J.A. SCHOFIELD, proj scientist, Union Carbide Corp, Tarrytown, N.Y.

Extensive Viscosity Correlations for Refrigerants (Halogenated Hydrocarbons) in Liquid and Vapor Phases - DR. B. LATTO, asst prof, McMaster Univ., Hamilton, Ont., Canada, and ABDUL AL-SALOOM, cons engr, Bagdad, Iraq.

An Investigation of Refrigerants for Single-State Centrifugal Water Chiller - T. ATWOOD, tech supv, Research Dept, Allied Chemical Corp, Specialty Chemicals Div, Morristown, N.J., and K.P. MURPHY, tech supv, Research Dept, Buffalo Research, Buffalo, N.Y.

Performance of Advanced Heat Transfer Tubes in Refrigerant-Flooded Liquid Coolers - A.M. CZIKK, sr engr, C.F. GOTTMANN, mgr, New Products Dvlpt, and

E.G. RAGI, asst staff engr, Union Carbide Corp, Linde Div, Tonawanda, N.Y.; J.G. WITHERS, mgr Heat Transfer Products, and E.P. HABBAS, dvlpt engr, Wolverine Tube Div, Universal Oil Products Co, Allen Park, Mich.

THIRD TECHNICAL SESSION

Chairman: J.K. THORNTON, chief engr, Cargocaire Engrg Co, Amesbury, Mass.

Subjective Warmth in Relation to the Density, Duration, and Areal Extent of Infrared Irradiation - DR. J.C. STEVENS, Fellow, and L.E. MARKS, Assoc Fellow, John B. Pierce Foundation Lab, New Haven, Conn.

Thermal and Comfort Sensations of Sedentary Persons Exposed to Asymmetric Radiant Fields - DR. P.E. MC NALL, head, Mech Engrg Dept, Kansas State Univ., Manhattan, Kan., and R.E. BIDDISON, research engr, Bendix Corp, Davenport, Iowa.

Moisture Permeation of Clothing - A Factor Governing Thermal Equilibrium and Comfort - DR. Y. NISHI, Asst Fellow and Research Assoc, and DR. A.P. GAGGE, Fellow and Prof of Environmental Physiology, John B. Pierce Foundation Lab and Yale Univ., New Haven, Conn.

The Effects of Fluctuating Temperature and Relative Humidity on the Thermal Sensation (Thermal Comfort) of Sedentary Subjects - C.H. SPRAGUE, asst prof, Dept of Mech Engrg, Kansas State Univ., Manhattan, Kan., and DR. P.E. MC NALL.

FOURTH TECHNICAL SESSION

Chairman: R.P. PERRY, mgr of engr - chief engr, Gibson Products Corp, Greenville, Mich.

A Critical Assessment of High Velocity Duct Design Information - R. ESCHMAN, staff engr, Thomas John & Assoc Inc, Corpus Christi, Tex., and PROF. W.E. LONG, Dept of Mech Engrg, Univ. of Texas, Austin, Tex.

An Experimental Study of Losses in Round Mitered El-

bows, Mitered Tees and Capped Crosses — PROF. C.F. SEPSY, research supv, and DR. C.D. JONES, prof, Mech Engrg, Ohio State Univ., Columbus, Ohio.

Room Air Distribution Performance of Ventilating Ceiling and Cone-Type Circular Ceiling Diffusers — DR. P.L. MILLER, assoc prof, Mech Engrg, and DR. R.G. NEVINS, dean, College of Engrg, Kansas State Univ., Manhattan, Kan.

Effect of Irrigation on Humidity at Three Air Force Bases, Southwest U.S. — O.E. RICHARD, chief engr, Meteorology Branch, and CAPT. HILDA J. SNELLING, group environmental analyst, USAF Environmental Technical Appln Center, Washington, D.C.

SYMPOSIUM: AIR TRANSPORT OF FRESH MEAT

Chairman: H.F. BERNHOLDT, mgr, Fresh Meat Research, Swift & Co, R & D Center, Oakbrook, Ill.

Cargo Aircraft of the 70's — E.W. GILL, deputy dir, Advanced Cargo Systems, McDonnell Douglas Corp, Long Beach, Calif.

Container Design for Fresh Meat Shipment

Servicing the Aircraft — Problems of Intermodal Handling — E.A. HUNTER, staff mgr, Freight Service Dvlpt, United Air Lines Inc, Chicago, Ill.

Economics of Air Freight Shipment of Fresh Meats — J.A. FOSTER

Summary — G.J. GODBOUT

SYMPOSIUM: DIRECT CONTACT REFRIGERANT FREEZING OF FOODS

Chairman: A.W. RUFF, vice pres, St. Onge, Ruff & Assoc Inc, York, Pa.

The Liquid "Freon" Freezant (LFF) System — DR. J.J. DALY, JR., mgr, Technical & Market Div, du Pont Co, "Freon" Products Div, Food Systems Sec, Wilmington, Del.

Recent Advances in the Liquid Nitrogen Freezing of Foods — J.T. SILLS, prod mgr, Air Products & Chemicals, Allentown, Pa.

Freezing Preservation of Foods with Liquid Carbon Dioxide and Dry Ice — K.A. LEHNER, mgr, Appln Engrg, Airco Industrial Gases — Pacific, Vernon, Calif.

SYMPOSIUM: FLOW MEASUREMENT

Chairman: DR. R. COHEN, Herrick Labs, Purdue Univ., W. Lafayette, Ind.

Flowmeter Calibrations, Procedures and Facilities at NBS — F.W. RUEGG, chief, and M.R. SHAFER, research engr, Fluid Meters Section, Mechanics Div, National Bureau of Standards, Washington, D.C.

Air Flow Measurements — E.A. CRUSE, admin dir, Air Moving & Conditioning Assn, Arlington Heights, Ill.

Liquid Flow Measurements — Special Considerations — DR. D.R. TREE, asst prof, Purdue Univ., School of Mech Engrg, Lafayette, Ind.

Refrigerant Flow Measurements with Contaminants Present — H.M. BRODY, chief engr, American-Standard — Applied Air Cond Dept, Columbus, Ohio.

Modern Anemometers vs Traditional Flowmeters — DR. M.H. GRAY, III, research engr, Corporate Research Div, Whirlpool Corp, Benton Harbor, Mich.

Things to Come: Improved Flowmeter Accuracy with Electro-Mechanical Feedback — L. KATZ, pres, Astro Dynamics Inc, Burlington, Mass.

SYMPOSIUM: PRECOOLING FRUITS AND VEGETABLES

Chairman: DR. I.J. PFLUG, Environmental Health, Space Science Center, Univ. of Minnesota, Minneapolis, Minn. Principles and Equipment for Precooling — A.H. BENNETT, research agric engr, Southeastern Agricultural Research Lab, USDA — ARS, Athens, Ga.

Precooling in the West — R. GUILLOU, Davis, Calif.

Precooling in the Great Lakes Region — DR. D.H. DEWEY and DR. R.C. HERNER professors, Dept of Horticulture, Michigan State Univ., E. Lansing, Mich.

Precooling in the Southeast — PROF. R.K. SHOWALTER, Inst of Food & Agric Sciences, Dept of Vegetable Crops, Univ. of Florida, Gainesville, Fla., and DR. W.H. GRIERSON, head, Harvesting & Handling Section, Citrus Experiment Station, Lake Alfred, Fla.

An Engineering-Economic Evaluation of Different Concepts for Precooling Citrus Fruits — J.J. GAFFNEY, agric engr, Univ. of Florida, Gainesville, Fla.

Summary — D.A. DIXON

SYMPOSIUM: RECIPROCATING REFRIGERATION COMPRESSOR

Chairman: W.J. WEST, mgr, UEF Compressor Operations Dev Engrg, Carrier Air Cond Co, Syracuse, N.Y.

Compressor Reliability — H.P. SOUMERAI, dir, R & D, Dunham-Bush, W. Hartford, Conn.

Hermetic Reciprocating Compressor Noise — D.J. INGALLS, acoustical engr, Hermetic Compressor Dept, Carrier Corp, Syracuse, N.Y.

The Dynamics of the Modern Reciprocating Compressor — R.E. COMSTOCK, vice pres — operations, Copeland Refrig Corp, Sidney, Ohio.

System Design and Installation — M.W. GARLAND, sr constl, Frick Co Inc, Waynesboro, Pa.

Hermetic Compressor Solid-State Motor Protection — B.B. GLIMP, sr proj engr, Delco Prods Div, General Motors Corp, Dayton, Ohio.

Compressor Specifications — T.G. FOSTER, mgr of engrg, Hermetic Compressor Dept, Carrier Corp, Syracuse, N.Y.

SYMPOSIUM: DOMESTIC REFRIGERATOR AND ROOM AIR CONDITIONER, The Room Air Conditioner Story

Chairman: P.E. KOLB, vice pres & dir of engrg, Fedders Corp, Edison, N.J.

Historical Background of the Room Air Conditioner — E. MACLEOD, consumer prod planning mgr, Carrier Air Cond Co, Syracuse, N.Y.

Room Air Conditioner Design Parameters — Performance — F.S. METCALFE, mgr engrg, Room Air Conditioners, Westinghouse Elec Corp, Columbus, Ohio.

Room Air Conditioner Design Parameters — Structural and Material Selection — J.P. SLATTERY, mgr prod engrg, General Elec Co, Louisville, Ky.

What's Behind The U and The L? — W.H. FARRELL, mng engr, Heating, Air-Cond & Refrig Dept, Underwriters' Laboratories Inc, Northbrook, Ill.

ASHRAE Technical Standards — G.W. SISK, JR., mgr, Advanced Dev Air Conditioners & Dehumidifiers, Whirlpool Corp, Evansville, Ind.

Trade Association Standards — G.C. SMITH, chief engr, Room Air Conditioners, Friedrich Div, Crutcher Resources Corp, San Antonio, Tex.

THIRD TECHNICAL SESSION — WEDNESDAY, JANUARY 21, 9:00 A.M.

Chairman — Joseph K. Thornton

Member ASHRAE

Subjective Warmth in Relation to the Density, Duration, and Areal Extent of Infrared Irradiation

J.C. STEVENS

L.E. MARKS

Affiliate Member ASHRAE

Subjective warmth aroused by infrared irradiation of the skin grows in magnitude as a power function of the flux density of the irradiation. The exact size of the exponent of the power function depends on the duration of the exposure and its areal extent.

Subjective warmth correlates well with flux density but poorly with flux duration. Since skin temperature depends on both density and duration, the proximal stimulus for subjective warmth cannot be skin temperature *per se*. A number of other common hypotheses concerning the

nature of the proximal stimulus are also at odds with the data on apparent warmth.

Flux density and areal extent can be traded for each other to preserve the same sensation of apparent warmth. At very low sensation levels, the rule of trading is virtually complete reciprocity. With increasing sensation level, area becomes a progressively less effective determinant of warmth than flux density, and as a result, at higher sensation levels it takes a much larger percentage change in area to offset a given percentage change in density.

Thermal and Comfort Sensations of Sedentary Persons Exposed to Asymmetric Radiant Fields

P.E. MC NALL

R.E. BIDDISON

Member ASHRAE

This paper reports the results of a study which compared human subjects' overall thermal sensations with their comfort sensations when exposed to asymmetric radiant fields. The radiant fields were obtained at the KSU-ASHRAE laboratory by simulating certain situations often found in the field; for example, cooled or heated ceilings and cold or warm window walls.

Subjects were exposed for a 3-hr period to each

environmental condition. Their thermal comfort responses were taken each 1/2 hr, and were analyzed statistically. For these tests, 236 subjects were used. By comparing the thermal and comfort sensations, it was possible to establish some preliminary limits of asymmetry in which subjects felt neither too warm nor too cool, but were uncomfortable due to feeling cool on one part of their bodies and warm on another part.

Moisture Permeation of Clothing — A Factor Governing Thermal Equilibrium and Comfort

Y. NISHI

A.P. GAGGE

Member ASHRAE

Member ASHRAE

A permeation efficiency factor that describes the cooling efficiency of sweating on the skin surface for a clothed human body is defined theoretically in terms of the convective heat transfer coefficient and the thermal insulation of the clothing. Sublimation of naphthalene is used to simulate the process of diffusive mass flow of water vapor from a skin surface through clothing to the ambient

environment. Experimental data derived by naphthalene sublimation validate the theoretically predicted permeation efficiency factor for naphthalene. By comparing the physical properties of naphthalene and water vapor, the same experimental data are used to validate the theoretically predicted value of the permeation efficiency factor for water vapor.

The Effects of Fluctuating Temperature and Relative Humidity on the Thermal Sensation (Thermal Comfort) of Sedentary Subjects

C.H. SPRAGUE

P.E. MC NALL

Member ASHRAE

Two series of tests, one to assess the effects of fluctuating dbt and the other to assess the effects of fluctuating rh on the thermal comfort of lightly clothed, sedentary, young adult subjects are described. In each series, all thermal variables except the fluctuating variable were held constant. These tests were conducted in the KSU-ASHRAE environmental chamber and were designed to provide data,

under controlled conditions, for comparison with ASHRAE Standard 55-66 on fluctuating temperature and humidity. Results from these tests show that ASHRAE Standard 55-66, Section 3.1.3 on fluctuating dbt, and Section 3.2.2 on fluctuating rh are reasonable but conservative. A simplified method of finding acceptable temperature cycling rates and amplitudes for field applications is suggested.

FOURTH TECHNICAL SESSION — THURSDAY, JANUARY 22, 9:00 A.M.

Chairman — Richard P. Perry
Member ASHRAE

A Critical Assessment of High Velocity Duct Design Information

R. ESCHMAN W.E. LONG
Member ASHRAE Member ASHRAE

This paper is the result of an extensive literature search in the field of high velocity duct design. Research to determine the state-of-the-art in this field was prompted by the unsatisfactory data available to design engineers and by a desire to uncover all previous research work before performing actual laboratory tests.

It was found that, in general, an inadequate amount of information is available for the satisfactory design of a complete high velocity duct system. While airflow in a few

types of fittings has been investigated by several research groups or individuals, most fittings and combinations of duct components have been tested by only one proprietary group or have not been tested at all under high velocity conditions. The lack of correlated and confirmed data does not, however, preclude the use of the limited dependable data that do exist for certain special fittings and duct components. Data available in the literature are presented, along with a complete bibliography.

An Experimental Study of Losses in Round Mitered Elbows, Mitered Tees and Capped Crosses

C.F. SEPSY C.D. JONES
Member ASHRAE Member ASHRAE

Pressure loss coefficients were determined for round, 8-in. diameter miter elbows with body alterations, circular arc turning vanes and cascades of commercially available turning vanes. It was determined that the use of appropriately designed and oriented turning vane cascades could reduce losses to values equal to those for sweep elbows of 1.5 radius ratio.

Loss coefficients for miter tees, with 12-in. diameter inlet and 8-in. diameter branches, with and without turning

vanes, were found to be equal to those of equivalent miter elbows, as is usually assumed, if the flow is equally divided between the branches. However, unvaned miter tees were found to deviate from this assumption when branch flows were unequal.

Capped crosses ("cushion head tees") were found to have very high loss coefficients, more than four times those for miter tees, which varied considerably with branch-to-main velocity ratio.

Room Air Distribution Performance of Ventilating Ceiling and Cone-Type Circular Ceiling Diffusers

P.L. MILLER R.G. NEVINS
Member ASHRAE Member ASHRAE

This paper is the third in a series which describes the results of an experimental program to determine how various parameters affect the air distribution performance of different types of air distribution systems. Included are values of the Air Distribution Performance Index (ADPI) obtained while using the cone-type circular ceiling diffusers and vertical temperature variations obtained with both ven-

tilating ceilings and diffusers.

It is concluded that ADPI, for a system using cone-type circular ceiling diffusers, is a function of room load, airflow rate and diffuser discharge pattern. Good air distribution (high ADPI) may be obtained with systems using diffusers but proper attention must be given to the diffuser throw characteristics and relative room size.

Effect of Irrigation on Humidity at Three Air Force Bases, Southwest, United States

O.E. RICHARD HILDA J. SNELLING
Member ASHRAE

The USAF Environmental Technical Applications Center was asked by the Air Force Office of Civil Engineering to investigate the possibility that the climate in the southwest section of the United States was becoming more humid. This request originated with base civil engineers who claimed that due to increased irrigation, the climate has

become more humid and evaporative cooling is no longer effective.

A study was made of wbt, dew point, and rh at three Air Force Bases and acreage under irrigation in surrounding counties. The findings do not support the contention that the humidity has increased.

Located throughout the country, these installations provide extensive performance and maintenance data which was all tabulated and put in final report form. Each test unit was kept on-line for a minimum period of one year so that its characteristics could be determined over a complete

heating and cooling operating cycle. A complete analysis of the data on these EEI improved heat pump unit installations should make a significant contribution toward continued improvement on both performance and in the economic feasibility of heat pump apparatus.

Why a Heat Pump Project

GUY CHEEK **L.E. BLADES**
Member ASHRAE

The EEI Heat Pump Improvement Research Project was initiated in 1963 under the sponsorship of the Institute's Space Conditioning Policy Committee. The primary objective of the program was to improve the reliability and

performance of heat pump equipment.

Ultimately, 200 units of each type were designed, assembled, and installed for field testing in the service territories of some 57 EEI member companies.

Design and Operating Cycle – Single-Phase Units

G.L. BIEHN
Member ASHRAE

To meet the criteria for reliability as established by the EEI Task Committee a new concept of the heat pump cycle appeared to offer the greatest potential. A report on this evaluation and the subsequent development of the cycle

and its components is presented in conjunction with a description of the salient features of the unit designed for this important project. Included is a comparison of the cycle performance characteristics.

Design and Operating Cycle – Three-Phase Units

J.R. SCHREINER

This paper will describe the 3-phase, 5-ton, single-package commercial heat pump developed by Carrier Air Conditioning Company in conjunction with the Edison Electric

Institute Heat Pump Improvement Project. The cooling and heating operating cycles and the unique components and features are reviewed in detail.

KW and KWH Evaluation of Typical Installations

J.W. MEGLEY **E.R. AMBROSE** **G.W. MC ELHANEY**
Member ASHRAE *Fellow ASHRAE* *Member ASHRAE*

This analysis of the energy requirements as recorded during the field tests of the equipment covers the interrelationships of the several components of the total loads,

climatic conditions and design criteria for selected installations in various geographical areas as well as such conclusions as can be drawn from the data.

Analysis of Special Operation Cycles of Heat Pumps

P.R. DWYER **R.L. JOHNSON** **R.H. TULL**
Member ASHRAE *Associate Member ASHRAE* *Presidential Member ASHRAE*

The importance of good installation practice is apparent from an analysis of defrost and supplemental heating data available from the EEI nationwide field test of heat pumps. Wide variations in the number of defrost cycles occurred on installations in the same area.

The superiority of initiating the defrost cycle by sensing reduced airflow through the outdoor coil rather than by a timing device was demonstrated in every section of the country. Defrost time was reduced as much as 40% by use of the airflow sensing control.

Maintenance and Service of Equipment

B.J. MELTON **P.R. HEIM** **T.I. WETHERINGTON, JR.**
Member ASHRAE *Member ASHRAE*

This paper reports the maintenance and service record of the Carrier 5-ton, 3-phase and the Westinghouse 3-ton, single-phase heat pumps which were tested in the EEI

Research Program. The number and frequency of service calls, the labor in terms of hours and the failure of component parts will be summarized.

SYMPOSIUM: ENVIRONMENTAL CONTROL OF PRINTING PLANTS — TUESDAY, JANUARY 20, 1:30 P.M.

Chairman — J. Woods

Associate Member ASHRAE

Introduction

Development of modern printing techniques has resulted in more emphasis being placed on the need and effect of environmental control within the printing plant. The proper application of temperature and humidity control, ventilation rates, air velocity, exhaust rates and filtration is essential in high production printing plants. As the envi-

ronmental requirements have become more critical, the heat loads and contamination levels generated by these processes have also increased.

This Symposium will focus on the design of environmental control systems that will meet the requirements of these processes.

Problems Involved in Modern Printing Plant Air Conditioning

JOHN C. DARNALL

This paper gives a description of printing plant air-conditioning problems, as related to different printing processes. Included are: (a) a slide presentation of the construction of modern web-fed letterpress plant and the problems encountered therein; (b) discussion of a high-speed, four-wide, web-fed offset press operation and its

specific requirements; and (c) a description of a rotogravure web-fed operation, with specific attention to ventilation and control of solvents.

In conclusion, web-fed letterpress plant of the future will be described, the specifications of which will be considerably altered from any of the above described.

Ventilation, Filtration and Exhaust Techniques Applied to Printing Plant Operations

THOMAS P. MARSAILES

Associate Member ASHRAE

The paper will cover the three subjects of ventilation, filtration, and exhaust as each applies to printing plant

operations and as each affects the major printing processes (letterpress, lithographic, and gravure).

Printing Plant Temperature and Relative Humidity Control System Considerations

DONALD H. SPETHMANN

Member ASHRAE

A printing plant includes a full range of temperature and humidity control requirements, from simple unit heater control of minimum temperature in paper stock areas, to completely air-conditioned control of temperature and rh

in areas of sensitive process. The different control system requirements for typical systems in a total printing plant are compared. Control systems for both normal conditions and for more exacting conditions are examined.

SYMPOSIUM: PART II: SURVIVAL SHELTER PROBLEMS — TUESDAY, JANUARY 20, 1:30 P.M.

Chairman — G. Engholm

An Automated Earth Temperature Station

TAMAMI KUSUDA

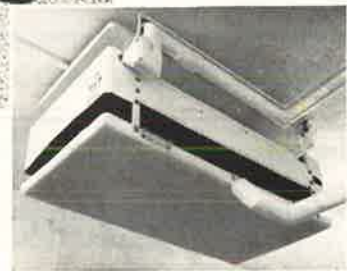
Member ASHRAE

To provide heat transfer data for the underground installations, the National Bureau of Standards has been collecting earth temperature data under various earth covers. Hourly data for earth temperature of selected depths, surface heat flux, soil moisture, ambient air temperature, humidity, solar radiation, wind speed and direction, and

rainfall have been acquired by an automatic data acquisition system for a period of 1 year.

Detailed accounts of the instrumentation system design, specification writing, installation of earth temperature probes, operation and maintenance of the data-logger, data transmission problems are presented.

Larkin's Dual Pak does double duty



Here's a system that's unique . . . and unsurpassed . . . for installations that require multiple compressors, such as in schools and institutions where heavy loads occur.

Larkin engineering has created a superior system that houses dual compressors, liquid receivers, a split-circuit, air-cooled condenser and complete refrigeration and electrical accessories—all in a single chassis—plus matched evaporators.

Larkin's single pre-engineered, factory-assembled unit serves separate coolers or freezers (operating in a range from 40° to -10°) providing an efficient, economical solution for many indoor and outdoor applications that usually require two condensing units.

The Dual Pak is available in models that feature automatic, time-initiated, temperature-terminated electric defrost or off-cycle air defrost systems, and it offers Larkin's patented low-ambient control.

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Registration totalled 1750

THE PAST IS PROLOGUE... THEME FOR SAN FRANCISCO MEETING

PRIDE for past accomplishments and cautious predictions for the future characterized the 1970 ASHRAE Semiannual Meeting, January 19 to 22, at San Francisco, officially bringing to a close the Society's observance of its 75th Anniversary.

In spite of one of the worst rainy spells San Francisco has ever experienced, 1750 members and guests attended the three-and-a-half-day meeting—a record for an ASHRAE Semiannual Meeting in a non-Society-sponsored exposition year. Concurrently, more than 15,000 people toured exhibits at the Western Air Conditioning Exposition in San Francisco's Civic Auditorium, where products of over 500 manufacturers were on display.

Assuming the General Chairmanship for the Meeting was Thomas J. White, replacing Joseph E. Murray, who died suddenly on January 12 (see obituary, page 68). President William G. Hole asked for a brief period of silence in honor of Mr. Murray at the opening session Monday, January 19.

In his Plenary Session address (page 50), Presidential Member William L. McGrath set the theme for the Meeting with his reflections on the past 25 years and his forecast for the future of those industries represented by ASHRAE. He stated: "There are important challenges ahead for our technical capabilities and almost unlimited opportunity to contribute to the solution of our nation's present and future problems of environment."

At the Welcome Luncheon, Mayor Joseph L. Alioto paraphrased author Gene Fowler: "Everybody should have two favorite cities—his own and San Francisco." The Mayor also commented on the role of ASHRAE in the "herculean" task of controlling man's environment. He mentioned that the 3 1/2 million population in the San Francisco Bay area would probably increase to 8 million by 1980 and that the sad news via radio and TV may well be "Don't let your children play today," unless air pollution can be harnessed.

Also at the Welcome Luncheon, President William G. Hole reported on the progress of the Society during the past six months (page 49). He challenged members to consider their responsibility to dedicate their work "for the benefit of the general public" and "to set moral standards for the industries we represent and to which we contribute our knowledge and skills."

The F. Paul Anderson award, the Society's highest honor, was conferred upon Glenn Muffly in acknowledgment of his achievements and contributions to ASHRAE and to the progress of refrigeration. Mr. Muffly, Presidential Member and a Life Member of the Society, has operated his own laboratory, holds 100 patents, and is considered an authority on patents in the refrigeration industry. He has been a consulting engineer, and was consultant for the Refrigeration Div of the National Electrical Manufacturers



Plenary Session Speaker William L. McGrath forecasts "The Human Habitat - 1994"

Assn. He is a member of the Ohio Society of Professional Engineers and the American Assn for the Advancement of Science. Presidential Member D. D. Wile accepted the award for Mr. Muffly.

The award of Honorary Member, in recognition of any person of pre-eminent professional distinction, was conferred upon Dr. William George Schneider, for his accomplishments as a physicist, researcher, chemist, and author of 120 scientific papers and co-author of High Resolution Nuclear Magnetic Resonance. Dr. Schneider holds numerous honorary degrees and has won international acclaim for this work in high resolution proton magnetic resonance, which has led to a number of important advances in structural chemistry, proton exchange behavior and hydrogen bonding. Dr. Schneider is a Fellow of the Royal Society of Canada, and the Chemical Institute of Canada. ASHRAE Member Grant Wilson accepted for Dr. Schneider.

The ASHRAE-ALCO Medal for distinguished public service, given annually to a member who has worked on a voluntary basis for his community, state or nation, was presented to George E. Linskie, engineer, designer, contractor and president, George Linskie Co Inc, Dallas, Tex.

Also honored was ASHRAE Presidential Member Merrill F. Blankin, Blankin Equipment Co, Philadelphia, Pa., who has served the Society loyally for more than 50 years. E.K. Wagner accepted the certificate citing Mr. Blankin as a Distinguished Fifty-Year Member.

Twelve ASHRAE Members who have attained unusual distinction in the arts of heating, refrigeration, air conditioning or ventilation and who have been in good standing, were elevated to the grade of Fellow. They are:

Allen D. Brandt, Bethlehem Steel Co, Bethlehem, Pa. (accepted by F. J. Weiss)

Roy C. Chewning, J. D. Kroeker & Assocs, Portland, Ore.

Richard B. Engdahl, Battelle Memorial Institute, Columbus, Ohio

Milton W. Garland, Frick Co, Waynesboro, Pa.

Lars C. Hanson, retired, Syracuse, N.Y. (accepted by T. G. Foster)

Frank J. Hausfield, Whirlpool Corp, Evansville, Ind.

Robert F. Logsdon, American Air Filter Co, Louisville, Ky.

Joseph D. Loveley, American-Standard Inc, Detroit, Mich.

John E. McElgin, ITT Nesbitt, Huntington Valley, Pa. (accepted by E. K. Wagner)

William G. Robertson, Jr., Henry Adams Inc, Baltimore, Md.

Warren Viessman, SCMCE 6 - Air Force System Command, Baltimore, Md.

Paul W. Wyckoff, Chrysler Airtemp Div, Dayton, Ohio

The E. K. Campbell Award of Merit of the Life Members Club was conferred on John Everetts, Jr., professor of Architectural Engineering, Pennsylvania State University, University Park, Pa., for "outstanding service and achievement in teaching." On Wednesday, January 21, the Life Members Club, chaired by Carl F. Kayan and hosted by Clyde E. Bentler, held a luncheon to honor Professor Everetts and all other ASHRAE Life Members.

President-Elect Frank H. Bridgers awarded plaques to the two Regions - VII and VIII - which had the largest attendance at their meeting on September 10, the 75th Anniversary of ASHRAE.



Dixon A. Ervin, Jr., Director and Regional Chairman of Region X greets members and guests at the Business Session opening the Meeting. Seated are T. J. White, A. T. Boggs III, W. L. McGrath and W. G. Hole



Emcee L. E. Shea officiates at Banquet marking culmination of ASHRAE's 75th Anniversary celebration

The Honorable John Knox, California Assemblyman, discusses conservation, the ecology and involvement by ASHRAE members



D.D. Wile (right) accepts F. Paul Anderson Award from President Hole for Glenn Muffly



Bottom right, Grant Wilson (right) accepts Honorary Membership certificate for Dr. William G. Schneider of Ottawa, Canada

Below, W. F. Wischmeyer (right) presents ARI scroll to Society, commemorating ASHRAE's 75th Anniversary





Life Members pose for the photographer at their semiannual luncheon



Members and prospective members gather in front of the ASHRAE booth at the Western Air Conditioning Exposition



Journal Committee Meeting -- one of the 21 Society Committees which met in San Francisco



Plenary Session audience listens to William L. McGrath

Among the invited guests at the Banquet were:
L. N. Hunter; managing director of the Air-Conditioning & Refrigeration Institute (ARI).

E. K. Stevens, president of the International Exposition Co, which handles the ASHRAE-sponsored exhibitions.

C. J. Scatena, president, and A. E. Hole, executive director, National Environmental Systems Contractors Assn.

Clarence Wesselman, international president of Refrigeration Service Engineers Society.

T. E. Brewer, president of Western Air Conditioning Industries Assn.

ARI SCROLL

In honor of ASHRAE's 75th Anniversary, former ARI President W.F. Wischmeyer – on behalf of L.N. Hunter, managing director of ARI – presented a Scroll citing:

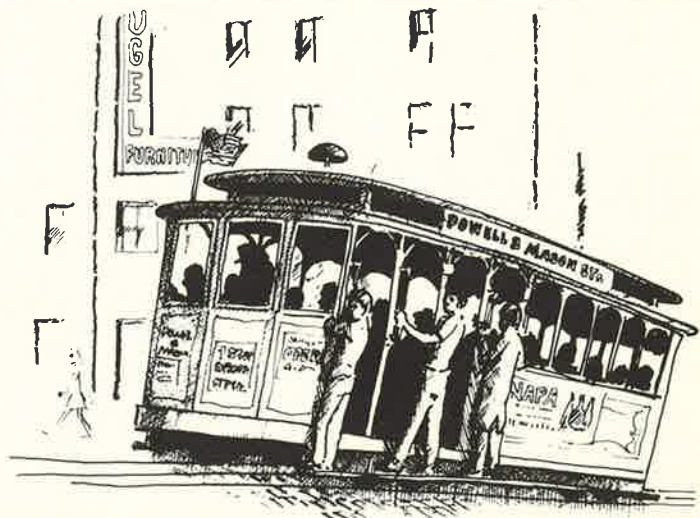
“In recognition and commemoration of the Society's 75 years of successful devotion and dedication to the advancement of the arts and sciences involved with and allied to heating, refrigeration, air conditioning, and ventilating, for the benefit of all men, this scroll is presented by the Air-Conditioning and Refrigeration Institute on this 20th day of January.”

Mr. Wischmeyer commented:

“Through the years your members have been in the forefront of the development of modern heating, refrigeration, air-conditioning and ventilation equipment, application and system design which have not only brought a new meaning for the word ‘comfort’ to millions, but perhaps

even more important have made possible many, if not most, of today's forward strides in industry, commerce, food preservation, medicine, national defense and space exploration.

“ARI, a trade association, and ASHRAE have in a sense ‘grown up’ together. We are in many ways interdependent. ARI is proud of the spirit of cooperation between our two organizations, and we have tried to spell out on this scroll – which it is my pleasure to present – our recognition of the part ASHRAE has had in the growth of our industry.”





Approximately 100 papers were presented at the four Technical Sessions and 17 Symposiums held during the three-and-a-half-day Meeting. Informal Forums also drew large attendance





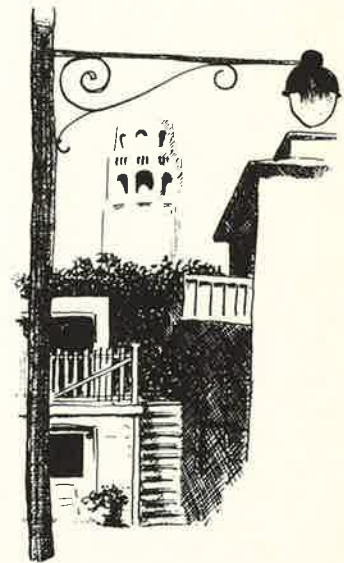
San Francisco's Mayor Alioto addresses members at Welcome Luncheon. Seated is President William G. Hole



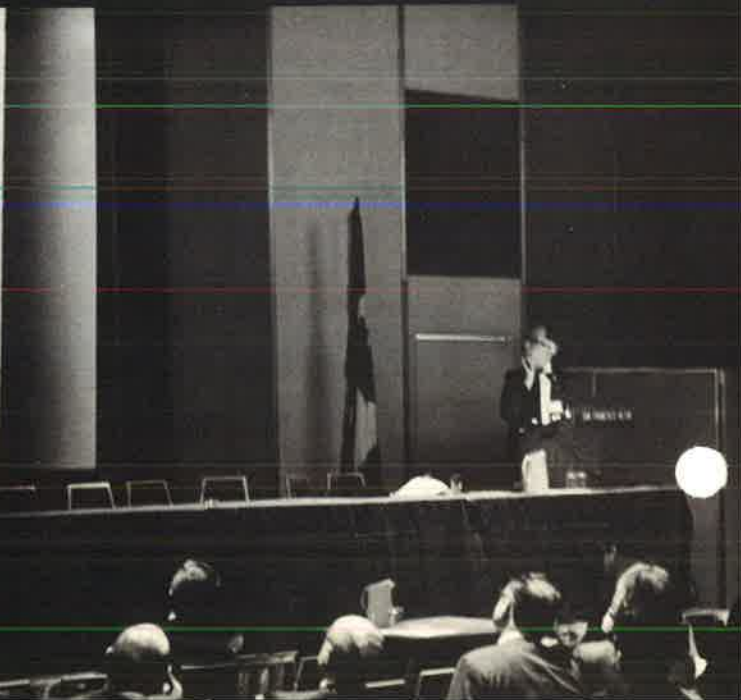
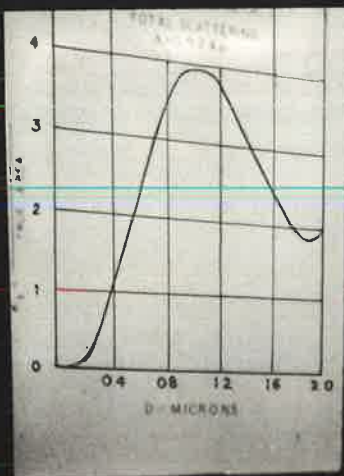
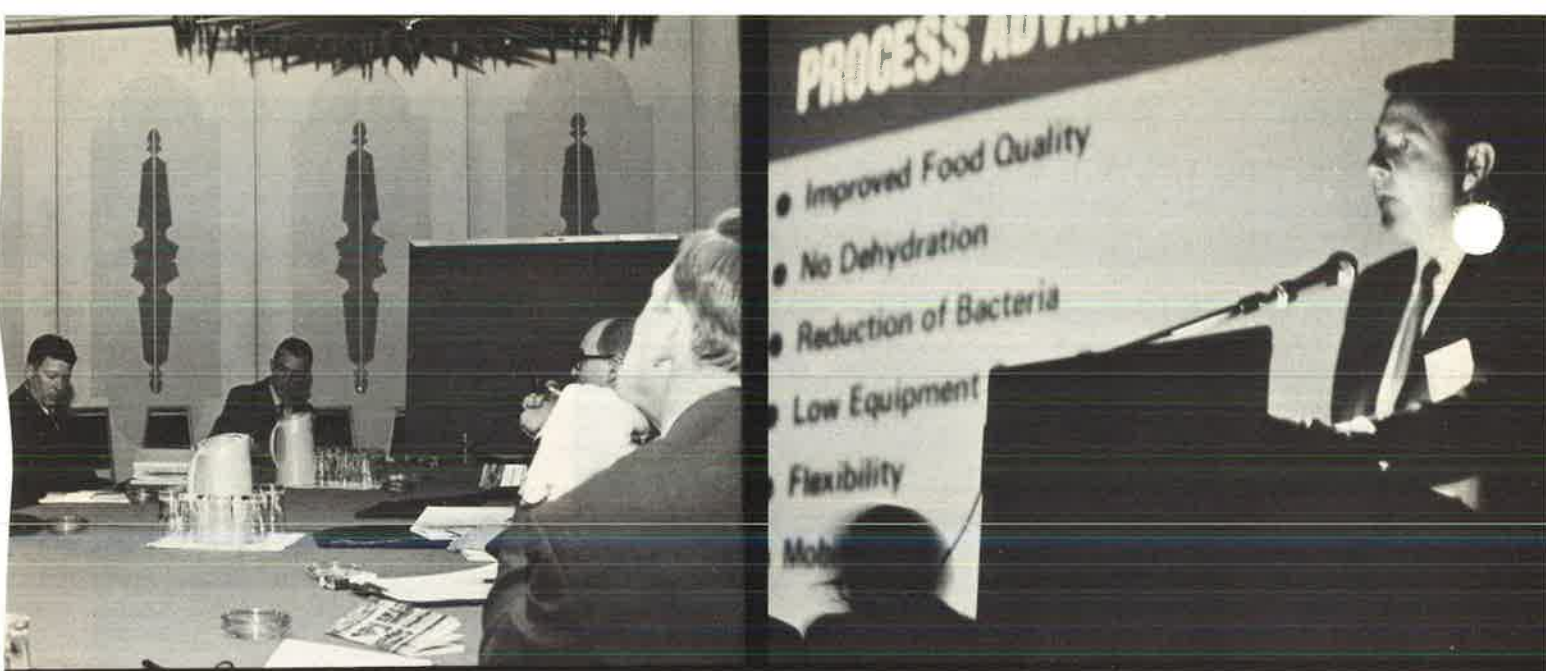
General Chairman and Program Committee Chairman Thomas J. White



ASHRAE President-Elect Frank H. Bridgers, center, presents plaques to the Directors of Regions VII and VIII, winners of the chapter attendance contest for September 10, the Society's 75th Anniversary. At left is D. E. Nichols (VII) accepting for Middle Tennessee and, right, M. Backer (VIII), representing Fort Worth



Nine chapters presented a total of \$16,667 for ASHRAE research. Each contribution was for \$1000 or more. Pictured are ASHRAE Director of Research Royal S. Buchanan; J. E. Copeland, Philadelphia; Henry Buffalow, Jr., San Jose; C. J. Bruechert and D. C. Powell, Atlanta; R. Friedman, Golden Gate; W. M. Green, New Orleans; S. E. Ammons, Dallas; and W. Dudek, Puget Sound. Absent are the representatives from Southern California and North Piedmont





C. DiMercurio Vern Burk Richard Tutt Robert Sandvik William Fearon Wilbur Walker

Dr. Gilman and Mr. Brewer hold "large" check from WACIA. Sharing the joy of the occasion are Central Arizona Chapter President Richard Joachim; Mr. Ervin; Golden Gate Chapter President Richard Friedman and Hawaii Chapter President Robert Hamilton



SOUTHERN NEVADA HOSTS REGION X CONFERENCE

ASHRAE's Southern Nevada Chapter was host for the Region X Conference held April 16 to 19, in Las Vegas, Nev. A full day of technical sessions was well attended with an average 75 at each session. Among the 296 attending the conference were representatives of the national organization and officers of Region X as well as Presidential Members William L. Holladay and Arthur J. Hess. National officers were Treasurer Dr. Stanley F. Gilman, and Executive Director Andrew T. Boggs III. Presiding over the delegates' meetings was Director and Regional Chairman of Region X Dixon A. Ervin.

At the Conference, Thomas Brewer, president of the Western Air Conditioning Industries Assn (WACIA) presented a "large" check (see picture) to Treasurer Stanley Gilman for ASHRAE research. Representing proceeds from the WACIA exposition held concurrently with the ASHRAE Semiannual Meeting in San Francisco, January 1970, the check of \$34,500 was given in the name of all

Region X Chapters.

Six technical papers were given at the all-day seminar. The morning session featured Vibration and Noise Transmission - Causes and Remedies, William Fearon, vice president-engineering, Consolidated Kinetics Corp; Development of a Nuclear Rocket for Space Propulsion, Wilbur L. Walker, director, Facilities Div, Space Nuclear Propulsion Office; and Fan Selection with Relation to High Efficiency Filters, C. DiMercurio, Western Region Sales Manager, American Air Filter Co Inc. Afternoon session topics included High Velocity Systems, Their Caprices and Characteristics, Richard D. Tutt, corporate director of engineering, Krueger Mfg Inc; Building and Code Requirements for Fire Damper Locations, Robert G. Sandvik, director of technical services, Sheet Metal & Air Conditioning Contractors National Assn Inc; and A Challenge to the Industry, Vern Burk, director, maintenance and operations, Clark County School District.

elaborated on various types of collectors and pollutant retarding devices.

Kansas City

Addressing the May meeting, Arnold Hansen, field sales manager for Wing Co, Linden, N.J., elucidated on the topic Rotary Air-to-Air Heat Exchangers. Explaining the two types of rotary exchangers, a desiccant impregnated wheel or a metallic media

wheel, he stated that the principal of the rotary air-to-air heat exchanger is to transfer room air conditioners exhausted to the atmosphere by transferring the energy to the entering outside air. The wheels are available from 28 to 140 in. dia and from 1000 to 4500 cfm. Their use is noted to reduce equipment sizes and operating costs. Computerized load calculations are available. The speaker also commented

that cross contamination is kept to a minimum through the use of a purge sector, to 1% contamination on the metal wheels and 0.4% on the desiccant wheels.

Louisville

April guest speaker Lester Carr, acting chief engineer for Veterans Hospital, Louisville, discussed the automatic laundry at the hospital. He stated that



President Benson, John Galston, of Skidmore, Owings & Merrill, M. Goetz, and Robert Menacker, Chapter Program Committee Chairman

NATIONAL CAPITAL ELECTS OFFICERS FOR 1970-71: HEARS TWO SPEAKERS IN APRIL

The April meeting of the National Capital Chapter was highlighted by the election of the 1970-71 slate of officers and by a technical speaker and a main speaker.

The following were elected: President – Clinton W. Phillips, Vice President – James E. Shea, Secretary – Shigeki Hiratsuka, Treasurer – Robert Menacker, Governors – William D. Goins and John O. Lewis; also, current President John Benson.

The technical session speaker M. Goetz, assistant chief, Plant Div, National Bureau of Standards, Gaithersburg, Md., discussed field problems and the corrective actions taken in regard to the three miles of buried steam and chilled water piping and two miles of buried compressed air piping which go from the central plant to the various laboratory buildings.

Main speaker for the evening was Walter A. Rutes of Skidmore, Owings and Merrill, architects, who spoke on Land Planning.

the concept of automatic laundries is new in the United States but has been successfully employed in Europe for several years. The system at the hospital uses a flow line washer with continuous feed into and out of the dryer. Flat work is run through automatic ironers and folders. Clothing is handled in the conventional manner. Following the talk, Chapter members were taken on a tour of the laundry facilities.

Memphis

Addressing the Chapter at the April meeting, Robert G. Sandvick, Director of Technical Services for the Sheet Metal and Air Conditioning Contractors National Assn Inc, spoke on Fire Damper Location in Air Handling Systems. He described the use of fire dampers in sheet metal duct penetrations of fire rated walls which protect the integrity of the rated walls that divide the building into compartments. The purpose of a damper is to contain the fire in one compartment while allowing occupants ample time to evacuate others. His explanation of test procedures was accompanied by slides showing tests of fire dampers.

Minnesota

Speaker at the May meeting was Dale R. Olseth, vice president and director of Dain, Kalman & Quail Inc, Minneapolis stock broker firm. In his talk on Investment Outlook for the 70's, he mentioned that the Market as of May 4, 1970, was almost as low as it was in 1963, the day of the death of

President John F. Kennedy. Stocks to take note of in 1970, according to Mr. Olseth, were in jet travel, leisure time, housing construction, computers, health and education, oceanography, pollution, and air cargo.

Northeast Wisconsin

A panel discussion on Contract Extras – When and Why comprised the program at the April meeting. Participants included Chapter President Warren Hahn; R. Surplice, architect, R.W. Surplice & Assoc; John Reddy, Loft & Fredericksen, consulting engineers; Ralph Swing, Wisconsin Telephone Co; H. Koller, supplier, The Trane Co; and R. Murphy, contractor, Bassett Inc.

North Jersey

Featured speaker at the April meeting was C. Elling, president of the Mechanical Contractors Assn of New Jersey. Speaking on Unity of the Mechanical Contract, he advocated a re-examination of the prevailing patterns of bidding and contracting and suggested combining of plumbing and heating, ventilating and air-conditioning contracts. His discussion also covered the feasibility of a combination of heating, ventilating and air-conditioning contracts with the electrical contract.

Elucidating further, he pointed out that the human factors involved should be given prime consideration and that the prevailing patterns of union jurisdiction should be an important consideration. He advocated avoiding the extremes of either lumping everything arbitrarily into a single

package or of fractionalizing the work into a maze of smaller inefficient contracts.

Ontario

The Annual Paper Night in May featured four papers. Speakers and their papers were A. Lenskyj of Canadian Westinghouse on Fan Motor Starting Times in Air Conditioning Applications; Dr. A.H. Abdelmessih of the Mechanical Engineering Dept of the University of Toronto, on Isotherms and Effectiveness of Circular and Square Fins; B. Hamilton, engineering student, University of Toronto on An Experimental Analysis on the Self-Pollution of Apartment Buildings; and T. Carter, student at the University of Toronto, on Wind Velocity Problems in Cities.

Orange Empire

The program of the March meeting included a tour of the Apollo facility at North American Rockwell in Downey, Calif. Tour host T. Willis showed the group a view of the manufacturing and checkout process for the Apollo Command modules, and described the different phases of the manufacture and assembly of the module as well as the unique materials used. Highlights of the tour included a viewing of yet-to-be released pictures of the space flights and entering a full scale mock up of the command module. Also, viewed were Apollos 10, 11 and 12. Apollo 11 was being prepared for shipment to the Smithsonian Institute. The tour took in the control

WHO WAS THERE?

So many of you have asked for statistics on attendance. Sidney Mackin & Associates have gone over the registration cards in detail and have recapped our 15,404 attendees as follows:

Management	4,159	Sales	2,003
Engineering	4,467	Maintenance	1,540
Purchasing	308	Production	616
Other (wives, students, etc)		2,311	

We only had the first six categories listed on the cards, but an interesting note is that we had 154 write-ins for architects! Unfortunately we do not know the total number of architects, consulting engineers, contractors, etc. present as this information was not shown on the cards.

WHERE DID THEY COME FROM?

<u>FROM WEST</u>	<u>FROM CALIFORNIA</u>	<u>FROM EAST</u>
Alaska 10	S.F. Bay Area 10,409	Alabama 10
Arizona 74	50 to 300 miles away 1,851	Connecticut 32
Colorado 48	Southern California 1,305	Delaware 1
Hawaii 32	<u>13,565</u>	Florida 12
Idaho 18		Georgia 14
Montana 32	<u>FROM MIDWEST</u>	Kentucky 12
Nebraska 6	Illinois 70	Maryland 26
Nevada 118	Indiana 34	Massachussetts 18
New Mexico 22	Iowa 10	New Jersey 50
Oregon 144	Kansas 12	New York 110
Texas 80	Louisiana 3	Ohio 104
Utah 70	Michigan 43	Pennsylvania 98
Washington 166	Minnesota 49	South Carolina 1
Wyoming 1	Missouri 26	Tennessee 21
<u>821</u>	Oklahoma 11	Virginia 25
	Wisconsin 29	Washington, D.C. 20
	<u>10</u>	<u>554</u>
		<u>157</u>
<u>FROM OVERSEAS</u>		
Australia 2		
Canada 132		
Chile 1		
England 6		
France 6		
Germany 4		
Italy 2		
Japan 18		
Philippines 1		
Scotland 1		
South Africa 4		
<u>177</u>		

14

11

ACE-WEST PAYS OFF!

You as a charter Exhibitor made possible the donation of the **BIG CHECK**, pictured here, to our sponsor W.A.C.I.A. for education and research.

Tom Brewer (right) President of W.A.C.I.A., accepts the **BIG CHECK** from ACE-WEST producer Phil Freeman as both radiate warm smiles of appreciation for the success of the Show which will now provide many new industry scholarships.

