NDUSTRIAL DESIGN

October 1957 $1.50 per copy

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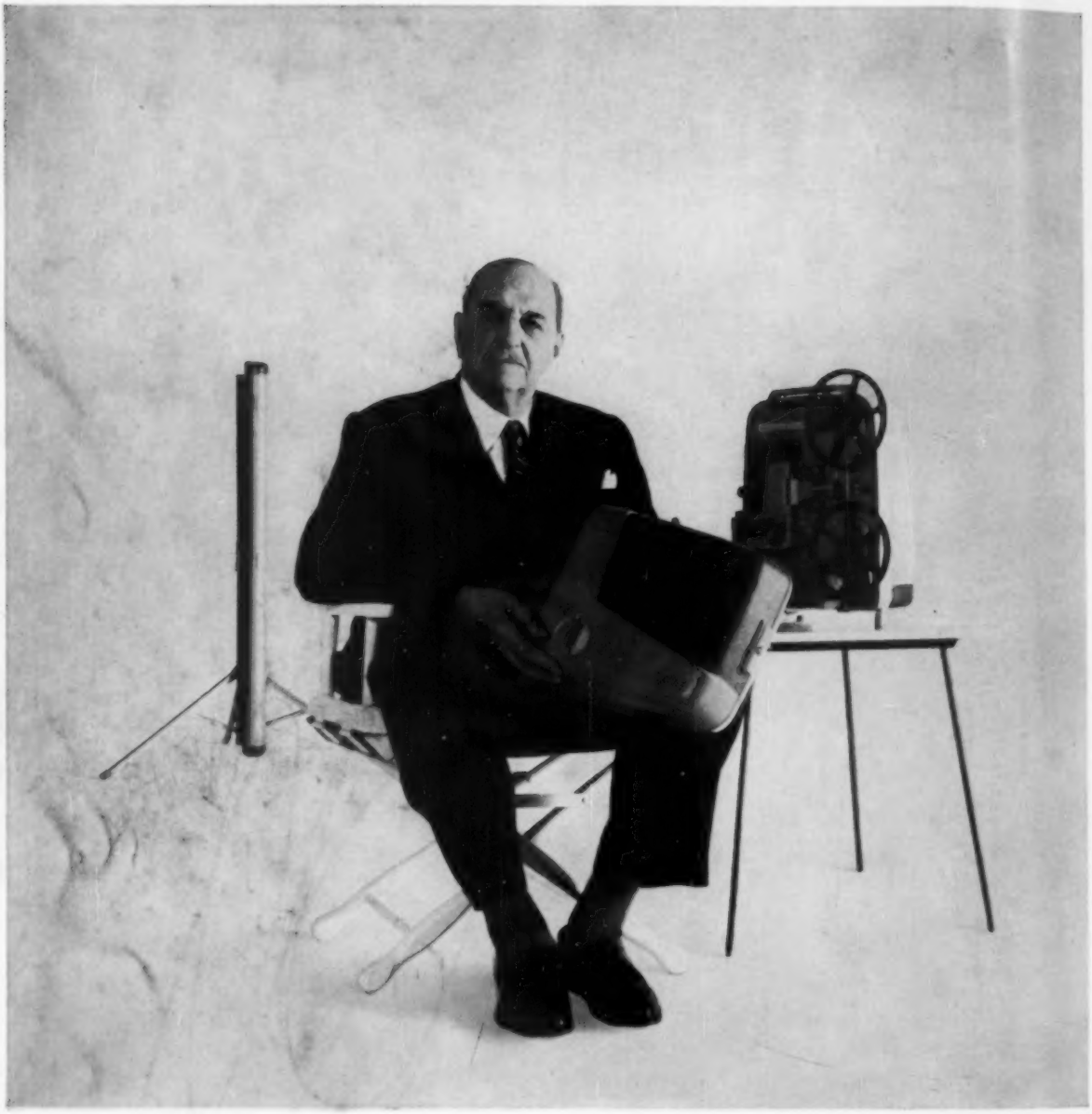
DESIGN ON THE WEST COAST

Aviation Electronics Packaging
Capital Equipment Merchandising



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...and produce cases of functional beauty

U. S. Royalite has been tried and proven for years in Revere Camera's top line of projectors. And now, Revere has introduced a moderately priced line strikingly styled with a Royalite case—the Wollensak as pictured here with a Revere executive. Revere's engineers have found—as have many imaginative camera designers—that this tough thermoplastic sheet forms easily to any shape in sharp detail—on low-cost tooling. Beautiful colors and textures are built in permanently. Versatile U. S. Royalite (the industry's standard for A.B.S.* plastics) is now being used in thousands of different applications—from refrigerator truck paneling to automobile interiors. Find out how the functional beauty of U. S. Royalite can benefit *your* product. Write for information.

*acrylonitrile, butadiene and styrene

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US RUBBER **United States Rubber**

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...r, 1957 VOLUME 4 NUMBER

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...NDUSTRIAL DESIGN

...monthly review of form and technique in ...igning for industry. Published for active in...trial designers and the executives throughout ...dustry who are concerned with product plan...g, design, development and marketing.

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Coming

In NOVEMBER— *a full pictorial report on the Milan Triennale; a comprehensive index to modelmakers throughout the country; an experiment in learning— 8 design students from 8 schools join forces to create a major traveling exhibition. In* DECEMBER — *ID's Annual Design Review issue, rounding up the significant innovations of the year.*

COVER: To symbolize two great West Coast industries, aviation and el... tronics, and the great and recent growth in the area, Jim Ward's cover de... shows electronically controlled delta-wing jet interceptors roaring over ... of tract houses in California.

FRONTISPIECE: Not a trick-shot but an aerial view of a Los Angeles ... way intersection. Dale Healy's photograph shows four levels of ... crossing in the downtown area of this pace-setting city.

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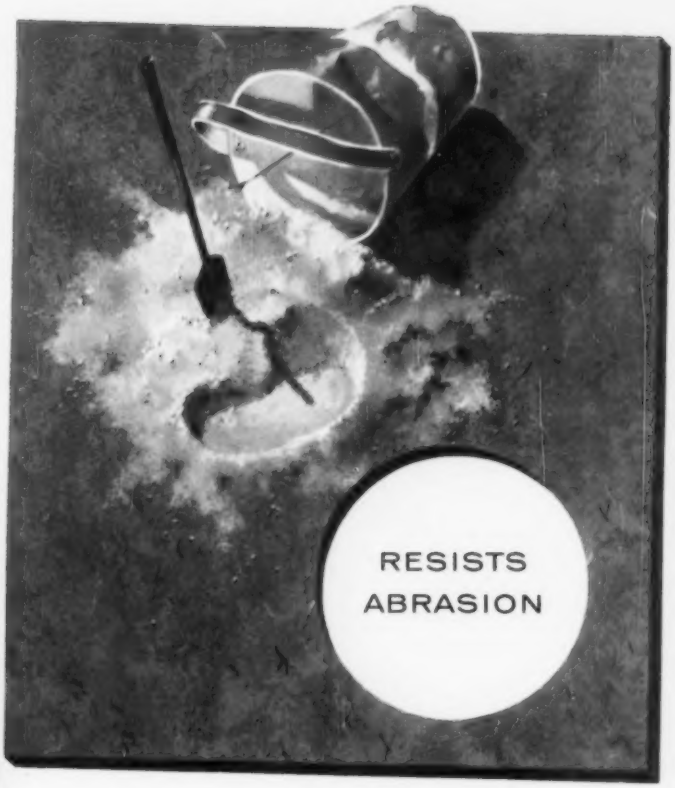

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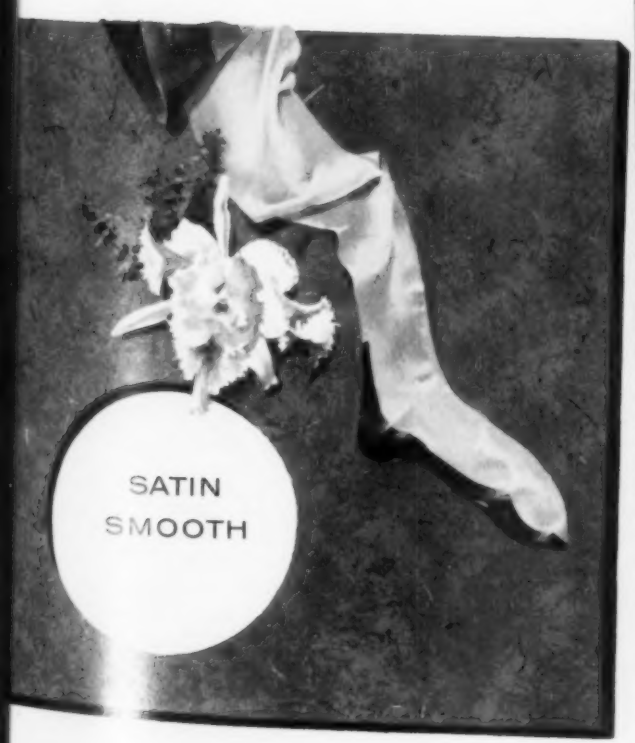
(44 types, textures and thicknesses for 1000 uses)



LETTERS

Design: a cooperative process

Sirs:
Your August issue is certainly more than ever provocative and stimulating. My compliments to you in making every new edition better than the preceding one.

I should like to take this occasion, however, to correct an erroneous impression in your text on the Westinghouse Refrigerator-Freezer, which our office is showing as one of its two entries at the Triennale. We designers are often accused of taking undue credit and I am, therefore, particularly anxious that the emphasis of your August text be put where it rightly belongs.

Your text says: "It was Mr. Muller-Munk's dream of making a low cost, lightweight plastic housing that stirred Westinghouse's engineering staff to develop a suitable laminate." This is not accurate because it was Westinghouse's own engineering staff which developed the plastic material and the manufacturing methods which made our design possible.

Yes, we did dream of a low cost, lightweight refrigerator because we knew that this was essential to what we wanted to accomplish. It was Westinghouse, however, which came up with the answer—plastics—for which, incidentally, they won the prize of the Methods & Engineering Council.

The main point which our organization is trying to make at the Triennale with the Westinghouse refrigerator and the Burroughs–Bell & Howell Microtwin Recorder-Reader is that industrial design is a process and not an end in itself. Our clients and their staff, as well as our partners, associates and our staff, are collectively responsible for whatever results we produce.

It is a cooperative process of people through which industrial design operates and not any abstract theory. This is what we are trying to convey to our friends abroad.
Peter Muller-Munk
Pittsburgh, Pennsylvania

Aspen comment

Sirs:
Regarding your editorial on "What happened at Aspen" in the August issue, I was impressed, primarily, because there are always a number of things happening at a conference like this—some at the sound and fury level, some at the frustrating level, and, of course, most important, some at the learning level.

After all the noise and frustration are gone, everyone must have had a learning experience; to recognize it and start to relate it is the important next step.

Your editorial helped me to see my own experience and start to relate it.
Richard S. Latham
Latham, Tyler, Jensen
Chicago, Illinois

More light on fishbone connector

Sirs:
Since your fine presentation of the Fishbone connector (*ID, August, '57*) you may be interested to know that we have perfected the system even further—with a new system by which the holes are also "prefabricated" and no longer need to be specially drilled.

You may be also interested to know that the connector is stirring a good deal of interest throughout the furniture industry. Several manufacturers, both here and abroad, have already announced to the press that they will be introducing it in their new lines of knock-down furniture in the fall. It is particularly useful to those who import furniture from foreign places of manufacture, for case goods can now be designed to be shipped flat without design complications. Other manufacturers will be able to run their pieces through fabrication in the flat, even through finishing stages, and then assemble them at the end of the line. We have also had a good deal of interest from display designers, for whom the Fishbone eliminates the limitation of exposed fittings for joining large panels . . . at the end of the line in order to reduce production costs.

We have also had a good deal of interest from display manufacturers and designers who heretofore have had design limitations imposed upon them because of the former need to use exposed fittings for joining large panels. We are excited by this entire prospect, not simply because we seem to have hold of a new gadget, but because we seem to have introduced an idea which promises to fulfill a void in an old and staid industry. It's almost like creating an industry within an industry.

You may be interested in knowing how this all came about. Some years ago, Harry L. Baum, Jr., attended the first design conference at Aspen. As a result of the stimulation of fresh new ideas which he encountered at Aspen, he embarked on a design integration program which changed, very radically, the complexion of his businesses. He surrounded himself with designers of real talent, and he started investigating ideas completely outside of his original interest.

One of the young designers, Robert L. Propst, developed several ideas which we thought had merit. We organized a development team, including Propst, a very talented practical engineer named Sanford L. Simons, and myself, acting as co-ordinator and liaison between manufacturers and our design and development facilities.

These projects have been in the works for over two years, and slowly the ideas evolved from scratches on paper to marketable products. One of the products is the fishbone connector. Others will follow soon.
W. F. Russell
Funco Products
Denver, Colorado
There have been many requests for the exact address for Funco Products, which we regret was not included in the original story. It is 450 Lincoln St., Denver 9, Colorado.—Ed.

Errata

Sirs:
I would like to clarify an unfortunate error which appeared in your August issue, page 40. The Bogen public address amplifier was designed by me when I was staff designer for Bogen, before launching my own office. Mr. Alfred Zuckerman was and is the chief engineer. The error occurred in the filling out of the A.S.I.D. form required for exhibition at the Triennale in Milan where Mr. Zuckerman's name was incorrectly given as designer.
Ray Prohaska
New York City

Sirs:
On page 101 of your August issue of INDUSTRIAL DESIGN magazine you show a barbeque grill being produced by the Majestic Company of Huntington, Indiana.

It has always been our thought that your policy has been to credit the designers where possible and we are wondering why this case was an exception. Perhaps you did not have the information at the time, but the new Majestic Char-Grill was a Good Design Associates effort.
Trace Christenson
Good Design Associates
South Bend, Indiana

bright idea

For enduring beauty that sells in a new car and re-sells in a used car . . . design it, improve it and protect it with McLOUTH STAINLESS STEEL.

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NEWS

New ASID officers, from top to bottom: William Goldsmith, president; Francis Braun, vice president; F. Eugene Smith, secretary; Milton Immerman, treasurer. The new officers were installed during the national ASID meeting held this month at Ojai, California.

ASID elects officers

In a series of close votes, ASID has elected a new slate of officers for the 1957-1958 season. Last year's vice president of the board of directors, William Goldsmith, will new serve as president. Mr. Goldsmith, who was educated at Carnegie Institute of Technology, is secretary-treasurer of Design Research, Inc., Chicago, and, as a partner in the Dave Chapman organization, has been responsible for the technical assistance program in design for Pakistan and Afghanistan.

Francis Braun, former treasurer of the ASID, will become executive vice president. He is a partner and treasurer of Product Presentation, Inc., a Cincinnati firm. F. Eugene Smith, partner in Smith, Scherr and McDermott, has been elected secretary of ASID, and Milton Immermann, partner in Walter Dorwin Teague Associates, will act as treasurer.

New members of the board of directors are: Arthur N. BecVar, Jean Otis Reinecke, Paul McCobb and Peter Muller-Munk. The new post of editorial director will be filled by Joseph Carreiro. Installation took place during the national meeting at Ojai, California, on October 17.

Student exhibit will tour world

A student exhibit of American industrial design education, slated for a tour of Europe and Asia in 1958, has its premier showing in Chicago, October 1-14, in the Illinois Institute of Technology's Crown Hall. Sponsored by the United States Information Service, the 3,000 square foot exhibit has been planned, designed and constructed by students from eight leading design institutions in the country. A summer-long project for the students, the exhibit was constructed at Illinois Tech's Institute of Design under the supervision of Warren W. Fitzgerald, head of product design at IIT.

Entitled "Industrial Design Education/USA," the presentation demonstrates what can be done through visually explaining the aims, procedures and accomplishments of American design education. The display incorporated outstanding work chosen from hundreds of student problems sent in by design schools, including: University of Bridgeport, University of California at Los Angeles, University of Illinois, Illinois Tech, Philadelphia Museum School of Art, Pratt Institute, Rhode Island School of Design and Syracuse University. A full report on how the exhibition was handled by the students, and what work it included, will appear in November INDUSTRIAL DESIGN.

Design educators form group

IDEA, the Industrial Design Educators Association, a group dedicated to the improvement of design education, will be formally inaugurated during a conference at Syracuse University, October 25 and 26. Impetus for the new group, representing the first formal organization of design educators in this country, was created by an article on design education (ID, June, 1955) and a symposium at the Philadelphia Museum School of Art (ID, February, 1956) which followed it. An informal IDEA group then held a meeting at the Illinois Institute of Technology and a final one at the Art Center School in Los Angeles in February of this year. At the latter meeting Joseph Carreiro was appointed acting chairman and is preparing a financial and organizational plan to present at Syracuse this month. Points from the tentative plan follow.

Active membership will be limited to those whose principal background is in industrial design education. Others interested in the field may join as associate members but without office-holding or voting privileges. Educational chairmen of various professional groups will automatically become ex officio members.

In addition to an executive committee made up of elected officers, the group will have a board of governors. The board will include regional chairmen from the East Coast, Mid-West and West Coast areas and the educational chairmen (without voting privileges) of the ASID, IDI and PDC. Membership fee for IDEA will be ten dollars a year and will apply to all except ex officio members.

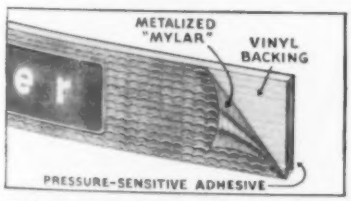
Properties of **"MYLAR"** *valuable in industrial design*

HIGH STRENGTH. "Mylar" is the strongest plastic film . . . Instron tester shows an average strength of 20,000 lbs. psi.

CHEMICAL RESISTANCE. "Mylar" film is unaffected by oils, grease . . . most acids and alkalies, moisture and solvents.

THERMAL STABILITY. Tests prove "Mylar" has an effective operating range, -80°F. to 300°F. . . . won't brittle with age.

Here's how Du Pont MYLAR® helped PHILCO® reduce trim costs...improve appearance



The luster of chrome, yet far less costly and easier to apply...that's the new lamination of embossed metalized "Mylar" polyester film with a pressure-sensitive backing.

PROBLEM. As with most consumer products, costs on the decorative trim of Philco*† refrigerators have been steadily mounting. Philco was looking for a new material which would give a high-quality appearance on their new "Super Marketer" refrigerator at significantly lower costs.

SOLUTION: After extensive testing, Philco selected an embossed lamination of metalized Du Pont "Mylar"* with a pressure-sensitive backing.

RESULTS: By actual tests, Philco is now able to save on both materials and installation costs!

Color and design flexibility are assured because each panel is backed with a pressure-sensitive adhesive. But the prime results are found in performance . . . that's because "Mylar" is resistant to moisture and most chemicals . . . is dimensionally stable . . . even in subfreezing temperatures...has high abrasion resistance.

HOW CAN "MYLAR" HELP YOU? Exciting "Mylar" film can be used in a myriad of ways . . . it can be metalized, embossed, punched or worked into any shape or design. For more information on how you can use "Mylar", send in the coupon.

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BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT **MYLAR®** POLYESTER FILM

*Registered trademark of Philco Corp.
†"MYLAR" is Du Pont's registered trademark for its brand of polyester film.

☐ Please send me information on properties, applications and types of "Mylar" available (MB-11).

☐ Please send me information on surfacing materials made with "Mylar". (MB-7).

E.I. du Pont de Nemours & Co. (Inc.)
Film Dept., Room I-10, Nemours Bldg. Wilmington 98, Del.

Application_____

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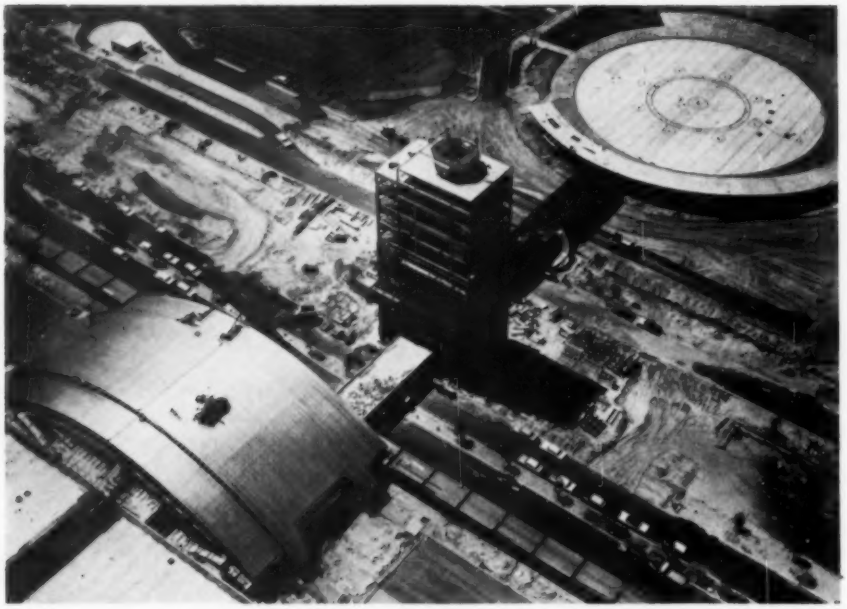
Building developments flourish in New York



At least three major projects, in various stages of progress, will be changing the architectural scene around the New York area this year. Across the Hudson in Bergen County, New Jersey, a 1,100 acre park and recreation area will be reclaimed from the Jersey Meadowlands. Further up the same river, preliminary tests have begun for adding a second deck to the heavily congested George Washington Bridge. Outside Manhattan, International Airport is undergoing a major transformation with the erection of Terminal City and surrounding roadways and parks.

International Airport. When completed, Terminal City (above) will include an International Arrival Building with two adjacent Airline Wing Buildings, an individual terminal building for each major U.S. airline, an operations building, ten miles of roadways, seven miles of taxiways, parking space for 6,000 cars, and parks, pools, and fountains. Total investment in Terminal City will come to $120 million dollars, including $29 million in the International Arrival and Airline Wing Buildings.

Dominating the new plan is the three-story Arrival Building which, flanked by the two Airline Wing Buildings, runs for eleven city blocks. Designed by Skidmore, Owings and Merrill, the building incorporates such modern passenger conveniences as supermarket-type checkout counters to speed customs processing.

Airport lighting, designed by Abe Feder, represents a new concept in outdoor illumination. Rated at 81,000 lumens, floodlights reputed to be the brightest yet developed are scattered across the grounds to create a blanket of intense yet modulated light which eliminates the alternate patches of darkness and light resulting from usual methods of artificial lighting. The 75-foot-high aluminum lamp towers lend an almost science fiction air to the airport area.

George Washington Bridge. A second significant architectural development gets under way in New York this fall with a new six-lane lower deck for George Washington Bridge (below). O. H. Ammann, designer of the original bridge, is directing preliminary test borings now, with actual construction beginning in 1958. The new deck should be open for traffic by 1962.

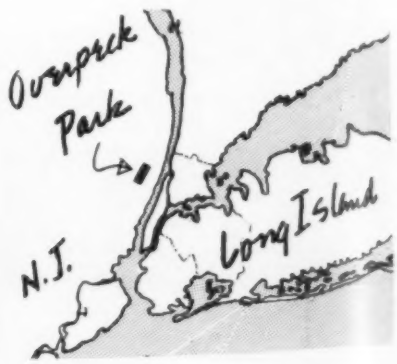
The lower deck is expected to blend in satisfactorily with the existing structure, since allowances for it were made originally in the foundations, towers, cables and suspended system.

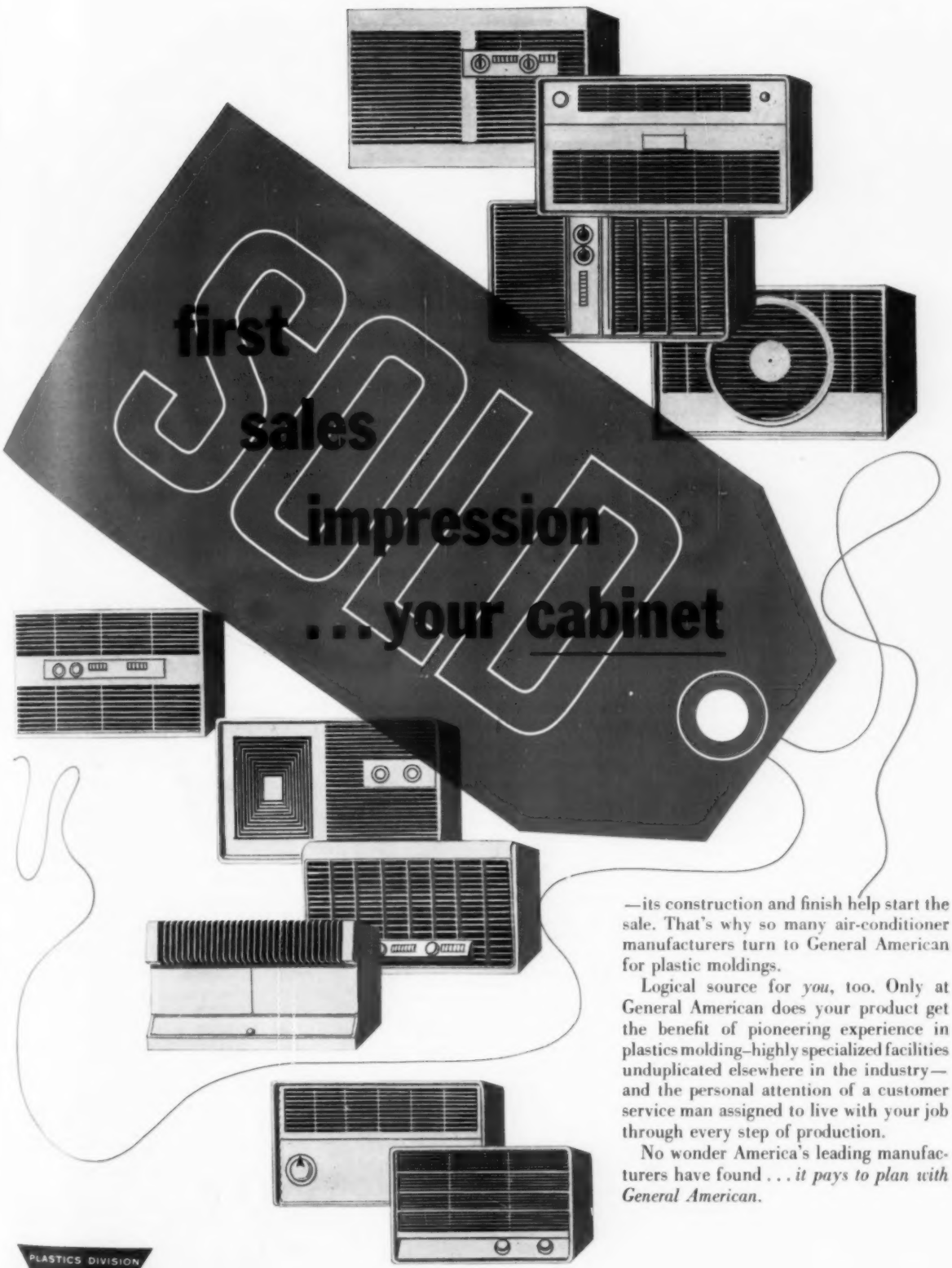
Total cost for addition will come to $167 million, including appropriate approach highways in New York and New Jersey. It will be financed by the Port Authority of New York and will work in with other Port Authority plans to connect Staten Island and Brooklyn with a Narrows bridge and Queens and the Bronx with a Throgs Neck bridge. The increased bridge facilities will be augmented by a $200 million Federal and state system of expressways which will direct the greatest possible amount of traffic to the north and south away from congested Manhattan.

Overpeck Park. Just west of George Washington Bridge in Bergen County lie the 1,100 acres which will be reclaimed as the largest county park (below) in the nation. One and a half times the size of New York's Central Park. it will provide recreational facilities for more than half the county's 600,000 residents.

A. Carl Steeling Associates, site planning consultants on the project, have recommended lowering the Overpeck groundwater level by two feet and raising the land surface level by about two feet. Between $2 and $3 million dollars will be saved in land-fill costs by using the "enclosure" technique for lowering the water level in the area. Total cost for the project, which will begin this spring, will run from $12 to $14 million.

The new park will provide camping, picnicking and kite-flying areas, fifty tennis courts, running tracks, nine baseball fields, eleven softball diamonds, three football fields, a model boat basin, amphitheater, county center, cafeteria and meeting rooms.





—its construction and finish help start the sale. That's why so many air-conditioner manufacturers turn to General American for plastic moldings.

Logical source for *you*, too. Only at General American does your product get the benefit of pioneering experience in plastics molding–highly specialized facilities unduplicated elsewhere in the industry—and the personal attention of a customer service man assigned to live with your job through every step of production.

No wonder America's leading manufacturers have found . . . *it pays to plan with General American.*

PLASTICS DIVISION GENERAL AMERICAN

Plastics Division
GENERAL AMERICAN TRANSPORTATION CORPORATION
135 South LaSalle Street • Chicago 90, Illinois

New buildings in Connecticut

Skidmore, Owings, and Merrill, New York architects, are changing the suburban landscape of Connecticut with the construction of two major buildings. The $19 million dollar group of offices for the Connecticut General Life Insurance Company (above) was dedicated last month; the $1 million dollar CBS Laboratories (below) will be finished in the summer of 1958.

Set on a rolling 300-acre tract outside of Hartford in suburban Bloomfield, Connecticut General's offices express a concept new and eminently sensible for insurance companies. Since the processing of insurance policies is a semi-continuous assembly line operation, typical vertical building space has been discarded in favor of the horizontal. The essential elements of the plan include a three-level main building attached to a five-level administration building by a glass-enclosed walk way. The taller administration wing removes most of the functions not directly connected with the work flow from the main work area.

In moving the large company from the city to a suburban location, a major problem was assuring a large, dependable, and satisfied work force. To appeal to their employees (and compete with Hartford businesses), Connecticut General planned elaborate facilities. An 800-seat cafeteria, with floor to ceiling walls of glass, is set above a reflecting pool and overlooks a pleasant wooded area. Other attractions include bowling alleys, tennis, horseshoes, shuffleboard courts and a softball diamond. Four inner courtyards provide space for quiet relaxation. Isamu Noguchi, Japanese sculptor, planned and furnished them as well as a large terrace near the cafeteria. His most impressive note is a three-piece, fifteen-foot high red stone sculpture group.

The extent to which members of the company cooperated with Skidmore, Owings, and Merrill in every stage of building was unusual. Before a final decision on materials was made, Frazar B. Wilde, president of Connecticut General, ordered a two-story mock-up, or pilot building. At $100,000 it was considered a bargain by the company in insuring them against major mistakes. For both architects and builders (the Turner Construction Company of New York), it was the fullest opportunity they had had to work with mock-ups. Final materials selected included glass and stainless steel in the exterior walls and glass, tile and plastic on interior walls.

The glass-enclosed aluminum and steel structure (below) proposed for CBS Laboratories will have a hilltop site in suburban Stamford. Doubling the present space of CBS Laboratories, the one-story, all air-conditioned building will enclose 33,000 square feet.

The proposed plan brings a feeling of the outdoors directly into the laboratories. A number of the original evergreen trees on the site will be left standing to shade the projected inner courtyard. The court will serve as an open-air rest area for employees.

To protect the Laboratories' work on classified government projects, the exterior will be walled from floor to roof on three sides with a translucent blue glass. The flat overhang roof will be supported by skeletal steel columns standing outside the modular frame of the building.

Life offers major consumer survey

To aid advertisers in directing their messages more profitably, *Life* has undertaken an ambitious study of consumer buying behavior, the first volume of which will be ready at the end of this month. Made by Alfred Politz Research, Inc., the survey covers dollar expenditures for 1956 in seven broad categories: food, beverages, and tobacco; clothing and accessories; medical and personal care; home operation and improvement; home furnishings and equipment; recreation; and automotive. The Politz researchers have broken down each category into narrower groups and tabulated them in various ways—by age of household head, by average household income, by geographic region, and so forth.

With the widespread interest in consumer spending and consumer behavior, *Life* believes that it is offering a rich vein for the data-hungry marketing world to mine. The project will most closely resemble the monumental work completed by economist Irwin Friend for the Bureau of Labor Statistics for the period 1950-1951. The more recent *Life* survey, sampling 10,000 households, brings this information up to December, 1956.

The first set of tables, just released, bear out commonly held conceptions of consumer spending. With 29% of family income going for food, it is the largest item on the budget. Home improvements, including rent and mortgage payments, follows at 19%. Other items: automobile and upkeep, 14%; home furnishings and equipment, 9%; recreation, 5%.

The survey does, however, present a few surprises. Gardening turns out to be the favorite leisure occupation, with needlework second. Cars take two-thirds of the working population to their jobs; trains only 1%.

Details for making the survey available have not been announced yet. It will be sold, probably at $10 a volume, directly from the magazine rather than through bookstores. The first volume, on who buys what and for how much, available at the end of the month, will be followed by three others (place of purchase, time of purchase and purchases by magazine readership), at six month intervals. Supplements on such problems as the techniques used in the survey will also be put out from time to time.

New hidden persuasion device

One device that George Orwell never dreamed of has become a reality for Madison Avenue this month. Subliminal Projection Company has announced a process for projecting "invisible commercials" on TV and movie screens at the same time the regular show is being seen. A special device flashes commercials at the rate of one every five seconds on and off the screen so that, while the viewer is unaware he has seen them, they make a subliminal (below the threshold of consciousness) impression on his mind.

At this point it is virtually impossible to get details on the nature of the machine. Plans are being formulated to rent it out to the highest bidder for its first wide-scale presentation. Leading figures behind the development are motivational researcher James M. Vicary, inventor of the process (left, above), Francis C. Thayer, president of Subliminal Projection Company (center), and Rene Bras, developer of the subliminal projector (right).

To indicate the success of his technique, Mr. Vicary cites a recent test run in a New Jersey movie house. Over a six-week period 45,699 patrons were bombarded with subliminal messages urging them to eat popcorn and drink Coca Cola. Result: 57.5 per cent sales increase for popcorn, 18.8 per cent increase for Coca Cola.

While advertising men are fascinated by the possibilities of subliminal persuasion, they have already pointed out a number of limitations. For instance, since attention may vary from person to person according to such factors as degree of interest, it may be difficult to set an average threshold of perception. Also, the scanning process used in TV broadcasting will interfere with the speed with which commercials could be flashed on and off. Because of these factors, Mr. Vicary agrees that subliminal advertising will be most effective in reminding viewers about products rather than in introducing new ones.

Announcement of the new process has created a furor in at least two directions. While Subliminal Projection Company has applied for a patent, a New Orleans firm has already developed a similar process and there are sure to be more. At the same time, in varying postures of moral indignation, some advertising men are viewing the whole affair with alarm. On the heels of Subliminal Projection Company's first release to the press came this statement from Ernest Dichter, President of the Institute for Motivational Research: "In our opinion the place for subliminal stimulation or hypnotic suggestion is in the experimental laboratory or in clinical therapy. Any other application—in movies, TV or other forms of advertising communication—without the express knowledge and consent of the audience, would be contrary to the public interest and therefore contrary to both the moral and commercial interests of the business and advertising community."

Mr. Vicary, however, points to what he feels are the positive aspects of his process: fewer interruptions for sponsor messages and added entertainment time. He does suggest that commercial use of the process may require a built-in assurance of proper usage. He thinks that a practical safeguard might be the prior disclosure of the message and a report that it is being projected subliminally.

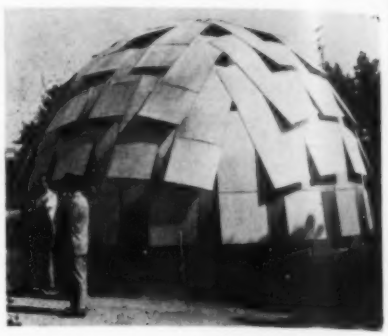
Loewy to do interiors for liner

Raymond Loewy Associates have been retained by the American Banner Line as consultants on interior design for the new S.S. Atlantic, America's first all-tourist class passenger ship. The Atlantic will make the U.S.-to-Europe run accommodating 900 passengers—860 of them in tourist style.

The Loewy firm's experience in ship interior design dates back to 1937, when the company did the interiors for the first all-fireproof ship. Since then the Loewy office has designed twelve major vessels for both Pacific and Atlantic service.

Plans for the S.S. Atlantic call for a reversal of what Loewy feels has been a tendency to treat ships either as floating art galleries that reflect a designer's highly personal taste, or as tame institutional spaces where nothing more exciting than a safe bulkhead color relieves the monotony. The Atlantic design will stress a spacious uncluttered look, presumably to compensate for the necessarily limited space available under the all-tourist class plan. Furniture will be scaled to increase the illusion of space. Pullman-style upper berths will fold inconspicuously against the wall during the day. Lower berths will be sofa-bed fashion to give the effect of a sitting room by day. Mirrors and other standard space-stretchers will be used throughout the ship.

Scheduled for delivery next Spring, the Atlantic promises an interior design that will combine the traditional Loewy flair for the dramatic with practical, low-maintenance materials. Other organizations collaborating in outfitting the Atlantic include: J. J. Henry Company, naval architects; James R. Patterson, interior architect; and the Arnot-Jamestown Division of Aetna Steel Products Corporation, marine joiner contractors.



Project pinecone demonstrates new building principle

Architect-designer Buckminster Fuller, who originated the geodesic dome and the dymaxion principle (of achieving maximum space per man-hour of labor, pound of material, and dollar of cost), has come up with another new idea. Working with architecture students on the Cornell campus, Mr. Fuller has developed a pinecone-shaped construction 20 feet high by 40 feet wide, made of overlapping plywood panels. The new type of construction would be used as a center for a less-expensive-than-usual reinforced concrete dome. Usual cost for scaffolding and framework in a concrete dome is $4.50 per square foot while this method would run about $1.50 a square foot. An additional feature is that the new frame may stay in place as a lining, while conventional frameworks have to be removed after the concrete dome is completed.

Total cost of Mr. Fuller's experimental pinecone was $1,500 and required 750 hours of unskilled student labor. Starting at the top, students assembled the dome on the site piece by piece, the members being hand-bolted together. Each completed portion was elevated by crane and the next lower boards attached. The lower boards were then bolted to a plywood collar which had been constructed previously and which serves as a mounting for the dome. Plywood tails, making this different from Mr. Fuller's other domes, eliminate waterproofing needs as joints are effectively shingled.

Officers elected by the Los Angeles Chapter of IDI include (left to right): George Jergenson, outgoing President; Gordon MacKay, President; Robert Mason, Vice President, William Brewer, Secretary, and Robert Emerson, Treasurer.

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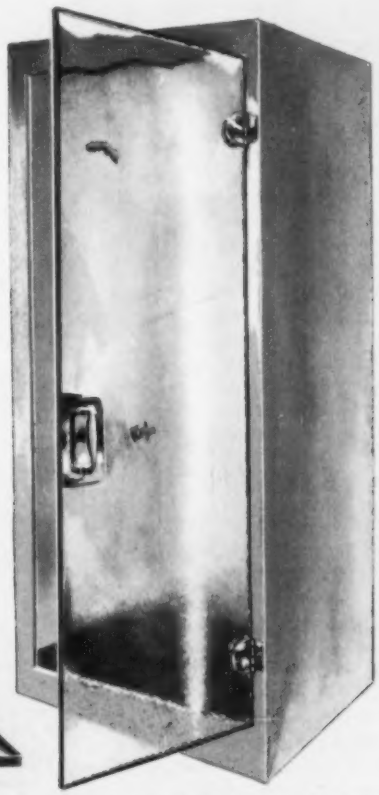

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Miniaturization Award

Entries are now being accepted for the first annual Miniaturization Award, a competition sponsored by Miniature Precision Bearings, Inc.

Awards will be given in two categories: 1) Products or components showing ingenuity in solving problems or making use of new design concepts or special materials 2) Individuals or companies that have created a better understanding of miniaturization through education, research, engineering, and standardization.

All entries should be submitted before the end of January to the Awards Committee, Miniature Precision Bearings, Inc., Precision Park, Keene, New Hampshire.

Company News and Views

Russel Wright Associates, under a renewed contract with the International Cooperation Administration, are sending a team of experts to Vietnam to assist in development of handicraft products.

Dow Chemical Company, preparing for increased use of plastics in the building industry, has established a developmental building products group in Midland, Michigan, as part of its plastics technical service. **Donald R. Gray** heads the new section, which will look forward to more extensive use of Styron, Styrofoam, plastic flashing, Saran film and Saran-lined pipe.

Merger: **The Dobeckmun Company,** Cleveland, Ohio, manufacturers of flexible packaging, has become part of the Dow Chemical Company.

As a culmination of a two-year color research program, **Robbins Floor Products, Inc.** will soon offer a new color line including fifteen new colors.

United States Rubber Co. plans to spend a minimum of 120 million dollars on research and development during the next five years in company laboratories, including the new research center in Wayne, N.J.

Clary Dynamics is the name of a new consolidation of the Clary Corporation's Aircraft and Automatic Controls divisions.

A new research facility for foil and packaging industries has been opened by **Aluminum Company of America.** Located at New Kensington, Pa., it will be known as the Foil and Packaging Division of Alcoa Research Laboratories. The company is also entering into the production of foamed-plastic insulated panels.

Minneapolis-Honeywell Regulator Company has entered the field of plastics production with its manufacture of epoxy casting and potting compounds.

New quarters for **Haberge Inc. International Designs** is in Room 429 at 225 Fifth Avenue, New York.

The first winner of a scholarship recently established by **Palma-Knapp Associates** is Richard E. Petrie. The scholarship will assist industrial design students in their senior year at the Art Institute of Chicago.

Reflecting the trend today toward lump sum bids on complete office interior projects, **Remington Rand Division** of Sperry Rand Corporation, New York, and the **E. F. Hauserman Company** of Cleveland have joined forces. Remington Rand supplies the office furniture and equipment, while Hauserman furnishes its Divider Wall, low-level movable office partitions.

People

James S. Ward, former vice president and associate of Peter Quay Yang Associates, has formed a new design firm, J. S. Ward and Company, in New York.

C. Robert Cawley is executive director and **Albert E. Storz,** design director, for a new Philadelphia concern, Mel Richman Design Associates, Inc., devoted to package and industrial design. **Mr. Richman** is president of the corporation.

A new trademark and corporate symbol for Corn Products Refining Company. has been created by **Harley Earl, Inc.** as the first step in its expanded activities in package design.

Vice president of the newly-formed Advanced Products Division of ACF Industries, Inc., Milton, Pa., is **William P. Hindman,** former works manager of the plant.

Lawrence V. Stapleton has been appointed director of marketing and general manager of Lippincott and Margulies, Inc. He was formerly vice president and manager of Grant Advertising, Inc.

Kenneth M. Kiel has joined the staff of the Defense Sales Division of Burroughs Corporation as product development manager, a newly-created position.

Gene Dekovic, recently of the Dekovic-Smith design organization, will now serve as independent communication consultant to the organization.

New addition to Jim Nash Associates, Inc., is **Walter J. Young.** He will act as director of design.

The post of Director of Design and Development at Duo-Bed Corporation, Los Angeles, has been filled by **John Maguire,** who also teaches design at U.C.L.A.

Thomas P. Evans is the new director of research and development at American Machine & Foundry Company.

Tore Gram, interior designer, has been appointed to the design staff of Ken White Associates, Westwood, New Jersey.

New member of the Package Designers Council is **John Penson,** president of Penson/Tuttle, Inc., Chicago.

Roger Mark Singer, industrial designer, has been retained as consultant to Dennis Mitchell Industries.

James J. May has been retained as design consultant by Kimberly-Clark Corporation of Neenah, Wisconsin, for the firm's line of Marvalon decorative materials.

New assistant dean of the School of Architecture at Columbia University is **Kenneth Alexander Smith.**

Dr. Robert F. Oxnam, who has been vice president for administrative affairs at Boston University since 1953 and also associate professor of government at the school, has been named president of Pratt Institute in Brooklyn.

Recently elected to the board of directors of Philco Corporation is **Admiral Arthur W. Radford,** who recently retired as chairman of the Joint Chiefs of Staff.

Smith, Scherr & McDermott of Akron, Ohio, announce a new member of their organization: **Richard H. Arnesen** (above) as design administrator.

A new industrial and interior design organization, Plan International Ltd., has been formed by **George Farkas** at 3206 Ponce de Leon Blvd., Coral Gables, Florida. Associates of Mr. Farkas' are Marion **Francis Ash,** in charge of research and production, **William S. Ash,** industrial engineer, **Klara Farkas,** industrial photographer, and **Jean Ryder,** public relations.

Charles Butler Associates will do the layout, design and decor of new turboprop aircraft for Capital, Continental, Northeast and Trans-Canada airlines.

Visiting professor at Pratt Institute this fall is **Paul Nelson,** a well-known French architect.

Steven L. Stratt is a new associate of Frank Gianninoto & Associates, Inc. He was formerly with the Raymond Loewy Corporation.

The Center for Research in Package Marketing, Inc., has appointed **Paul Fine** as vice president and technical director. Mr. Fine was formerly with the Institute for Motivational Research. New director of Client Consultation Services for the Center is **Dr. Gerald Ehrlich,** former director of The Counselling Service, New York.

Henry Dreyfuss has just been appointed a member of the visiting committee for Harvard's Graduate School of Design. He has also been reappointed as Associate in Industrial Design at the California Institute of Technology.

Design on the West Coast

If you ask a West Coast designer why he settled on the West Coast, the chances are he'll answer that he likes the way of life. Perhaps this answer doesn't seem surprising—a good proportion of the people on the coast are there because they like the year-round vacation atmosphere. But think of the advantages the designer hasn't mentioned – the stimulating cultural atmosphere, the freedom, the money changing hands. The Pacific shore harbors not one design center but a string of them – from the earnest, pioneering Pacific Northwest to cultivated San Francisco, the pallisaded art colonies below it, down through the boisterous overgrowth of Los Angeles and the southern counties. These regions have produced a host of styles, some passing and some lasting, in clothes, furniture, architecture, and patterns of living. Wouldn't you expect industrial design to flourish on the Coast?

The fact is that while design certainly flourishes along the Pacific, the designer does not. At least not yet. As this issue will show, his future depends on a number of things: on the results of his pioneering relationship with the special group of industries the coast seems to attract, on his ability to find a place in industries that don't know they need him, on the future of the coast itself as a center of design and a locus for industry.

THE WEST COAST: a designer's view

At the right hand of the Indies there is an island called California, very near to early Paradise.
Ordonez de Montalvo, 1510

So near and yet so far from the earthly paradise of a thriving relationship with industry, designers from San Diego to Portland look at the special conditions of their region—at architecture, education, people, and industry itself—to answer the riddle that confronts professionals on the Pacific shores.

Among the designers who will tell you they work on the West Coast because they like it, only a few, like Hunt Lewis and Melvin Best, could call it home by birth. The rest, like the multitudes of young folk who flock to California every month, are immigrants in search of more work, better living and a fresh, untrammelled scene. In a few cases, some special occasion, a big account or reasons of health brought the designers out. Most made the choice of replanting roots quite consciously.

In *Industrial Design's* research into the reasons designers have moved west, the answers came in chorus—"We like it here!"; but as with all choruses, there were many voices to be singled out. Gideon Kramer, almost alone as an independent designer in the Pacific Northwest, tells of the backward state of industrial development in Washington and Oregon, but adds that he sincerely loves the land and waters of Puget Sound, and hopes—with something like modest idealism—to make a contribution to his adopted homeland's future.

In Los Angeles, where industry is growing at a faster rate than just about anywhere else on earth, designers like Charles Cruze regret their lack of connection with the key industries, but feel at home, live with western attitudes at a western tempo, and have something like a missionary zeal to back up their hopes for the future.

In cosmopolitan San Francisco, not only Easteners but also designers from overseas like Walter Landor (right) can quickly feel at home, irresistibly attracted by the city's culture and elan—and by its promise of a charming setting for work, living and recreation.

Not even the California beaches, romantic deserts and awesome ocean cliffs, nor the rugged Northwest timberlands and bays, can make up for the practical demands of a designer's existence. A designer has to make a living as well as live, and when he sizes up the coastal opportunities he is likely to notice several pressing facts about Western industry and culture that cannot help but affect his work.

A land noted for quick fortunes is

Ernest Braun

The good life, *San Francisco style, gives any designer unmatchable and unorthodox scenic charm. Walter Landor makes his office in a converted loft on Pier 5, where his staff enjoys unlimited legroom and lengthy frontage on the Bay. The Landor family's nearby Union Street home (r.), designed by Maybeck in 1903, has a lushly appointed patio in front, and a wide-screen view of the Golden Gate Bridge. Weekends, the Landors drive 50 miles up to Sonoma, where they have assembled, with friends' help, a unique camp from second-hand lumber (below). On a hillside, it faces out on the famous vine-covered Valley of the Moon. Landor has many clients in the East, prefers to make monthly transcontinental trips in order to live in California.*

Ernest Braun

Jeanne Hiemen

today anxious about rapid decline; a haven for renowned artists, architects and artisans is dotted with the monstrosities of too much, shot through with the errors of too fast. The industrial designer who wants to size up the situation needs to distinguish the fact from the fancy, the fancy from the functional.

West Coast Industry

—What it holds for designers

What the designer has to work with on the Pacific Coast is first of all almost brand new: thirty-five years ago Los Angeles ranked 19th among the nation's manufacturing cities—today it is third. The bulk of the progress was made in the post-war era: Los Angeles manufacturing increased 149.3% in the first decade and the rate shows signs of acceleration since then. Population has increased 41% since 1950: 2½ million have joined the fold.

By any standards, Los Angeles is big: manufacturing tops five billion dollars a year, population exceeds six million, and the area has passed Chicago to become the number two retail center in the nation.

And it's growing still: last year alone 612,000 people swelled southern California. The West, with 12% of the nation's population, accounts for 23% of the national building rate. Even the New York Giants and the Brooklyn Dodgers are packing up and moving west.

In view of the general growth pattern, the industrial designer's earnings might be expected to show a similar growth in the area, but in volume of business the contrast is marked—most pointedly for the designers themselves. Gross earning figures are not, of course, available, but the slack seasons, the rush for new clients and the designers' protestations of their need to "get in" with the prominent West Coast manufacturers ironically point up the lack of work in a booming economy. What kind of industry is it, that in the years of greatest manufacturer's demand and widest

public recognition of design, lags in its acceptance of the industrial designer's contributions?

California plants have special needs

The industries that have grown fastest in Los Angeles, measured by the yardstick of employment according to its Chamber of Commerce figures, are electrical machinery, transportation equipment and instruments. The figures reflect the well-known fact that the electronics and aviation industries have made a lively home in Los Angeles. *How* they use design services is a subject for discussion on pages 79-108, but *how much* they use them is indicated by the nature of their work; engaged mainly in highly specialized defense contracts, they do not yet employ designers in proportion to their size.

"Transportation equipment" includes (besides aviation) the automobile industry, with the major auto companies and numerous truck and commercial vehicle makers all to be found in the area. But almost all of them are branch assembly plants, like the huge General Motors plant in East Los Angeles. To put plants there was the most efficient way of preparing cars for a market that stands several thousand miles from home. Made in Detroit, the cars are shipped as basic parts and assembled locally. The cars are, of course, also designed in Detroit, and the auto companies hire no local design services to augment their corporate styling studios.

The branch-plant pattern extends to other industries: packaged goods, rubber products, hard goods. A typical highway intersection in East Los Angeles shows the nearby plants of General Motors, Lever Brothers, Minneapolis-Honeywell, Hyster. All these companies hire design consultants in other cities, and those designers operate out of the companies' home offices.

Hyster is unique, however, in that its design consultant, Henry Dreyfuss, happens to be located in nearby Pasadena. The employment of Dreyfuss—formerly an entirely eastern-based office—by a manufacturer centered in the Northwest

↑ **Lush:** *Charles Cruze studio in Los Angeles is kept open to tropical surroundings; Cruze designed and built offices on virgin soil in heart of "little Madison Avenue" only 8 years ago.*

John Hartley

← **Dramatic:** *Even kitchen of Greta Magnusson Grossman's house enjoys vista of spread-out Los Angeles.*

↑ **Sporty:** *Five Melvin Best designers, like many others in area, use foreign cars to cover long distances to work.*

↓ **Lavish:** *Paul Laszlo's Beverly Hills home, designed and executed by Laszlo, Inc., has 60′ living room, glass on 3 sides, circular swimming pool.*

and Midwest, is unusual in the Los Angeles area, but it gives hope that the branch-type of industry need not forever exclude West Coast designers from the local plants of national corporations.

Small business grows up

By far the greatest number of West Coast manufacturing plants are not, however, the regional wings of major corporations, but small shops employing fewer than fifty people. They have sprung up in abundance because Los Angeles—almost entirely new itself—is a ground where small businesses can take hold and boom overnight, nourished by a wide-open consumer market large enough to use their entire output and receptive to almost any new product. Many of the basement businesses have grown up into fairly big firms: Packard-Bell, Stephens TruSonic, Ampex and many other electronics manufacturers are examples, and design is an acknowledged factor in their growth.

But more often than in any other city, one encounters the manufacturer who started his business in his own garage, invented a fairly unusual product (often a household gimmick or cheaper fabrication method) and built his business up to a comfortable level for his personal needs. As a type, he's habitually more dependent on his own wits than on the bright ideas of specialists, and has so much vitality that he often rolls up his sleeves and plunges not only into engineering, but into design development as well. Such an energetic individual generally demands that his consultants—especially in fields so difficult to evaluate as design—have something superior to offer; the burden of proof is on them. How has the West Coast designer been making out with such rugged individualists, neither hide-bound conservatives nor reckless plungers?

Design's reputation over the years

Among the first designers to settle on the West Coast were the German Kem Weber and the New Zealander Jo Sinel, who arrived in the 1930's. Servicing mostly packaging and architectural projects, they and other early West Coast practitioners like Hunt Lewis and Karl With began teaching in the local design schools that flourished only after the war. The new crop of designers that they nourished, many of whom came to the professional schools by way of technical studies, found jobs in electronics and mechanical-product firms. Young designers like Hal and Clarence Zierhut got their apprenticeship in big electronics firms and design offices, both at home and in the East—then set up for themselves to specialize in electronic products. Others, like Tom Hansen, at Marchant Calculators, Inc., joined big western manufacturers and stayed with them.

But consumer goods industries, in contrast, have only sporadically used consultant designers in the past: Henry Keck for Hoffman Radio, for example, or Newton Leichter for Paper Mate Pen Co. Only a sampling of West Coast home-products makers have designers on their permanent payroll: John Maguire at Duo-Bed, Jim Kelso at Packard-Bell Radio-Television, Joe Portanova at Hoffman Radio, Gene Cripe at Utility Appliance are among them.

But manufacturers are often uncertain of *how* to use design, *for what* goals, and *how much* to pay for it. The word "design" is only beginning to enter the industrial vocabulary in the West, with occasional reference to the reputation of the solid or glamorous eastern designers, whose work doesn't always seem to apply to homey local problems. Convincing businessmen that design is an essential service to almost any industry is one of the designer's big problems at the moment—and one of his most enthusiastic projects.

How did industry get that way?

Resources and needs tell the story

Easterners have long been in the habit of looking across the Hudson River and viewing the West as the place where the sun goes down. But if the Far West is the United States' underdeveloped area,

Impermanent: *New world abuilding in Los Angeles: plant goes up next to tract houses.*

Los Angeles Chamber of Commerce

its "last frontier," it may also be true—as Frank Lloyd Wright has said—that it is the most dynamic part of America because it is still growing.

The last war changed the face of California in many ways: it brought war industry to the desert, and the people to man it. It brought troops of Americans for their first view of a "land of perpetual vacations," and many of them hurried back after the war to make a new life, a fast dollar or a pleasant retirement.

But booming industries and fast migrations are an old story to California—going back to the gold rush days more than a hundred years ago. Mining and lumbering—and the production of the equipment needed for them—made the first California wealth; citrus (and other agriculture), movies and oil made it wealthy before the war.

At the outbreak of World War II, wide open spaces and cloudless skies attracted the aviation industry to a land with a higher number of "flight hours" than almost any other in the nation, where sites for plants and airfields were relatively cheap, and to which hard-to-get engineers could be tempted to move and settle down for good. After the Korean War had turned combat planes into flying computers, the electronics industry built up its new technology close to the place where the planes were being built. Today the missile is the key to the future of aviation, and California has attracted the commanding share of research and development.

The influx of population to man these industries in turn encouraged new manufacturing concerns to supply the consumer market. Families often came ready to start anew—to buy new appliances and furnishings, to start a new life in a (for them) new kind of modern housing and home-making. Electrical appliances, oil and gas fired water heaters, myriad household gadgets came to be locally made to meet the demand without cross-country transportation costs.

Design for a full-grown market

There is a certain advantage to this

Smog: *Wilshire Boulevard glitter is dulled by smog belt; recent Prudential building (Welton Becket) is one of many skyscrapers planned.*

Size: *Kaiser aluminum plant in Oakland is a cog of heavy industry in West, supplies basic materials to increase area's self-sufficiency.*

freshly conceived economy: it does not rely on any single industry for its stability and it is a market unto itself, which manufacturers can get familiar with and satisfy with less competition from outside. And there proved to be still another advantage to this emergence of a strong local market.

Because the products — California clothes or room heaters (where central heating is unnecessary)—were directed to a *specific* need instead of a national average, they frequently found a market and influence elsewhere where the same need existed. "'Anything and everything' simply will not work in California," says author Carey McWilliams, commenting on California's reputation for innovation. "Design must be based on function and need." The unconventionality of western manufacturers has often been noted, but, McWilliams remarks, "their lack of conventionality is not studied or invented—it was born of necessity."

Considering Los Angeles' spectacular —and seemingly inevitable—rise, it is interesting to compare the Los Angeles region with other areas of the West Coast that would seem to welcome the same growth.

San Francisco's restrained surge

The San Francisco Bay region has undergone a change rivalled in America only by Los Angeles itself. The Richmond-Berkeley-Oakland hills across the Bay from San Francisco are heavily industrial and growing fast in many of the same fields as Los Angeles. Electronics, particularly, has been attracted by the pleasant environment and the proximity of centers of scientific investigation like the University of California at Berkeley and Stanford University. On the Peninsula south of the city, an intense expansion is under way, centered around the Stanford Research Institute at Palo Alto. The Stanford Industrial Park and other planned industrial sites are adding to the total of manufacturing firms around San Francisco.

Yet San Francisco may never challenge Los Angeles for industrial primacy on the West Coast: it gets too much rain and fog to attract aviation, its urban building space is more limited, and even its ideal port and other transportation advantages have been surpassed by the strategic location and industriousness of Los Angeles—where they *make* their own ports.

The "colonial" Pacific Northwest

It is, on the West Coast, the Pacific Northwest that contrasts most sharply with Los Angeles, because the many similarities in environment help to single out the important differences. The states of Oregon and Washington have been described in government reports as being in a "colonial state of development." The huge Boeing Airplane Company resides in Seattle, for many of the same climatic advantages that attract its competitors to Los Angeles. But the unusual part of its relation to the city is that it employs over half the manufacturing work force in that county, and constitutes nine-tenths of Seattle's industrial growth since 1950.

The surrounding area has natural resources—water, timber and food products—that might have created industrial needs and a local market like that in Los Angeles. But the major obstacle to the Northwest's growth remains the long distances to major population centers, and its hope for the future seems to lie in diversifying its production in specialized manufacturing.

While San Francisco prospers and the Northwest worries about its prospects, Los Angeles dominates the scene. It might be said that if the metropolis of Los Angeles had not existed, the West would have had to invent one. There had to be some center of industry to supply the growing area west of the Rockies, two thousand miles from the industrial heartland of the Middle West. But the mountains and deserts that divide West and East not only set the nation's rivers flowing in two directions; they also set living patterns going down divergent paths. "Western living" bears on the designer's work as well as his life—giving it special limitations and special opportunities.

Los Angeles roadscape, photographed by Glenn Christianson, Art Center School

Lee Boltin

San Francisco élan reflected in "windingest street," pastel houses, bay-view apartment building.

Fisherman's Wharf keeps San Francisco keyed to the Pacific, helps make it a top tourist stop.

Lee Boltin

Western living

—What's unique about it?

Western living has been much talked about: some say it's a dream; others, a nightmare of disoriented values. But it's not only a matter of an open-collar society lazying around the swimming pool, nor a Hollywood fantasy of ladies in blue hair and mink-lined Mercedes and pearl-lined bathrooms. It is, to be sure, a world of transience and fashion, impression and show, but it is naturally more prone to take up new styles for another reason: it has no real reason to cling to tradition, since it has none in the traditional sense.

Western living seems to be a determined effort to squeeze the juice from all the fruits the region has to offer—sun and sand, mountain and sea, natural vista and man-made marvel. It's a young society—most of the people are new in arriving, fresh with enthusiasm, usually better heeled than they ever were before (California's per capita income is one-fifth higher than the national average.) They're willing to dabble in anything that promises pleasure—off-beat dress, friendly mores, flamboyant architecture—and are freed of the standards of behavior of tighter communities. It has made a good market for innovation—one that has set local industry to dreaming up new ways to excite consumers.

The question on which all others hinge is whether the West Coast—of which Los Angeles is the focal point and extreme expression—is really a "region" at all. Can it be considered a unified area by virtue of special values, unique needs, a common outlook? Does it have a life of its own, a popular culture? And how does a serious designer fit in? How does he go about designing for a culture that has Hollywood as its center?

California culture—myth or promise?

It isn't what the ads show, says a noted home furnishings critic living near Los Angeles. "California living," she sug-

gests, is a promotional gimmick dreamed up to sell goods in the East. Not only do people *not* engage in the glamorous pastimes shown in Kodachromes and slick fashion magazines, say the disenchanted, but even the climate doesn't live up to its reputation: it's generally too cold in the evenings to sit out in the spacious patios. Only the *image* of California living has captured imaginations throughout the country.

Yet Los Angeles certainly looks different on the surface; and its sheer size has an effect on people's living habits. Architect Richard Neutra has discovered that when drawn in a scale suitable for representing all other major cities normally, Los Angeles becomes an entire wall of blown-up subdivisions. Lopsided business districts stretch hundreds of miles along endless boulevards; an amorphous pattern of residential areas shows very little differentiation of neighborhood-types; a scattering of industries lies right at the heart of the city and is diffused randomly throughout the metropolitan area.

Some observers have asked whether such a "megalopolis"—a grouping of suburbs into an unlivable super-city—is the road down which all modern cities are destined to go. Already Los Angeles' pattern is having its effects on cultural life. As Neutra noted, Los Angeles is "of all metropolises, *the most unknown*. More than any other city I have encountered, it is *unknown to its own inhabitants*." It's just too big to know. Workers will (and must) often travel hundreds of miles a day in order to make a living; but the lack of a permanent opera in a city of six million indicates not that there is no one to listen, but perhaps simply that it's too far to travel after those hundred miles to work and back.

How many people are anxious to listen is another open question. The Hollywood Bowl concerts are popular, but western movies, stock car races, muscle building and Las Vegas weekends seem to be the most prominent features of Los Angeles culture, at least if you ask anybody from San Francisco!

Designers in a problem culture

In this kind of an environment, how does the creative artist prosper? Hollywood graphic and industrial designer Saul Bass has some pointed things to say about culture and creativity in Los Angeles. Pointing out that it has a unique and flavorful cultural tradition, he goes on to say that "already the changes are taking place that will make Los Angeles much like every other industrial center. Its industry (and an adjunct of industry such as design) is subject to the laws of a highly developed technology that tends to create its likeness everywhere." Uniqueness, Bass implies, can be maintained only through "iconoclastic thinking among West Coast designers, but this—as anywhere else—is difficult to come by."

Designer - architect Charles Eames notices a serious lack of tradition in the area, but to him it explains the excesses and absurdities of California culture—particularly in the lack of civic responsibility in residential architecture. "Nobody is looking over their shoulders, from the past or around them," he says. "Certainly Los Angeles is receptive to new ideas—both good and bad—because it has as yet no cultural standards into which things must fit." In this sense, the West Coast may be not unique, but only the mirror of the historic American problem of rapid growth on virgin soil.

Are westerners a new breed?

What about western attitudes? Do these represent something new? Dr. Ernest Dichter, Director of the Institute for Motivational Research, gives a qualified "yes."

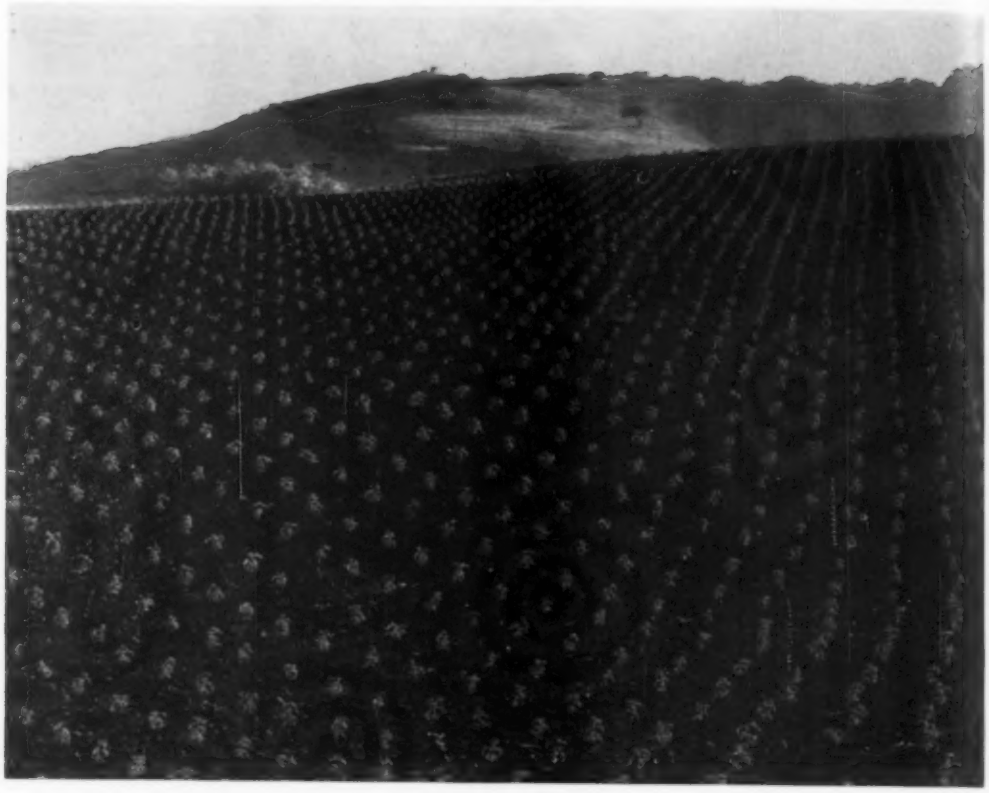
"The westerner," finds Dr. Dichter, "thinks he is different from the rest of his countrymen because he got a lucky break: he is living in the West. He shows great insistence on the personal touch and on friendliness. On the physical level people equate this emotional need with informality. The product itself, as well as its advertising projection, must reflect warmth and cordiality if it is to succeed."

As for pattern-breaking, Dr. Dichter found some important qualifications to this attitude in the West: "Because he has the makings of a good life and because he doesn't want to be rushed, the westerner is considerably more conservative than his reputation would indicate. He has a fear of jumping to conclusions and discarding the familiar merely for the sake of adventure." This goes part way toward explaining the sudden appearance of "old English" houses and bulb-burning fireplaces in the midst of the cult of "make it new."

How to design for the West?

A look at the West Coast products featured in this issue may not immediately suggest a striking difference in the character of West Coast design. Designers there seem to be aiming at some universally acceptable goals: mass-production efficiency, easy function and durability, and a timely appearance. The most articulate western designers make it clear that they are aware of their special place in American design, of their favorable opportunities to create new design motifs, and of their difficult role in acting as intermediaries between western manufacturers and western consumers.

After the tally of likeness and difference has been taken, how unique is the West Coast in toto? California, it has been said, is *all* of us: it is a compound of people from all parts of the country, changed to a new character by the chemistry of the sun. It has become as different as any one section of a country can be when it still talks the same language, uses the same currency, and is within 8½ hours of the opposite coast. *It is different within an existing pattern*: and those differences matter to design and to business. It is perhaps growing more like other regions all the time, but there is still difference enough to make some people deplore the place, some to comment on its rootlessness, some to see great promise.

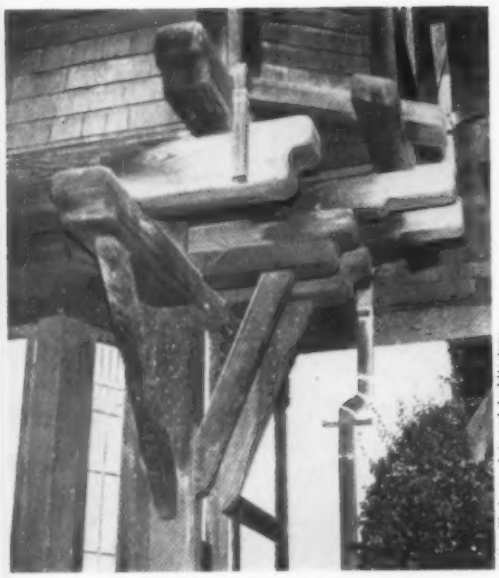


Beyond the tangle of smokestacks and TV towers,

along roads connecting hustling cities, the land soars high,

brings forth its fruits, the sands blow free, the ocean thunders

before the eyes of California's photographer laureate Edward Weston



Julius Shulman, Arts and Architecture

California architecture turned a corner with the Greene brothers.

Design adapts to the West

—Is there a regional architecture?

The question of what's so special about the West Coast has come up with great intensity regarding the architecture of the Pacific. Lewis Mumford and others have in recent years defended their designation of a unique "Bay region" architectural style against the advocates of the International Style; but the discussion of regionalism is not new to California. Many of the outstanding elements of western buildings are local manifestations of imported themes, and California architects have been conscious in the past of their foreign sources and the need to adapt them to the West Coast scene. Their solutions to the problem have often bounced back to influence architects around the world.

The Spaniards—the first European influence on California—bequeathed not one style but several, so that Spanish is still the most pervasive feeling in Southern California's "anonymous" urban building pattern.

But white stucco and red tile alone do not make an architecture, and California architects have been trying for more than sixty years to create individual expressions. Their efforts seem to divide roughly along two lines. One group, which might be called the romantic school, begins with Bernard Maybeck and the Greene brothers.

At a time when the rest of the country's architecture was academically eclectic, Maybeck (who died in Berkeley this month at 95) took a stand on an original kind of building for the California climate and particularly for San Francisco's cosmopolitan atmosphere. He brought to bear on California building the Japanese wood construction that had been worked out in a similar climate and terrain on the other side of the Pacific. But Maybeck's originality lay not only in his using native woods but in the way he used them: the interior spans he managed to open up with wooden beams freed the space within from the jungle of the Victorian floor plan.

Another spontaneous reaction to an environment that required a new architecture was the work of Charles and Henry Greene in Pasadena, starting in the 1890's. They consciously investigated what Japan had already discovered about similar design problems. The exposed post and lintel method of wood construction that they adopted was required by the very nature of the material, but the Greenes made a virtue of necessity by exposing the joints for rich decorative effects while creating uniform spacing of elements.

The Greenes picked out other Japanese architectural interests and adapted them to the California scene. Landscaping was conceived as part of the total inter-relation of house, garden and view; even the generous overhangs functioned to tie the house in with its surroundings. And their detailed specification of inner and outer elements as a whole included flush ceiling lights, room dividers (using glass in the way the Japanese used paper screens), built-in cabinets, and sectional furniture.

A parallel popular style, equally influential, was the California bungalow. Often a blight on the landscape, but at its best an adequate adaptation to the land, its long low roofs, rich redwood surfaces and homey overhangs made an impression on California building that is still felt today. Its quality, called romantic by some and casual by others, struck a note that was meaningful to Pacific Coast life and that its architects would not soon abandon.

On this scene came Frank Lloyd Wright in the 1920's, reinforcing what was becoming a romantic tradition if not a regional style. In some respects he was an anachronism: though he built in poured concrete instead of wood, he created a clear sense of structure with elaborate decorated surfaces. Contrasts of openness and enclosure made for a strong relationship to the lush surroundings.

But the twenties also saw a contrary movement take root in California, one which, in terms of its relationship to indigenous building, was well dubbed The International Style. (An architec-

ture of crisp volumes and planes was not entirely unknown in the West: Irving Gill, who came to San Diego in the 1890's from Louis Sullivan's Chicago office, had slowly developed a personal idiom in poured concrete which pointed toward a new technology.)

It was when two Viennese architects, Richard Neutra and R. M. Schindler, came to California that the modern "International" interest in methods of construction in concrete, steel and glass came into focus. They used pre-cast concrete tilt slabs, with ribbons and planes of glass, to emphasize the shapes characteristic of formal planes rather than of the skeleton. But their work could at the same time be related to the exposed structures of Japanese buildings, translated from the craft stage of wood into the industrial idiom of reinforced concrete.

For many years they plowed the furrow almost alone, Neutra in particular finding more disciples in eastern schools than in western offices. But during the war, among the millions of troops who passed through the West Coast to the Pacific theater, there were many young architects who saw there not only the warm expressions of the Maybeck-Greene tradition in the patio plans of William W. Wurster, but the appropriateness of the sparse but open Neutra homes as well.

At the war's end, a good part of a generation of young architects migrated back to a land where they could build without barriers — where people were receptive to novelty and enthusiastic about a new style of life. The region in fact became richer in talent than in the immediate demand for it; some of the architects stuck it out, others went elsewhere. Those who stayed helped to form the new spirit of West Coast architecture.

It was inevitable that, in the postwar building flurry, a battle should rage between "redwood" romance and "international" terseness. Many of the younger architects who had grown up amid Maybeck and Greene, bungalows and northwest prairie houses, absorbed the spirit and projected it in new terms.

Julius Shulman, Architectural Forum

California architecture embraces contrasts of setting and style: Richard Neutra: house in the desert (Palm Springs)

Fred R. Dapprich, Architectural Forum

Harwell Harris: house in the tropics (Los Angeles)

Charles Eames: house on the Pacific Palisades (near Santa Monica)

Charles Eames

Ernest Braun, House and Home

Outdoor living *inspires new solutions in outdoor space: landscape architects Eckbo, Royston & Williams play geometric patterns against formal planting and light structures to organize patio into an outdoor room.*

Morley Baer

Roger Sturtevant

Japanese influence *on architects Campbell and Wong extends from formalized urban gas station (General Petroleum Service Station, San Francisco, left), to luxurious motel (Dinah's Motel, Palo Alto, below). Oriental culture is vivid in West.*

John Yeon and Harwell Hamilton Harris exemplify this group. The meaning of Japanese concepts was reinforced after the war as other architects, like Smith & Williams and Campbell & Wong, sought more expressive ways to use local materials. On the other hand, Neutra persisted in his efforts to communicate, through standardized detailing, new and little-known construction methods to the building trade; Charles Eames re-formulated the problem of architecture as a problem of industrial design with mass-produced elements; and Raphael Soriano brought his own poetry to the use of industrial materials and components in residential buildings.

Who has emerged the victor in the architectural arena? If one looks for a clear-cut triumph of one style, there is disappointment; if one looks for resolutions of viewpoints and a possible emergence of something new, an interesting situation presents itself. For many of the coastal architects have proved willing to experiment with the approach of the opposite camp: steel buildings frequently show a stronger emphasis on the expression of structure and decorative materials, while the architecture in wood often achieves the clarity and crispness of form once found only in concrete. Perhaps no one better exemplifies the bridging of the gap than Pietro Belluschi, whose buildings in wood have a lyric quality that is always volumetrically clean and restrained, while his skyscrapers seem rich in structural expression within the medium of steel and glass. A host of other outstanding architects—Wurster, Bernardi & Emmons, Bassetti & Morse, John Lyon Reed, Victor Gruen, Gordon Drake, Craig Ellwood, Gregory Ain and Vernon DeMars—have worked out their own idioms from the cross-currents.

Probably the most important thing that can be said about Pacific Coast architecture is that, regardless of "style," it has been built for people: in contrast with the East, where a modern house was long a community anachronism and is usually work done for wealthy and experimental clients, the West Coast has, since the end of the war,

↑ **Multiple dwellings** *are in demand in fast-crowding Los Angeles; this one by Raphael Soriano introduces corrugated garage door, planted terrace.*

↓ **Office building,** *architect Thornton M. Abell's own quarters, has redwood lapping in long, low lines typical of residential bungalows.*

↑ **Builder's houses** *enjoy luxury touches: Eichler Homes, mass-building firm, hires architects Anshen & Allen and Jones & Emmons for this type of home. (Palo Alto.)*

↓ **International style's** *planes are modified by careful surface details in new Seattle First National Bank branch at Bellevue, Wash., by Mithun & Nesland, Ridenour and Cochrane.*

thought in no other terms.

And modern California architecture knows no price tag either. Well-known architects have been called upon by builders to design large housing tracts —Anshen and Allen, Jones and Emmons, and others have made outstanding contributions to the design of speculative housing; Soriano, Ellwood and Carl Maston have been responsible for handsome "garden apartments" and other multiple dwellings that have been increasing astronomically in the past few years. Outstanding contributions to school planning have been made by such architects as Ernest Kump, John Warnecke and Richard Neutra, who have re-evaluated the basic necessities of school structures and come up with fresh concepts that have often had a national influence. In fact, as many architectural opportunities have been found in more modest building projects as in large-scale commercial structures —a field in which two firms in particular, Welton Becket and Pereira & Luckman, are leaving their mark.

Despite the frequency of architectural advances, it is hard to sort out true "architecture" from the endless building that goes up on the West Coast. If the average architect and builder is facile with modern idioms that the East has been slow to adopt, it can also be argued that this has led to styling rather than design of buildings, and to a certain monotony. Most of it is "contemporary" in spirit, while "googie" architecture has by-and-large lost out in the battle of taste; yet the elements of most new buildings, though collected from the genuine architectural investigations, have often been misapplied.

No architect or group of architects is yet, it seems, in a position to make a major challenge to the shapeless organization and reckless building up of Los Angeles, and it remains, as Southern Cal's Dean of Architecture Arthur B. Gallion has said, "a rough sketch for a city." But he concludes, "The ever-present prospect for acceptance of a fresh proposal is a stimulus to the creative energy of those working in the region."

Walter Baermann, humanistic educator

West Coast design education

Rival educational traditions thrive side by side.

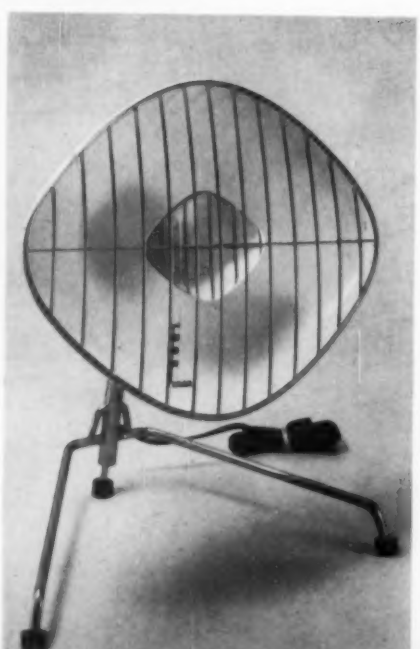
In social gatherings of designers around Los Angeles, it's not unusual for a kind of class reunion atmosphere to emerge from the professional small-talk. Teachers and students of five "generations" are found together, carrying on the same discussions of theory and practice that began in school days. In the Melvin Best office in Pasadena, for example, partner Bob Bond was Best's teacher at Southern Cal, Best later taught Bill Ward and Bob Fujioka there, and Ward himself now teaches at the same school. The close cooperation and friendship that has been noticed among West Coast designers may reflect nothing more complex—nor less strong—than old school ties.

Part of 1948 design class at Cal Tech (l. to r.): Instructor David Welsh; Robert Brinkman, now with General Motors; Craig Paul, now with Harley Earl; George Miller, now a sales executive; Curt Whittlesey, now with GM styling; Jack White, with GM Frigidaire. Also in class were Robert Bond, now partner of Melvin Best; Jerry Parks, now design and human engineering director of Cal Tech jet labs; Sidney R. Shannon, Jr., now with Genisco, Inc., L. A.; Robert McLean, Ray Palmer, Harold Ford.

Harry R. Greene and Salvatore Merendino

Plan for built-in kitchen, experimental student project at Cal Tech (1942), includes built-in oven, wall refrigerator, stainless steel counter-top and sink.

Portable electric heater (right), 1954 student project at Southern Cal by Council Tucker, now of Merendino-Greene office.



Influential professionals feel that young designers ought to be prepared to earn their keep as soon as they start working — with professional technique at the drafting board and with sound practical judgment. Others feel that the growth of both the individual and the profession will be limited unless designers are given a generalized knowledge and cultural understanding with which to tackle the new kinds of projects for which design is being called on.

Every school in the country represents some combination of the two philosophies, but in southern California the extremes stand out in a juxtaposition that makes the picture of West Coast design all the more interesting.

The "humanistic" tradition was founded by a happy accident when a

group of public spirited Pasadena citizens started an art school for want of something better to do with ground that the city wanted to turn into a parking lot. Hunt Lewis was named the first Director of the California Graduate School of Design in 1937; and Lewis, himself a graduate architect from Princeton, invited early West Coast designers Kem Weber and Karl With to teach. All three were immersed in humanistic interests themselves, and the History of Culture course at the school figured as importantly as Business Principles and Cost Accounting.

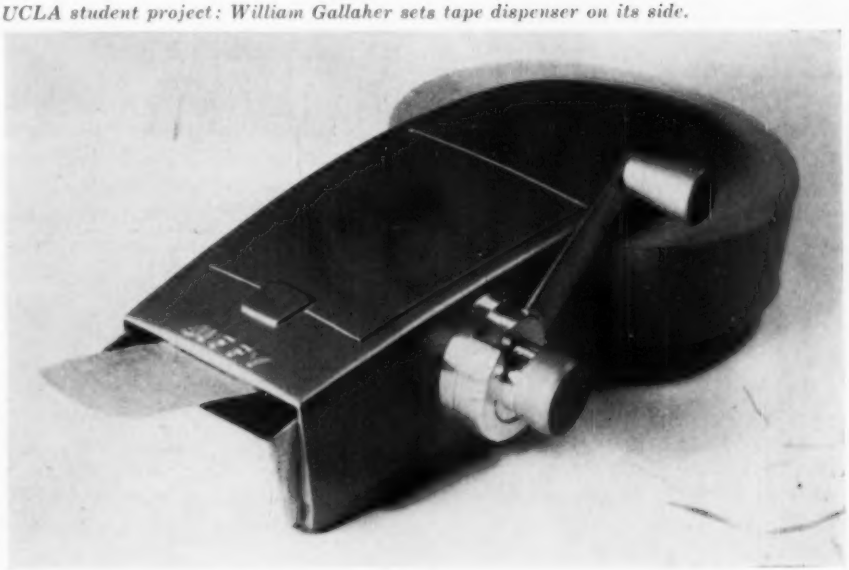
The Grad School lasted four years, until the war took most of the male students off; then it moved over to the scientific and technological precincts of the California Institute of Technology in Pasadena. The director of the renamed California School of Design (still a post-graduate school) was Walter Baermann, and under his influence the humanistic direction was at its strongest. Two of his students, Sal Merendino and Harry Greene, remember Baermann as the formative influence on their personal philosophies of life as well as on their design objectives. "A Germanic idealist," as they describe him, he communicated to his students his Bauhaus-like theories of the social mission of design and the importance of becoming a whole man, grounded in the history of the creative arts and industrial technology.

The next design director at Cal Tech, Antonin Heythum, helped modify the humanists' approach by his interest in the latest technological and marketing resources. Working closely with local plants and assigning ground-breaking projects like the built-in kitchen of 1942 (far left), Heythum encouraged greater attention to research and production problems.

Karl With, one of the first West Coast design educators and now head of the UCLA Department of Integrated Arts, lectures to a UCLA industrial design class.

Henry Dreyfuss (far right) and John Maguire (back to camera) advise students on road planning project, human engineering.

UCLA student project: William Gallaher sets tape dispenser on its side.



Students work on geodesics with Maguire (l.).

Origins of USC's design class

Sal Merendino and Harry Greene have never felt at rest away from a design school, and they picked up the teaching load at Cal Tech when Heythum moved on to Syracuse University. In the post-war period M & G trained many of the designers who now staff local industries and design offices (see class, far left). Keeping close to prac-

tical problems and concentrating on professional working methods, they have aimed at the same time to create "better, happier human beings—whether they become designers or not."

The fate of the Cal Tech design school reflects on the general relation of design education on the West Coast to the great centers of scientific education for which the area is noted. While a host of technical schools and university research labs are supplying the specialists for advanced western industries like aviation and electronics, design departments have been set up more frequently at fine arts schools like Rudolph Schaeffer School of Design, California College of Arts and Crafts, Chouinard Art Institute, and California School of Fine Arts. What happened at Cal Tech was characteristic: when the Institute's President Millikan, who was sympathetic to design, was succeeded by Ralph DuBridge, the school turned toward pure scientific research. Applied studies like design found no place in this new orientation, and the design section was eliminated in 1949.

The irrepressible Merendino and Greene moved in the same year from Cal Tech to the University of Southern California's School of Architecture in suburban Los Angeles, and have now made a once-waning design section into a department of some fifty students, graduating ten to twelve a year. Under the sympathetic guidance of Dean Arthur B. Gallion, they have aimed at a well-balanced professional training that tackles total design problems from research to execution, and branches out into such areas as community planning (in which the Merendino-Greene office is itself engaged).

UCLA reaches far afield

A similar balance is being effected by another design school in the area that grows partly out of the same tradition. Under the stimulation of Henry Dreyfuss, the two-year old design section at the University of California in Los Angeles (UCLA) is making a unique attempt to encourage creative thinking in West Coast designers-to-be.

The head of the UCLA department, Assistant Professor John Maguire, developed the professional approach to design education while working in Dreyfuss's office; his humanistic interests were fostered by his teacher at Southern Cal, Hunt Lewis.

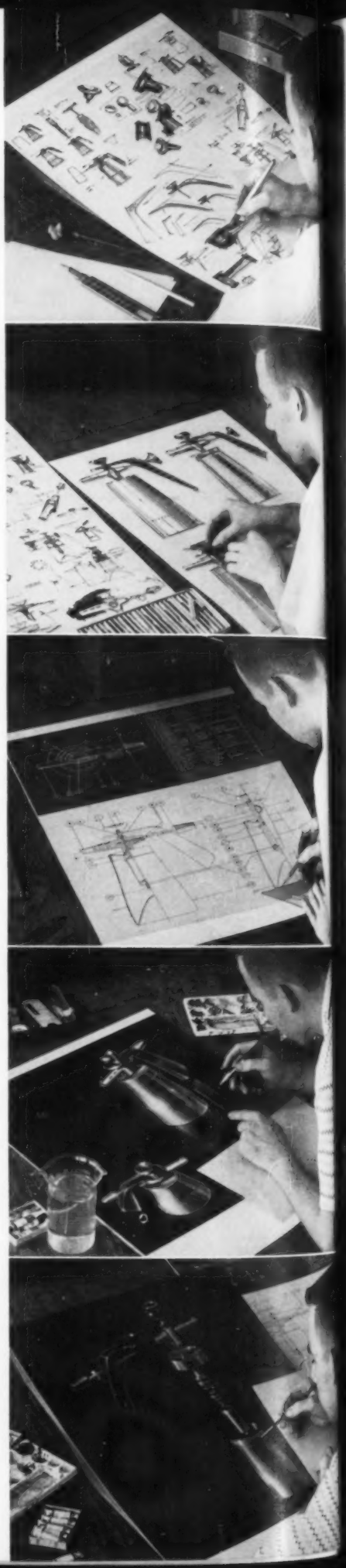
Combining the two approaches, Maguire has set up a five-year program which makes room for both the aesthetic training required by the UCLA art department, and for a thorough investigation of selected projects in such areas as road planning, human engineering, geodesic structures and ship interiors. These are studied in groups—usually one project per year—and original discovery of the essence of the problem, rather than execution of the finished model is the goal of study.

By drawing together a variety of approaches, and stressing the diversity of answers to any design problem, Maguire and his fellow-teacher Seymour Steiner are trying to develop the "complete designer" whose wide scope and liberal background allow him to tackle any assignment he steps into after graduation.

Art Center trains for skill

The Art Center School, in the heart of Los Angeles, takes quite the opposite approach. "We don't use books," says Director E. A. Adams; "we give professional training by practicing professionals for professional success." This principle has led to a design curriculum consisting almost exclusively of sketching, rendering, modelmaking and product styling. General education courses required for accreditation are given a utilitarian bent: the history course uses the daily paper as its textbook.

The aim of servicing the business community extends also into the selection of instructors (no professional educators, only practicing designers). Many Los Angeles independent designers teach at Art Center part-time, including Strother MacMinn, William Brewer, Robert Cadaret, Joseph Farrer, Charles Kratka, Mary B. Sheridan, David Solon and Ted Youngkin. Many more designers in the area are alumni. Thus Art Center represents one focus of design education in Los Angeles, though the fact that its teachers are all practicing professionals rules out a "faculty" in the traditional sense of the word, since they are rarely assembled at the same hours.



At Art Center, execution is paramount from the start, as the rendering and modelmaking activities on these pages indicate. Modelling starts in the first year of John Coleman's product design course, and is particularly emphasized in the transportation design course, where former General Motors model specialist Joseph Thompson is a key man in George Jergenson's department. Many problems are presented in terms of products already on the market. The student's job is to design and execute a finished housing. "We want the student to know the realities of life," Adams says of this approach, "to know just how far he can and can't go when working in industry." He learns more about the facts of life in the hot competition that Art Center fosters: only 20% of its entrants graduate—the rest are "fired" or back out.

Meeting the immediate needs of industry for design and commercial art talent has been a specialty with Director Adams, ever since he founded Art Center in 1932 as a commercial art school with the first design course in the region. The trade-school rather than the academic set-up is still the rule. Many of the grads who go to the auto styling studios are car-conscious Californians who are often spoken for early in their schooling, and are subsidized by their future employer. They come out highly skilled in the techniques of auto design and can take their place in the styling studios immediately after graduation. Art Center is proud of its many successful alumni, its impressive record of student awards, and its reputation for appropriate placement of its specialized students.

A school of this fast pace, equating proficiency and success and eschewing the past in order to concentrate on the immediate and the future, is in many respects a natural phenomenon of the coastal climate—and a necessity to its own market. Many designers will always feel that its expressed goals can be achieved only by the kind of training offered in the nearby universities — a comprehensive general education combined with special skills—while a number of others, including the alumni who have proved themselves on the West Coast, will continue to attest to the efficacy of Art Center training.

First-semester Art Center student models auto deck and fender section.

Telephone redesign proposes in-line push-button dialling.

Working model of outboard motor features up-to-date color and styling.

The West Coast future

What are the prospects for design?

The idea is held by everybody in Southern California that some sort of destiny awaits the place.

James M. Cain

In a land where "manyana" can mean either patience and laziness or impatience and haste, the future holds both longing and dread. "How big can we grow?" ask the city-planners in alarm; "How big can we grow?" the businessmen ask, exultant. To all questions of Los Angeles' growth, the mountains to the east and the Ocean on the west stand as visible reminders that the city has its limits, and that the West Coast may eventually reach its own limit.

"Behind the arrival of Los Angeles as a manufacturing and industrial center," notes Carey McWilliams, "is a factor often overlooked, namely that because of its late state, it has been able to build *modern* plants and to profit by the experience of industry in older centers. Technologically, the East's head start in industry could prove to be the West's major advantage."

Its late start has gained for California the latest technological facilities in the aircraft, missile and electronics industries, but in a long race neither an early nor a late start by itself makes a winner. The natural resources that have *made* California are today showing signs of running out.

The metropolis in the desert had an economic development which is in many ways the story of its water and its power. For agriculture and civic supply, water had to be piped in from distant mountain ranges. Californians now see the search for water beginning again, and are looking to the Feather River project for a new source.

As for power, California has long been the leading hydro-electric power producing state in the U. S., but here too, its industrial and population needs exceed its own output. Local oil is still running strong (though some observers say it has passed its peak and is approaching exhaustion), but with more motors and boilers in machines and autos thirsting for power, California has been forced to get natural gas and petroleum from other states to meet its needs.

In fact, the only resources that do not seem to show their limits in California are enthusiasm and ingenuity—and perhaps there will always be enough of them to find a way out if the bubble bursts. Los Angeles has set up a Solar Research Center to look to another natural resource, the California sun, as a new source of power. And as some palliative for the smog that beleaguers the growth of industry and population, municipal restrictions on residential and commercial burning have been widely put into effect this Fall.

How soon the West's phenomenal industrial growth will slow down can't be predicted, but under increasingly heavy competition from national manufacturers through the branch-plant empire, more local concerns are looking toward the rest of the United States to augment regional sales. At the same time, many Californians are urging a westward look toward the Asian market. Los Angeles' port, the Long Beach-San Pedro harbor, is estimated to be the busiest shipping center on the Pacific Ocean today. Still, exports of locally manufactured goods show no general trend toward oriental sales.

But it is inevitable that an industrial center must supply a hinterland far larger than itself, and it is in the eventual extension of the West Coast's market that designers may look to provide greater services to industry. If strong competition is generated between East and West for the national market, the profession that has already proved itself as a key sales tool is likely to be called on for a bigger role in the Far West. And if, on the other hand, the export market develops, local manufacturers who are aware primarily of the demands of their own bailiwick will be calling on design specialists to interpret the needs of foreign consumers.

West Coast designers are already making efforts—singly and in groups—to cultivate industries, to perform consistently responsible work, and to educate an awareness of the value of design. The industrial design committee of the Los Angeles Chamber of Commerce—established to convey to producers and merchandisers the achievements and availability of local design offices—has recently been revamped as a subcommittee of the Chamber's industrial consultants committee.

Designers are also taking steps to broaden their own thinking and capabilities for the diverse calls that may come up in the near future. A recent meeting of the American Society of Industrial Designers' Los Angeles chapter devoted itself to discussing oriental art and design. A June meeting of the Industrial Designers' Institute Los Angeles chapter invited participation by industry in a discussion of design case histories; and the IDI San Francisco chapter is similarly active. On another tack, the national meeting of ASID this month at Ojai Valley, California, takes up the Cal Tech prognoses of the world's next hundred years in relation to design.

Though design is not yet in full bloom on the West Coast, it is sown in what is believed to be a rich and fertile soil. Jean Reinecke, principal in a large Chicago design firm, visited Los Angeles recently in search of new accounts of his own, and many local designers welcomed his presence for the prestige it might add to the profession's local reputation. Reinecke commented that Los Angeles designers' present situation was very much like that of Chicago designers in the '30s, when they had to prove their usefulness in stimulating depression-frozen sales and in selling the total company image, and had to prove themselves against better established New York firms. Today Reinecke and other Chicago designers are in a position to reach out to the West Coast for business. Many of the local designers seem to take solace from the analogy.

Most of the industrial designers are sticking it out, their impatience assuaged by the relaxed temperament the climate breeds. "Manyana" means to them not merely a promised land gleaming in the future, but a pressing urge to whip through the waiting period with all dispatch.

AVROM FLEISHMAN

DESIGNER'S DIARY: *a West Coast week brings travel, talk and travail*

For a closer look at West Coast designers, how they spend their days (and their evenings), we asked the staff of Industrial Design Consultants Inc. of Los Angeles to keep a record of a typical week. Smaller than some, larger than others, IDC is not necessarily a prototype for young West Coast design offices, but a diary of the staff's work week points up many of the problems and obstacles they share with their colleagues on the coast. Bob Mason and Bill Cameron met three years ago at a meeting of the Los Angeles Chamber of Commerce "Committee of Industrial Design." They quickly found they had similar attitudes toward the potentialities of design in the Los Angeles area and how it could be tapped. They formed their own company fifteen months ago and since then have served nineteen clients. Their work load has increased steadily; recently they could justify adding another designer, Douglas Heazelit, full time. They believe that aggressive salesmanship is a must and put plenty of time and effort into it. Yet they are fully aware that after landing a job their success depends on the quality and comprehensiveness of the services they offer the client.

MONDAY

"WEEK STARTS on the telephone . . . 10% of our time is spent this way . . . More than half of this in selling."

In Los Angeles, industry is accustomed to a hard-sell approach, but direct selling is only part of the job of getting design contracts. Cultivation, through community and industrial club activities, is a necessary investment in the long range promotion of any design service. IDC finds that the acceptance of design as an integral part of manufacturing is improving in their area, but still has a long way to go. They drive 2500 miles a month to help get it there.

"AND WE DRIVE . . . and we drive . . . and we drive . . . We spend 20% of our time behind a wheel."

"AND WE TALK about industrial design . . . Spoke on 'Creative Thinking' to Santa Monica Bay Management Club."

"STUDENT DESIGN EXHIBIT is planned with people from UCLA, USC, Junior Chamber of Commerce. Made chairman."

"LOGISTICS STUDY for Phelps includes tabulating baggage, passenger, freight flow at International Airport."

TUESDAY

"TEACHING at Chouinard Institute means planning fall design course with James Normile, Assoc. Director."

Most West Coast designers share the responsibility of teaching, not so much for the additional income as for the prestige it gives them and because they feel they have a stake in the future of their profession. To keep themselves informed about new materials and new fabrication techniques and to maintain contact with the East and Midwest, IDC welcomes representatives from all over the nation as sources of the latest news about technical developments.

WEDNESDAY

"CLIENTS PREFER that we work directly with vendors like Conway Knowlton, plastic fabricator."

Local I.D.I. and A.S.I.D. chapters have done a lot to help lower communication barriers between designers in Los Angeles and have put a new hue on professional exchange. Mason and Cameron, both charter I.D.I. members, get together regularly with other designers. Although no designer likes to lose a job to his competition, most Los Angeles designers philosophically feel that every time one more manufacturer uses industrial design, it helps all designers.

"COURSE in engineering procedure at Art Center teaches future designers to work with engineers."

"VENDORS are invaluable in keeping us up-to-date . . . we enjoy talking with them (here, Northern Engraving)."

THURSDAY

"BRAINSTORMING with Bob Lowenthal, Styline Products President . . . He considers design a basic problem."

"AND A LATE DINNER . . . We must be ready to help a client at any time, day or night."

"PROFESSIONAL LUNCH with L.A. designers Emerson, Johnson, Mackay on Sunset Strip talking shop."

"BOOK WORK at UCLA Engineering Library, seeking human engineering data for Phelps vehicle cab project."

FRIDAY

TELEPHONE . . . in the office or out, keeps us in touch with our colleagues, our families."

"NIGHT WORK . . . back in the office to prepare for conference tomorrow . . . Overtime is unavoidable."

THURSDAY

"AND WE DRIVE . . . and we drive . . . We'll cover 208 miles before this day is over . . . It's not exceptional."

"WAITING is part of it too . . . Most Los Angeles businessmen are very time conscious, informal but efficient."

"COOPERATIVE CLIENT—Arcadia Metals is aggressive company that knows how to use and work with designers."

IDC feels that it is essential to offer both engine ring and appearance design for a versatile and comprehensive industrial design service. Currently they are active on four jobs. They consider that their fees are average for the area: $8 an hour for production and detail work, $15 an hour for research and development, $35 an hour for short term consulting. Many manufacturers, they say, tend to eliminate the industrial designer too soon in the process.

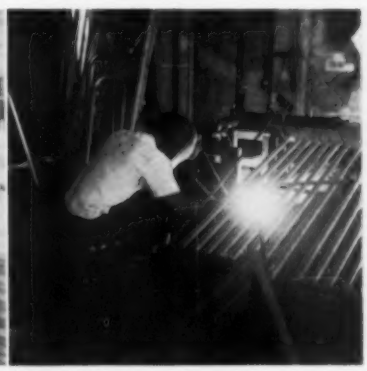
"VERSATILE CLIENT—Pickett Products retains us to research and design house numerals, slide rule."

"IN THE MODELSHOP . . . Few clients can read blueprints or drawings . . . Models don't mislead."

FRIDAY

"CULTIVATION CALL on Mercury International . . . We see them every 4 to 6 months . . . No sale yet."

"CAR CONFERENCES . . . We must plan and discuss our problems while traveling, grab a bite on the road."



"DESIGNING while making saves time and money . . . Many clients prefer that we work like this sometimes."

Sometimes Mason and Cameron find they save time and a client's money by reversing the usual design procedure. Frequently it's faster to don a welder's helmet and fabricate a part in the client's shop. They then check it out later with engineering drawings. Persistence is a primary ingredient in building IDC business. They call on many prospects every four or six months over a period of years, confident their cultivation will eventually land them a contract.

"AND WE DRIVE . . . We moved to Santa Monica to get out of the smog but drive through it often."

"I.D.I. meeting is very important for getting together on problems like fees, an eternal question in L. A."

SATURDAY

"WE SCOUT the market . . . New developments in all products are stimulating a source of lots of ideas."

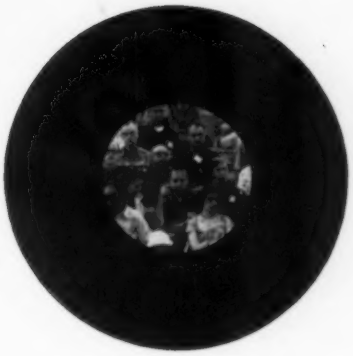
"CONFERENCE with Joe Hirsch of Ramo Wooldridge who shares IDC project on tactile studies . . . No client, but fun.

The three IDC designers usually give up Saturdays to plan the coming week, catch up on their correspondence, reading, and work on projects they are promoting themselves. One current project is a study in tactile stimuli, which they hope will land them a government project. They drop into department stores, other retail and wholesale outlets to talk about new products with buyers, to make themselves aware of what is happening in the consumer market, new materials, new color trends.

"ON SATURDAYS we try to stay together to discuss IDC problems, next week's work, general plans."

In Los Angeles, a designer's byword is "potential." Bob Mason says, "Small, actively competing manufacturers are our potential. Many companies want industrial design, but feel they can't afford it, others are only beginning to realize its value, and still others haven't begun to think of design. We intend to give these people the extra attention needed to help them understand what industrial design is and what it can do for them." Bill Cameron adds, "It's not the climate in California, it's the potential that gives us our yen and enthusiasm to follow and encourage the rapid advancement and maturity of West Coast industry. Our potential is limited only by our ability to practice industrial design in every sense of the term and to promote it at the proper level." Bob and Bill regard this current struggle as an investment—one that will, they feel confident, yield returns in 7 to 10 years.

SUNDAY



People

The story of West Coast design is, like any regional story, ultimately about people. And the people who give life to this particular story are not always designers. They are corporation presidents, merchandisers, architects, inventors and teachers—men who started out on their own in a land that reveres the individual. The nature of West Coast design offices also seems to reflect the importance of the individual: there is a preponderance of small offices, and a few large individualized firms; but very few of the institutional offices found elsewhere appear on the Coast. Industries, too, often turn out to be extensions of one man—the president who had the idea, raised the capital, built the firm, and continues to exercise a positive and highly personal leadership in business and design policy alike.

Bernard S. Benson

Because "If two of us agree, one of us is redundant," incisively witty Bernard Benson is always willing to argue, and a subject likely to provoke him into argument is "brainstorming." Convinced that no intellectual good can come of this "cerebral popcorn," he champions a deliberate "epistomatic" analysis from problem to optimum solution.

Finding solutions is an old story to the thirty-four-year-old president of Benson-Lehner, manufacturers of data-processing equipment. At twenty-one he was in charge of Great Britain's guided missile program. Later, as a Douglas research engineer, he developed ten patents for missile control systems, delta wing designs, and automatic data reduction machines. Now he sets the working and design philosophy that has given his products international prominence, attributes much of the multi-million dollar company's success to the uniqueness of the designs, for which he personally is largely responsible. Benson is shown above piloting the company's $100,000 "Data Cruiser," part of a campaign for new business from private enterprise.

Henry Dreyfuss

Is Henry Dreyfuss a West Coast designer or an East Coast designer? Although his work is almost evenly divided between New York and Pasadena—with clients at both ends and in between—Dreyfuss' living preference tips the scales westward. He puts up with a lot of travel for the reward of returning to a verdant estate near the Pasadena office he opened in 1945.

His is a kind of operation exceptional on the coast: the big-time, internationally known, nationally influential design organization. It is an operation that reflects the serious, methodical, positive temperament of Henry Dreyfuss himself. Dreyfuss uses elaborate memo systems, conference phone set-ups, matching "current operation boards" in both offices—all in an effort to close the 3,000 mile gap between coasts. But the miles are still there, and he spends about a third of his time flying over them. Wherever he goes, he keeps his pockets full of small sharp pencils, which he throws away as they turn dull with his scribbling. Happiest when creating designs he knows will endure (the Big Ben has been on the market virtually without change since 1939) Dreyfuss is a powerful force for classicism. He teaches at U.C.L.A. and Cal Tech, and is on the Visiting Committee at Harvard's Graduate School of Design.

Pietro Belluschi

When Pietro Belluschi was awarded an honorary LLD from Reed College in 1951, architect Herman Brookman praised him for his "brilliant talent, . . . good taste and common sense." These qualities—the passionate force of brilliance tempered by a restraining practicality—combine to make his work vitally influential in the development of an architectural idiom for the Pacific Northwest. Though he now heads the Architecture Department at M.I.T., his influence continues undiminished.

Belluschi comes by this balance honestly. Born near Venice, he spent his youth in Rome, where his artistic impulses made him rebel against his middle-class background. The ideal on which architecture is based, Belluschi states, is the right to free our thinking from past dogmas. Believing that the architect must share this right with his clients, he sets out to educate and convince them, rather than to thrust his genius upon them. Out of this attitude has come both professional and lay admiration of the "Oregon" house, the Portland Art Museum, the St. Thomas More chapel, the Equitable Building in Portland.

Charles Eames

Deceptively youthful (no one believes he's a grandfather) Charles Eames has in his Venice (Cal.) workshop made new forms that have changed the way we sit, store things, play, build. His original molded plywood chair remolded an industry's thoughts on seating; later his modular storage units, and his own experimental house became forces in design and architecture.

Why is Eames in California? "We came out in 1941 because we didn't know anyone here." In a sense he still doesn't: needing solitude for his work, Eames lives pretty much apart from activities of the West Coast design world. To achieve intrinsic quality with the utmost economy of means, he pursues each problem relentlessly (five years spent on joining and molding methods for the plywood chair). Result: a playful inevitability, with no extraneous elements.

On the West Coast, Eames, with his wife, Ray, has built a life-long interest in films into a sort of sub-career: he has made a number of experimental films, and "went Hollywood" recently to direct aerial shots in "Spirit of St. Louis."

Raphael Soriano

In a career marked by a singular and consistent reticence (he seldom answers mail—from anyone), architect Raphael Soriano has often achieved a poetic expression unusual in the commercially produced materials (steel, corrugated plastic sheets) with which he works.

Born in Greece in 1904, Soriano received his architectural training at the University of Southern California. After working for Richard Neutra, he opened his own office in 1934. It was in Bel Air in 1951 that he built the famous Curtis house, the prefabricated, modular, experimental house that has been called "the finest industrial product that American home building can boast." More than most architects, Raphael Soriano has seen the problems of architecture as problems of industrial design, and has found many of the solutions to his own architectural problems in the imaginative use of standardized industrial parts.

The amiable Soriano (who plays recorded Bach while he designs) has aims easier to state then to achieve: he simply wants to make a rhythmic and happy environment for people. Toward this goal he employs an idiom at once geometric and romantic.

Gordon **F** *raser*

When, after the war, pioneer housewares importer Gordon Fraser discovered stainless steel for the American market, it was the beginning of a reputation for, and a career in, shrewd shopping. Intense, red-haired Fraser, whose background included study of art history in Munich and Florence, opened a small store in Berkeley in 1947, where he was one of the first to promote the work of Edith Heath, Bob Stockdale, and other Bay area artisans. When other shops showed interest in his European and Asian sources, he turned wholesaler, with a national market and nationwide influence.

Although now living in New York, Fraser spends a third of his time on the West Coast (where he has a warehouse) and another third traveling in search of goods. A designer in his own right, he designed the famous Laurel line of flatware.

Stephen **B** *osustow*

As executive producer of UPA cartoons, lean, softspoken Stephen Bosustow has since 1947 shared billing with the Messrs. Magoo and McBoing Boing. When, after a mass wartime cutback at the Disney studios, Bosustow and other ex-Disney artists decided to provide some business for themselves, the only possible competitive weapon was a form of cartooning that was cheaper to produce. Having no such weapon at their disposal, they forged one: a system requiring only a few flat colors and less animation. The result was a unique modern style that eventually took the whole country by fairystorm.

Now the young granddaddy of experimental studios throughout the nation, UPA continues to experiment with the whimsical and lighthearted. Bosustow, who today is cast as the administrator of seven small creative studios, says "A good film always has a good story—a good idea." So, apparently, has he.

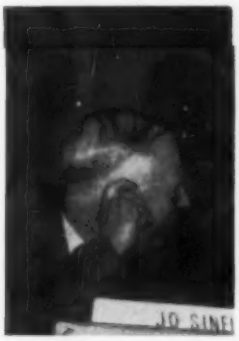
Saul Bass

Equally at home in the abstract world of ideas and the tangible world of the eye, Saul Bass has become an undisputed leader in the western graphics world with work that is fresh, lithe, charming, and free of the bonds of a single "style." The key to his working methods, like the key to his work itself, is independence: he prefers to keep his staff small, rather than risk becoming an administrator instead of a creator. (An incidental advantage is his freedom to devote weeks to such things as the Aspen conference, of which he was program chairman this year.)

Bass went West as an advertising agency art director, stayed to do film work, most famous examples of which were the cast cartoons for "Around the World in 80 Days" and the identification program for "The Man With the Golden Arm" (page 128). Two days a week he spends in Hollywood, works the rest of the time at his Altadena studio where his small staff is busy on big projects: an extensive redesign program for the New York Central, a gas station redesign for Speedway Petroleum.

Designers' Classified: *Pioneers who paved the golden way West*

Henry Hughes chose Belmont, a suburb of San Francisco, for his three-man office, established in 1944. Projects in the works include portable heater, supermarket handling system, toys.



Jo Sinel, charter member of A.S.I.D., arrived on the West Coast in the '30s, taught at Chouinard Art Institute before starting his own practice in San Francisco in 1937. He did calculators for Marchant, is doing bottles and labels for Petri Wines.

Charles Cruze, A.S.I.D., came to design in Los Angeles in 1929 after an acting career in silent movies. He is now working on an ultra-sonic device for Birtcher Corp. (which he has served for 16 years), and on packaging for Gladding McBean.

William F. H. Purcell, A.S.I.D., is included here in his role of managing partner of the Dreyfuss Pasadena office, where he has been since 1946. Native of South Africa, educated at Cambridge and M.I.T., he devotes half his time to overseeing all Lockheed projects for Dreyfuss.

Harry R. Greene and **Salvatore Merendino** (both A.S.I.D.) and associates E. Gloer, R. Selje, H. Barley, went into business in Pasadena in 1943. Environment Design, Inc., an independent subsidiary, was formed in 1956 to do interiors and architectural planning.

Walter Landor came to the U.S. to work on the English pavilion for the 1939 World's Fair, took a look at San Francisco and decided to stay. His staff of 17 concentrates on package design for clients throughout the country.

Hunt Lewis, A.S.I.D., established one of the first design firms in Southern California, was director of California Graduate School of Design (1936). Today he and Tom Tweedie have Pasadena office.

Clarence Karstadt (not shown), Los Angeles designer, comes from Chicago, where he worked for Sears Roebuck before going on his own in '43. His client roster has included Sears, Arvin Industries, Birtman Electric Co.

Newton S. Leichter (not shown) presides over his own practice in Los Angeles, and has for 18 years. His work has included packages for Paper Mate, Wilshire Oil Co.; Douglas and Lockheed aircraft; and commercial interiors.

Postwar starters who are educating industry to the value of design

Reineman

Keck

Tepper

Smith

Petterson

Richard Reineman, A.S.I.D., has new one-man office in Covina — an experiment, he says, in intense concentration. On the boards are school furniture, bowling equipment for Brunswick-Balke, molded items for Dudley Machinery Co.

Henry Keck, partner Burnie M. Craig, Paul Harrison, Thomas Hale, make up Henry Keck Assoc., in Pasadena. Recent projects are water heater controls for Robertshaw-Fulton, dishwasher for Waste King, sweeper for Wayne.

Gene Tepper, I.D.I., an easterner who came west to work for Landor, and **Don Smith,** Salinas-born graphics designer, joined forces in San Francisco. In addition to serving Applied Electronics, Hewlett-Packard, they have organized the San Francisco Art Festival for three consecutive years.

Thorleif Petterson, A.S.I.D., established his design office in Norway in 1937, reopened it in Pasadena after ten-year hiatus which included war service, study at Cal. Tech. Main concern is design of scientific instruments.

Harold R. zur Nieden (not shown), who was born, educated and practiced in Switzerland, conducts an international practice—with clients in France and the Netherlands—from his South Pasadena office opened in 1953.

Channing Wallace Gilson and partner **Donald Brundage,** I.D.I., head five associates in Los Angeles and San Francisco (branch) offices. Diversified projects include gasoline pumps, drinking fountains, Shop Smith home tool.

Mitchell Bobrick, I.D.I., operates in Pacific Palisades under the name Industrial Designers Group. Lighting is his special interest (he has done tunnel lighting); he is consultant to Sunbeam Lighting Co. and others.

Gilbert A. Watrous, I.I.T. grad, and **William Noonan,** Art Center graphics man, opened Visual and Industrial Design in San Diego this year. Besides graphics for Convair, Stromberg-Carlson, they designed San Diego's Children's Zoo.

Cornelius C. Sampson, chairman of the San Francisco chapter of I.D.I., finds his work revolves around food packaging, trademarks and all-inclusive identification programs.

Maguire, P.

Paul R. Maguire, independent designer in Los Angeles since 1950, has laid out distribution and materials handling systems as well as designed Pioneer appliances and an autocollimator for Mikron Instruments Corp.

Zierhut, C. and H.

Clarence and Harold Zierhut incorporated Zierhut Associates with Dean Myers about two years ago in Los Angeles. All are Art Center grads, experienced in electronics design. Alwac retains them on an annual basis.

Gilson

Watrous

Bobrick

Sampson

Harada

Steuer

Best

Emerson / Johnson / Mackay

Norman Steuer come to San Francisco in 1934 with Owens-Illinois Glass, which he joined in Ohio. In the last ten years on his own he has worked for Shell Oil, Beckman Instruments, Safeway stores, among others.

Robert M. Emerson, Allan B. Johnson, F. Gordon Mackay joined forces in Los Angeles in 1954. They have much in common — all are natives, Art Center grads, I.D.I. members. Johnson serves as president, Emerson sales manager, Mackay design director. Besides electronics work, they have done disposers, baggage handling equipment, melamine dinnerware.

Walter Harada, treasurer of the San Francisco chapter of I.D.I., designs primarily furniture and flatware in his office.

Melvin H. Best opened his own office in Pasadena in 1950, today has a staff of nine. Current projects include video tape recorder (Ampex), electric can opener (Klassen), telescriber system (Tel Autograph Corp.).

Staff designers serve highly technical industries as well as those making consumer products

Carl J. Clement, Jr. (not shown) was sole designer at Hewlett-Packard from 1951 until 1956, when Thomas C. Lauhon was hired. His department, now numbering four, is attached to the product design group.

Gene H. Cripe (not shown) joined the Utility Appliance Corp., Los Angeles, in 1944, after designing refrigerators for Fairbanks, Morse & Co., and Arvin heaters.

George T. James, I.D.I. (not shown), developed and designed Franciscan Modern dinnerware for Gladding, McBean & Co., where he has worked since 1944. He studied ceramics at Alfred University in New York, has also taught the subject.

Henry H. Bluhm, secretary of the San Francisco chapter of I.D.I., is on the design staff of Magna Power Tools, Palo Alto.

James W. Kelso, I.D.I., directs the three-man team and model shop which comprises industrial design at Packard-Bell. At P.B since 1939, he still continues his outside practice as design consultant in plastics.

Joseph D. Portanova, I.D.I., is Director of Styling at Hoffman Radio Corp., where he has been employed since 1939.

Frank T. Walsh, A.S.I.D., is design supervisor at the Instrumentation Division of Ampex Corp. in Redwood City. On his staff are **Richard Ketcham,** vice chairman of the San Francisco chapter, I.D.I., and **Glenn A. Smith.**

Bluhm

Walsh

Harold Dsenis, A.S.I.D., was the first designer hired by Consolidated Electrodynamics Corp., in 1949. Today he heads the staff. He was in the former California office of W. D. Teague.

Franklin Q. Hershey, I.D.I., brings to his job as manager of Kaiser Aluminum's design staff of eight, long experience in the automotive industry, including 16 years as chief stylist of advanced cars at GM, later at Ford.

Hershey

Kelso

Portanova

Dsenis

Maguire

Jergenson

Roysher

MacMinn

Coleman

Design educators bring students knowledge garnered from current private practice

John Maguire, A.S.I.D., is assistant professor in charge of industrial design at U.C.L.A. and director of design at Duo-Bed Corp. A native, he went east to work for Dreyfuss, returned in 1953 to join Merendino-Greene.

George A. Jergenson, A.S.I.D., I.D.I., heads industrial design at the Art Center School and specializes in transport design, for which he trained during eleven years in the GM styling department.

Hudson B. Roysher, A.S.I.D., organized industrial design departments at the University of Illinois and Southern California. Today he has his own practice, teaches at L. A. State College of Applied Arts and Sciences.

Strother MacMinn, A.S.I.D., on the industrial design staff of the Art Center School, is a native Californian who worked for Henry Dreyfuss, spent four and a half years with GM.

John Coleman, I.D.I., worked for GM, Hudson Motors, and appliance division of Aviation Corp., before becoming product design department head at the Art Center School, Los Angeles.

Interiors specialists who developed a new idiom to accommodate West Coast living

Paul Laszlo, A.S.I.D., Hungarian-born furniture and interior designer, practiced in Europe until 1936. He has done furniture for Pacific Iron Products, Brown-Saltman; has had his own office in Beverly Hills since 1956.

Martin Borenstein, I.D.I., is both licensed architect and industrial designer. His recent flexible furniture designs for Brown-Saltman were conceived in his workshop in Berkeley, where he also maintains a showroom.

Greta Magnusson Grossman continued her design practice, begun in Stockholm in 1933, when she came to Beverly Hills in 1940. She has designed furniture, lamps, commercial interiors, and is participating in ALCOA's Forecast Program.

Ronald M. Cleveland, A.S.I.D., operates the Barondon Corp. in Los Angeles, which divides its time between architecture and product design. He is also a licensed architect.

Dee L. Jenner, A.S.I.D., heads the interior design division of Welton Becket & Assoc., Los Angeles. A graduate of Art Center, he worked for Douglas Aircraft, Henry Dreyfuss; now concentrates on airplane interiors.

George C. Bohlig, A.S.I.D., is staff designer with George Charles, Inc. in Tustin. Before coming west in 1950, he was director of design at Gamble-Skogmo in Minneapolis.

Borenstein

Laszlo

Cleveland

Grossman

Jenner

Bohlig

Aviation

What the wailing whistle of a passing train was to his father, the roar of a jet overhead is to the West Coast youngster: a sound symbolizing progress, achievement, speed, new horizons. The sound and sight of airplanes is also a constant reminder that on the West Coast aviation and its related industries fill the pay envelopes of a large portion of the population; that it is an area where names like Boeing, Lockheed, Douglas became great and contributed to the greatness of the West; where classic airplane designs like the DC-3, B-17, P-38 were born and grew to revolutionize travel or shorten a war; where completely new concepts are old hat before they see the light. Awe-inspiring as the aviation industry is for its technological development, it still retains some of the shakiness of early days when flying and making airplanes was insecure and a gamble: even today, the crash of a prototype, the gain or loss of a contract, the start or end of a war can put thousands of people to work or out of jobs.

In looking at aviation on the West Coast, we shall discuss the inseparability of aviation and electronics, how and why this industry grew up in the West, the direct and indirect influence the designer has exerted on the meteoric development of aviation – a field that is still growing so fast that $1,000,000 jet fighters that can fly only 700 miles an hour are retired to playgrounds, where they stand still and children use them as jungle gyms.

Boeing photograph from Office of War Information

Boeing B-17's in action during World War II.

AVIATION—industry of changes

Guided missiles are a new challenge to aviation on the West Coast, where change and new concepts are commonplace

With increasing regularity the public has been reading about the decline of the aircraft industry in statements like these: "The death rattle is in the throat of the flying Air Force," (*Look*, October 1, 1957); "With military spending about to be cut and the U.S. strategy shifting from manned aircraft to missiles, the plane builders have plenty of reason to worry about their future," (*Fortune*, September, 1957); "Will guided missiles blast aircraft industry's plans?" (*The Iron Age*, May 30, 1957). They all suggest that the inevitable replacement of many military aircraft by guided missiles (a fact that was brought to the public's attention more forcefully by the recent Russian announcement that they are on a par with, perhaps ahead of, the U.S. in the race for an effective Intercontinental Ballistic Missile) should have many manufacturers on the West Coast deep in gloom. The stake in this trend is large not only because aviation itself is a big industry in the area, but because it has many dependents: of some 34,600 subcontractors that serve all major aircraft companies, 10,314 are in California alone—compared to 4,487 subcontractors in Ohio, 3,382 in New York, and the rest distributed across the nation in lesser numbers.

To say that missiles will replace military aircraft does not mean, of course, that airpane builders or their satellite industries will go out of business. What it will mean is a shift of concentration, a shift of spending by the government, and consequently the distribution of the West's share of the military dollar, which is considerable. The procurement program recently outlined by the Air Force is a clear indication of where the new emphasis will lie. Comparing 1956 orders with anticipated spending for 1960, manned aircraft will be reduced from $4 billion to $1.9 billion, missiles increased from $483 million to $2.8 billion, electronics increased from $756 million to $1.3 billion.

These recent developments have certainly not caught the aviation industry with its guard down. The military will continue to order manned aircraft, if in reduced quantities; commercial airplane building is high; and most West Coast airplane manufacturers are making missiles: Boeing has the Bomark surface-to-air missile

that will replace jet interceptors; Douglas has the Nike series of surface-to-air and the giant Thor intermediate range ballistic missile; Convair makes the Atlas surface-to-surface ICBM, Lockheed the Polaris ship-to-shore missile, and so forth. In spite of the size of the corporations in the aviation industry, the vast number of people it employs, and the huge sums of money it represents, its history (which is still a short one) has been punctuated by major technological upheavals at regular intervals.

An airplane is sold because it does something an earlier model couldn't do: the military base their buying on superior performance; commercial airlines want faster, smoother, and sometimes larger planes that are safer and more efficient than those being flown by the competition. The rapidity of change and development in the aviation industry has served to retain some of the traditional "seat-of-the-pants" attitude, while increasing costs have held wild speculation in check. The cost of going faster and higher has gone up as speeds and altitudes of airplanes have increased: mass-production and the precision of airplanes today makes even the smallest modification a major engineering undertaking, in contrast to adjustments that could be made with a screw driver and a pair of pliers not too many years ago. Today, with prototypes costing millions (the first model of the Boeing 707 jet transport cost more than $15,000,000) and an enormous investment of time and personnel required to get a plane from the drawing board into the air, no company can afford to risk its stockholders' money without being reasonably certain that it will be able to sell production models. In earlier days, when airplanes were far less complex and costs comparatively minute, individual companies took the plunge more readily and would produce an airplane and then peddle it to the Government or to the airlines.

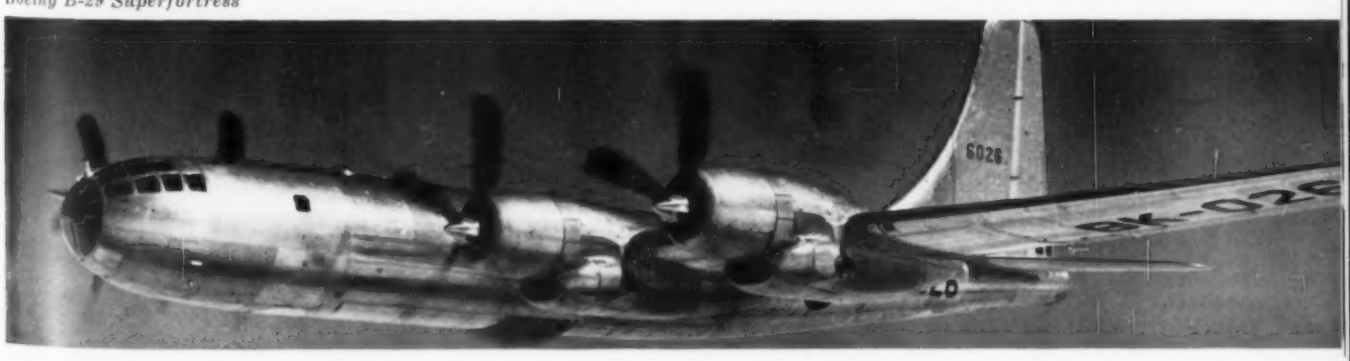
The B-17 is a good example of how airplanes used to come into being; it also represents a turning point in the complexity (and cost) and design of aircraft, and, since it was developed prior to and during World War II, is an example of how the production of airplanes changed from custom-building to mass-production.

In 1934, Boeing was one of the companies to receive a notice from Wright Field announcing that the Government was going to order a substantial number (220) of multi-engine bombers. The prospect of getting such a contract was appealing, but the investment for the prototype could be ruinous—Boeing was thinking in terms of $275,000, which, of course, would be company money. But Boeing, needing a Government contract, decided to accept the gamble. By spending even more than they originally estimated, they produced a four-engine airplane that stood up very well against the competing craft, two twin-engine bombers, one by Douglas, the other by Martin. It looked as though they had a winner until it crashed and burned on takeoff with the controls locked by mistake. Disqualified, Boeing saw the contract go to Douglas. But the Government had been impressed by the airplane and ordered thirteen B-17's, as it was designated, for service tests. From this point on, the development, production, and performance of the B-17 is a classic story: the war speeded up its evolution and led to the subsequent production of the B-29. Exactly 12,731 B-17's were built between 1936 and 1945 in eight different models, ending with the B-17G which could go sixty-six miles an hour faster, carry more bombs 750 miles farther, almost 10,000 feet higher than the original prototype.

It cannot be disputed that the aviation industry, one of the West's biggest, is engineering-based. How has the industrial designer fared in this large segment of West Coast industry? There is one area in which industrial design is already of undisputed value: wherever the airplane comes into contact with the customer—interiors, identification, etc. There is active competition among designers, both eastern and western, for the big contracts the airlines and airplane manufacturers are passing out, as shown on pages 86-87. There is beginning to be a call for serious design appraisal of engineering-oriented areas such as the cockpit, and, as the development of electronic equipment becomes more and more a parallel to airframe design, other areas open up.

DOUGLAS G. MELDRUM

Boeing B-29 Superfortress



Hughes-Convair joint conference on cooperative development of F-102A and its fire control system.

Aviation-electronics inseparable

Hughes-Convair project raises question: Is it a plane with an electronics system, or an electronics system within a plane?

In 1950, Hughes Aircraft Company of Culver City, California, received a contract from the Government to develop and manufacture an airborne fire control system—a system that would fly a supersonic jet interceptor automatically, locate an enemy at long range, day or night, regardless of the weather, fly the airplane on the correct course to a point where the armament should be fired, and automatically fire the armament at the exact moment for a hit. Interesting as the fire control system is, the contract is particularly significant because of the timing: it wasn't until a year after Hughes had received their contract that an airframe manufacturer was finally decided upon to make the airplane to carry the electronic system.

The requirements for the airplane must not be underestimated—it had to be very fast with good range—but if sequence of contract awards is any indication, the plane was to be built around the electronics system as much as the system had to be designed to fit into the plane. A Hughes spokesman has pointed out that, "It is difficult, if not impossible, to resolve whether the electronic system was designed for the aircraft or the aircraft designed for the electronic system. The truth of the matter is that the airframe and electronic system were developed as an integral unit." When Convair of San Diego was chosen to make the airframe, the two corporations immediately began their closely coordinated project.

Convair F-102A (top), the supersonic plane that carries the Hughes fire control system (above), fires Falcon missile, sometimes mounted in wing-tip pods (below).

Fire Control System

Their joint goal was to develop a defensive weapon that had very little margin of error and did not rely upon human reactions to make it completely reliable. They put themselves in the position of the pilot of a supersonic jet interceptor taking off to ward off a supersonic enemy bomber. He flies with the knowledge that he will be able to make only one pass at the aggressor, and a very fleeting one at that. He is also aware that if the enemy does get past him, the possibility of an American city's being blasted by a hydrogen bomb goes up steeply. The closing speed of two supersonic airplanes is so great that it is impossible to expect a man to fly the airplane, aim, fire, and hit his target if he relies solely on his own reflexes. To add to the interceptor's problems, enemy bombers can fly at night, or through overcast, and drop their

Hughes fire control system installed in nose of F-102A. Dome in front contains radar antenna.

destructive load unseen and unheard, since they travel faster than their own sound. The obvious answer was a system that would fly the airplane, aim, and fire the missile automatically.

The introduction of rockets and missiles, in that order, revolutionized aerial combat tactics. Fixed machine guns on fighters and interceptors were used until recently, and forced an attacking pilot to approach the enemy in such a way that the target was in his sights long enough for him to fire the necessary bullets into the other plane to damage it into ineffectiveness. The most satisfactory way of doing this was to head slightly in front of the target, flying a curved course that brought the fighter increasingly nearer to the bomber. Unfortunately, this course inevitably brought the fighter within range of the bomber's guns, particularly those in the tail, for too long a period and, with his relative speed quite low, he was in a very unenviable position. Rockets, with their greater impact, can be fired in salvo and usually bring down a bomber with one contact, making only one pass necessary. This can be accomplished by flying a direct collision course from either side, releasing the rockets before the bomber is opposite the fighter. By veering off quickly, the fighter avoids retaliatory fire from the bomber and is a very difficult target. Guided missiles were still another step forward because they can be released from much greater distances and guided after they have been launched. Hughes has developed electronic systems for all three types of armament and, as these systems performed more and more operations, two basic trends developed: one, to add more electronic equipment to the fire control system for operations other than firing the airplane's armament, such as navigation and communications; and, two, to integrate more closely all systems, minimizing the amount of electronic equipment that must be carried.

How they worked

In the Hughes-Convair project, the fire control system was to control the firing or launching of both rockets and a guided missile, the Falcon, which is also made by Hughes. Engineers and executives from both Hughes and Convair met at joint conferences to cover specific problems, areas of responsibility, methods to cover Air Force personnel training, flight testing and test equipment, operation and maintenance of the system, tools, and so forth. Never before had a major project involving a large electronic manufacturer and an airplane builder been so closely coordinated. Both companies took the attitude that each was the expert in his respective field and was not concerned with details unless they affected his system. Convair engineers had to design an airplane that would have room for a system which weighed 1,700 pounds, occupied 28 cubic feet, and contained some 7,000 parts. Essentially, the basic components are a control panel, a radar transmitter and antenna, a computer and, of course, a weapon. In operation, the radar transmitter sends out a pulse through the antenna. This signal is reflected from the target back to the antenna and fed through the radar receiver to the computer. The computer analyzes this information and presents it to the pilot on his radar scope. "Control Surface Tie-In" is brought into play after the radar has sighted and locked on the target. This system receives steering signals from the computer, and automatically moves the airplane's control surfaces through actuators, taking over and flying the plane on the right course, and firing the missile at the proper moment. The F-102A, the delta-wing supersonic airplane designed by Convair to carry the Hughes system, went through many radical changes before its design was finalized. Making it supersonic was a major stumbling block until Convair incorporated the "Area Rule" (ID, December, 1955) and pinched in the waist. This reduced the sharp drag that occurs when a plane breaks through the sound barrier, and eliminated the problem.

The joint problems of the two companies involved more than development difficulties: close coordination of production schedules was a major factor. It was decided that since the demand was pressing (the Air Force needed an active weapon immediately), Convair would not make the usual one

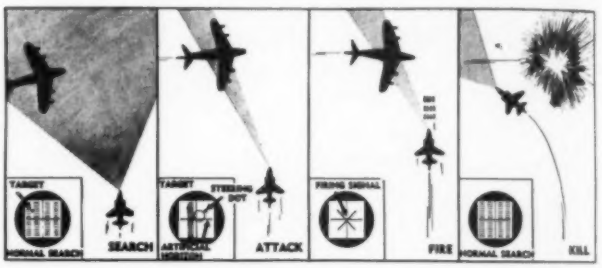
or two prototypes and then go into full-scale production. Rather they would start turning out F-102A's at a slow production rate, making necessary modifications as the planes came off the assembly line. Though this expediency was hazardous, no major pitfalls developed and the close relationship between the two companies paid off. At one point, for instance, Convair was not ready to make a certain tie-in portion of the nose assembly for the first several aircraft that came off the assembly line. Hughes stepped in and produced the parts until Convair was set up to continue the operation.

Testing

A laboratory on the ground, although it can simulate actual flying conditions to a point, has some limitations. To test the fire control equipment for the F-102A, Hughes used a "flying" laboratory. They installed the system's electronic components in a specially adapted T-29 airliner, complete with a F-102A cockpit, and with thirteen men aboard were able to test the system under actual flying conditions. By spreading out the components in the T-29, several engineers were able to check flight performance simultaneously. Once the test plane is aloft, control can be shifted to a pilot in the simulated F-102A cockpit, who takes over and flies the big airliner as though it were a jet. Hughes found that this method of testing saved thousands of dollars and hours of time.

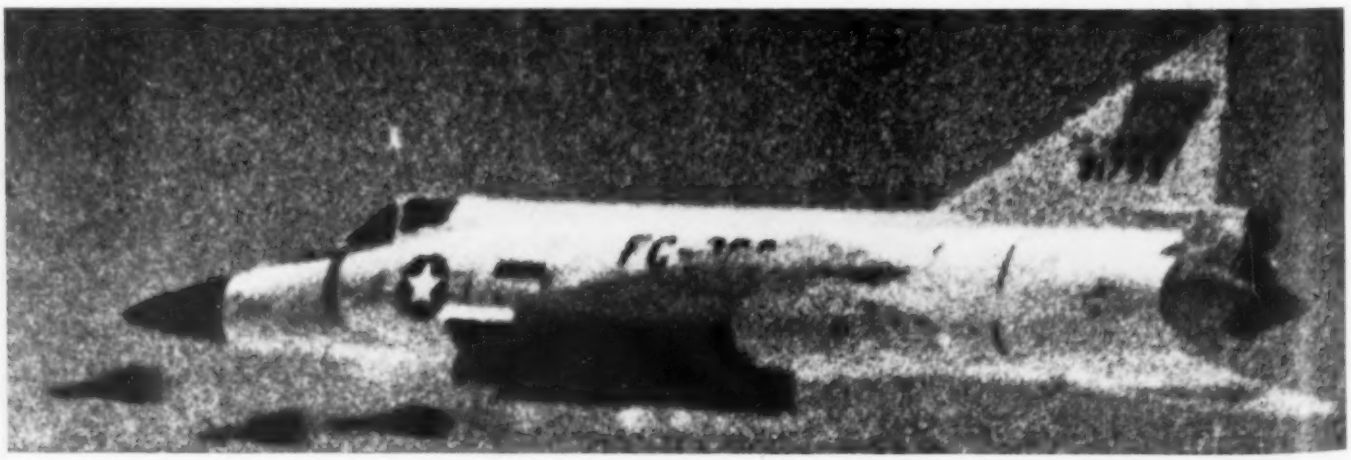
The F-102A, with the Hughes fire control system, is to all intents and purposes a manned guided missile. Unmanned guided missiles close to perfection are being developed, and today there is no question that the interceptor is on the way out. The F-102A is filling the gap until ground-to-air-missiles can take over and be depended upon to do their job. But the Hughes-Convair project indicates the interdependence of electronics manufacturer and airframe maker. Although the industrial designer has not gained a firm foothold in this advanced area of aviation, any field where this kind of conceptual interchange is needed is an area where specialists in non-specialization will eventually be necessary.

Flying laboratory: F-102A cockpit inside larger plane for in-flight testing of Hughes-Convair fire control system.



What the pilot sees: *(left to right): The interceptor searches an area specified by ground control station which has detected an enemy bomber. Pilot's scope shows location of bomber as a "blip." Pilot localizes his radar beam on bomber and target data is fed into computer which develops steering signals which are delivered to pilot's scope. Pilot flies interceptor to put steering dot in center of reference circle. Computer automatically launches interceptor's armament at precise time and place to score a direct hit. "X" appears on pilot's scope when armament is launched and interceptor takes evasive action to avoid retaliatory fire and flying debris. With "Control Surface Tie-In," steering signals for the aircraft are received directly from the computer, automatically moving the airplane's control surfaces to fly it on the right course, and automatically firing the missile at the proper moment.*

Convair F-102A unleashes a salvo of air-to-air Falcon guided missiles.



Boeing Model 40 transport in 1927

Boeing 707 jet transport

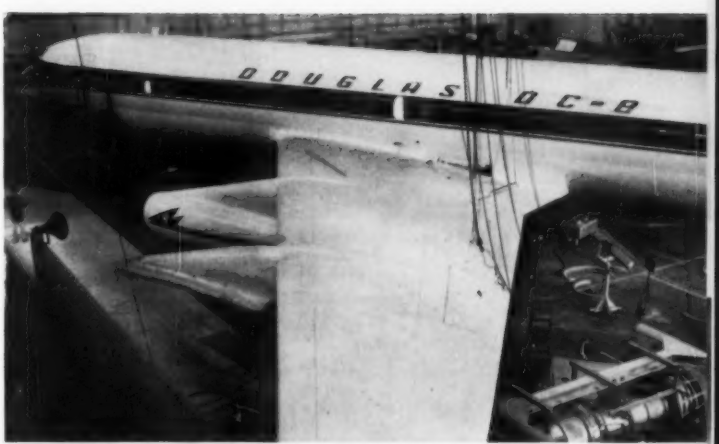
Jet airliners—a new milestone

With jets in competition, industrial designers play an increasingly important role in selling airliners

Thirty years ago, Boeing Model 40 transports carried passengers from Chicago to San Francisco in twenty-three hours. The biplanes flew a little over 100 miles an hour, had no stewardesses, and carried the pilot in an open cockpit behind the passenger compartment. This year, the Boeing 707 jet transport made the same flight in three and a half hours at a speed of over 550 miles an hour. The contrast in flight times is no greater than the airplanes themselves or the passenger accommodations. The Model 40 was about 33 feet long, had a wing span of 44 feet, weighed 6,075 pounds, and carried four passengers. The 707 is 145½ feet long, has a span of 142½ feet, weighs 296,000 pounds and can carry 162 passengers.

Between these two extremes, airlines have offered passengers everything from noisy, drafty, shaking, cramped cubbyholes to lounge seats and berths, two decks, near-silence and smoothness. In the airlines' race against railroads and ships, and among themselves, the industrial designer has been a far more critical participant than is generally acknowledged—working to help the airlines attract travelers to the attractiveness of time spent in the air.

How this situation stands up can be clearly seen in the big commercial jet transport race now under way on the West Coast. In terms of a marketable product, Boeing is slightly ahead with its 707, which has flown since 1954 and promises the earliest delivery date. Douglas is only slightly behind with its DC-8, which still awaits a maiden flight. Convair got off to a late start with the 880, and although it boasts the highest cruising speed (615 miles an hour) is far behind in airline orders. In addition, two firms are building the first American-made turboprops: the Lockheed Electra and the Convair 440, that will bring high-speed flight on shorter hops. It is significant that three of these four firms engaged major consultant design offices which are working at top speed—on the spot—to help them win the race. How these firms use designers is discussed overleaf.



Douglas DC-8 commercial jet under construction

Convair 880 jet airliner due to fly in 1958

How designers serve aviation

The industrial designer performs many functions in the aviation industry, from airplane interiors to graphics

Up in Seattle, at Boeing's plant, Frank Del Guidice and a staff of nineteen are a permanent outpost of Walter Dorwin Teague Associates of New York, and have been for eleven years; over in Burbank, six of Henry Dreyfuss' Pasadena staff are in residence with the Lockheed designers, and down in San Diego, Convair has recently set up quarters for a group of designers from Harley Earl, Inc., of Detroit. The role of these designers-in-residence is somewhat different in each case, but the goal before them is the same: to get to the airlines first with the best plane.

Performance, as has been noted, comes first in selling airplanes, but each of these major manufacturers acknowledges, by its individual design program, that other factors are making the crucial difference today. In the competition between Boeing and Douglas for commercial jet sales, for example, Boeing has had more experience with large jets than any other aircraft manufacturer in the country. Douglas, however, starting with the DC-3, has built a magnificent reputation and record for their commercial airplanes (which Boeing has not) that makes them prized by many airlines. The jet aircraft themselves are very similar in external appearance and performance: both have distinctive swept-back wings, with four jet pods hanging below and forward; their cruising speeds and altitudes are the same; their wing span, length and payloads are comparable. The only obvious difference is the number of windows: the 707 has more than twice as many as the DC-8—103 compared to 48. Since their prices are competitive (both sell for about $5,250,000 apiece) and everything else is on a par, these multi-million dollar products are sold on the basis of the devotion of an airline to a certain make, the manufacturer's reputation, and on the interior which ends up as a very important consideration.

The industrial designer plays a very delicate role in the aviation industry, whether he is a company staff member

Teague Associates designs displays for Boeing.

Office interiors are part of designer's job at Boeing.

or a consultant. He is constantly aware that his work can be a clincher in a selling program involving a very low quantity and a very high unit-price. He frequently finds himself a middle man and a self-appointed diplomat. He must try to introduce something startling and new within the confines of an airplane fuselage, without raising the manufacturer's price out of the competitive range (and even with the high cost of airplanes, the differential is amazingly—but necessarily—small). At the same time, he must keep the interests of his client's customers (the airlines) close to his heart. In the aircraft industry, the industrial designer operates on a variety of levels to do a variety of jobs. In some cases his job begins and ends with the passenger compartment: he does extensive research on seats and seating arrangements, passenger control stations for air and light, eating facilities, including galleys and tray arrangements, lavatories, overall lighting, ceiling configuration, materials for the walls, floors, seats, colors, and special decorative effects. His influence often reaches farther, both in the airplanes themselves and into the aircraft company. A typical monthly listing of work done at Boeing by Teague will include such projects as cockpit design, office building interiors, cafeteria and theatre schemes, personnel brochures, window displays, I.R.E. exhibit, lighting for workbench, 707 interior.

The design service offered by WDTA is probably the most comprehensive in aviation on the Pacific Coast. When the decision was made to go ahead with the 707 project, for instance, Teague representatives were available from the very beginning. They encouraged and convinced Boeing to build a completely comprehensive mockup, set it up in New York rather than Seattle, and give airline representatives the experience of actually flying in a jet, complete with flight announcements, stewardesses, takeoff sounds—the only difference being that they were "flying" on the eighth floor of a New York building, not at 40,000 feet. How many 707's this industrially designed technique sold cannot be determined definitely, but Boeing was convinced enough to invest half a million dollars in the mockup (ID, January, 1957).

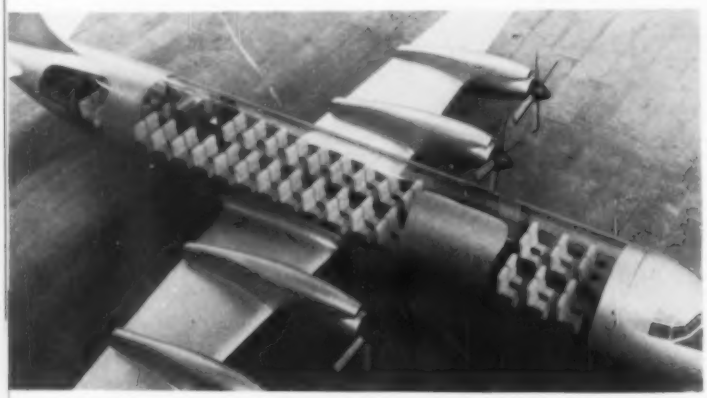
By far the most time is spent on airplane interiors, but since WDTA sent a team to Seattle to help Boeing design the interior of the Stratocruiser in 1946, they have done more than 990 different jobs, ranging from plant traffic control problems to the development of a new concept for quality control of parts for guided missiles and other complex mechanisms. The airplane is, of course, the center of attention at Boeing or any other aircraft plant. The Teague team has gone far beyond the forward bulkhead and into the cockpit of both commercial and military planes where, in close cooperation with Boeing engineers, they have designed flight stations and instrument arrangements.

At Convair, the Detroit team of Harley Earl, Inc. is working with Dorothy Draper Inc., of New York, as interior styling consultants for the forthcoming 880 jet. At Douglas, a group of 14 staff designers, combining engineering and industrial design experience, is creating the interior of the DC-8 under J. A. Graves, Chief Interiors and Industrial Design Engineer. At Lockheed, another pattern of service to industry is emerging in Henry Dreyfuss' work, described overleaf.

Harley Earl team works on interiors for Convair 880 jet.

Douglas designers plan the interior for their company's DC-8.

Interior of Boeing 707 by Walter Dorwin Teague Associates.



Dreyfuss designs Electra

Dreyfuss-Lockheed-airline relationship results in new seating concept for turboprop travel

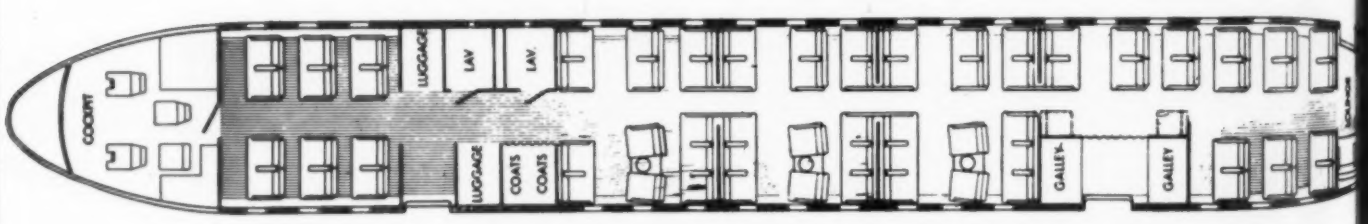
When Henry Dreyfuss began to design the interior of the Lockheed turboprop, the Electra, he took into full consideration the kind of airplane it is: a fast (414 miles an hour cruising speed), short-range plane (150 to 2,000 mile routes) meant for flights lasting under three hours with a quick turn around. The Electra was not designed for long, trans- or intercontinental flights like the Boeing 707 or Douglas DC-8. It is, and Dreyfuss treated it as, a "commuter" airplane.

Dreyfuss is not new to aviation on the West Coast, or to Lockheed. He was originally asked to redesign the interiors of the Constellation when it was modified to the Super and later to the Super-G. In addition to major overall redesign responsibilities, Dreyfuss was, and still is, in charge of seeing that every Lockheed airplane delivered to an airline is as up-to-date as possible in its interior. This demands constant detail changes and periodic complete redesign. Lockheed has stated that, since all airlines fly planes that are competitive in performance and since passenger fares are controlled by Government agencies, interiors are a crucial sales point.

Dreyfuss found that, for the kind of service Lockheed warranted, it was impossible to maintain sufficiently close or constant contact with Lockheed departments from his Pasadena office, even though it was in the same city. He established an office at Burbank within the Lockheed plant, which has now grown to six people and is under the direction of William Purcell, assisted by George Perkins. This office was already operating when the Electra program started, giving Dreyfuss the opportunity to work closely with his client from the ground up on this comprehensive project.

Essentially the Electra interior program, which involved eighty separate design problems and 2,500 engineering drawings, followed this pattern: Lockheed's preliminary design engineering group developed an airplane that gave every indication of being a profitable investment. As soon as Lockheed had a potential customer, Henry Dreyfuss designers, in cooperation with Lockheed staff members, began to develop the interior, keeping in mind the requirements of all airlines, yet introducing new ideas and improvements. At this stage, such preliminary problems as the location of doors, lavatories, galleys, and seats had to be worked out. The design of the Electra airframe, as with any commercial airplane, was a strong influence on where these units could be located. Galleys, for instance, could not be put in the rear—they are heavy and their weight would affect the handling of the airplane under certain load conditions. For convenience in serving passengers, they should be located in the center of the fuselage, but that would put them in line with the wing, making it impossible for catering trucks to service them efficiently. When these major facilities were placed, (see plan, below) preliminary mockups were made to test them out.

The next step was to begin work on a full-scale mockup, incorporating lighting and air conditioning systems. Working from rough drawings by Dreyfuss designers, Lockheed constructed a wooden facsimile giving close consideration to areas and components where possible production problems might occur. The mockup, erected at Burbank as a test model and sales tool, was kept flexible, reflecting two seating arrangements and two airline color schemes.



Plan of Electra interior shows compartment arrangement with informal seating for "living room" atmosphere.

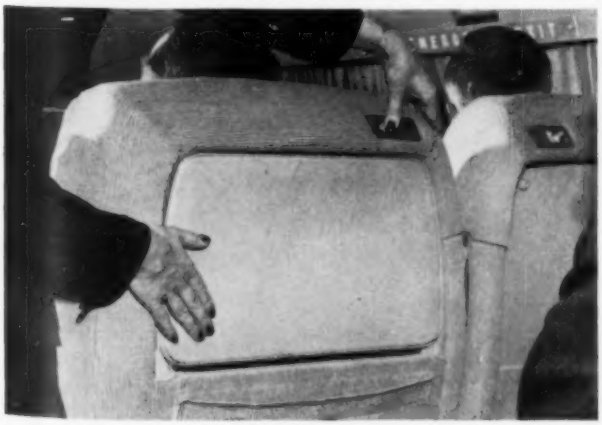
Compartment has table and lamp. Seats on either side of table are set at slight angle for more leg room.

Working with airline designers is second nature to the Dreyfuss men at Lockheed; they spend a great deal of time studying special interior features that must be tailored to fit compatibly into the whole interior. In practice, Dreyfuss gives consulting service to any and all airlines—often with the airline's designers working on the spot. For efficient serviceability, airlines must have interchangeability of parts, and it falls to Dreyfuss to solve these problems to the satisfaction of both the airline and Lockheed. The Dreyfuss design department at Lockheed is responsible for color schemes on the inside of the Electra, as well as on the outside. An airline that wants to change its paint scheme for any Lockheed airplane it is purchasing or owns (and this problem invariably arises when a new airplane is put into service) can consult with the Dreyfuss office. The color scheme is analyzed and applied to a 1/32-inch model which is submitted for customer approval. It is then turned over to Lockheed engineering for production drawings.

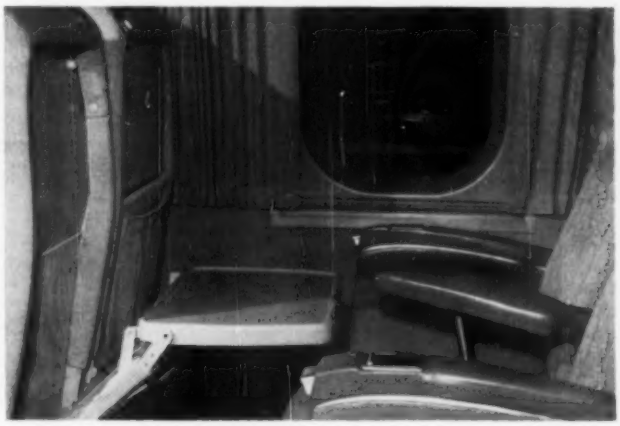
American Air Lines was one of the first Lockheed customers to place an order for Electras; it changed its plans for the use of the airplane after a sixty-six passenger seating arrangement had been worked out for them. Originally, American planned to use the Electra in transcontinental service until they received their Boeing 707s. When it found that Boeing would deliver earlier than expected, it decided to use the Electra on short hauls, taking advantage of its ability to take off and land quickly, its efficient airport control characteristics, and its operating economy. American came to Lockheed with a request that Henry Dreyfuss help its design group, headed by E. Gilbert Mason, work out a scheme that would give them two basic elements: more first class seats and an informal atmosphere.

Since the plane would not be in the air for more than two hours at a time, a new concept in seating was possible. After considering several alternatives, Dreyfuss decided (and this was acceptable to American) to break up the

Tray is in back of forward seat, pushbutton operation.



Tray opens to proper height for comfortable eating.



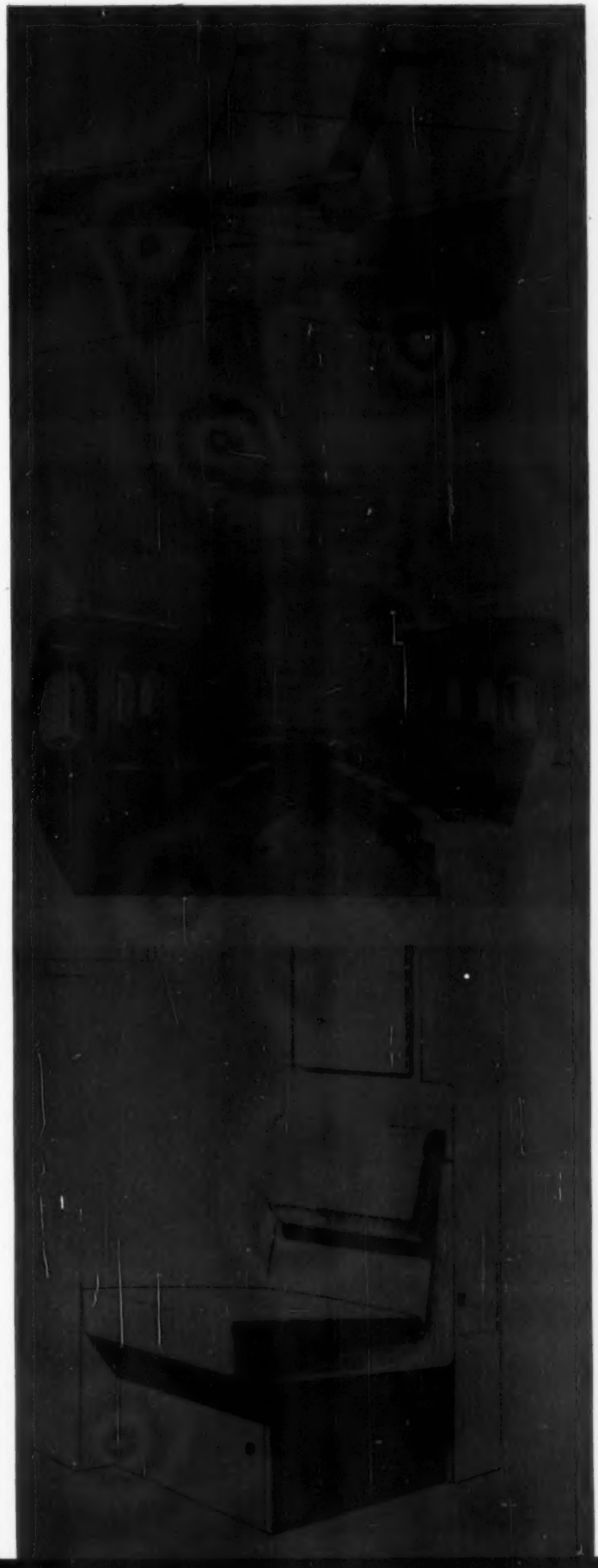
interior into six compartments and a lounge. All the seats were fixed, and arranged in rather informal groups of fourteen to a compartment, with a table and lamp between the center seats on the three abreast side. This was later changed and reclining seats were put in the forward and aft compartments. It was found that by breaking up the plane into compartments, the crowded look and tunnel-like atmosphere common to most airplanes was reduced, and the noise level lowered by the additional transverse bulkheads. Research showed that people reacted rather warmly to sitting face-to-face and, since the plane is designed to be used for commutation, this informal arrangement might very well be welcome. To further offset any objections to facing seats, the two seats adjacent to the table were set at a slight angle for added freedom. The lamp, which might seem out of place in an airplane interior, was installed to add to the informality of the arrangement and to serve as a screen between the people sitting in the facing middle seats. Hatracks, arranged between compartments, could be lower than conventional types as they face into the compartment to give easier access for passengers. Other racks for blankets and pillows were placed facing the aisle for use by the stewardess: they are easy to reach and she need not stretch over seated passengers to get to them.

An effort was made to give the middle seat, always considered the least desirable, equal value with others. By placing it opposite the table, more leg room and a feeling of openness was provided. Despite the effect of greater roominess and a "living room" look, the new seating arrangement increased the number of seats from 66 to 71. The whole scheme fits in with Henry Dreyfuss' principles of designing air transport interiors. After designing the interior of the compartmented Constellation, Dreyfuss once stated, "Our aim was to design a transportation facility that was at the same time luxurious and economical—that is, spacious and opulent for the passenger, yet practical to operate for the airline that would be flying it." Continuing this principle in the Electra, Dreyfuss feels that by eliminating the single corridor effect and breaking the airplane into compartments, the passenger is given a greater feeling of privacy, and, as he is able to walk from one compartment to another, feels less confined. The additional bulkheads give the appearance of greater structural strength, adding to the passenger's feeling of security.

Henry Dreyfuss designers at Lockheed are not concerned solely with current design problems or projects. Details are followed all the way through to the production line, where periodic visits by designers help minimize bad workmanship and incorporate changes during production. Although Dreyfuss designers at Lockheed do not officially go beyond the forward bulkhead and into flight station in their work, their presence has encouraged greater attention to the development of this area, a fact that becomes obvious by comparing the flight station arrangements shown overleaf.

Step for stewardess makes it easy to reach hatracks without leaning over passengers.

Pillows, blankets are stored in racks on bulkheads between compartments facing aisle for accessibility.



On the Electra project, literally hundreds of seating arrangements were worked out by Dreyfuss designers to meet specific airline requirements or as possibilities introducing new ideas and concepts. The three sketches on the right, from top to bottom, show possible designs for the seat to be used in the compartment arrangement, one of many lounge alternatives, and a fixed hostess seat. Although the vast majority of the ideas presented do not get into production, the many alternatives must be considered to gain optimum payload without sacrificing comfort and appearance.

Cockpit complexities

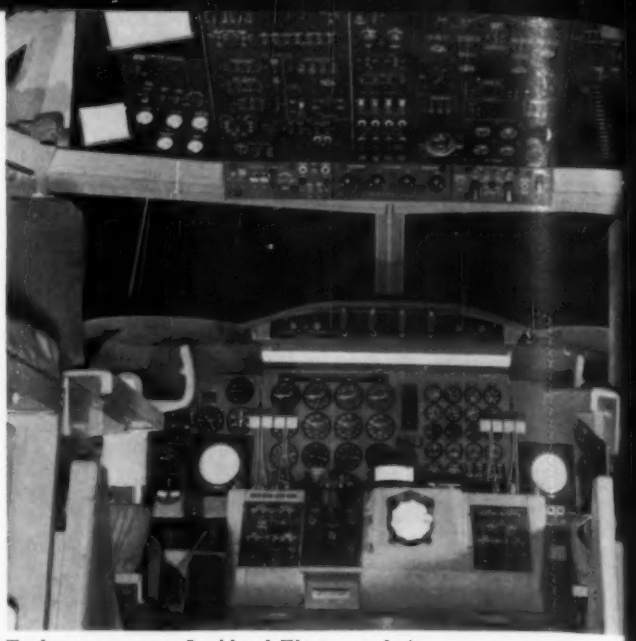
The pilot gets a break in comfort, convenience from better cockpit design

The more the airplane advanced, the more complicated its cockpit or flight station became. The men who pilot planes must watch literally hundreds of instruments. And now the switch from reciprocating engines to turboprop and jet power is making a significant difference in the appearance and design of the flight station—it has reduced the number of instruments. There are 117 fewer cockpit controls, instruments and indicators in the Boeing 707 than in the Boeing Stratocruiser, which is driven by reciprocating engines. Propellor pitch controls, feathering buttons, mixture controls, supercharger controls, are among those eliminated by the jet power source. In the Lockheed Electra the reduction of controls is not as radical since it still has propellors, but there are fewer instruments. During its design more attention than ever was given to their location and the frequency with which the pilot scans them.

Jack Davis and Robert Robillard, Lockheed industrial designers, were responsible for the concept of the Electra flight station and the innovations introduced in it. They took advantage of the additional width of the Electra's nose to give the crew more room to move around in. By regrouping devices, the Lockheed designers located instruments logically in the flight station area, enabling the pilots to turn to a given group for a particular function. This treatment reduced fatigue contributors and emphasized the more important controls and monitoring devices. They designed reclinable seats that are freely movable in all directions—frontward, backward and sideward—to make access and egress easier and to give the pilots the necessary controls at their fingertips when they need them.

The Lockheed designers did not redesign any of the actual instruments, but they did do a toggle switch to be installed on overhead consoles: regular bat wing switches are a menace to the skull and, because they stick out, can be accidentally tripped by catching in coat sleeves. The new switches are not only safer, but more pleasing to look at and are being used by Lockheed in other airplanes in passenger compartments.

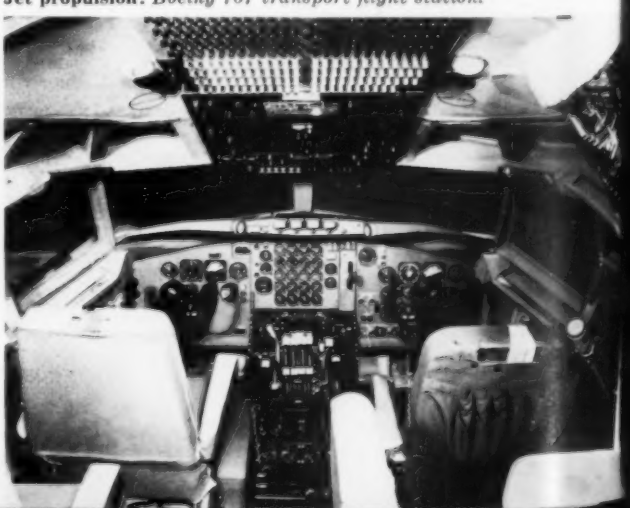
The Henry Dreyfuss office, which worked on the Electra passenger compartment, did not have any official role in the cockpit design. Yet a comparison with the Constellation flight station, designed before Dreyfuss was retained by Lockheed, is evidence of a design awareness resulting from the close association of Lockheeed designers with the Dreyfuss staff. The new flight station evidences not only clearer overall organization but sensitive detailing for both comfort and efficiency that suggests that the visual design of the atmosphere in which the pilot works can be a major consideration in his performance and the passenger's safety.

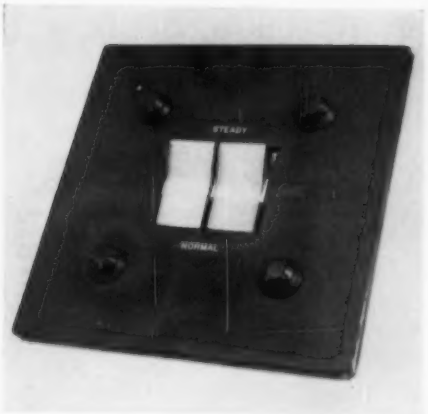


Turboprop power: *Lockheed Electra cockpit.*

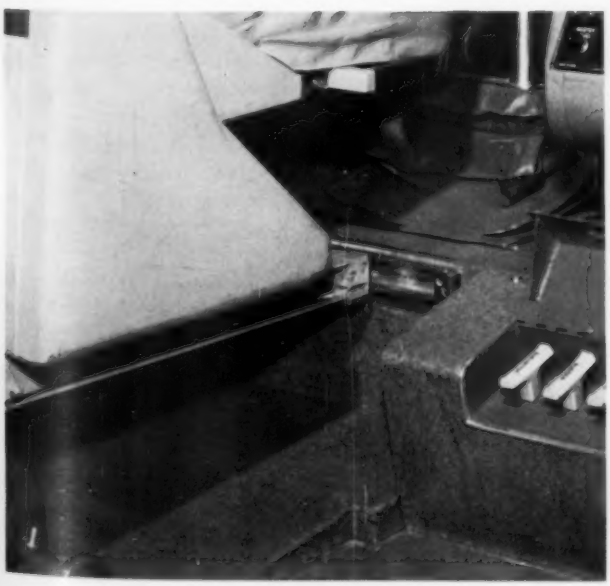
Reciprocating engines: *Cockpit of Lockheed Constellation.*

Jet propulsion: *Boeing 707 transport flight station.*





Electra flight station: *New toggle switch by Lockheed designers for Electra cockpit (above) does not stick out like bat wing switches, which are a menace and can be tripped accidentally. Sliding seat (below), can be moved in all directions for pilot's convenience. Control column (right) shows design influence in lighter feeling, cleaner lines, and light color. Electra cockpit was designed to give a less cramped, more comfortable atmosphere for pilots.*



Helicopters going up

The West Coast keeps up in helicopters with new and often amazing machines

The Hiller H-23D features a new transmission and drive system design.

Hiller Rotocycle carries one man, collapses completely.

All that flies over the West Coast is not jet; many weird machines, more nearly resembling odd collections of plumbing or awkward grasshoppers than the forms usually associated with flight, can be seen going straight up, coming straight down, or simply hovering above the ground. Although VTOL (Vertical Take-off and Landing) machines are being developed from Connecticut to California, a good number of large and small helicopter manufacturers have congregated in and around the Pacific Coast's aviation industry, where they are experimenting with a variety of different devices to defeat gravity. Most of the development work is being done for the Government and, as the pictures on these pages and overleaf show, a great deal of attention is being given to perfecting a compact one-man VTOL vehicle for the Armed Forces. Experimentation on these craft is not limited to large corporations with vast facilities. Since the goal is simplicity of operation and construction, imaginative engineers can start small companies and produce experimental models that are competitive.

Among the companies engaged in the advancement of the VTOL concept of flight on the West Coast, Hiller Helicop-

Tilt-wing airplane by Hiller changes attitude of wings for take-off, landing, and forward flight.

ters, which ranks third in the world in unit production of helicopters, is perhaps the most familiar and its flying "manhole cover" the most widely publicized of new types of flying machines. Hiller also makes more conventional helicopters and a recent and significant advancement not as exciting as some, but one that gets to the root of the helicopter problem—maintenance and safety) was the design of a new transmission and drive system for their H-23 helicopter, which is being used by the Army. The new transmission permits 1,000-hour service between overhauls, an improvement that lowers operating costs substantially over extended periods. Other Hiller projects include a Marine-Navy collapsible "Rotocycle," a one-man helicopter for military observation, liaison, rescue, and tactical maneuvers. It is designed to be collapsed into a small package for easy transportation or parachute drop. On a larger scale, Hiller is building a transport-size tilt-wing craft for the Air Force. This plane, reported to be the largest VTOL now being built, will be propeller-driven with a wing that turns from a vertical position for take-off and landing, to horizontal for forward flight.

Hughes Tool Company's aircraft division, also in the helicopter business on the West Coast, recently introduced their new Model 269, an ultra-light two-man vehicle that can carry 900 pounds 170 miles at 75 miles an hour.

Hughes Model 269 two-man helicopter.

Hughes 269 is ultra-light, has a cruising range of 170 miles.

Roto-Craft "Pinwheel" is powered by rocket engines.

A pressure jet engine drives the Monte-Copter Model 10A.

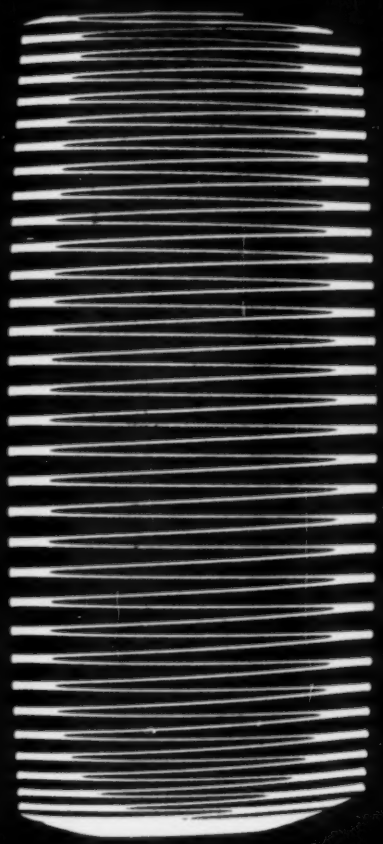
Smaller companies on the West Coast are making daring contributions in the constant drive to introduce new methods of air transportation. The personal or one-man helicopter is more a piece of equipment that one "wears" than a machine that one "flies in." It must be simple to operate and withstand severe punishment. Weight, of course, is a major consideration and was emphasized strongly in the development of the "Pinwheel" (left, top) designed by Roto-Craft of Glendale so the pilot could use his feet as landing gear. By driving the rotor blade with a rocket engine, Roto-Craft eliminated the weight of a gas engine, with the result that it weighs less than the operator.

Another one-man helicopter is the jet-propelled Gluhareff (bottom), which also uses the pilot's feet for landing and has a single- or two-bladed rotor. Eugene Gluhareff, an ex-Sikorsky design engineer, is president of the company bearing his name. It was formed in 1952 with the help of Robert P. McCullough of McCullough Motors, who has the exclusive license for production rights of helicopters developed by Gluhareff. Although this helicopter has not been flown in free flight, it is calculated that it will have a range of 25 miles and a maximum altitude of 18,000 feet.

A larger experimental helicopter being developed in Seattle is the Monte-Copter Model 10A, equipped with a Lycoming pressure jet engine. Its power is obtained from a centrifugal compressor driven by a reciprocating engine. Compressed air is ducted up the rotor mast, along the rotor blades, and out nozzles on the blade ends.

Helicopters and other wingless VTOL craft, particularly the one-man variety, suggest the obvious possibility that the soldier with his equipment (for whom most of them are being designed today) will be replaced tomorrow by the businessman with his brief case or the housewife with her shopping bag. Just when this tomorrow will come is hard to say: there are many problems still to be solved, but the people who live with these problems have a confidence that is as characteristic of the entire aviation industry as it is characteristic of most West Coast residents.

The pilot's feet are the landing gear on the Gluhareff machine.



Electronics

Despite its beanstalk growth (in Southern California companies spring up at the rate of one a week), electronics is by no means a new story on the West Coast. Its history there is exactly as old as its history anywhere else, for it was in San Francisco half a century ago that Lee DeForest put a grid into a bulb and found that he had invented the electron tube (and electronics). The first rhumbatron, klystron, and the first tv tape recorder were also developed on the coast.

On the West Coast now more than 35 companies are making band pass filters; more than 28, measurement equipment; more than 30, transformers; more than 40, control equipment. From huge (3000 employees) Hoffman to tiny (7 employees) Magne Tec, electronics thrives in the West. And, more and more, design helps it thrive. The new emphasis is on human engineering, and this turns out to be a serious challenge—to the designer.

BIG PROJECT — LOW BUDGET

Design considerations are varied on multi-unit electronic test equipment for fire control system

When the Avionics Division of Aerojet-General Corp., Azuza, California, a subsidiary of the General Tire and Rubber Company, decided to make a bid to produce electronic test equipment for the Lockheed F-104 interceptor's fire control system, they entered the project with the attitude that an entirely new concept in electronic test equipment was needed. First they were convinced that the traditional "black box" was outmoded and needed a change to keep up with the enormous increase in the complexity of testing systems, and second, Aerojet people knew they would be competing against some of the largest electronic manufacturers in the country and would have to come up with something new and better if their system was to appear outstanding to the military men making the selection.

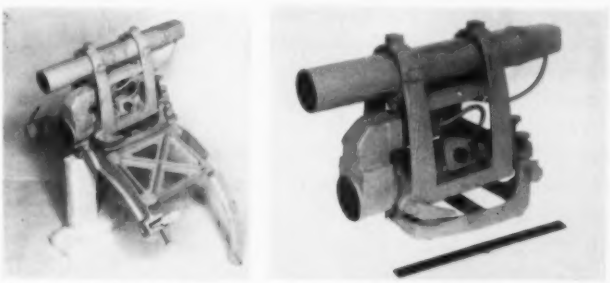
Although the primary concern of Aerojet engineers was function, they gave a great deal of consideration to the problems of the people who would operate the equipment. They realized that if it is not functioning properly, an electronic system is not only worthless but dangerous; malfunction of certain components (or parts within components) can put literally millions of dollars worth of equipment into jeopardy, and even risk human lives. It is more than a waste of time for an interceptor to take to the air if its electronic system is not working properly, and the responsibility for permitting a plane to take-off falls to a G.I. on the flight line who is not an electronics engineer, who has had only a minimum amount of training in the operation of the necessary test equipment. Although the fire-control system of the F-104 is highly complicated, test equipment had to be designed that would give 100% testing reliability, yet be simple to operate. Testing speed was almost equally important: to keep combat planes in the air at all times, testing time must be minimal.

Portable analyzer for Aerojet test equipment for Lockheed F-104 interceptor fire control system uses visual presentation, simple controls.

Lockheed F-104 jet interceptor.

Aerojet's problem was manifold: the equipment had to consist of several units (eight basic elements), and these components, they felt, should have a family resemblance. They knew the production order would be low in quantity, resulting in budget problems. In addition to being simple to operate, the test equipment had to be able to test itself, since it, too, is highly complex, and since the system's operation might depend on it. Basically the equipment had to perform several primary operations: it had to test the F-104 fire-control system in the airplane, indicating in which component or components a fault lay; and it had to be able to trace trouble within a component to a specific part or circuit. In the interest of keeping planes flying, it was not considered practical to isolate trouble within basic components while the system was in the airplane. The test equipment, therefore, was designed to include a portable analyzer that could be taken to the plane, where it would indicate a faulty component. This would be removed and replaced by another in good working order. The inoperative component would then be taken to the shop, where it would be more closely analyzed by more complex test equipment. Other test components included power supplies, generators to supply signals to simulate actual operation, and so forth.

For help in solving their many problems, Aerojet went to Melvin Best Associates of Pasadena, and asked them to assist in working out a new approach to test equipment. Melvin Best, aware of Aerojet's budget limitations on the project, decided the project had to be broken down so that the various components in the test system would receive varying design emphasis, depending on their importance in the relation to the operator. How the program was organized, why different components were given greater or less design emphasis, and how design continuity in all the components was maintained, is discussed overleaf.



High intensity source (above), as designed by Aerojet (left), with Best changes incorporated (right). Triple mirror unit of Aerojet test equipment (below) designed by Melvin Best Assos.

Test console, cooperatively designed by Aerojet engineers and Melvin Best staff.

Design time must be closely checked for efficient handling of low budget projects

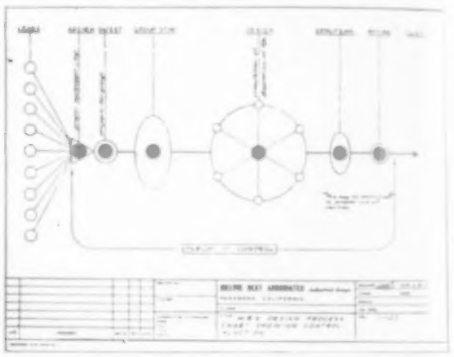
Melvin Best Associates' first step in designing the Aerojet test equipment for the F-104's fire control system was to decide which of the eight components in the test facility should receive the greatest design attention. Two components stood out: the portable analyzer that would be used to test the fire control system in the plane on the flight line, and the large test console that would analyze parts suspected of malfunction and indicate specifically where the failure lay. These two units, they knew, would be operated by Air Force maintenance men for hours at a time, and should be designed with this in mind. Other components, such as the power supply and signal generator, did not warrant as much consideration since they did not have to be constantly adjusted and interpreted by the operator. The portable analyzer became the center of the design program because this unit determined whether or not the airplane was airworthy, and had to be operated under the worst conditions (on the flight line during all kinds of weather, at night, under pressure).

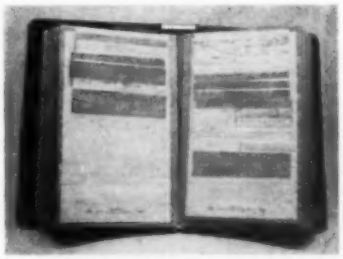
With Robert Bond heading the project, the Melvin Best staff designed and constructed a model of the portable analyzer, carefully considering human engineering factors, color, and visual characteristics. It was their conviction that the flight line operator would take greater care of his testing operation if the equipment he was using looked efficient, and was pleasant to operate This unit was the pace setter for the whole family and its basic design was followed through to a greater or lesser degree in all other units. The console, for instance, was designed by Aerojet engineers with Melvin Best designers serving as consultants, suggesting changes whenever necessary. The high intensity source was also designed at Aerojet, but changes suggested by Melvin Best were incorporated (see previous page for before and after).

Since this was a complex project involving several components, with each unit receiving a different amount of design attention, close records had to be kept by Melvin Best in order to distribute design time and keep a constant check on budget expenditures. These records were kept accurately at Melvin Best Associates through a series of charts and graphs such as those shown on the right. They have devised a specially designed scheduling board which lists projects vertically on the left (this includes all projects if a client has more than one). Corresponding bands go horizontally, representing time. Colored yarn, with a separate color for each designer, is woven in and out of color-coded pegs to give a pattern that shows the length of time men are scheduled to work on a project. This system gives a continuous scheduling pattern that is easily read and shows obvious overloads. To keep accurate time and expense records for clients, MBA uses time tickets that automatically produce five copies to be used for billing, scheduling, and so forth. By using these techniques for keeping a close record of exactly how much time they spent in each operation on the Aerojet project, Melvin Best Associates were able to keep a constant check on their work, anticipating situations where they might exceed budget limitations.

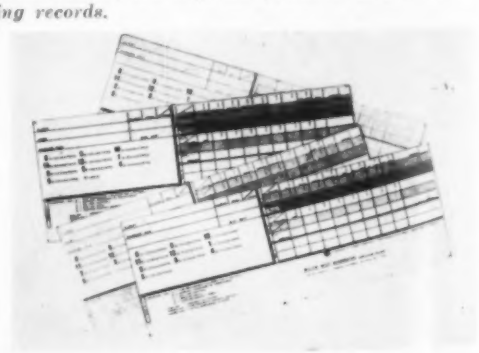
Scheduling board keeps track of personnel work loads.

Organizational flow chart at MBA.





Time tickets (below) are kept in special book (above) for accounting records.



Human Engineering: an Approach

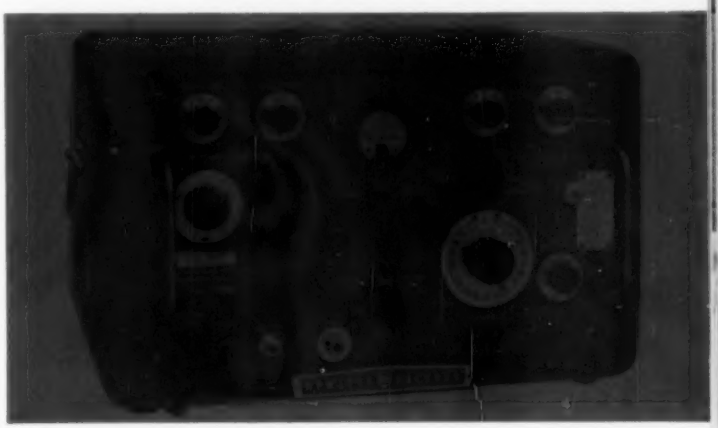
In non-consumer industries, an aspect of design becomes a necessity

One phrase basic to the working vocabulary of the West Coast designer is "human engineering." He does, or says he does, a lot of it. But for him, as for most concerned people, there is a great deal of honest confusion about what this really means. An editorial in the magazine *Research and Engineering* once argued that we have no clear picture of what human engineering is, what human engineers do, or what professional training prepares a man to be one.

Yet one thing is clear: human engineering, both on the West Coast and elsewhere, is too much with us to be denied out of existence by a lack of definition. If the designer is essentially a man who builds a better (and better looking) mousetrap, then the human engineer is the man who, by studying the attitudes and motions and limitations of the trap setter, tries to build an *even better* mousetrap.

Writing in INDUSTRIAL DESIGN (October, 1954), Deborah Allen called human engineering "one aspect of design, enlarged to the scale of a profession." In both respects — as an aspect of design and as a distinct profession — human engineering is singularly important on the West Coast. Like so much else of significance in West Coast design, this can be explained largely in terms of certain major industries located there, notably aviation and electronics. Both these industries manufacture equipment of considerable complexity, demanding unusual attentiveness (and sometimes unusual intelligence) of the operator, and often imposing great strain. Because of the nature of the jobs such equipment must do, to minimize this strain becomes a matter not only of efficiency, but literally of life and death. Any design, of course, ought to take into account the safety and convenience of the user — and any designer therefore does "human engineering," as far as that goes. But it does not go as far as the West Coast designer must: if the design of an airliner instrument panel or a radar control instrument *doesn't* provide for the operator's safety and comfort, the result may be disastrous — and safety is a safe quality to bank on in selling these products.

This may help to explain why the West Coast designer finds human engineering one of the chief means of making himself useful to industry. He is, as noted elsewhere in this issue, frequently found struggling to get his foot in the industrial door. Designers everywhere have gone through this phase, but in most places the most frequently available design opportunities are, at the outset, for styling; and the traditional pattern has the designer doing "face lifting" until he can convince management that there's more to design than designing what meets the eye. This pattern tends to be reversed on the coast, where the easiest job for the designer to get is often the hardest (and most important) job to do — human engineering, with all the implied responsibilities. It challenges the designer to a serious level of professional service that industry everywhere may come to demand. And besides, a foot in the door may help keep the door open to other aspects of industrial design.



With the knob program illustrated by the panel above, Hewlett-Packard took one step toward human engineering. Redesign was begun as an economy measure, but additional design aims were to create an easily recognized line of knobs and to clarify the random assortment of totally unrelated forms that tended to make existing control panels confusing. First it was decided that there were only two basic controls needed: switches, requiring considerable torque and manipulated in distinct steps; and potentiometers, delicately manipulated through a continuum for finer control. The designers thought at first that they might be able to use just one type of knob for both tasks, but they discarded this idea. It was felt that the knobs had two completely different functions to perform, and that it would be confusing to have one knob doing two kinds of jobs. By using distinct knobs for each function, they made the control instantly identifiable as either a switch or a potentiometer. Thus the operator could anticipate the force required, and the total function and organization of the machine was visually dramatized for him.

Designers at Hewlett-Packard

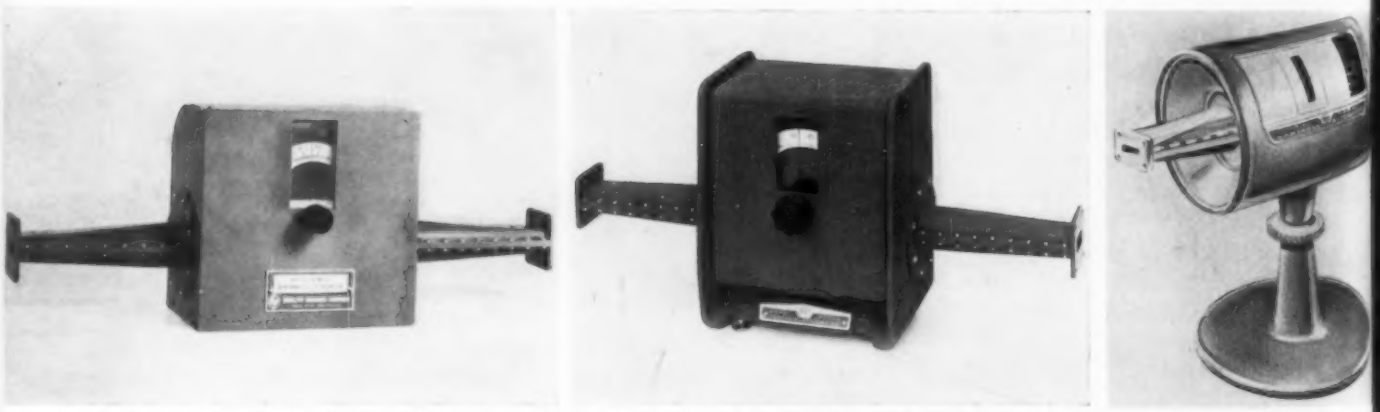
A prospering company increases in its awareness of design.

William R. Hewlett (left) and David Packard (right).

If there were not so many car owners in the United States, the electronics industry might never have developed, for it seems that most of the successful companies were started in garages. Hewlett-Packard of Palo Alto is no exception. Bill Hewlett and Dave Packard began building experimental electronic equipment (from a diathermy machine to an electronic harmonica tuner) in a one-car garage in 1939. But the company had progressed far beyond the garage stage when the first industrial designer, Carl Clement, was hired in 1951. By this time H-P had 500 people, two factory buildings, and a line extensive enough to call for "family cabinets," which Clement designed.

The cabinet job proved the value of design. Clement feels that H-P's industrial design department (there are now four designers) approaches problems from the operator's or user's standpoint, as opposed to the technical approach of the engineer. "If we were building equipment exclusively for engineers," he says, "the need for so called human engineering would be somewhat less . . . but as we simplify the relationship between instrument and operator, we correspondingly increase our market."

Clement's work on the precision attenuator (below) is a good example of the kind of problem he has faced. In 1952 the instrument was completely engineered and ostensibly ready for production when management thought, after seeing the engineering model, that the appearance could be enhanced by a "brief exposure" to industrial design.



Engineered precision attenuator, left, was modified as seen at center and five years later, redesigned as seen at right.

An investigation by Clement indicated that a cylindrical form coaxial with the wave-guide transitions would be easier to operate, cheaper to make, better to look at. However there were engineering objections, and advertising commitments to the existing design, which consequently was disturbed as little as possible functionally. This basic design has been used ever since. But a few months ago it seemed feasible to redesign the center sand casting as a die casting. Since this would involve considerable retooling and since there was considerably less urgency than there had been five years previously, it was decided to investigate the feasibility of the coaxial cylindrical form again. This time it was enthusiastically received. The final scale and mechanism as sketched above were worked out by the company product design engineers.

Style: Beckman Instruments

continues to put "consumer" styling into professional instruments

Beckman Zeromatic pH meter has Cymel housing.

Pocket pH meter becomes on-the-spot laboratory.

One electronics company that got to market early with "high styling" is Beckman Instruments, Inc. of Fullerton, California. Both from a human engineering approach (increased meter legibility) and from the standpoint of clean appearance, Beckman was the first instrument manufacturer to seek "the designer look," and has used, in addition to its own staff, a variety of designers including Thor Petterson, IDC, and Norman Steuer.

The two new models of pH meters (to measure acidity and alkalinity) shown here are housed in two-toned gray Cymel. The Zeromatic (left), a line-powered lab unit formerly cased in metal, is faced with vertical embossed ribs, has control buttons set on an escutcheon plate. The pocket meter (above), designed for individuals and small businesses, has complete operating instructions printed on it. An etched metal plate is decorative and sets off the meter adjuster and the calibration spikes of the memory dial.

Designing Precision Instruments

The electronics industry presents diverse and complex design problems

Panel of Librascope's LGP-30 computer helps simplify its operation

The LGP-30 computer (right) by Librascope, Inc., Glendale, Calif., is unusual in having been designed as an integrated unit rather than an assemblage of separately designed, compartmentalized sections. This makes far fewer components necessary, and the unique result is a general purpose computer smaller than the average desk! A system of lights tells the operator which of three operating modes is in effect, and switches are interlocked so that the machine can't be stopped before an operation is completed.

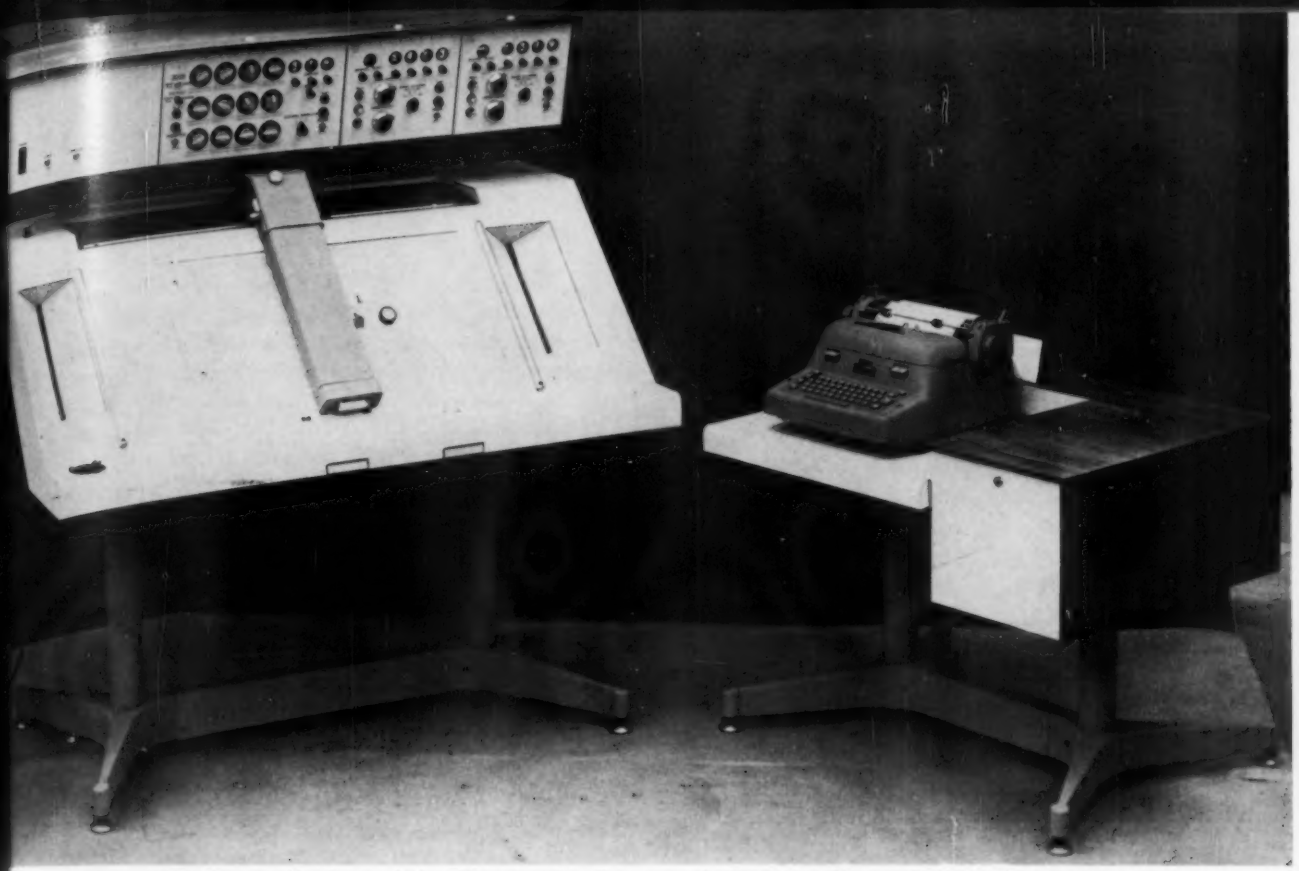
For Telecomputing Corporation's Oscillogram Reader (top of opposite page), a highly complex machine perhaps never before thought of as potentially handsome, Paul R. Maguire sought by human engineering to eliminate all fatiguing or diverting operating factors. Instrument layout was tested with field operating technicians. Styled for a modern office, the instrument has dimensions based on the requirements of the average female. Side table takes either a typewriter or a plotter. Front panels hinge down for accessibility, and rear panel can be removed for servicing.

Although Rutherford Electronic Company's pulse generators are all based on standard rack mount dimensions, various stack dimensions are called for. In Maguire's modular design (opposite, center) top and bottom are standard, but the height may be changed, permitting the economy of storing materials flat and fabricating as each run demands.

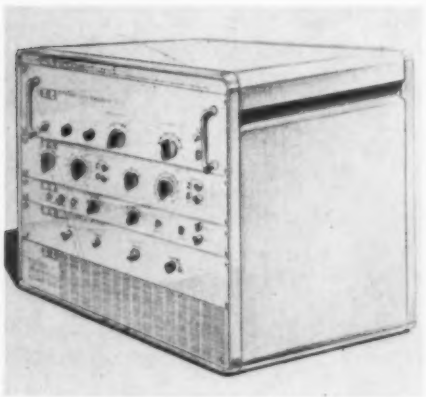
To the question of how much a designer must know about electronics in order to work in that field, Zierhut Associates have an interesting answer: it is not so important to be an expert as to be an expert in working *with* experts. In designing the computer (opposite, center) for Alwac Corp., Zierhut did perception studies, fatigue measurements, manipulation tests. Convinced of the importance of a computer's "fitting in," they include furniture and interior design elements in their specifications.

The look of precision was important in Emerson/Johnon/Mackay's redesign of a frequency counter (bottom, opposite page) for Computer Measurements Corp. (formerly Detectron). For clarity, new typography and more space around numerals have been provided. The trademark, in "quieter" type, has been moved to a less conspicuous spot, and controls regrouped out of the way of measurement dials.

Complete LGP-30, being fed from Flexowriter, is desk size.



Oscillogram Reader made by Telecomputing Corp. was designed for office use by Paul Maguire.



For Rutherford Electronics' pulse generator, Maguire designed modular cases.

Furniture and interior design elements are integrated with Alwac computer in final design rendering presented by Zierhut Associates.

Frequency counter redesigned by Emerson/Johnson/Mackay in two values of gray has aluminum cabinet and front panel, with aluminum extrusion trim.

Under New Management

As a "random element," Charles Eames prodded engineers into doing their own redesign.

From the material on the preceding pages it might seem that the electronics industry on the West Coast is dedicated exclusively to the production of specialized instruments for commercial use. This, of course, is not the case. Firms like Ampex, Packard-Bell, Stromberg-Carlson, and Stephens Trusonic are all forces to be reckoned with in the production of consumer products; and industrial design figures in the reckoning. Just how much it can figure is strikingly illustrated in the case of the Stephens Manufacturing Co. of Culver City, California.

The company was founded (in a garage, naturally) by Robert L. Stephens, whose background was sound engineering for the early "talking pictures." A pioneer in high fidelity equipment, Stephens in 1938 built a company that got and kept a reputation for quality products. But, primarily an engineer, Stephens tended to concentrate on product excellence to the neglect of sales effectiveness, advertising, public relations, and up-to-date management techniques.

When Bert Berlant and Bernard D. Cirlin took over control of the corporation about a year and a half ago, this was the general status of Stephens Trusonic, Inc.: a company with a good reputation for fine engineering, that had not developed or advanced as a sales organization.

The first problem Berlant and Cirlin faced was clear: the company was under new management, and they had to announce that. But such announcements are routine, and they felt that the change was more than routine. What they wanted was a way to dramatize the idea that they were *really* under new management.

The new management decided on the following divisions of labor and responsibility: Berlant, an engineer, was to be in charge of all engineering and production; Cirlin would be "general manager." One of the first engineering objectives was to replan the entire production system in order to facilitate production, and to permit standardization of parts wherever possible. This was necessary if Stephens, with sixty-one employees, was to compete in a consumer market dominated by mass-produced items. This is a common situation in electronics on the Pacific Coast, where relatively small companies sell quality products that are "semi mass-produced" in competition with gigantic corporations. Stephens already had a superior product. The problem was to carry into large-scale selling an expression of the same high quality that was by now taken for granted in their normal operation. The questions, then, were 1) How do you say "*really* under new management?" and 2) How do you articulate the inherent excellence of a product?

In both cases, Cirlin thought he knew how: design. Moreover, he knew a designer: Eames. So he called on him.

What was a new situation for Stephens Trusonic was also a new situation for Charles Eames, a designer whose whole professional history suggests the lone wolf, working on self-proposed projects that he has developed fully and engineered into a state ready for manufacture. Although he is active in policy-making in the Herman Miller Company, collaboration of this sort on a specific company project with a group of engineers was for him a new relationship.

"Of course we approached the problem with our own vocabulary," Eames says. But, as far as the specific subject was concerned, it was a very limited vocabulary. He had never designed speaker enclosures—or, for that matter, any sound equipment—before, and he had no more than a moderately interested amateur's understanding of high fidelity. So he didn't begin by designing, but by sitting down with the company engineers and asking questions—partly for his own edification, partly to establish the problem.

"We challenged all the fixed ideas about speakers," Eames says. He asked very basic, even naive questions like "What is the grille cloth for anyway?" (Answer: to keep people from poking their fingers through the delicate speaker cone.) And "Why do you have to put a speaker in a box like this?" (Answer: Maybe you don't.)

As the approach described above indicates, Eames very quickly established that the problem was not simply that of providing new speaker enclosures, but rather one of completely re-thinking the theory of speaker structure and placement. For true bass response they wanted "backloaded coupling," piping the sound through a long path to reinforce the front wave with the pressure behind the speaker cone. In the Quadreflex design the speaker is surrounded by "tunnel space," permitting bass reflex response in a smaller enclosure than previously required.

The greatest reward in the re-thinking process, according to Eames, is that it became company-wide. "The most gratifying part of the whole project is the way the engineers took to the new ideas and developed them. We would say, 'Why not do it *this* way?' And they would say, 'Well, you *could*. But if you did then you'd have to move the. . . . say, maybe that's not a bad idea. Look!' . . . And then they'd go to work on it. Their contribution was by far the greatest —what we did was second best. And the creative approach didn't stop with the engineers. The whole company began thinking very actively and creatively about design and the result will be some major changes in the techniques of sound distribution." The Quadreflex speaker, with its new backloaded coupling, points toward such changes.

If the engineers were the main contributors, what was the designer's role? Eames calls him a "random element." This suggests a new concept of the designer as a sort of industrial gadfly, prodding management and engineering departments to help think through their own design. Yet, for all his insistence on crediting engineers, Eames did design a radically different line of speaker enclosures for Trusonic. The line was too radical for many people, including some dealers, and the initial trade response to the enclosures was not overwhelmingly enthusiastic. Some dealers "made fun"

Photo: Bernard Gardner

President Bert Berlant (right) and Vice President Bernard D. Cirlin (left) of Stephens Trusonic, Inc. examine Eames enclosures.

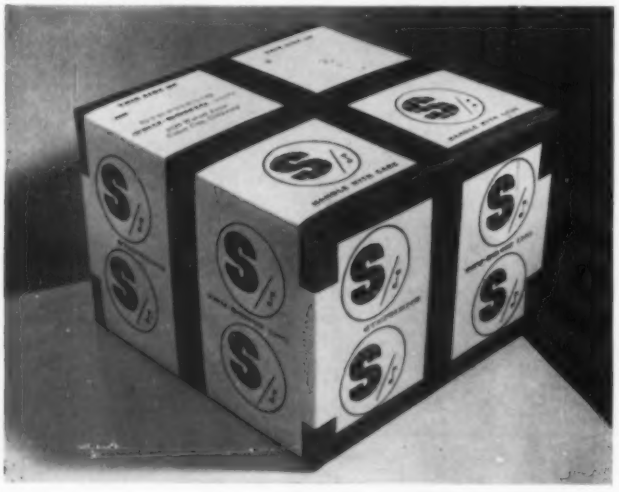
of them. (One very large New York music company won't stock them because they're "too modern.") Others liked them but wouldn't stock them because they didn't see why any customer would pay an extra $100 for design, when he could get the same speakers in a conventional box. Others stocked them but couldn't sell them. But still others liked them, understood them, stocked them, and sold them; and at the 1956 and 1957 Hi-Fi shows, the Eames enclosures did more than anything else to establish the new personality of Stephens Trusonic.

Although they were highly praised in the more sophisticated design and electronics circles, Eames does not think of the new designs as 100% successful. For one thing, he did not lick the problem of the grille cloth, usually an unattractive dustcatcher, that he would have liked to get rid of. (He came closest in the Quadreflex, which has a colored woven saran cloth stretched over an aluminum hoop that can be snapped off for cleaning.) But there was another element alien to Eames' customary working methods: haste. "It was a matter of doing the best we could do between now and Tuesday," he states, adding philosophically, "Still, it is important to remember that 'the best you can do between now and Tuesday' is still a kind of 'best you can do.'"

The best Eames could do turned out to be much better than Berlant and Cirlin had expected. Consider their aim: "Initially the Eames enclosures were not to set the world on fire or sell by the carload, but simply to impress the industry with the imagination of the new management." They feel that the new designs have done just that, and that there is a resultant industry-wide attitude of "look-to-Stephens-for-the-new-and-unusual," which is exactly what they wanted. Furthermore, the Eames speakers, originally figured to represent 3% of annual sales, already represent 7%.

Cirlin's belief in redesign did not stop with the speaker housings. He was convinced that the situation called for a redesign of everything that went to the dealer and to the consumer. Carson Roberts, the imaginative, unorthodox Los Angeles advertising agency, was called in to do the graphics design, and they produced new stationery, business cards, warranty cards, descriptive brochures, labels, and shipping cartons. From the new shipping cartons (below) there was an unexpected benefit. The unusual design not only reinforced the enclosures' representation of an alert, up-to-date company, but it also stood out strikingly enough to enable salesmen to do instant spot checks on a dealer's inventory. But the main contribution of the graphic program was to carry the new company image to every point at which Stephens came in contact with the public or the trade.

Shipping cartons designed by Carson/Roberts for Stephens Trusonic attempt to depict a "new and sharp" Stephens.



Cirlin is satisfied that results have borne out the validity of his belief in design as the most effective tool with which to establish the desired reputation. The company needed help, and Eames cast in the strange (for him) role of the practical man industry turns to in a pinch, was helpful. But he stresses that his value lay not so much in his services as an answer man but in his creativity as a question man. And one question that rises inevitably from his relationship with Stephens is, in the words of a song from another era, "Where do we go from here?" Now that a company image has been established, how can it be kept? Will all Stephens products have to be Eames-designed to match the new speakers and the new reputation? Will Eames have to keep the thing going by continuing to ask questions until the production system resembles the dialogues of Plato?

He thinks not. Regarding his relationship to the company image, the important thing is not for him to design every product (or that subsequent products be based on his design innovations) but rather for him to have established an approach, a basis of creative inquiry that the engineers themselves will carry into new product planning. It seems that they are doing it already, and no one is more enthusiastic about the way they are doing it than Eames, who, on this project, has been as much a teacher as a designer.

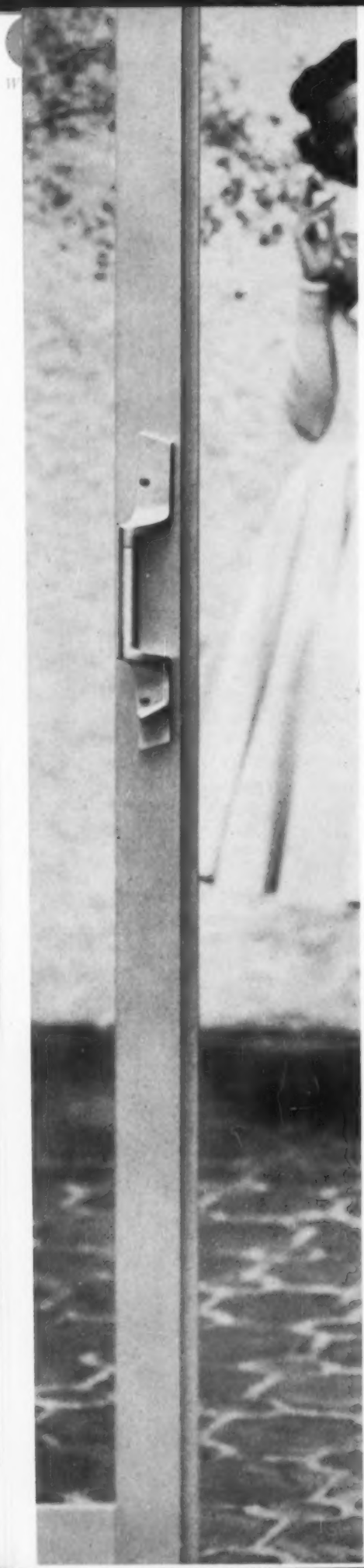
Berlant and Cirlin had decided at the outset that within one year the engineering department was to begin developing such new products as were determined necessary by the sales department. Since, in spite of the fact that 8" speakers represented quite a large part of the speaker market, Stephens had never made one, an 8" speaker was the first new product developed. This was an "engineered" product—but engineered in a way that exploited fully the re-thinking methods introduced by Charles Eames. It has a new kind of die-cast frame, and for strength and flexibility, uses a plastic-impregnated fabric that holds the cone to the frame; the curvilinear cone provides graduated de-coupling to reduce spurious resonances. And because of the company feeling that appearance was important in everything that left the plant, Berlant and Cirlin were understandably delighted by a dealer who, after seeing it, commented "It *has* to sound good." That was what they were after, and they believe that design has now "taken over many of our future operations." Future enclosures will have the benefit of advanced design thinking before production (Saul Bass is working on some of them) and the pioneering that Eames did in finishes and textures will be followed up.

The new Stephens Trusonic, Inc., attributes much of the success of its first year to the achievements of design. Cirlin has been elected to the board of the Institute of High Fidelity Manufacturers. Since he has been in the industry just a little more than a year, the company suggests that this honor is really a recognition of the new "feel" he has presented. This new "feel" is design.

But however successful the new enclosures have been, Eames' last word on the subject is that the best is yet to come, and that it will come from the engineers at Stephens.

Home-grown Industries

While aviation and electronics flourish on the Pacific Coast, they might, except for a special set of circumstances, have bloomed as well anywhere else. But the area also boasts a number of prospering industries that are indisputably "home grown," rooted in the climate, resources, outlook, and peculiar needs of the West. Whether these are resource-based or market-based, there is a visible pattern to their growth: They welcome experimentation; first stimulated to produce for local consumption, they find that the need is more than local, that the national market also wants the special product, the fresh idea. At a time when skeptics claim that the resources of the Coast are running low, these hardy home-growns suggest that unfettered experiment may reveal that the region's most lasting resource is its own resourcefulness.



ARCHITECTURE-BASED INDUSTRIES

They first took root on the Coast to meet a local building mode, but ended by scoring a number of firsts on the national scene

Modern architecture, one of the Coast's most successful exports, has given impetus to a small but important group of native industries. An area that took modern for granted when the rest of the country was still engrossed in period styles naturally had to provide, to some extent, its own building components, furnishings, and home equipment. Some genuine innovations are found among these native products — packaged solutions to the demand for greater glass areas, appliances unobstrusive enough for the new living areas, simplified heating devices and systems for garbage disposal, furnishings for outdoor rooms and overscaled furnishings for overscaled tastes, the rough-hewn accessories turned out in countless tiny work shops. Many products that were custom-built to start with went into mass production as they were specified by more and more architects, exhibited in the ever-present model homes, and finally packaged into builders' houses. Many of these products have national markets and heavy competition, yet the best sustain their prestige by retaining the simplicity that so often characterizes pioneers.

Among the most influential of these local products—and most consistently successful on a national market—have been Arcadia's sliding doors and windows and the built-in cooking units of Thermador.

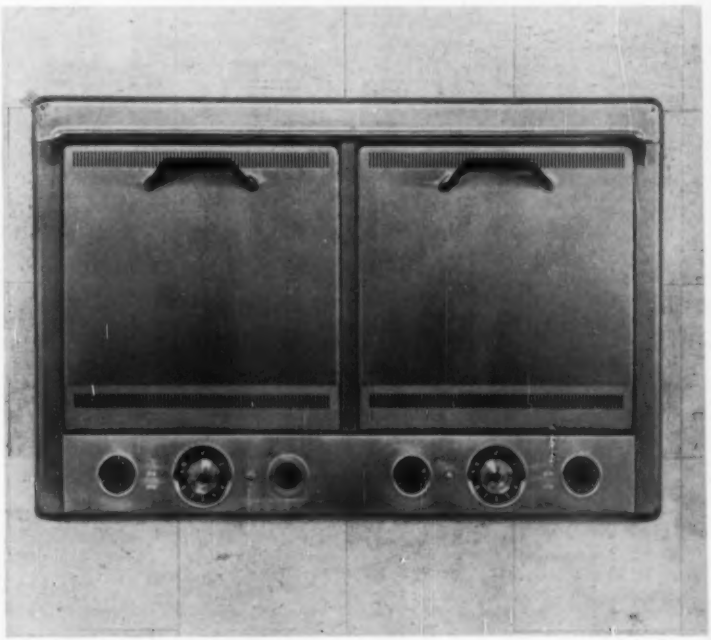
Founder H. E. North, trained in mechanical engineering and economics, based Arcadia's success on superior engineering as well as market foresight: it boasts of such innovations as refinement of the bottom rolling door, use of adjustable sheave in the sill section, the latch mechanism, snap-on glazing molds and wool-pile weatherstripping. Arcadia factory (above), was designed by Jones & Emmons, handles by Merendino-Greene (r.) and IDC (l.), whom it now retains.

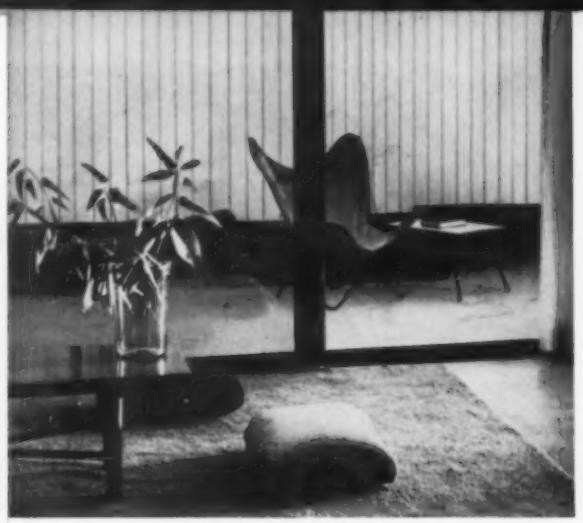
Thermador's earliest ranges, like Arcadia's first doors, were built to order for architects and builders between 1939 and 1941, and required skilled cabinet makers and tile-setters to install burner and separate controls (l.).

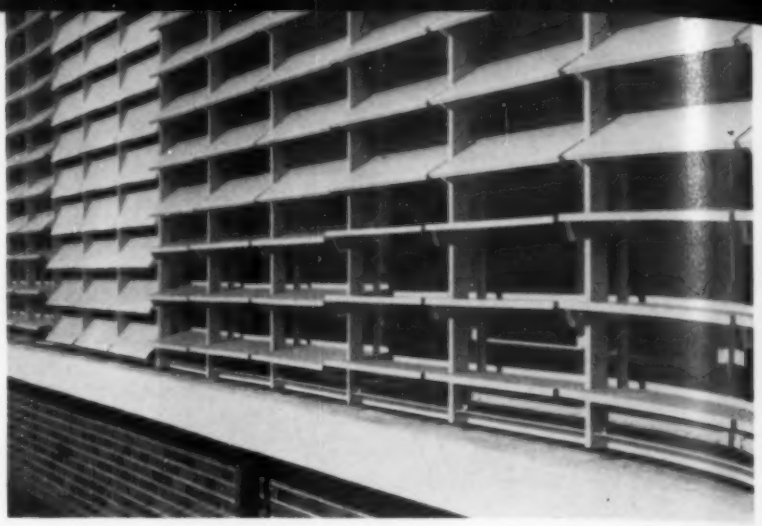
Arcadia Metal Products (left) of Fullerton, started in 1948 as a custom builder of sliding glass doors and windows, but its young founders guessed from the start that the lowered prices achieved by mass production would result in a market that would justify this change. Adoption of stock sizes made assembly line techniques possible, and between 1949 and 1955 Arcadia production rose from 1200 units to over 50,000, of which two-thirds is now shipped out of the state. One speculative builder—Eichler Homes—has alone accounted for 8000.

Like Arcadia, Thermador Electrical Manufacturing Co. has inspired nationwide competition. Though its built-in ranges have influenced appliances of every sort, they remain unique for the straightforward appearance that contributes to the popularity of built-ins.

At war's end, perceiving that a good market for built-ins was in the offing, Thermador redesigned its surface units into a single stainless unit, with controls on top, that easily drops into opening of the proper size. The new appliances quickly achieved national recognition in unusual kitchens in architect-designed houses, like one by Richard Neutra (l.). Company has pioneered other improvements (double oven, below, air-cooled oven door), but has retained inconspicuous elegance of earliest custom-built units.



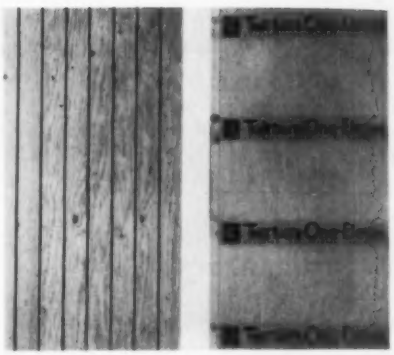


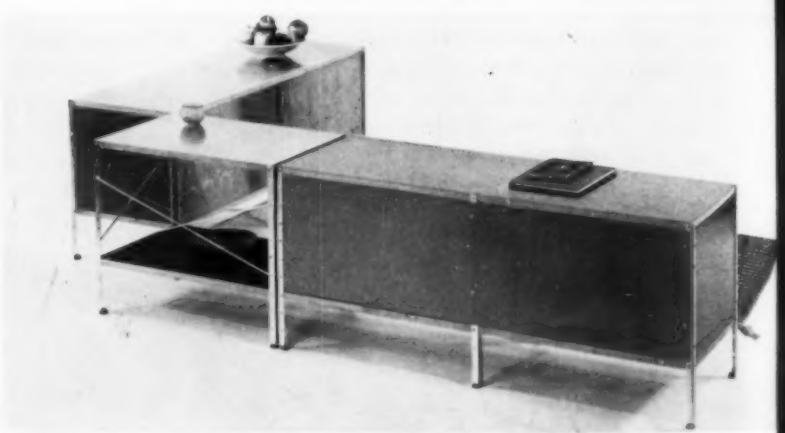


Products for building and furnishing *in an experimental spirit*

These building products might have originated anywhere, but the Coastal climate is especially friendly to such experiments. California furniture is easy to spot. While longer couches, higher lamps and lower coffee tables are only exaggeration of a nationwide taste, the strong simple classicism of the outdoor furniture has had a nationwide influence. Not only has it made its way indoors (see facing page) but it has affected the design of housebound articles.

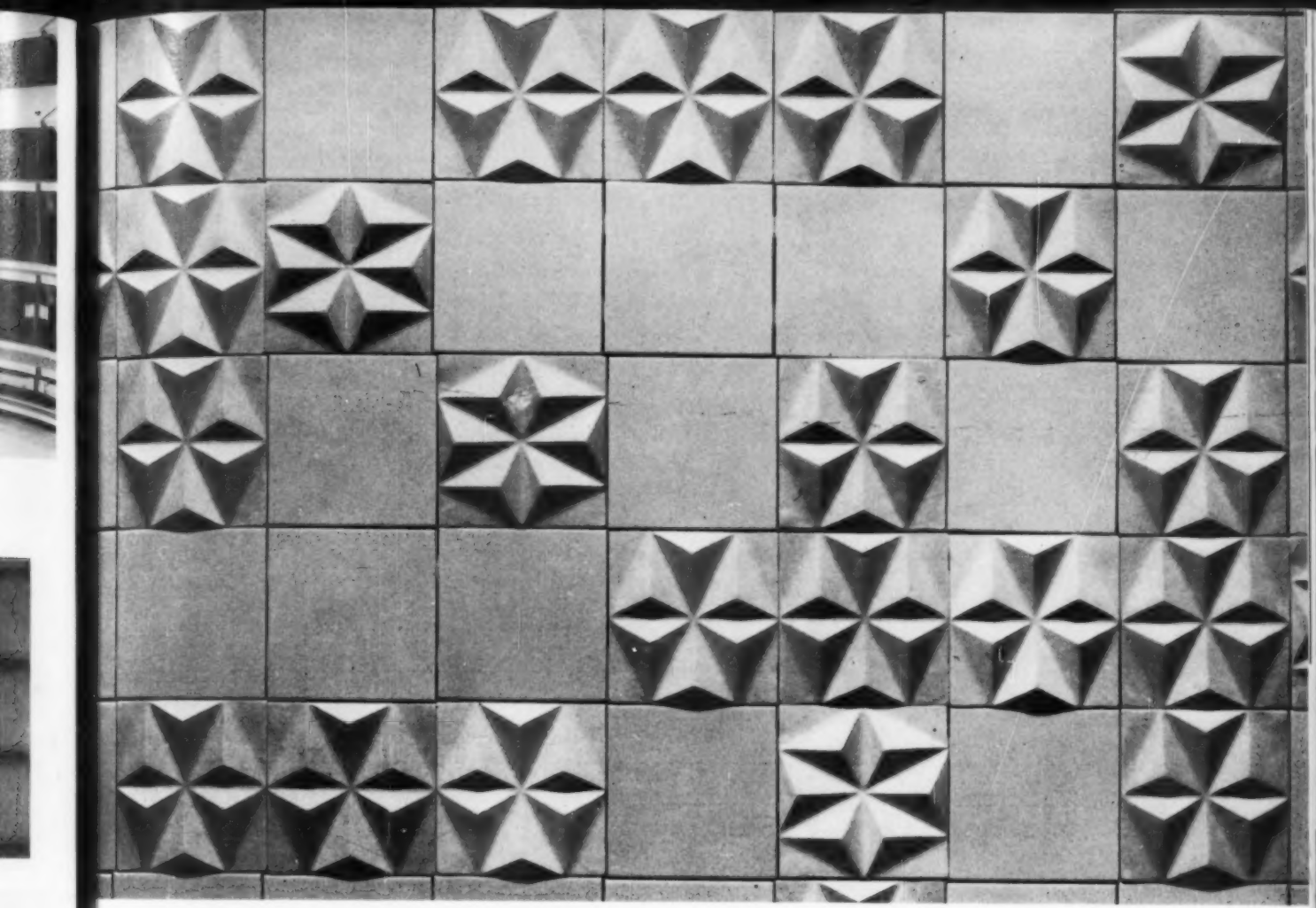
Climate-fostered *products, like translucent corrugated Alsynite (above, left) and Lemlar aluminum louvers (above, right), used here by Soriano and Neutra respectively, have been nourished into businesses by Coast's architect-builder market. Texture* 111 *(r.) one of wood developments by Douglas Fir Plywood Association, is another builder's staple.*





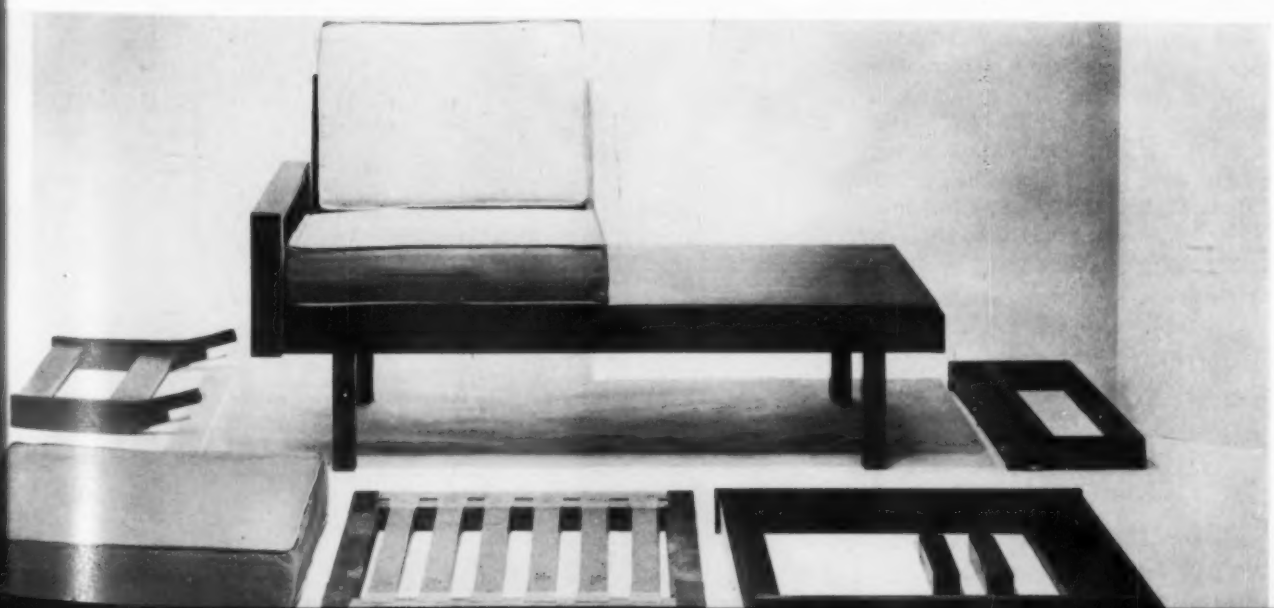
Charles Eames *would be unique wherever he worked, but most of his furniture has been developed on the West Coast where his Midwest manufacturer has found a good market for his technically unprecedented products.*

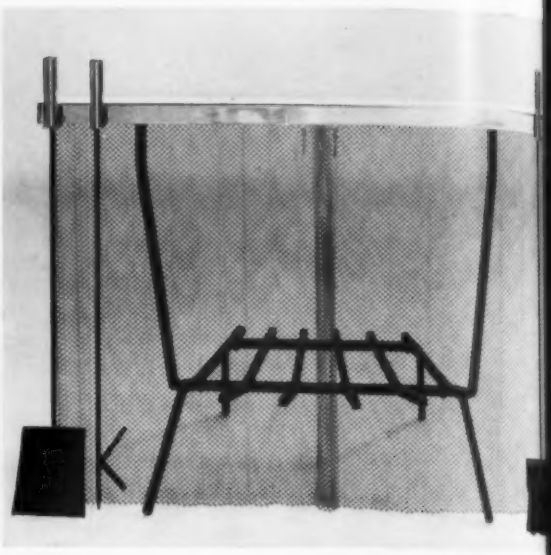
Van Keppel-Green *didn't invent string seating, but by using it as a weatherproof material* (1946) *they just about invented outdoor furniture, and heavily influenced the casualness of indoor furnishings. VK-G classics are of a piece with the best Coastal architecture and landscaping.*



"Variations," *a new modular group by Martin Borenstein for Brown-Saltman, shows the sawmill squareness of redwood furniture translated into elegant indoor walnut. Basic leg units, seats, tops, cabinets, are all on 24" module, can easily be rearranged by newlyweds, transients, renters, model-home builders, or people with a taste for "architectural" furniture.*

Pomona Tile, *early in introducing decorative architectural tile, has undertaken extensive design research to produce new patterns for modern interiors. Saul Bass has created a series of 3-dimensional designs composed of groups of tiles in varying depth. Millard Sheets, Paul McCobb, Paul Laszlo and Dorothy Liebes are the other designers participating in continuing program.*



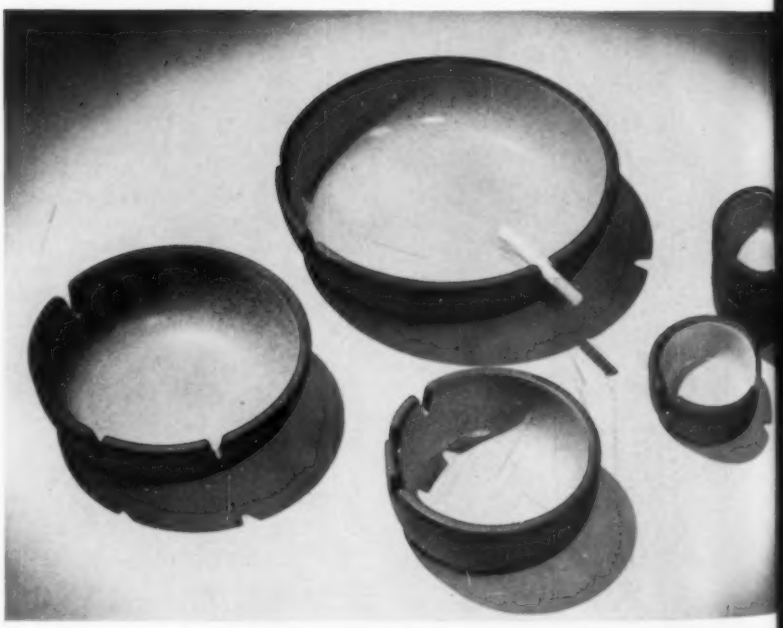


Architectural Pottery (*l.*) *is a business that grew out of an original student idea; first models were designed in California School of Art project in* 1949; *in* 1950, *students John Follis and Rex Goode joined Max and Rita Lawrence to found firm to manufacture them. The original classics (shown left) are still in the line, others have been added by original teacher, La Gardo Tackett.*

Above: *Fire screen and tools by Smith and Tepper for Fred Meyer of California are adjustable.*

The taste for the handmade look in pottery is satisfied by countless prominent individual craftsmen on the Pacific Coast, by semi-mechanized shops like Edith Heath's, by such giant concerns as Gladding McBean, and by countless lesser-known or unknown artisans. The best-known products have a monumental simplicity and often a new idea.

Other of California's native products are related to hard facts of life. In the south, where central heating is an extravagance, old-fashioned necessity reinstates the fireplace as a focal point. Two side results are the prefab fireplace and some well-designed accessories. An alternative is the panel heater. The lack of facilities for garbage handling has created a thriving business in garbage disposers, some of which are only sold locally, others nationally advertised industry leaders, like Waste King.



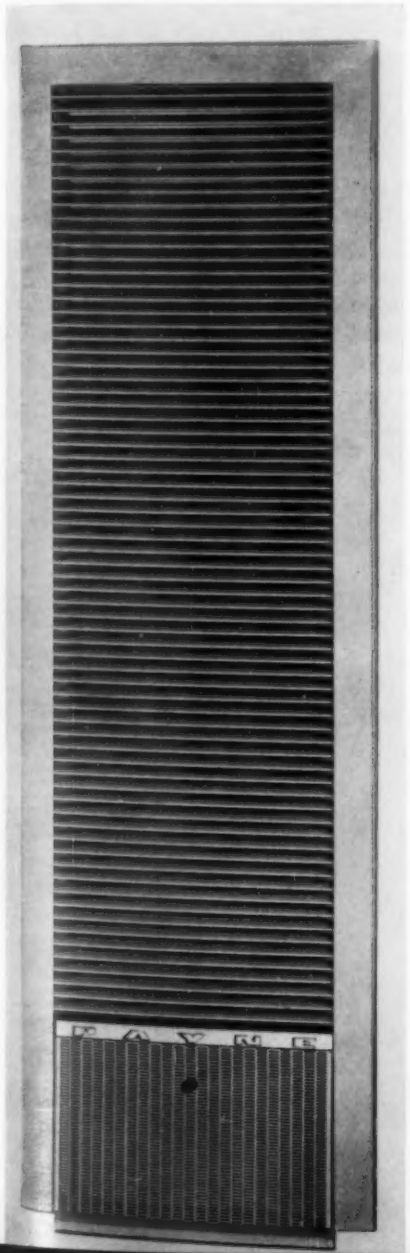
Original, *and much imitated, ashtray designed by Edith Heath is still popular after nearly a decade. In their Sausalito workshop, Heaths have successful business producing original stoneware designs in quantity for national distribution.*

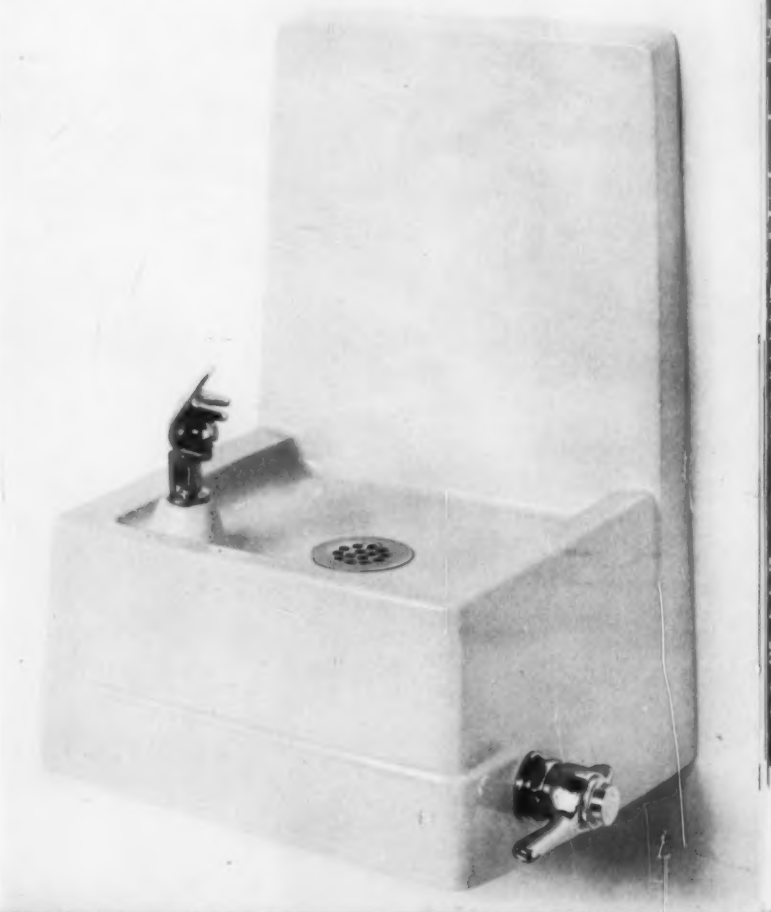
Pacific Coast industries sometimes reflect the good life, sometimes the results of the hard facts of life.

Waste King, *one of biggest in disposer field, has been redesigned by Emerson-Johnson-MacKay.*

Fountains *for modern interiors, pioneered by Haws (Berkeley), are designed by Channing Wallace Gilson.*

Panel Ray *gas heater first solved radiant wall heat problem during war, with architecturally-integrated unit with elements behind simple grille. Redesigned by Merendino-Greene, Panel Ray has reached production level of millions.*





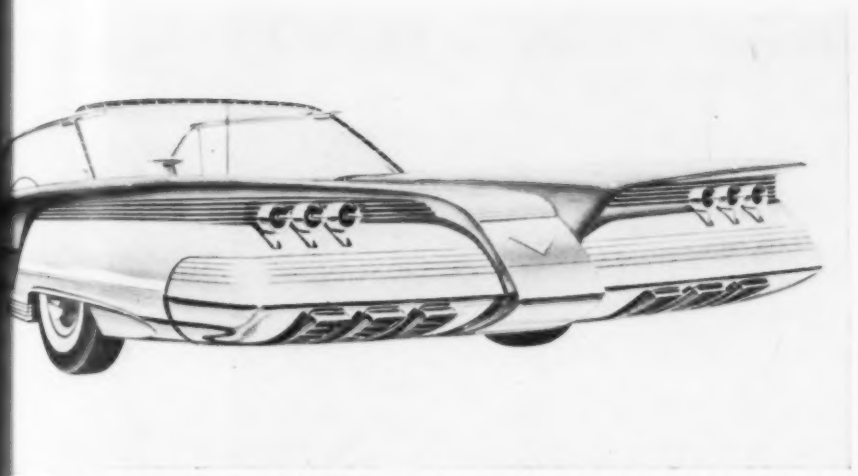
Resource-Based Industries

The first boom of the Far West arose from its extractive industries—mining, fishing, lumbering, agriculture. Today's coastal economy still rests heavily on natural resources—both material and environmental

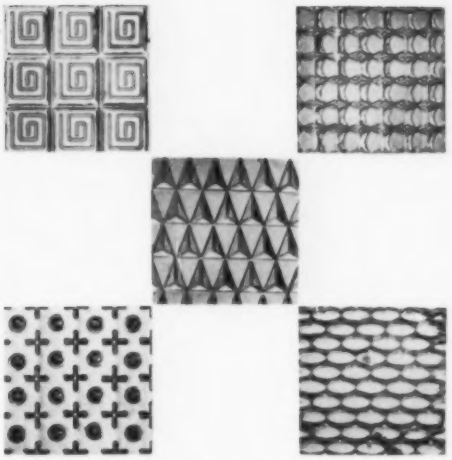
Aluminum, shining light of the Coast's processing industries, is there for two main reasons: aircraft, and Henry J. Kaiser. The aircraft industry was responsible for plants built during the war to process bauxite from the south; Kaiser got into aluminum by a happy postwar accident, while looking for an available metal for the smaller, lightweight car. In a war surplus arrangement he acquired, in a northwest plant, the makings of an empire and proceeded to build one. Kaiser has been strategically located to corner a good western market, but has a national outlook; it is now nudging Reynolds for second spot in the industry, continues to expand aggressively into such consumer products as foil (below) and frozen food containers.

As an adjunct to a research program that paces its lusty growth, Kaiser is making increased use of its own design staff to keep sales climbing. A neighboring producer, Harvey Aluminum—a postwar brainchild of engineer Leo J. Harvey—takes quite a different tack on product development. Specializing in industrial extrusions, it relies entirely on the inventiveness of its engineers for refinements and innovations. Harvey plans a new reduction plant in Oregon, ready in 1958.

Roll of foil, new Kaiser consumer product, is removed from separator at foil mill.



Rear view of car proposal by Kaiser designers shows aluminum deck and fenders.

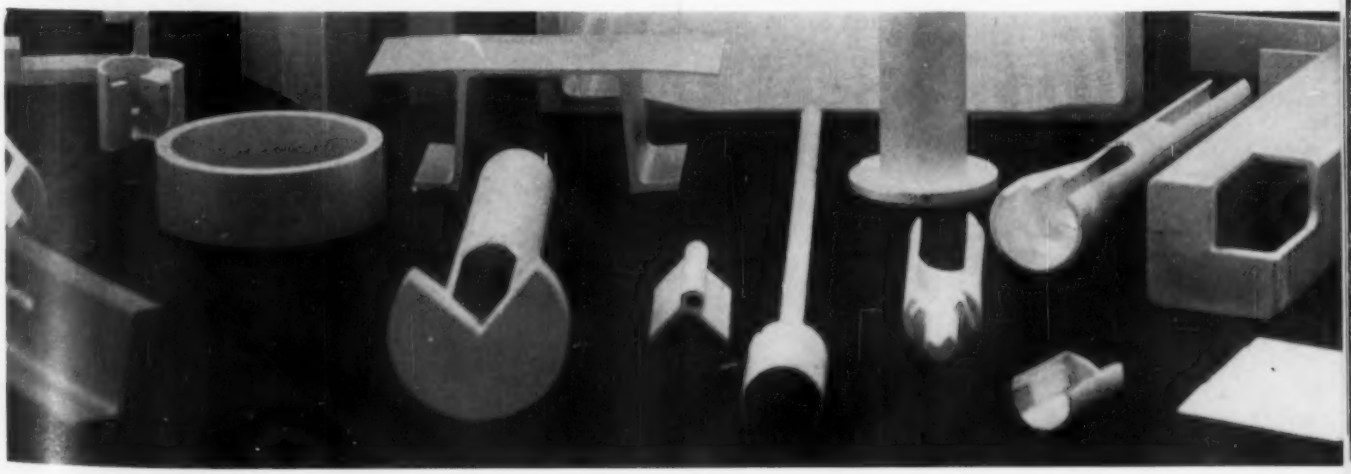


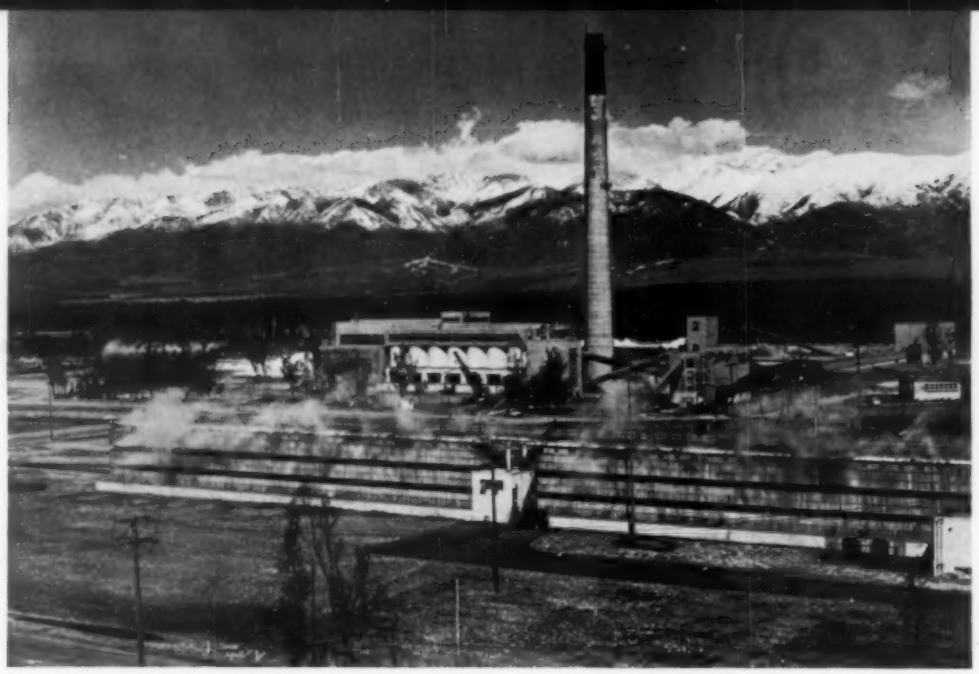
Subtle and deep-embossed patterns in aluminum.

Specialized know-how for manufacturers using aluminum in end products is what Kaiser's young Industrial Design Department has to offer. Under former Ford stylist Franklin Hershey, the design group of eight has, in the eighteen months of its existence, worked with boat manufacturers, with a metal furniture company on a line of all-aluminum office furniture, and done extensive investigation of foil packages and new types of containers. The department also serves the company internally, with displays, promotion, and general consultation.

A vivid demonstration of how the design group proposes to help Kaiser lure the auto industry into increased aluminum usage took place in Detroit recently. Full-scale color renderings of six projected car designs (and an all-aluminum car) were shown to automotive stylists, to suggest ways that the material could be used to greater advantage. The "Del Mar" model above has a grille and center section bumper formed of a single extrusion, as well as cast or extruded aluminum deck and fender sections and integrally-formed ornamentation on rear and side components. Numerous texture patterns were also shown. Hershey's aim is to build the department into a service for all practicing designers—both by offering information and by creating an awareness of the need for design assistance in many industrial areas that have never been exposed to it before.

Range of extruded aluminum shapes made by Harvey Aluminum is demonstrated by recent exhibit of facilities at Torrance.





Fontana steel mill, the West's answer to an eastern monopoly, is currently undergoing big expansion.

Wood and Steel: *Northwest staple and a southern newcomer*

Wood, a century-old industry first stimulated by mining activities, continues to be the taproot of the Northwest economy: 30 million acres of forest produce some 13 million board feet a year. Lumber in turn is the raw material of several important coastal industries—building (with the Douglas Fir Plywood Association active in research for new architectural uses); paper and packaging, with Crown-Zellerbach among the local giants that develop and merchandise products through design.

Steel has only since the war been claimed as a Coastal industry, and now the first integrated blast furnace, Kaiser's Fontana plant, is undergoing a $133,000,000 expansion that will double its capacity. Its planned yearly output of 450,000 tons reflects the continuing healthiness of the local market: not only aircraft and construction firms but makers of steel furniture, business machines, electric irons and door locks are among heavy purchasers of locally produced steel.

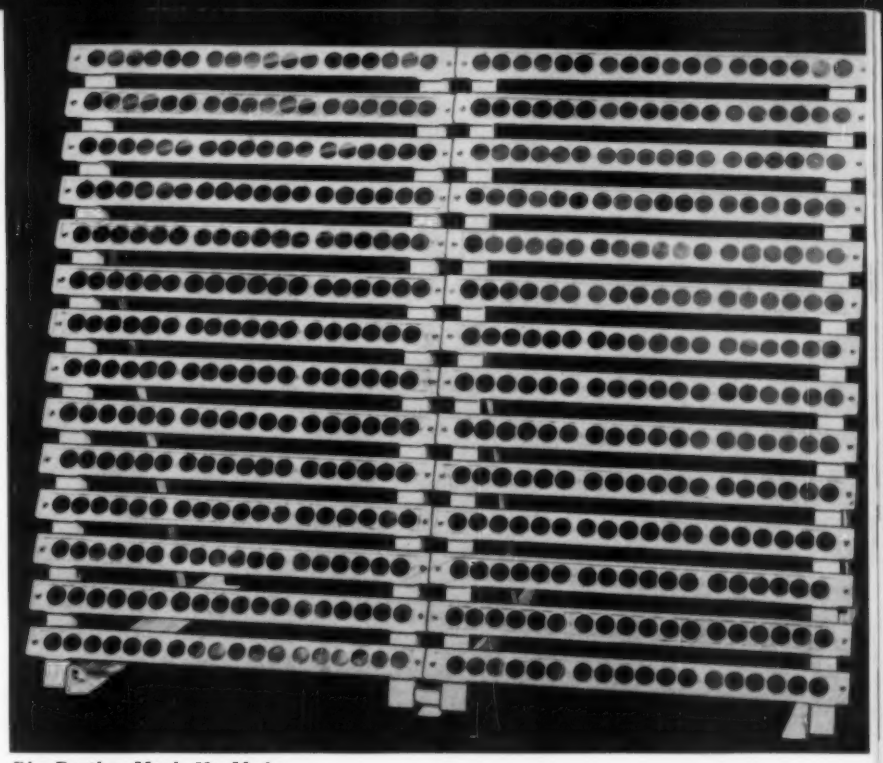
Fifty-ton Berger crane was originated by Crown-Zellerbach engineers at its Camas, Washington mill.

Solar Energy

In extracting a livelihood from its environment, California has not overlooked a major resource: sun

The world's first Solar Energy Center, to conduct experiments in the use of the sun's power, is under construction in Tierra del Sol, east of San Diego. Among the immediate projects are a solar means of sea water conversion, a solar furnace, a house using solar heat exclusively and sun-powered street lights.

Meanwhile Hoffman Electronics of Los Angeles is aggressively claiming a place in the front lines of those working to use the sun as an economical and efficient source of energy. Hoffman, which recently established a Solar Division, is currently the only commercial manufacturer of silicon solar cells, and is already marketing a portable sun-powered radio and is filling Army orders for a solar-powered flashlight. Early this year Hoffman demonstrated a solar converter panel (right, above) capable of converting 10% of the sun's energy into usable electricity.



Big Bertha, Mark II: Modular construction of solar energy converter permits adjustment to various power requirements from unattended source—for radio systems, telephone relays.

Solaradio by Hoffman has battery in handle, silicon cells to recharge it for lifetime use. $150.

Solar flashlight with nickel cadmium battery is charged by cells at side; developed for Army Signal Corps.

Capital Equipment

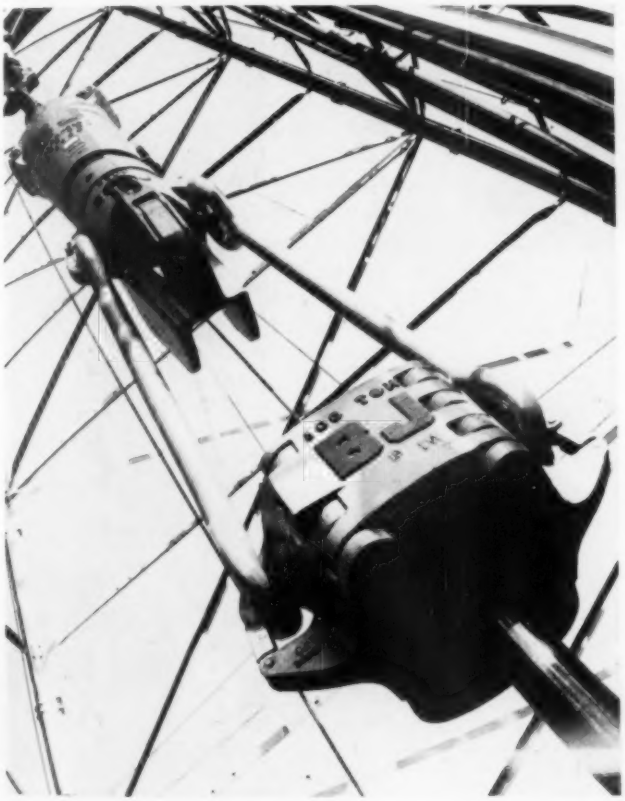
The first industry of the Pacific Coast is, in a sense, the heavy equipment to exploit its rich natural products—an industry that often has turned out inventive products to answer the special problems of the West's soil, size and resources

Mining machinery was a California invention of the last century, when foundries sprang up around San Francisco to fashion all manner of equipment to meet the region's special geographic conditions. "Black gold," lumber, and agriculture in turn attracted industries to meet their needs. At the turn of the century, for instance, the biggest tractors ever built were constructed in California, some with plows 44 feet wide to work the endless western fields; in the north unique mechanical monsters for sawing and lifting trees were improvised to cope with the vast Northwest timber.

In the course of its 100-year exploitation of Pacific Coast resources, the oil industry has brought what is undoubtedly the most problematic equipment to the far West, its obtrusive rigs and pumps cropping up on beaches or in backyards without regard for land value or landscape. Lately the oil companies have made efforts to correct the civic blight; several have turned to designers for equipment that offers identity, prestige, visual neatness—as well as better operation.

Offshore drilling platform proposed by Standard Oil of California is designed to be neat, unobstructive; special color will make it less visible from Summerland shoreline.

Uniform color bands neaten irregular oilfield equipment.

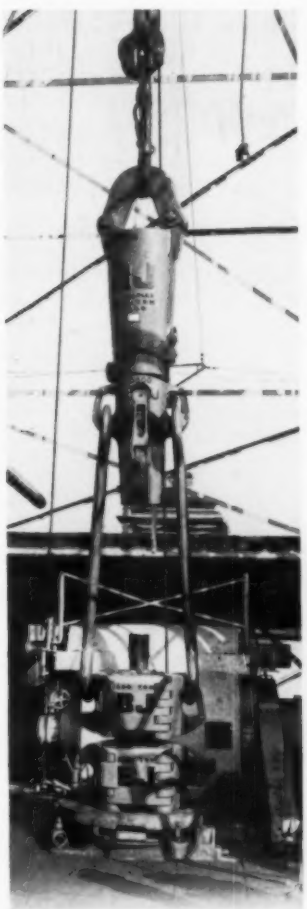


Byron-Jackson's restyled Hydraplex Hook and Elevator-Spider.

← Flexible aluminum hose with completely mechanical system for handling and positioning of arms is invention of Chiksan Company, called first basic improvement of loading tankers in 30 years.

It was for public relations reasons that the Basin Oil Company of Southern California called in designer Hunt Lewis to tackle a local problem: rapid expansion of a residential area adjacent to its holdings found the company challenged by irate neighbors in North Inglewood. Asked to suggest improvements that would mollify the residents, Lewis made several simple proposals: cleaning up the oiled areas, building retaining walls, adding a color scheme to all visible structures to camouflage a disorderly skyline. When the suggestions were carried out, requests for revocation of the firm's lease stopped.

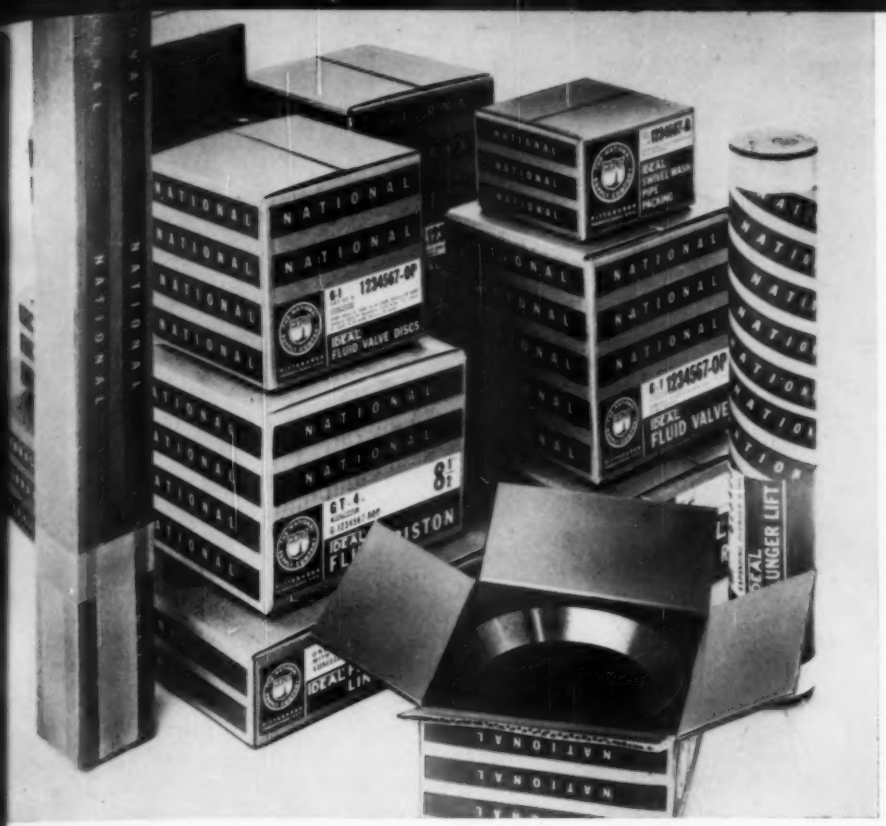
Subsequently Lewis was retained by the Byron Jackson Division of Borg Warner to supervise the appearance design of a new 500-ton Elevator-Spider and Hydraplex Hook. Rugged practicality, always the main consideration in drilling equipment, seemed to require better expression. Working with B-J oil tool engineers, Lewis developed a configuration that is smooth but not overly refined, for the Spider and Hook introduced this year — with the largest capacity ever built. He continues design consultation on other items in the Byron-Jackson line.



One firm's family

of products bear the recognizable mark of one designer's consistent attention: National Supply products by Dreyfuss

Simplified form of block and hook attached to swivel increases recognition value, makes for less hazardous operation.



Continuous wrap-around pattern on all National cartons unify assorted shapes in warehouses and on store shelves. Label was designed to be clear and masculine, not fashionable, for oil fields.

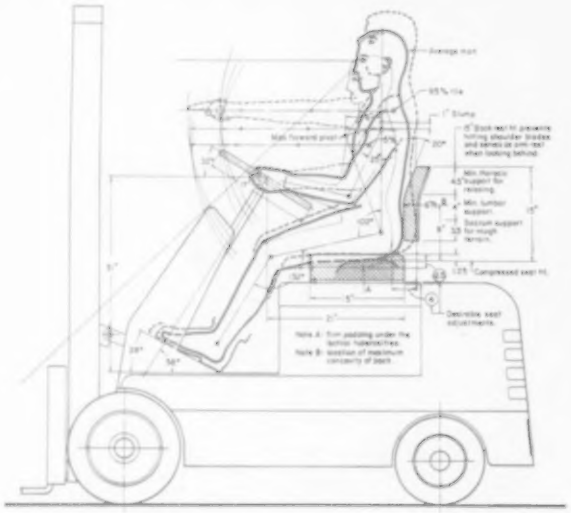
The National Supply Company, the world's largest manufacturer and distributor of oil field machinery and equipment, puts major emphasis on an aggressive marketing, engineering and industrial design job. The design part of the program is handled by Henry Dreyfuss, who services National's far-flung operations — Pennsylvania, Texas, Ohio, and California — from both east and west coast offices. Work has included the industrial design and human engineering of the rigs and rotary tables that form the heart of a drilling operation; pumps and wellhead equipment; the International Petroleum Exposition in Tulsa; a comprehensive packaging program; and new architectural prototypes for National's coast-to-coast chain of stores.

An example is the swivel (left) which is one element in the chain of equipment that controls the movement of pipe in a drilling operation. For maintenance reasons — primarily to minimize dirt accumulation and facilitate cleaning—this was a problem in form simplification. In the case of the "horsehead" pumper, whose familiar silhouette stands, often row on row, sucking "crude" out of the ground, form simplification is vital not only for maintenance, but for safety; clean, geometric forms give the worker maximum protection. Out of this broad design program has come a recognition value; in an industry where industrial design is an unfamiliar force, National's simplified, brightly colored shapes stand out against the drabness of the oilfields.

Prototype supply shed, designed by Dreyfuss, is adapted to field conditions throughout the country.

Wellhead choke has rectilinear handle opening for easy handling, plus more legible designations.

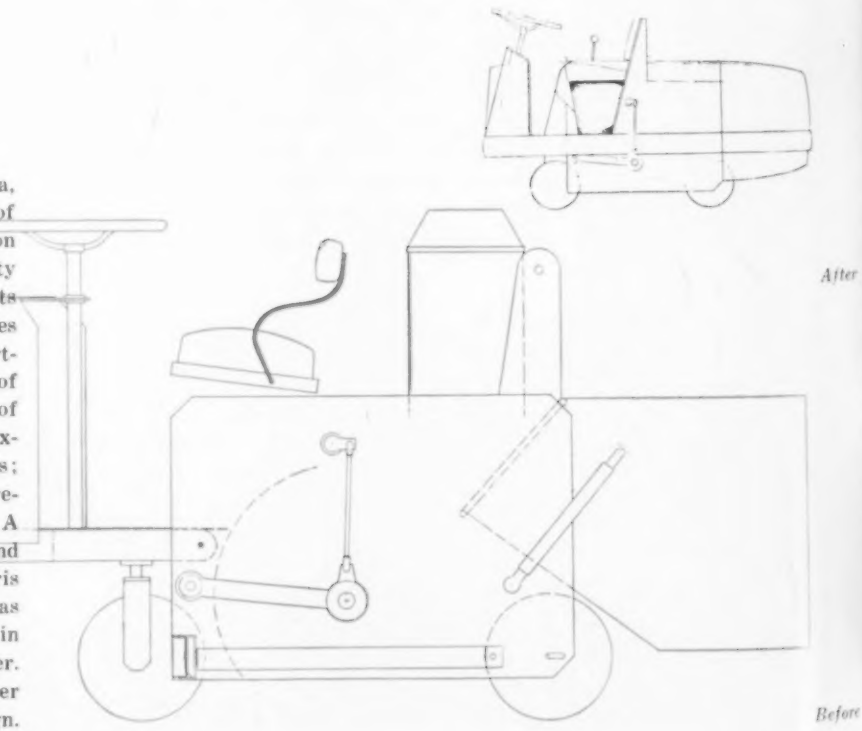
West Coast



For special handling:

Unusual problems in mobile equipment get special design treatment.

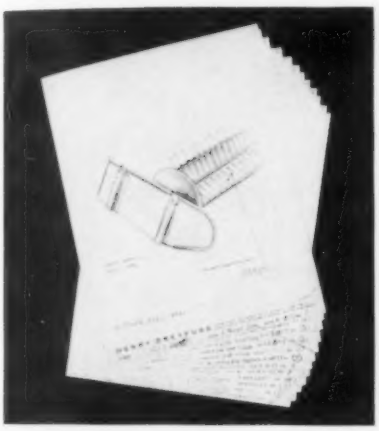
Of the four major producers of materials handling equipment, Hyster of Portland has had the most spectacular rise. In its northwest location, chosen three generations ago, it produced such innovations as giant lumber carriers and tractor-mounted winches for the logging industry. Since 1929 the company has expanded into making lift trucks and yard cranes for lumbering, which eventually found industry-wide use and a national reputation. In 1951, president E. G. Swigert retained Henry Dreyfuss to work on all Hyster products. To date, the designers have worked on all of the 27 basic models in the line, of which the lift truck is perhaps the most dramatic example of change. Sold heavily on the basis of its turning radius and general maneuverability, the lift truck is designed to be as short as possible—and to look it. The black lower section lowers the body *visually*, emphasizing its inherent stability. The tapered shapes help the operator, surrounded by emergencies as he works, to drive more safely in reverse.



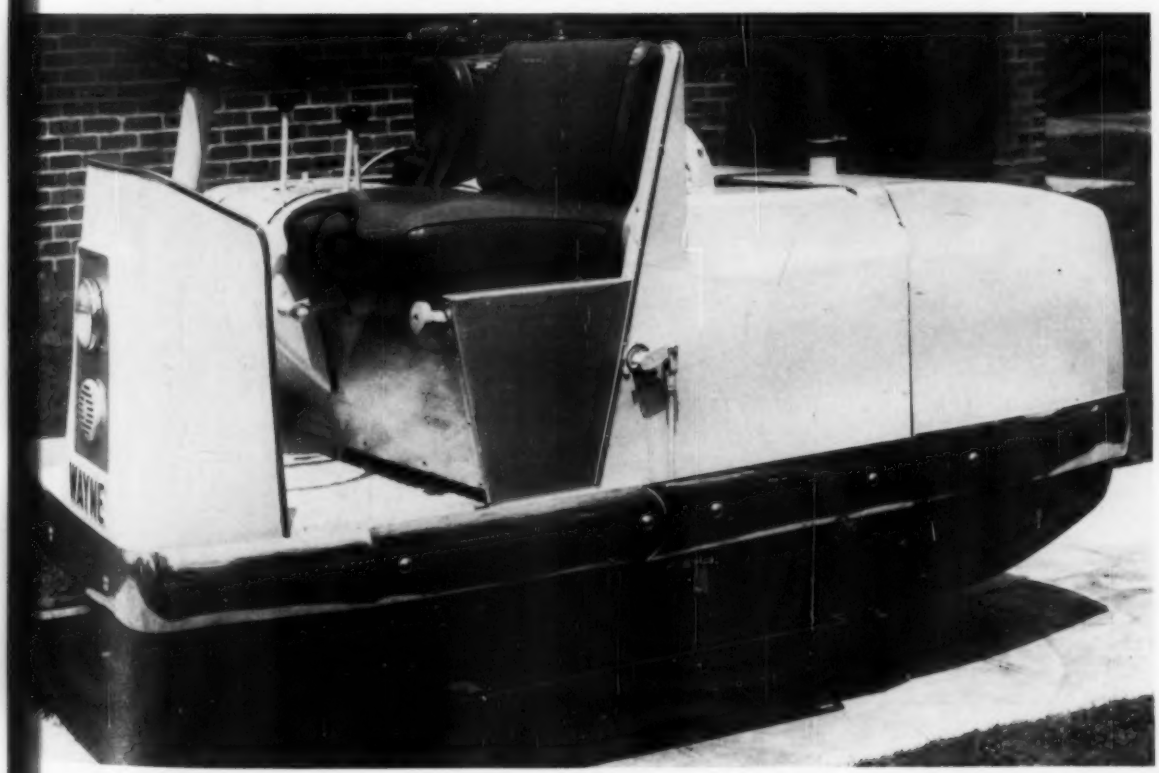
After

Before

Wayne Manufacturing Co. of Pomona, the country's largest manufacturer of mechanized sweepers, has a reputation for achieving ruggedness and quality that was not apparent enough in its products. Henry Keck and Associates were retained to upgrade the line, starting with model 605 (r.). The limits of simple tooling and the requirements of safety suggested enclosing many exposed shafts and hydraulic elements; but Keck soon found it necessary to rearrange a number of parts as well. A large dust collector was removed and made an integral part of the debris chamber; the sizable gas tank was worked in behind the seat which, in turn, was integrated with the sweeper. The wheel was angled, and a bumper added at waist level to unify the design.



To give Deere and Company the benefit of broad design thinking on the variety of farm machinery made in 12 plants throughout the country, Henry Dreyfuss has worked out a unique relationship that supplements the normal flow of drawings, scale and full-size models with design consultation and abbreviated drafting procedures. During 20 years of close work with Deere engineers—after which designer and engineer say they can read each others' minds — an intimate working relationship has gradually evolved in which conferences and sketches can often obviate the need for exhaustive work in the drafting room and model shop. Though life-size wood-and-clay models of farm vehicles often choke traffic in the Dreyfuss office, sketches (left) are frequently sufficient to suggest detail improvements for safety and maintenance, as well as easier fabrication, stocking, shipping *and* visual distinction. Through this flexible combination of painstaking design development and abbreviated working methods, Dreyfuss can influence the image of more products than would be possible by conventional means.



Merchandising western products

Graphics to personify unique brands

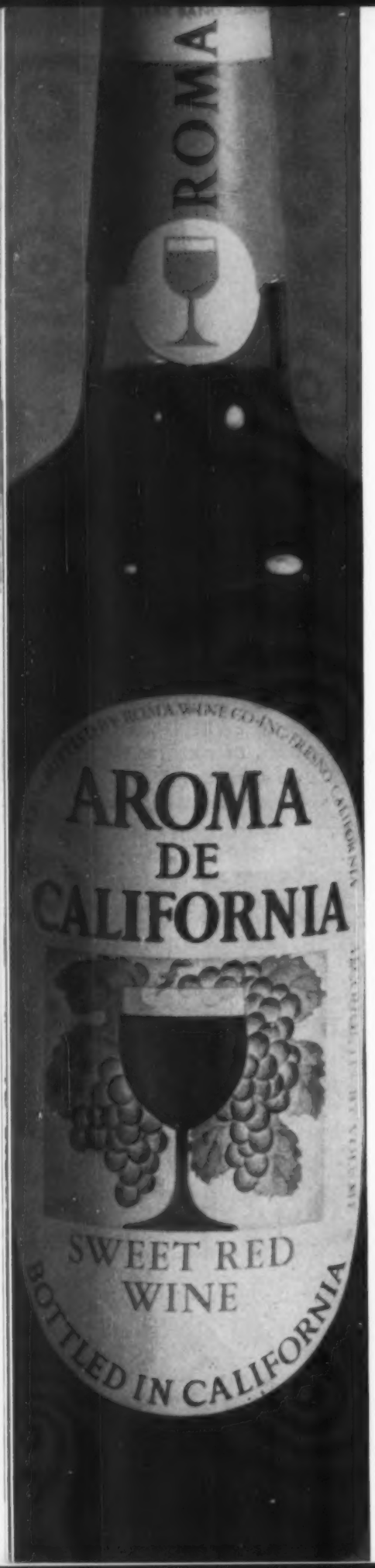
On the Pacific Coast, San Francisco is still the main commercial center where many western corporations make their merchandising and marketing decisions. The "Bay" is northern California's home base for its own resources—wood products, canned foods, wines; and Sansome Street is the "Wall Street of the West," where boards of directors meet and services are hired. Following their trade, a host of designers specializing in packaging and graphics have set themselves up there—to design for local products, to meet corporate identification needs, to make the package talk to western consumers.

Los Angeles is no laggard as a distribution center of everything from electron tubes to soda pop, and designers in southern Cal have learned how to use the straightforward idiom of engineers (top right) as readily as they express carefree western living in their package designs. The influence of San Francisco packaging specialists moves outward, and designers like Walter Landor get calls from national firms located in the East (far right).

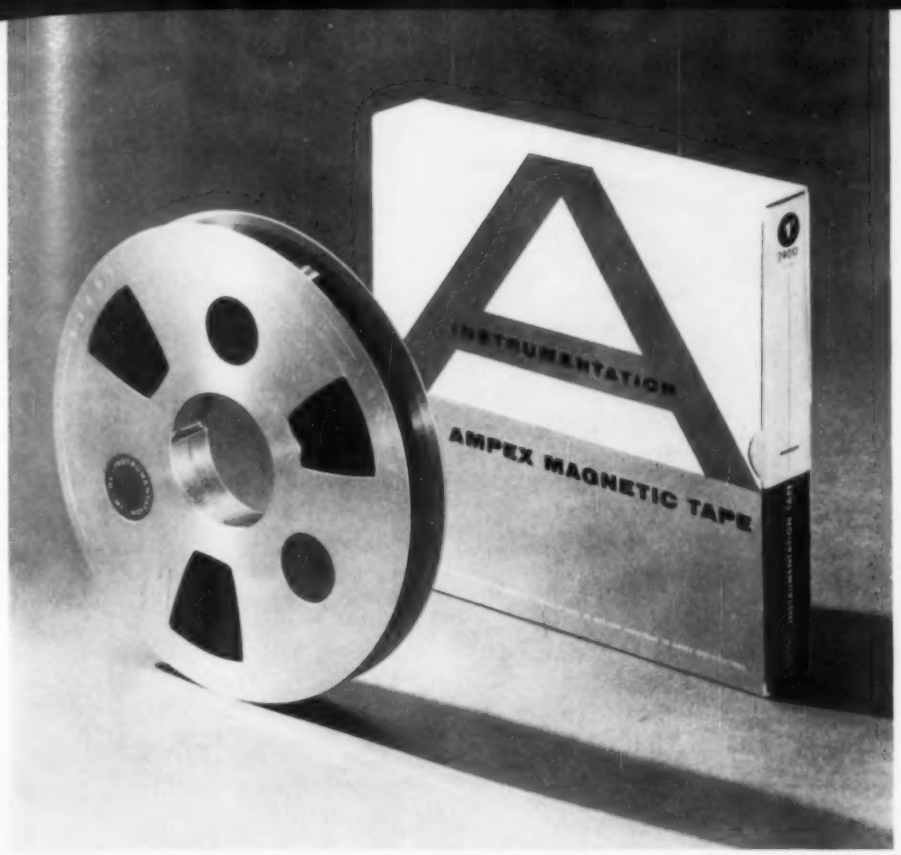
Furniture store logo; Smith & Tepp

Soda bottles, crown, carton; Gould & Associates, for Bireley's (General Foods).

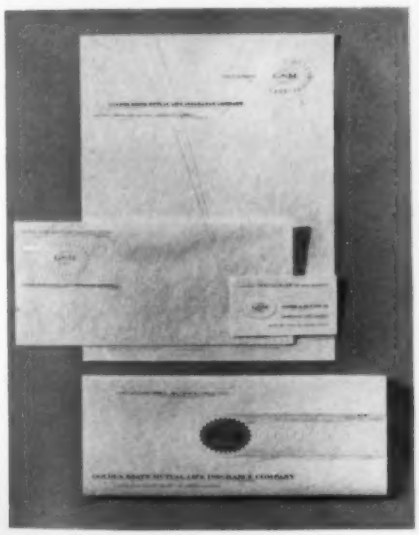
Soap flakes package in green and blue for Safeway (Oakland); Saul Bass.



Roma Wine bottle, labels, closure; Jo Sinel.



Redesigned tape reel presents clean aluminum surface to go with precision instruments; Melvin Best Associates, Frank T. Walsh of Ampex Instrumentation Division. Package design carries over elements of reel, makes bold presentation to customers; Max Silten.



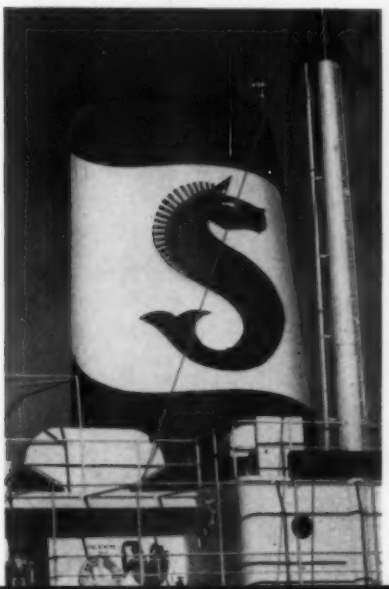
GSM

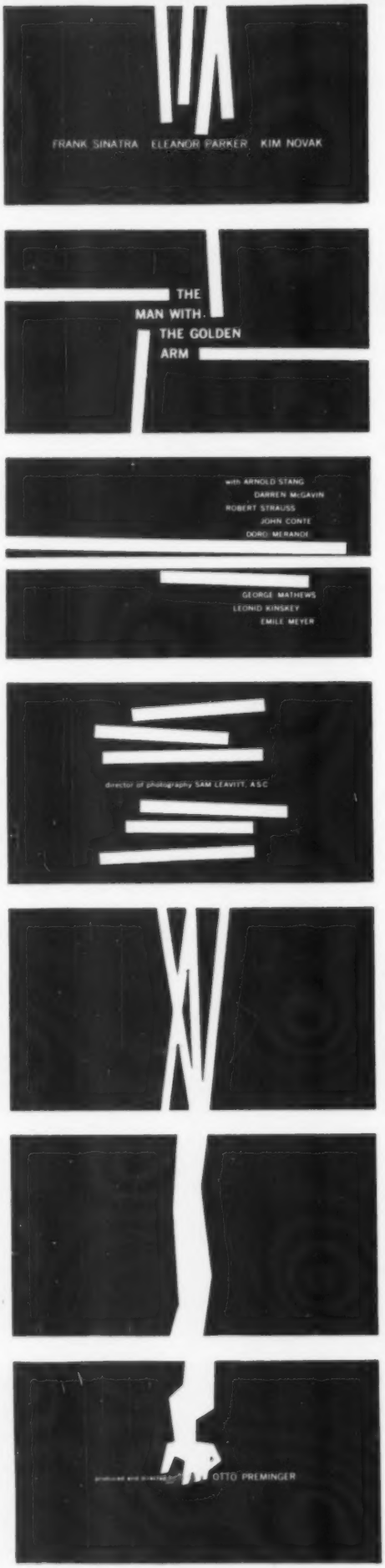
Golden State Mutual Life Insurance Co. trademark, stationery, policies; Saul Bass.

U. S. Steel nail carton (part of package line), States Line corporate identification; Walter Landor Associates.

sequoia circuits

Sequoia Process Corp. logo by Smith & Tepper. Below, Landor Associates designed product (lock) and package.





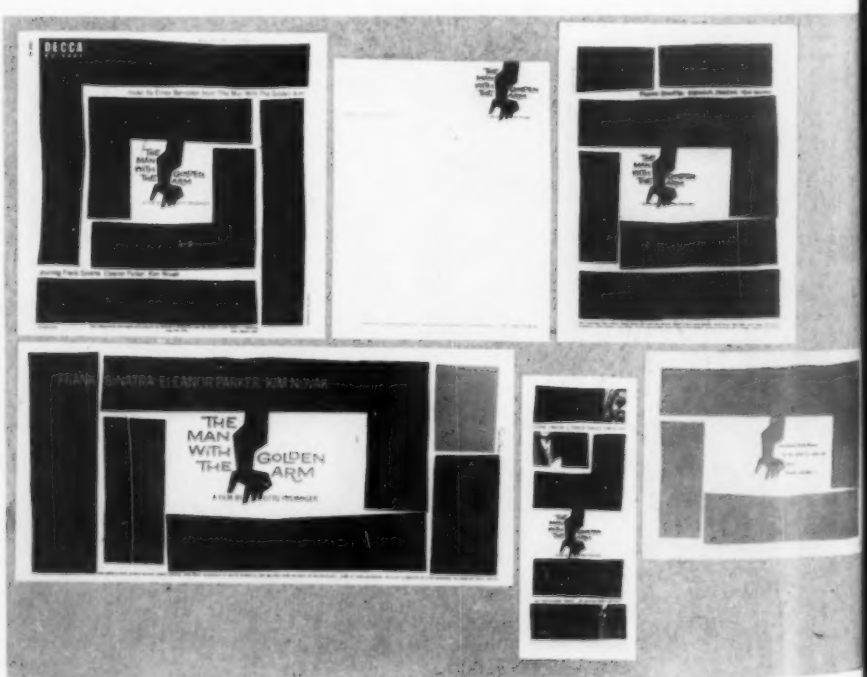
GRAPHICS for the movies

The name "Los Angeles," before the recent industrial boom, meant "Hollywood" to the world at large, and motion pictures must be accounted as an important industry that has long made the coastal wheels go round, economically speaking. Hollywood itself, while right at the doorstep of an active colony of graphic specialists, has in the past been little more than a sometimes patron of the graphic arts. Yet today—perhaps because of competitive blows from TV—producers are beginning to explore the *art* of movie making, and this suggests that there may be a larger opportunity than ever before for artists in visual communication.

Producer Otto Preminger, one pioneer in this area, hired Saul Bass to design the titles for "Carmen Jones," feeling that a dull list of screen credits could, with style and imagination, be turned into a positive first impression for the audience and a personality for the film. So successful were the results that he retained Bass on "The Man with the Golden Arm" and, more recently, "Saint Joan." Bass has worked with other producers on such releases as "Edge of the City," "The Seven Year Itch," and the full-length credit cartoon short in "Around the World in 80 Days."

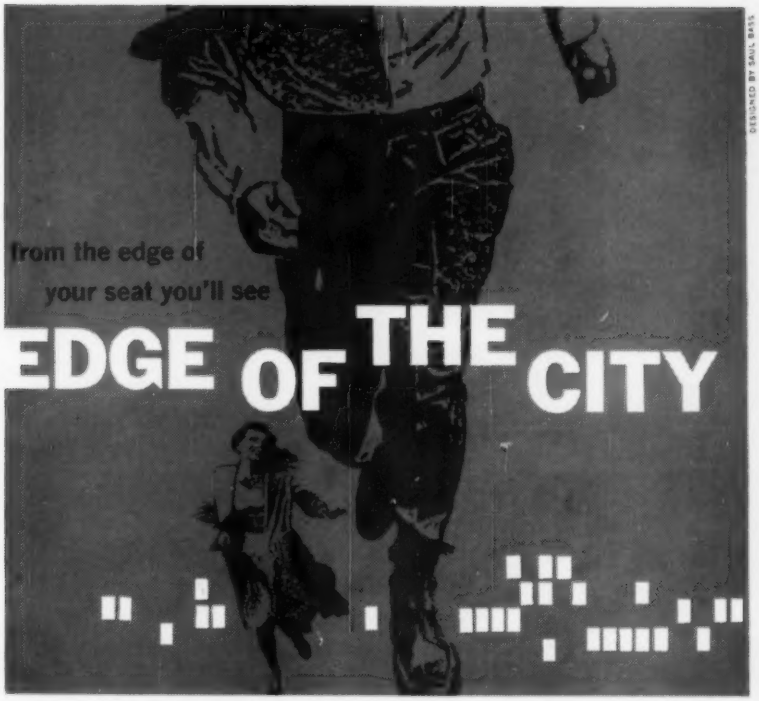
What is most interesting is that Bass' work on many of these films has fanned out into a kind of "product identity" program: the strong graphic motif of the title is translated into ads big and small, into posters and billboards, to make a consistent and recognizable symbol for the film wherever it is advertised and whenever it is played — a "house style" within the movie industry.

Title-piece for "The Man With the Golden Arm" uses white bars on black screen for spare, gaunt driving intensity, with jazz on sound-track.



Identification program for United Artists' "The Man With the Golden Arm" employs white and black abstract forms throughout producer's stationery, posters, record album, billboards, preview invitations, magazine and newspaper ads.

Titles for Columbia's "Storm Center" are superimposed on frightened child's face and burning books, for film on alleged Communist influence in schools.



Poster for Metro Goldwyn Mayer's "Edge of the City" employs white rectangles used in film title-piece for emotional staccato effect.

Poster for United Artists' "Saint Joan" departs from bell-motif of title-piece: here squares of color and red field create medieval stained-glass effect as background for film on Joan of Arc.

Marketing devices for the West Coast's motorized millions

In a land where two-car families are the rule rather than the exception, designers are conceiving devices to sell almost anything quickly, automatically, or at the roadside

Mobile car wash machine can be operated by one man in three automatic operations, does complete job in ten minutes; Merendino-Greene, for California Car Wash Systems, Inc.

Gas station by architects Smith & Williams (The Roulac Co., research and construction), for General Petroleum Corp., simplifies shelter to metal roofing.

Photo booth by Emerson, Johnson-Mackay for Auto-Photo Co., uses Formica panels, stainless trim, Nineties lettering.

Resort fashions store at Lake Tahoe by Walter Landor Associates for Joseph Magnin Stores: canvas roof and sides can be packed away to duck winter snowstorms.

Beverage vending machine by Channing Wallace Gilson for Dariomatic, Inc., was first refrigerated vendor to show actual product; enamel finish in yellow and blue.

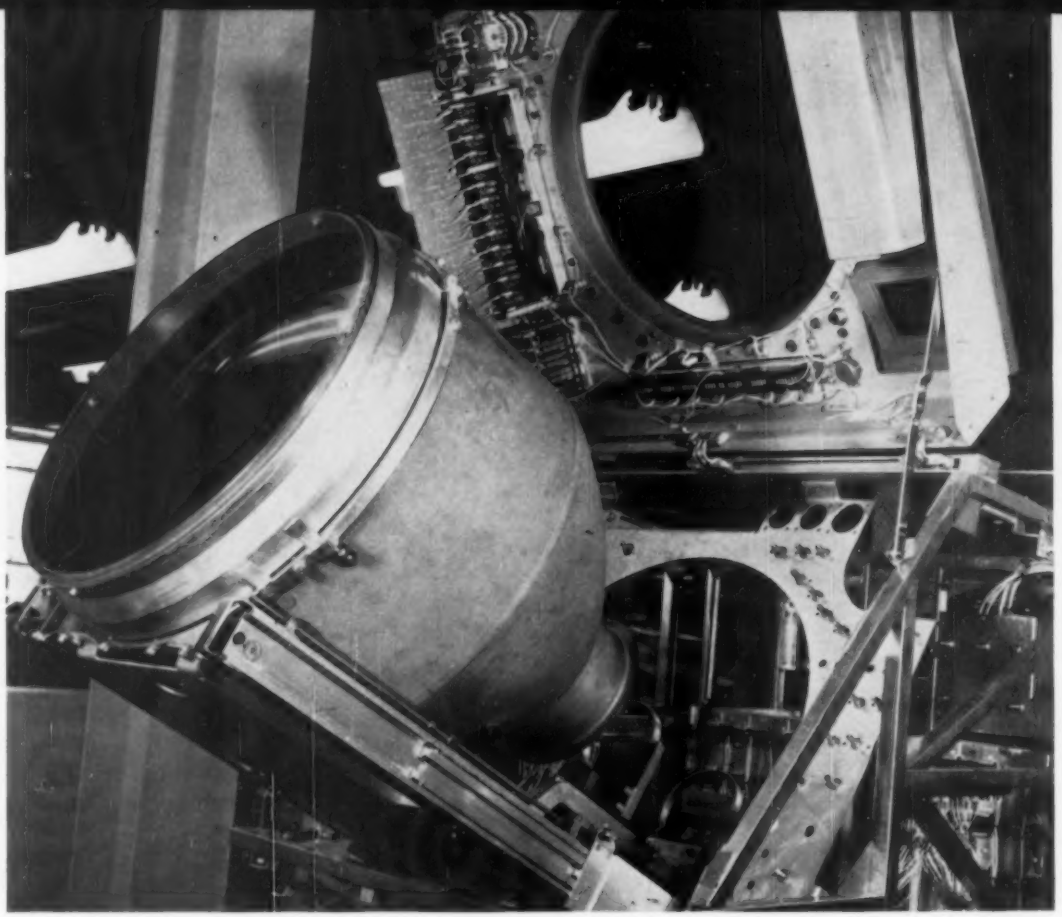
As in its products and its appetites, westerners are distinguishable from many other Americans in the way they do their shopping. Suburbia includes almost all of Los Angeles—and is noticed in the prevalence of station wagons, shopping centers and roadside services. Even urban (and urbane) San Francisco is swinging along with the trend, as shown in the mammoth mart below—while the rest of the country can expect the mobilized West to come up with almost anything in drive-ins.

At the same time, other special needs of western society and environment are leading to new solutions in marketing devices. Mechanization shows itself in snapshot booths (with an old-fashioned graphic touch), and in food dispensers for busy plant lunch hours. For a tricky climate, stores takes on a new look—

Garish neon stores still dazzle, but the modern shopping center is becoming the dominant form of West Coast distribution—adopted, without embarrassment about scale, for a motorized, decentralized world.

Stonestown shopping center adjacent to Park Merced housing development in Lakeside district of San Francisco, cost $30,000,000, includes Emporium department store, office building, 2 supermarkets, store-lined mall, parking for 3,000 cars; Welton Becket and Associates.

end **DESIGN ON THE WEST COAST**



Model of one of SAGE consoles now produced by International Business Machines Corp. at Kingston, N. Y.

SPECIAL MODEL APPLICATION

Designers' Aids and Sources, Part V: *models in a complex engineering development*

Pictured above is one of the many consoles that make up what is perhaps the most complicated electronic installation of our time — the SAGE, America's defense against warfare in the jet age. Highly complex, its computer requires 123 miles of wire and 58,500 tubes, consumes sufficient power to supply a town of 15,000, and generates enough heat to keep 45 homes comfortably warm at sub-zero outside temperature. SAGE operates on a 24-hour-a-day, 7-day-per-week basis. SAGE must never fail; no tolerance in operation requirements is permissible; it is essential that SAGE be absolutely accurate and constantly in top working shape. The computer does not operate alone: a twin computer stands by, ready at any moment to take over. There is no direct precedent for SAGE. When it was ordered, specific operation methods and production techniques had to be developed.

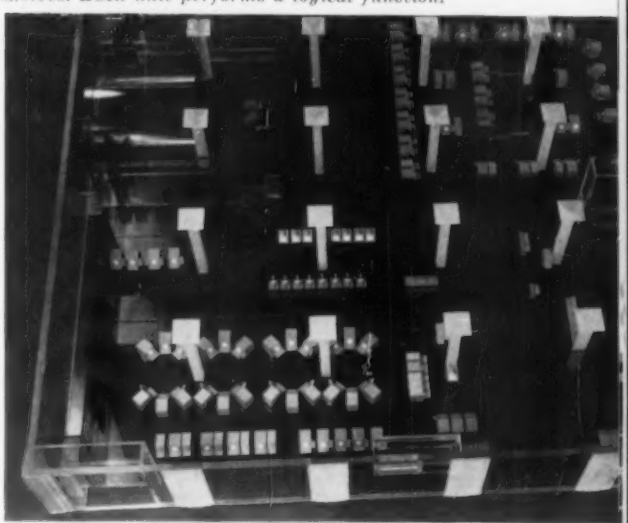
The disembodied viewer of the console above is not, despite the infinite detail of its construction, the manufactured product, but rather a working model — one of many models that were critical in the development of this system.

SAGE was developed for the Air Force by M.I.T.'s Lincoln Laboratory; the computer was designed and is produced by IBM, with the Detroit design firm Sundberg-Ferar serving as design consultants. During the SAGE development many models were constructed. In all kinds of design, models serve to convey a product's most essential aspect. In the case of SAGE this aspect was *operation*: all problems relating to the successful operation of this new defense system had to be solved before the computer design was finalized, and engineering plans were turned over to production. Without exception design decisions were based on: a) *human engineering* — proper arrangement of controls for most direct manipulation; b) *production* — an investigation of production techniques with constant reference to ease and cost of manufacture; c) *performance accommodation* — development of a system of *modular construction* to allow for additions or changes of computer functions. What SAGE means to air defense, and how models were used as a summary expression of design and engineering, is shown and discussed in the next five pages.—*a.g.*

At heart of SAGE computer are rows and rows of frames made up of identical sections in which basic units—pluggable units—are stacked like shelves. Each unit performs a logical function.

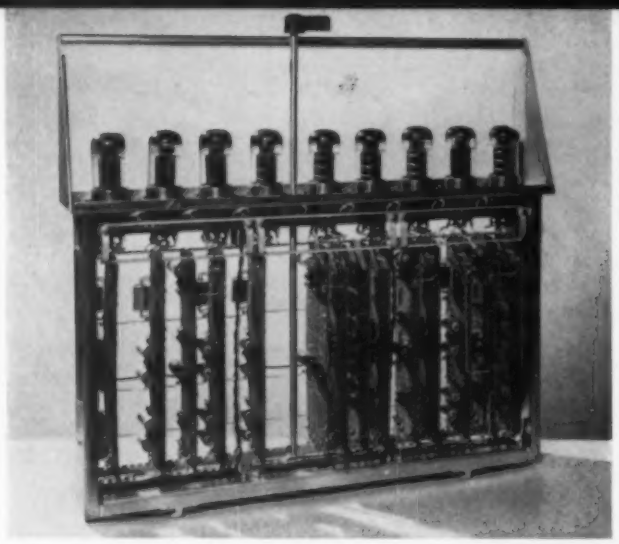
SAGE (Semi-Automatic Ground Environment) is an anti-aircraft defense system designed to record immediately and keep permanently a record of aircraft over the United States. It can detect the approach of hostile aircraft and can guide interceptors to "the kill." At its heart is a digital computer which deals with events as fast as they occur and eliminates the slide rules and plotting boards used with earlier systems but made obsolete by the speed of supersonic aircraft. SAGE can handle many targets simultaneously and can store millions of items of information in its "memory." The mammoth job demanded of the new defense system is reflected by its size—a four-story blockhouse is required to accommodate the rows and rows of electronic gear and the many consoles that make up a SAGE unit.

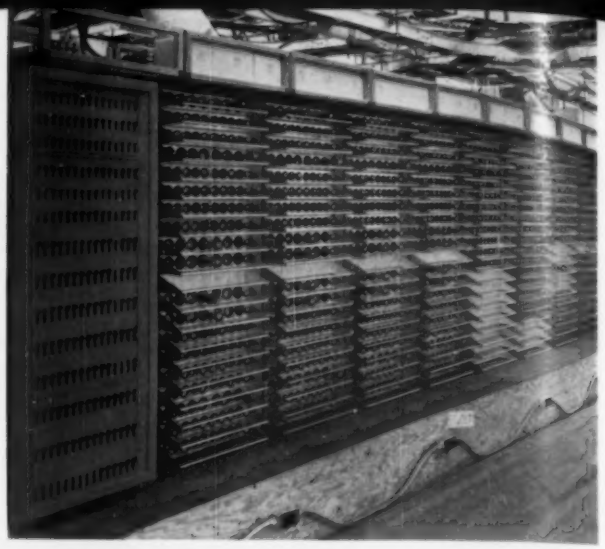
In 1952 IBM was selected by the Air Force to work with the Lincoln Laboratory on the development of a computer for the proposed system. Following the fabrication of two prototypes by IBM, the computer was released for production early in 1954. Since SAGE performs all data processing and calculations but leaves decision-making and console operation to the men stationed behind the tv-like viewing screens (see page 135), it was evident from the start that its success would depend as much on ease of console operation as on the flawless functioning of the electronic brain. Quick servicing and a maintenance control system were also essential aspects in the design of SAGE. Consequently, IBM engaged the industrial design firm of Sundberg-Ferar as design consultants. It was the job of their representatives, headed by Howard Weber, to assist with design problems. These were, in turn, evaluated by a design committee consisting of Lincoln psychologists, IBM engineers and a human engineering consultant.

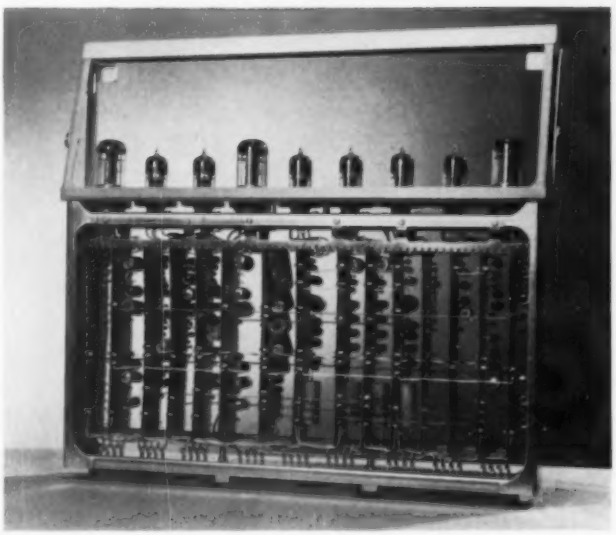


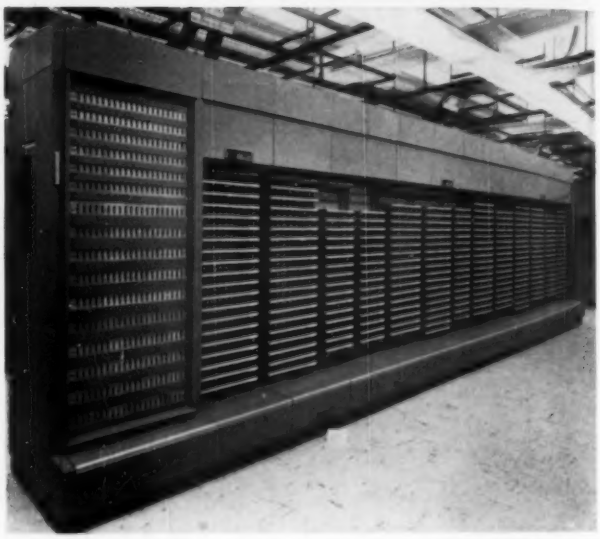
To study component placement, IBM built own scale models of buildings which will house SAGE. Above is one of building's four floors accommodating the situation display consoles (see page 135).

Perhaps the most significant industrial design contribution in birth of SAGE was attention given to operator's needs: e.g., logical placement of controls, as in the operation console below (see pages 136, 137).









First expression of pluggable unit (top picture) was designed and a model fabricated in IBM's mechanical engineering division. Designers changed it (above) to unify SAGE appearance.

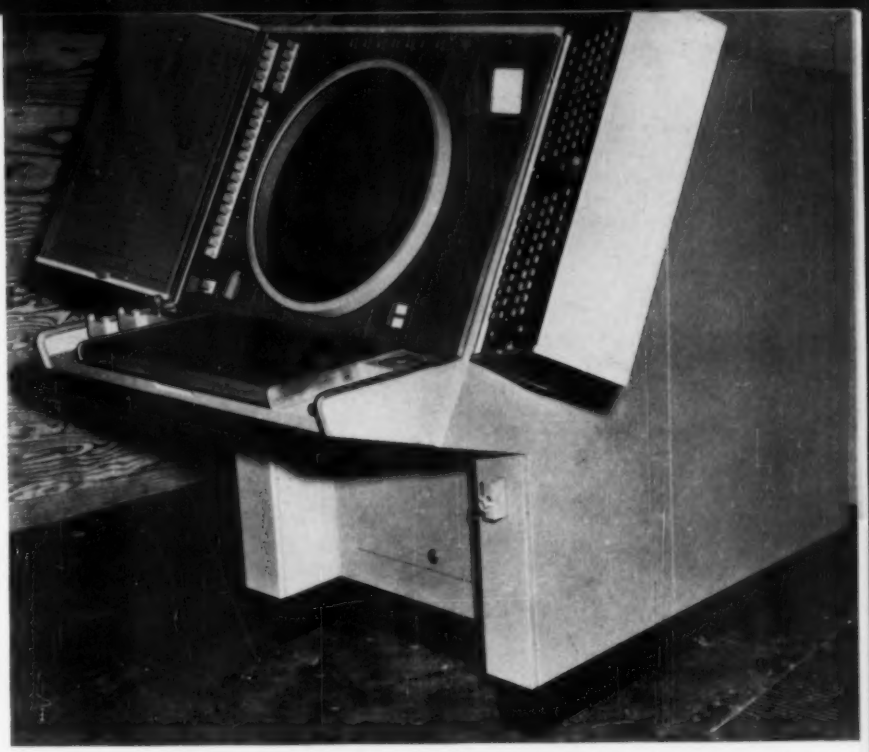
Basic units are used like building blocks to assemble the computer's electronic gear. IBM engineers developed construction system (top picture), industrial designers added covers to frames.

The pluggable unit is the basic performance unit of the SAGE computer. The amount of these units stacked up in long rows of frames (see top, right) determines the overall performance capacity of the computer. When Howard Weber was brought into the SAGE project, this unit construction system had been developed by IBM's mechanical engineers and prototypes had been built. The reason for this "unit" concept of assembly was to assure portability and easy access for testing and replacing parts. To the prototypes of frames and of the magnetic core memory (right) where all SAGE data is stored, Weber added the covers; he also redesigned the handle of the pluggable unit for overall design consistency. New models of each of these were made and studied to get the computer ready for operation tests. Industrial design considerations were important here to give SAGE a unified appearance but their import was not as pronounced as with the consoles.

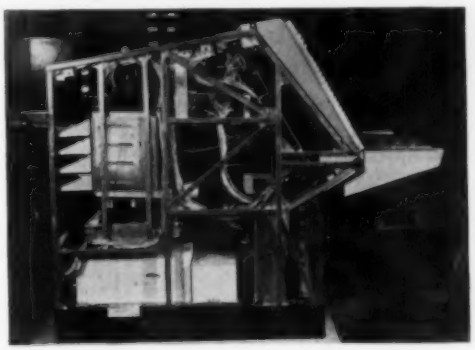
Fundamental section of electronic brain is the magnetic core memory where all SAGE data is stored. Unit was left uncovered for easy replacement of tubes and other parts.

The situation display console has a most strategic place in the SAGE set-up, for on its screen the course of approaching aircraft can be followed, and the progress of battles viewed. Air Force personnel use coded buttons to switch air situation views and ask the computer questions. The operators must have a full view of the room to be in immediate contact with other console personnel, and they must be able to switch controls and reach them with the greatest of ease. These were prime considerations in the design of the console.

Throughout the development of this and all other SAGE consoles, the designers worked directly with engineers, who kept them up to date on circuit arrangements behind console panels. Weber's first design expression of this console was an airbrush rendering; from this a full scale wooden mock-up was constructed by IBM's own model-shop at one of their plants. The design committee checked this model for console height—the top was slanted to give operators an entire view of the room when seated; for handling and placement of controls; for angle of wing unit (see top, right); and for general appearance. The mock-up was also an aid to IBM's mechanical engineers for study of the metal frame around which the production console was to be built. Engineering drawings were made with dimensions taken from the wooden mock-up and were used as blueprints for a sheet metal mock-up constructed and assembled at IBM's own engineering machine shop. The industrial design problems were taken care of largely by means of the earlier model. The metal mock-up was needed to help engineers determine production techniques accurately, which was of prime importance since full-scale production of these consoles requires elaborate tooling, and costly, time-consuming set-ups, production errors *had* to be avoided beforehand. To try console fabrication on a production basis, and to permit trial operation of the total prototype computer, 70 console models—more than a hundred are needed for a full scale SAGE installation—were produced on a pilot line production run. During this production process it became evident that the frame construction used on the prototype (middle picture, right) was cumbersome and would be a hazard on a full-scale production run. The mechanical engineers therefore redesigned the frame—a stamped, sheet-steel construction was decided on—and a new prototype was built. Following the approval of this model, and some additional internal changes for improved maintenance and more reliable operation, the situation display console was ready for full scale production.

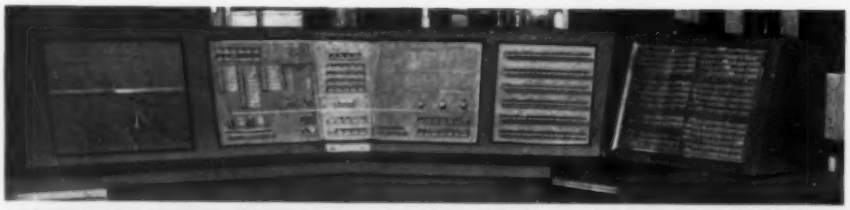


Full scale wooden mock-up of situation display console built by IBM's own model-shop followed designer's airbrush rendering. Model, used to finalize control locations and angle of wing units, was checked by specially selected design committee.



Structure of frame for metal prototype (left) was developed by engineers from wooden model.

Prototypes of console manufactured on a pilot line production run—an aid for full scale production study—were used in SAGE computer trial operations.



Original design concept for operation console was based on one-man operation. Wooden mock-up (left) followed cardboard mock-up study for panel locations. Sheet metal full-scale model (below) incorporated changes suggested by design committee.

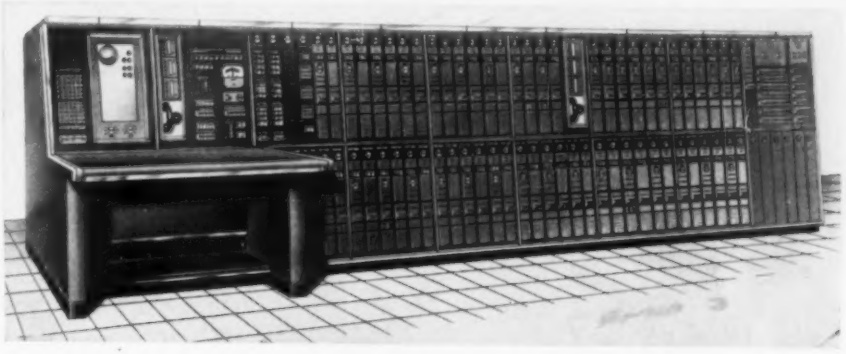
The operation console design made some unique requirements of both designers and engineers. The performance-handling capacity of this console was changed drastically in the process, which meant the design concept had to be revised completely, and a totally different assembly system developed. The operation console handles the complete maintenance control of SAGE: all of SAGE has a connection to this console from which its operation needs are met, requirements detected, and the entire system is controlled. This is the control station from which operators constantly analyze the computer's "living status." Time was an important factor throughout all the design work. When Weber started on this console, the total circuitry of the computer had not yet been finished. He began to design controls on the basis of predicted requirements. It looked, at the time, as though one man could handle the "watch" required at this operating station.

Weber began with paper cut-outs of controls with which he determined their location (he positioned them on mock cardboard panels) and ended with dimensioned drawings from which a wooden mock-up (top picture) was built by an outside shop. The model's shape was semi-circular to give one man access to all controls with reasonable ease. Again, this mock-up was checked by the design committee and a few changes were made: a chassis was dropped, and some control panels were rearranged to facilitate production. Again due to time pressure, and because it was necessary to check the actual performance of this console, the space behind the panels of the wooden model was left hollow, and the circuit panels were installed for a trial run. Design and engineering problems seemed to have been solved, and an outside shop was contracted to build a sheet-metal mock-up for further production analysis. At this point, however, the circuit system requirements were completed, and what they indicated was this: in order to accommodate all functions of the computer, much more circuitry had to be linked with the console. This meant that one man could not at all times handle all the controls, and that the console had to be designed so that two men could be stationed there when needed. Also apparent was the need for a system permitting panels to be added or eliminated should there be future changes in computer requirements, which would have to be accounted for on the operation console. To meet this, designers and engineers developed a *modular unit system*. This meant that the console did, in fact, consist of two types of basic units: a) the desk type

module for operator placement; b) a regular panel module for circuitry and controls. This would permit units to be added without much difficulty. The lack of time was haunting the entire SAGE engineering and design crew, and designs of the new units, first done in sketch form (middle, right), were immediately translated by mechanical engineers into engineering specifications, and the now straight operation console (below) was rushed into production without any preliminary study models.

Changes, redesign of knobs, relocation of some controls, addition of new SAGE equipment continue; it is impossible to freeze all specifications with an installation as complicated in its construction and as flexible in its performance ability as SAGE. But these can now be handled by IBM's design and engineering crew who, in constant attendance on the computer, are by now thoroughly familiar with its problems and problem solving. All the basic performance and operation problems, however, had to be gotten out of the way before production began. That is why solutions could best be effected by means of elaborate prototype set-ups.

Design of a third SAGE console—the mapper console where incoming radar signals are first received—was straightforward, involved no wooden model. Sheet steel prototype served as design as well as production engineering model.



Operation console was changed to permit two-man operation. Modular unit assembly was first expressed in sketch (above) next in actual production of console (below). Modular assembly system makes for ease of computer requirement adjustments.

Design Review: Washers and Dryers '58

Design says it takes two to do the laundry

A

The first of the washers and dryers for 1958 were on view by mid-summer, the others shortly after. This head start on other kitchen appliances provided a chance to take a long look at two appliances which, as they become more versatile, pose anew the questions of symmetry (actual and built-in) and coherent controls.

The manufacturer looks upon the washer and dryer as a laundry pair and has gone to trouble and expense to convince the consumer of the dryer's value. The designer, directed to make them look like twins, is faced with styling similarity into two machines which, when you get right down to it, are not alike in function.

With the major exception of Westinghouse and Bendix, most washers have center post agitators and are loaded from the top. But dryers, which work by tumble action, are loaded from the front. GE (A) cleverly conceals this fact with door that spans the width of dryer, decorative chrome strips which define face surfaces of both units. In Frigidaire (B) door meekly breaks into dryer front, is not set off by metallic trim. Westinghouse (C) has no symmetry problem with two slant-front openings and makes an asset of this with look-in glass doors.

The efforts at building symmetry into controls this year is modified by an honest attempt at more careful organization and better communication with the user.

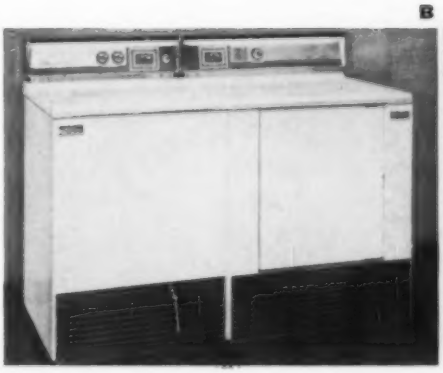
GE (A) replaces last year's profusion of knobs with sensible number of push keys that blend into back panel to underplay imbalance between backsplashes.

Kelvinator (D) miniaturizes controls, collects them on equal panels, then organizes the two items as mirror-image twins.

RCA Whirlpool (E) achieves visual symmetry by minimizing some of the washer controls, but the price is illogical grouping. (Under logo are agitator speed and rinse temperature controls.)

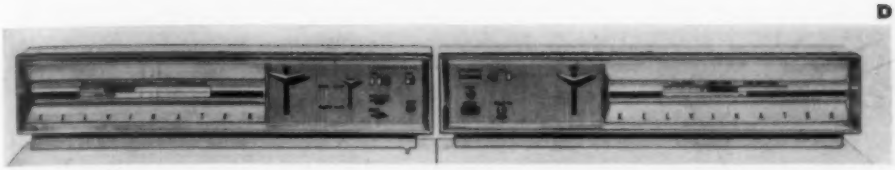
Norge (F) has tall backsplash that lights up over controls.

B



C

D



E

F

G

H

I

Two in one

Designing balance into laundry equipment is not a permanent problem. The obvious solution, making one unit of the two, is already on the market and predicted to be the appliance of the future. The question is: when? It depends on technical refinements—reconciling spin speeds for the two functions, speeding up the whole operation, lowering prices—and consumer education. Manufacturers have burned some bridges behind them by overpraising agitator action.

Philco-Bendix Duomatic (G) has high spin speed (550 rpm) for thorough water removal at end of wash cycle, shorter drying time. Wash water temperature can be boosted by heating unit; wash choices include cold water. $559.95.

Westinghouse Wash' N Dry's (H) low spin speed (185 rpm) is kind to clothes but not powerful enough to spin much water out, making for long drying time. Clothes can be weighed on door, wash water regulated accordingly. $549.95.

GE Combination (I) is undercounter model of standard cabinet size—30" wide, 24½" deep, 36" high. Heating unit can raise temperature as much as 20°. $499.95.

Choice and complication

GE discovered last year the folly of offering the housewife a plenitude of controls for operating washers and dryers. Despite demonstrations and clear-cut instruction books, she guessed rather than read, then complained that the machine did not fulfill its promise.

This year the control panel makes the choices, and even its simple operation is spelled out in black and white on the washer lid. Five "fabric keys" (J) list types of wash; when pressed, the key automatically sets wash and rinse water temperatures, wash action and spin speed. Although wide variety is implied, there are only two possibilities in each category. Wash time is still selective.

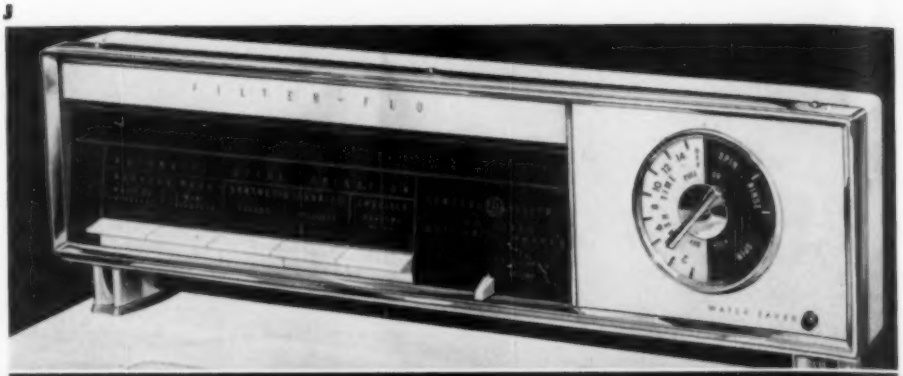
GE dryer (K) has three distinct functions: it dries delicate, normal and heavy fabric loads; sprinkles clothes (tumble action without heat, sprinkler tube attached to drum); and takes wrinkles out of synthetics (thirty-five minutes of cool drying, last ten without heat).

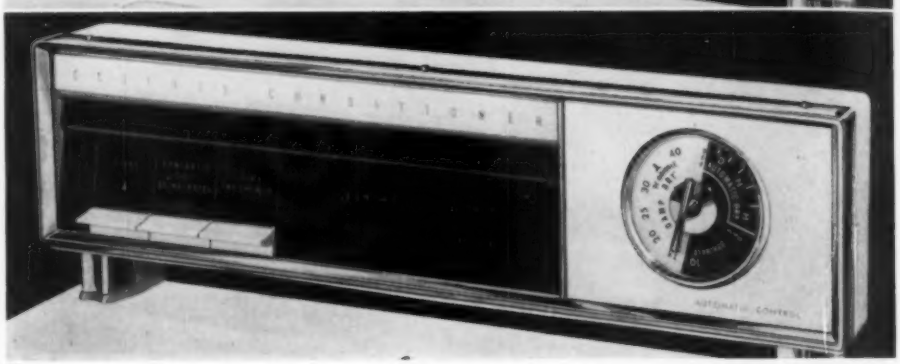
Norge washer (L) has added a range gimmick—a clock timer that will start wash cycle at preset time. Washer also offers three temperatures for both rinse and wash waters. Norge dryer supplies four drying methods: tumble drying with or without heat, stationary drying with or without heat.

RCA Whirlpool (M) has built-in instruction chart. Revolving fabric guide tells correct cycle, time, water temperature, agitator speed and rinse temperature for fabric dialed. Each fabric type has a key color which is repeated in control dials. Choice ranges from five wash to two rinse temperatures.

Westinghouse Space-Mates (N), impress the consumer with five push-buttons for the washer (below), three for the dryer (on top). Actually, each button does not control a separate operation—it takes three to cover wash water range.

J





K

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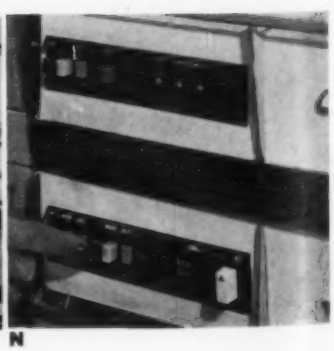


N

O

A new approach to drying: less heat and more air

Maytag introduces this year a new method of drying clothes based on relatively low temperatures and greater amounts of faster-moving air. The techniques employed in making this dryer have resulted, the company claims, in the first uniform heat distribution system, first convection cool cabinet and first disk-type revolving lint filter.

Instead of blowing hot air into the tumbler drum, the Maytag dryer has a suction fan which pulls air from front to back of the solid-wall drum, thus confining heated air to the drying chamber. The fan, a powerful sixteen-blade centrifugal unit, keeps the air moving at 150 cubic feet a minute through the drum, out through a lint screen and directly to the exhaust vent.

Room air enters the dryer through a slot in the rear, passes around the impenetrable drum and moves to the front of the cabinet. This cushion of unheated air serves as an insulator which keeps the cabinet surface from heating up.

Air is heated just as it enters the drum by a heating element which circles the drum opening. In the electric model (P) a coil in a vented enclosure is used; in the gas, a shroud distributes heated air from a single port burner located in a cone under the drum. Since all air is heated before it mixes with the clothes, temperatures are kept even within the drum and, it is said, no hot spots can develop.

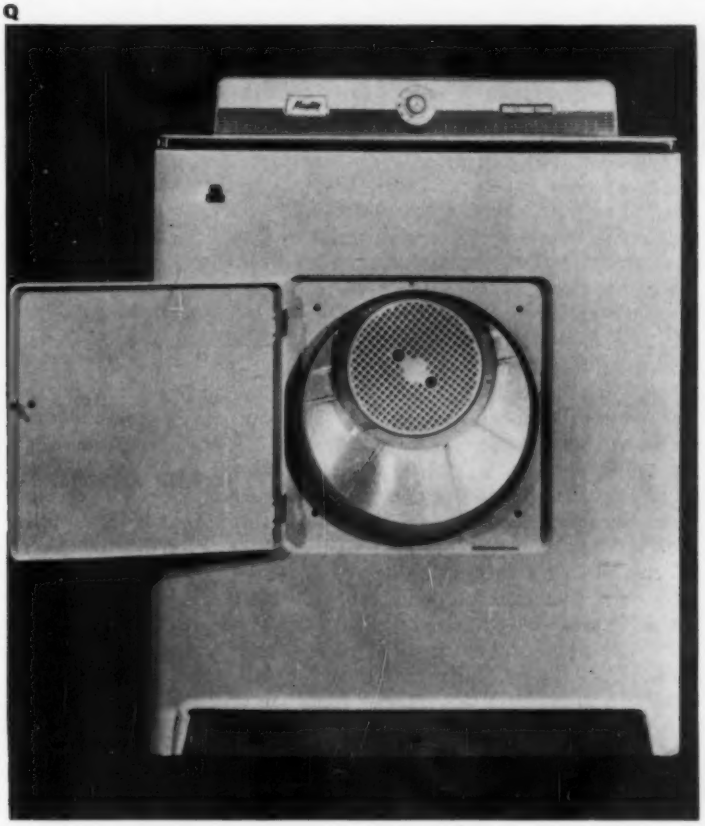
Drying temperatures are controlled at 135° for normal fabric loads, and at a higher temperature, 160°, for synthetics. Maytag has found this high enough to relax thermoplastic fibers so wrinkles smooth out, yet low enough to prevent introduction of new wrinkles, which can happen at temperatures as low as 180°. Both cycles are followed by three minutes of no-heat tumbling.

The new lint filter (O) is a disk that fits over the exhaust port of the tumbler drum, rotates with it, and filters all air that passes through the drying chamber. Thumb and finger holes make it easy to remove.

Single mount construction — an exclusive single support at suction fan housing supporting drum and heating mechanism—contributes to quiet and vibrationless operation.

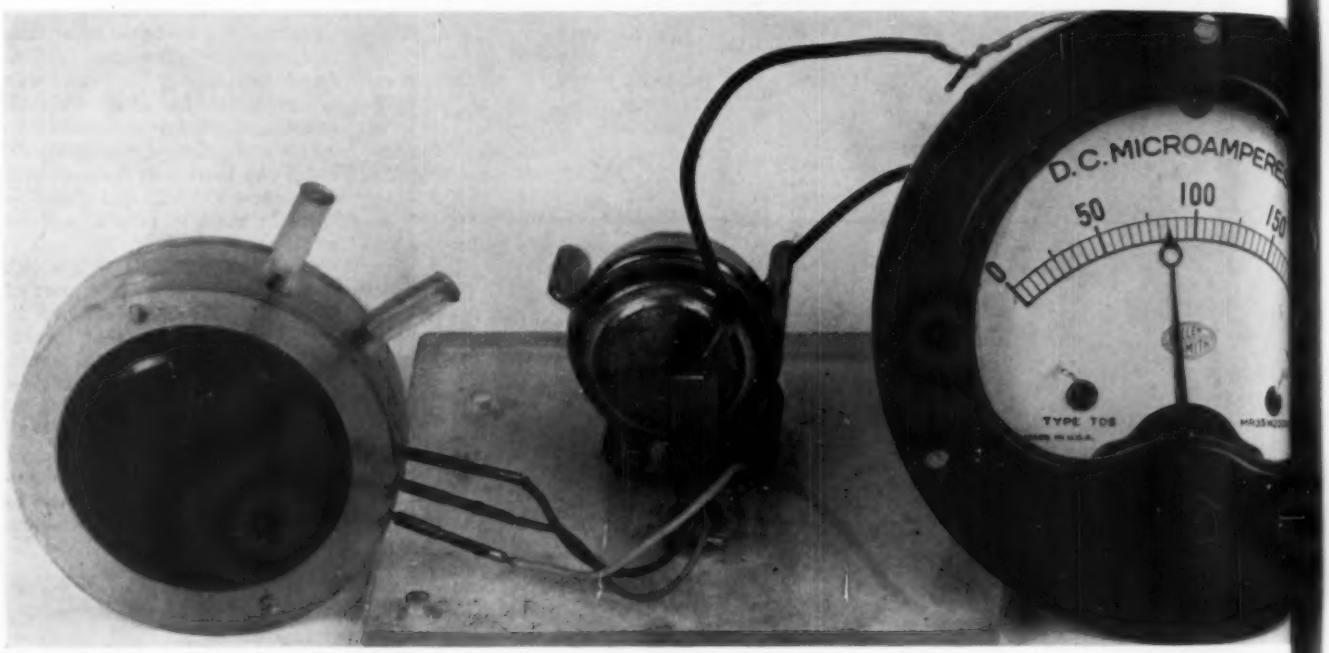
P

Q



Technics: Development News

Reports on new engineering and scientific developments that will change the performance and appearance of future commercial and industrial products: first in a series of periodic reports.

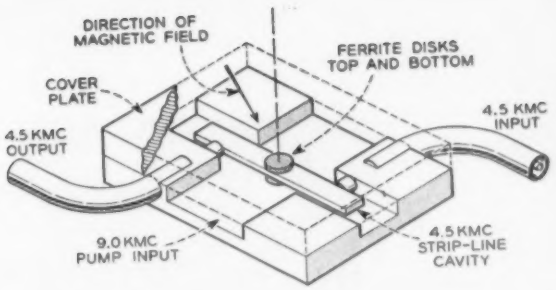


Solion, future tube replacement

The vacuum tube, for decades the leading component in electronic circuitry, has had to put up with some stiff competition in recent years: it was threatened first by the transistor, and is threatened now by the *solion*, an electrochemical device that utilizes ions moving in a chemical solution. (The vacuum tube depends on electrons moving through a vacuum for its ability to detect, amplify, and modulate signals; the transistor depends on electrons moving in a solid.) A major scientific achievement, the solion (at left, above, with microammeter and specially developed miniature battery) is the first device permitting amplification of signals through a chemical solution. It is exceedingly sensitive to changes in sound, light, heat, pressure or motion, which agitate its ion flow. Tubes and transistors can also perform this sensing function, but the power required for it is a lot less when the solion is used.

The "inertia" principle of the new instrument has particular meaning when applied to air navigation. As the "heart" of an air navigation control system, the solion promises to replace present complex equipment of much greater size. The solion possesses a kind of "memory" and once a plane is started in motion in one direction, any change in course of navigation is instantly detected by the solion which, driven by the battery, in turn drives indicators and controls, which register the change.

The solion was developed by the U. S. Naval Ordnance Laboratory in collaboration with University of Texas scientists after ten years of research. The solion's most severe drawback at this point is its low frequency operation. It cannot replace the tube or transistor in most commercial applications until it can be made to operate at, at least, radio frequency. But, as with any new invention, it is up to industry to develop it further and make use of it in a practical way. Solions are now being manufactured by Emhart Manufacturing Company for Naval procurement.

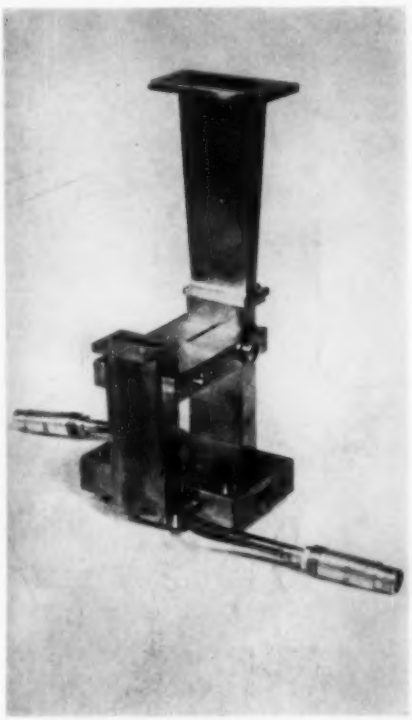


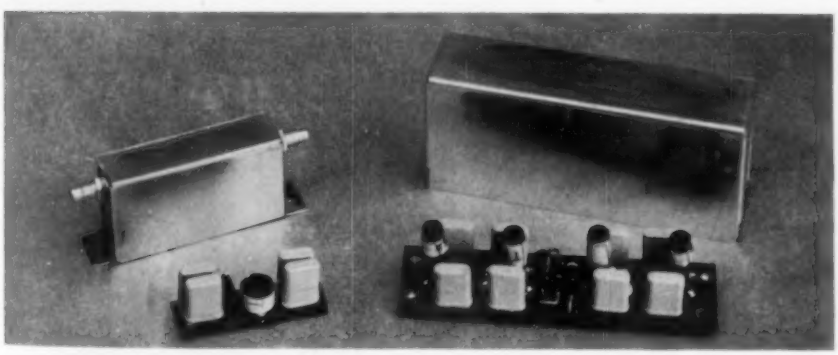
Amplifier for weak signals

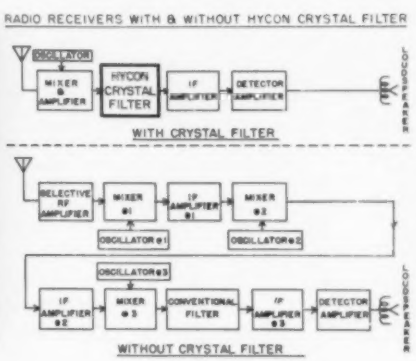
Reception and amplification of very weak radar signals, or any electrical impulse at very high frequency—"messages" in radio astronomy, for example —have been a problem due to a serious drawback in conventional microwave amplifiers. The noise level of these amplifiers in the high megacycle range is often higher than those of the incoming low power level signals; consequently they are lost—the "message" cannot be transferred. Bell Telephone Laboratories has found an answer to this communication handicap by developing a microwave amplifier with vastly reduced noise level that should interest communication scientists and engineers.

The new amplifier is essentially a discovery in solid state physics. (Dr. H. Suhl, and Dr. M. T. Weiss, who developed it, are both research physicists at Bell Laboratories.) The use of a *ferrite* material as the amplifier's active element, is the discovery around which the entire amplifier was built. A ferrite is a *ceramic* magnetic material with very high resistivity; this works as an aid in cutting down circuit distortions. Consequently ferrites are excellent "receiving elements" at very high frequency signal transmission. The fact that ferrites are used in these new amplifiers, makes them an addition to solid-state devices.

The funnel-shaped apparatus (right) consists of coaxial cables, where the weak signal is received and the amplified signal transmitted; the microwave "cavity" at the base, where amplification takes place, and a funnel-shaped input for the power needed to carry out the amplification. As is indicated in the diagram (right top) the active element —the ferrite which magnifies the strength of the incoming signal—is at the heart of the entire performance; it also indicates that the power needed to carry out through the entire operation must be at a frequency that equals the sum of input and output signal frequencies. The experiment upon which the diagram is based was conducted at 4500 megacycle signal frequency operation. Bell Telephone scientists feel certain that further development in ferromagnetic amplifiers will permit operation at even higher frequencies.







Quartz crystal radio filters

The use of quartz crystals in place of the coil and condensers that make up most standard filters, has resulted in an important, new radio component. Shown above in approximately half size —two types for different applications— crystal filters are currently being used for radio transmission in buses, military and airborne receivers, and may in time replace the filters now employed in commercial radios and tv.

The function that filters perform in the process of message transfer is to tune the receiver to the frequency at which a message is being transmitted. The complexity of the filtering network depends upon the frequency range. Military, industrial, and civilian transmission set-ups are each assigned operating frequencies to avoid signal interference. Licenses at the higher frequencies are generally of not much use, however, because of the complexity and bulkiness of the corresponding filtering circuits. The diagram above illustrates the circuit simplification that results when a crystal filter is used in place of the standard LC (coil-condenser) networks.

The crystal filter was developed by Dr. D. Kosowsky for Hycon Eastern, Inc., Cambridge, Mass. Priced at $30 to $40 each, the new filters are still too expensive to be used in commercial radios and tv sets. When cost is reduced, substitution of the new filters in radio sets will mean, above all, reduced manufacturing costs. It will then not be necessary to align radios once they are off the production line.

New Fiberglas improves molded articles

An improved variety of Fiberglas, to be called Super-Fi, is of interest to designers because it provides molders of reinforced plastics with a finer glass strand for better dispersion of fibers throughout the molded piece; this makes for a smoother surface than has heretofore been possible, and more uniform strength in the molded piece. Super-Fi is said to be particularly adaptable to molding of such products as appliance parts, housings, automotive parts, hand luggage, and to corrugated reinforced plastic sheets which can be used in such things as translucent patio roofs and display dividers. The cost is no more than that of conventional molding material.

The new material is said to provide a surface finish as much as forty per cent smoother than laminates using standard rovings. This fact, plus the added strength of the finer strands, suggests that there may be broader applications for Fiberglas in the corrugated sheet, automotive, container and furniture markets.

Where the end product requires a painted finish, such as on an auto body or appliance housing, it has been necessary to subject the molded piece to several sanding operations before and after primer and finish coats of paint. A piece molded with the new Super-Fi, the manufacturers say, requires much less sanding before painting, and none after. Manufacturer: Owens-Corning Fiberglas Corporation, 16 East 56th St., New York City.

Plastic tooling aids light metal fabricating

The light metal fabricating industry, faced with the challenge of rising costs and sharpening competition, is looking to plastic tooling as a solution to many of its immediate problems. Plastic compounds can provide better tooling at lower costs and minimum downtime in automotive and

aircraft production, and their use is spreading to appliances, furniture and other light metal parts.

Arvin Industries, Inc., Columbus, Ohio, has demonstrated how widespread the possibilities for use of plastic tooling have become. Arvin makes a wide variety of light metal products in the housewares, automotive, outdoor furniture and electronic fields. Because of the many prototypes involved in its operations, the company is expanding its use of epoxy plastic products, using compounds based on Bakelite epoxy resins. Arvin is also using glass-reinforced epoxy forming dies in production operations and glass-reinforced epoxy jigs and fixtures for quality control. The epoxy tooling compounds used by Arvin are supplied by Mainland Plastic Industries.

Use of tooling compounds based on epoxy resins has helped cut time and costs. Close tolerances can be held in fabrication and this dimensional stability is maintained throughout the life of the tool. The resins cure at room temperature, hold tightly to inserts, bond directly to backing structures and adhere strongly to reinforcing materials.

Lightweight tools made with epoxy resins are said to be easier to handle than conventional tools, and they are less expensive to build because of the elimination of costly machining and the simplification of many operations.

Epoxy tooling compounds can be cast or laid up to the final shape in one operation. Since many conventional finishing and dovetailing steps are eliminated, tooling time and cost has been reduced fifty to seventy per cent on some items. On some production changeovers, Arvin was able to move forward with new tools produced over a weekend. Ordinarily, these same tools would require several weeks delivery time.

Manufacturers: Mainland Plastic Industries, Hazel Park, Michigan; Arvin Industries, Inc., Columbus, Indiana.

Teflon becomes a film

Du Pont is adding a "Teflon" film to their line of industrial and packaging films, which includes "Mylar" polyester film, cellophane, and cellulose acetate. Sample quantities of the new film, "Teflon" 100-X, will be made available to designers, engineers and executives, upon completion of semi-works facilities, plans for which are now under way. Resin production for the new film will probably not be ready until 1959.

Although 100-X will probably be more expensive than "Mylar," it is expected to make possible a number of new usages in higher temperature ranges. Film from "Teflon" is said to have outstanding electrical insulating characteristics, particularly at high temperatures, being capable of continuous service at 400°F. Printed circuits and other high temperature electrical applications are among the promising uses for the film.

The film is heat-sealable, and is unaffected by practically any chemical. This makes it suitable for a variety of special container applications as well as for certain outdoor uses where such corrosion resistance is demanded.
Manufacturer: E. I. Du Pont de Nemours and Company, Wilmington, Delaware.

New gun for urethane spray

A new spray gun is said to make practical the coating of walls and ceilings with urethane foam insulation. A development of the Minnesota Mining and Manufacturing Company, the new equipment has been tested in the insulation of an ice-house at the Du Pont Company's Chambers Works at Deepwater Point, New Jersey. The entire job took six days of spraying time. Urethane foam has already been used to insulate pipes and tanks of all sizes. While material costs are higher than conventional insulations, savings in application time can result in a lower overall cost.

The unique features of the new spraying equipment are the mixing chamber in the spray gun itself and the proportioning of the material from the intricately engineered metering apparatus. This metering equipment is attached to the spray gun by three separate lines, one carrying the prepolymer, another for the catalyst, and the third for the air. The flow of the foam ingredients can be controlled down to an accuracy of one-half of one per cent. The proportioned materials are mixed in the small chamber of the gun in about 1/30th of a second, picked up by the atomizing air, and sprayed out to foam up against the surface. By pushing a button the operator can shoot foam from the gun in a continuous stream for foaming-in-place operations. The mixing and proportioning equipment has a device for recirculating the material to prevent clogging.
Manufacturer: Minnesota Mining and Manufacturing Company, 900 Fauquier St., St. Paul 6, Minnesota.

Aircraft bolt has wider potential

The Hi-Shear Rivet Tool Company's Hi-Torque Bolt is now being made in a wide variety of materials and range of sizes. Originally designed for use in aircraft and missiles, the Hi-Torque Bolt is applicable to any industrial use where strength at extremely high temperatures, high loads and pressures must be maintained.

Hi-Torque Bolts are made in countersunk and protruding head configurations, and in a sealing bolt configuration designed to seal integral tank structures by means of a rubber "C" ring located under the head of the bolt. The bolts are manufactured in materials that are temperature and corrosion-resistant (4130, 4140, AMS-6304 alloy steels; 17-4PH, AM-350, type 431, AM-355 stainless steels, Iconel X, A-286, S-816, Haynes 25, J-1570 super alloys; 2024T4 aluminum alloy and titanium) and are said to retain their high strength characteristics at the heating rates and loads imposed by high speed aircraft and missile flight. The bolt was designed for optimum torque values, a good recess contact area, high tensile strength, head-to-thread balance, high fatigue life, close recess tolerance control without the attendant weight penalty, and a recess in any steel, alloy or special material.

The Hi-Torque driver is designed so that as torque is applied, a component of the applied force holds the driver to the recess. This "self-locking" design eliminates axial loads and accidental driver slippage. As torque is increased, the driver locking action increases.

The design of the Hi-Torque allows it to be used at a wide range of angles. The driver thickness is always less than the minimum width of the recess to allow easy insertion. Manufacturer: Hi-Shear Rivet Tool Company, 2600 W. 247th St., Torrance, California.

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For Your Calendar

September 24-October 24. On view at the Gallery of the Octagon, 1741 New York Avenue, N.W., Washington, D. C. will be an exhibition of the work of AIA architects selected for design awards in 1957.

October 14-18. The National Hardware Show is scheduled at the Coliseum, New York.

October 17-20. The American Society of Industrial Designers holds its national meeting at the Ojai Valley Inn, Ojai, California.

October 21-23. The American Society of Mechanical Engineers will gather in the Americus Hotel at Allentown, Pa., for a National Power Conference.

October 24-25. The Aircraft Electrical Society will stage its annual display of the latest aviation electrical products in the Pacific Auditorium, Los Angeles, Calif.

October 25-26. IDEA, the Industrial Design Educators Association, will have its formal inauguration during a two-day conference at Syracuse University.

October 28-31. The Third Trade Fair of the Atomic Industry will he held at the Coliseum, New York.

October 28-November 1. The National Business Show will be staged at the Coliseum, New York.

November 1-4. Third Creativity Conference, sponsored by the Boston Institute of Contemporary Art, will be held at Arden House, Harriman, New York.

November 4-8. 39th National Metal Exposition and Congress is scheduled for the International Amphitheatre, Chicago.

November 13-15. The Eighth National Conference on Standards will be held at the St. Francis Hotel, San Francisco.

November 18-21. Air Conditioning and Refrigeration Exposition will feature commercial and industrial systems at the International Amphitheatre, Chicago.

November 19. Industrial Education Institute, Boston, will present a seminar on new techniques for applying statistical analysis to design problems, in Chicago. The same seminar will be held in New York, December 4.

December 1-6. There will be a design engineering conference held in conjunction with the annual meeting of the American Society of Mechanical Engineers at the Palmer House, Chicago.

December 9-12. Eastern Joint Computer Conference and Exhibit will be staged at the Sheraton Park Hotel in Washington, D. C.

January 6-17. International Home Furnishings Mart will be held in the Merchandise Mart and the American Furniture Mart, Chicago.

January 27-29. The Sixty-Fourth Annual Meeting of the American Society of Heating and Air-Conditioning Engineers will be held at the Penn-Sheraton Hotel, Pittsburgh, Pennsylvania.

January 27-30. The 1958 Plant Maintenance and Engineering Show and Conference will be held at the International Amphitheatre, Chicago.

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