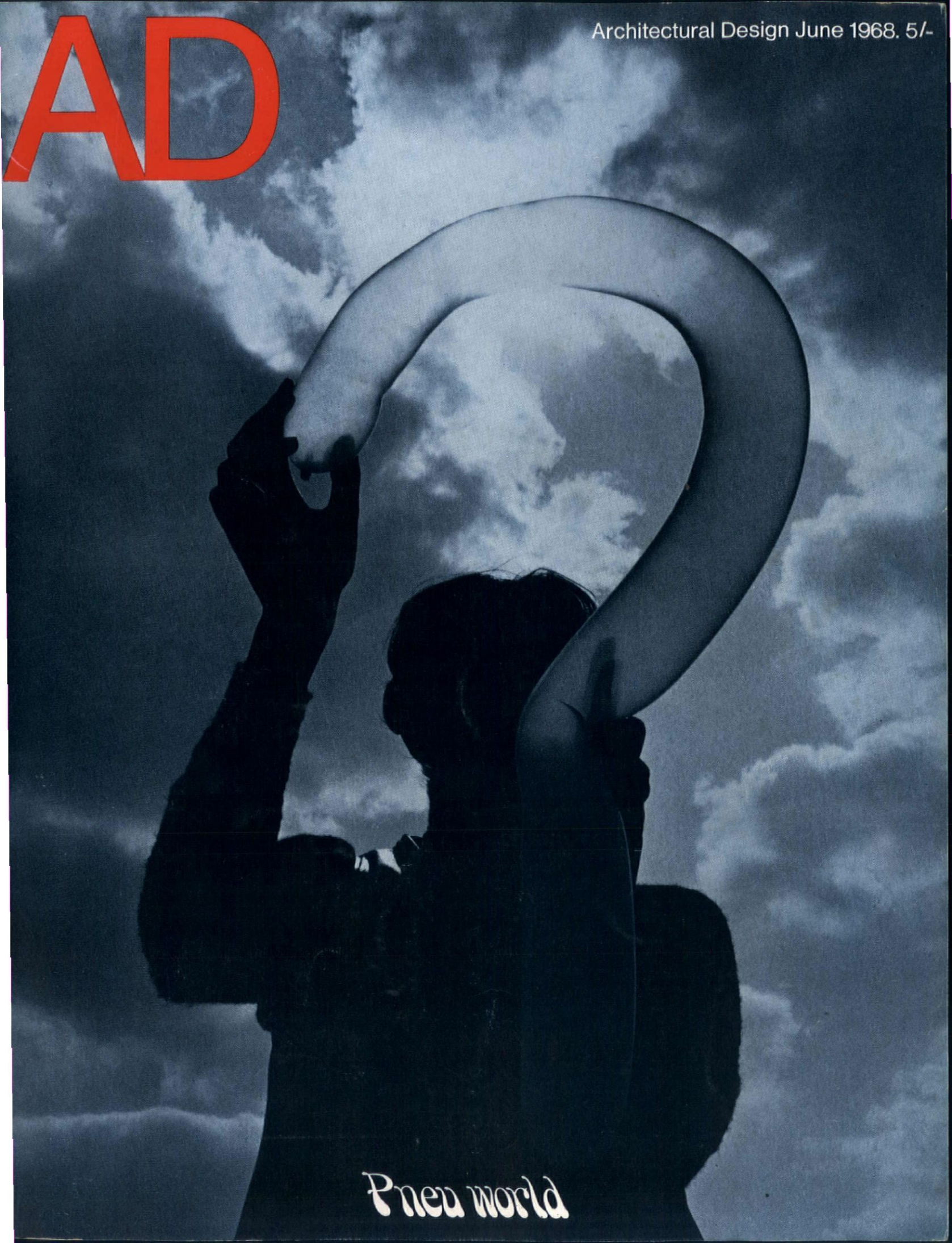
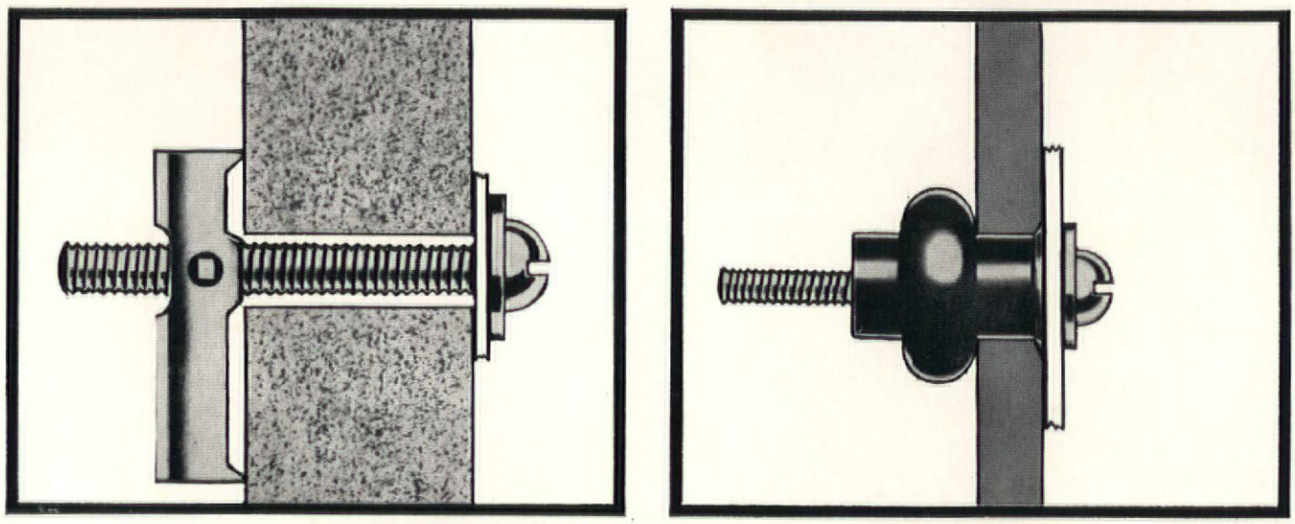
AD

Architectural Design June 1968. 5/-



Pneu world

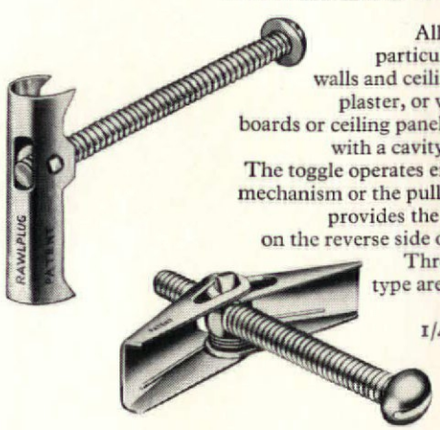
Rawlplug cavity fixings support you through



...thick and thin.

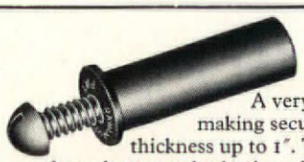
Rawlplug Cavity Fixing devices provide a secure anchorage for metal thread screws in thick, thin, hollow or friable materials where it is difficult or impossible to use conventional fixings. A simple trial will convince you that these devices meet a very prevalent need in the world of diverse proprietary building materials today.

RAWLPLUG TOGGLES



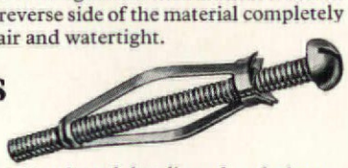
All-metal fixings; particularly useful for walls and ceilings of lath and plaster, or where building boards or ceiling panels are mounted with a cavity behind them. The toggle operates either by spring mechanism or the pull of gravity and provides the locking device on the reverse side of the material. Three sizes of each type are available with 1/8″, 3/16″ or 1/4″ metal thread screws.

RAWLNUTS



A very adaptable and useful device for making secure fixings to materials of varying thickness up to 1″. They are particularly suitable for glass, sheet metal, plastics, plywood, asbestos and proprietary building materials. As the screw is tightened the Rawlnut is drawn up into a solid collar on the reverse side of the material completely locking the hole, making it air and watertight.

RAWLANCHORS



This device makes a permanent tapped insert into plywood, asbestos, insulating board, hardboard and plasterboard. Screws can be inserted and withdrawn at will. An ideal use is in providing fixing points in-situ in prefabricated building sections. There are three sizes for 1/8″, 3/16″ and 1/4″ metal thread screws.

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B039

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They range from shower units to bidet fittings.

And when coupled with suites like the Clarendon in Sun King, they bring a touch of opulence that is hard to resist.

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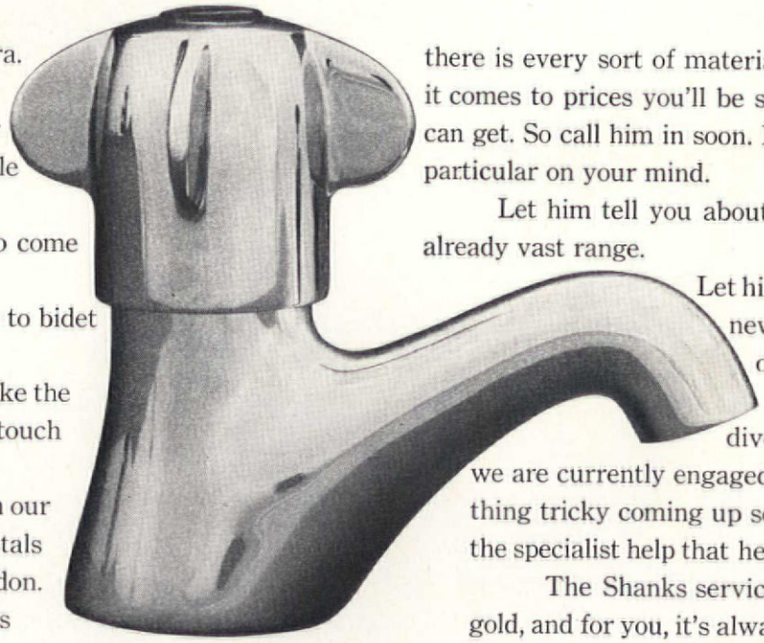
Within the range that he offers there is every sort of material and design. And when it comes to prices you'll be surprised at how keen he can get. So call him in soon. Even if you have nothing particular on your mind.



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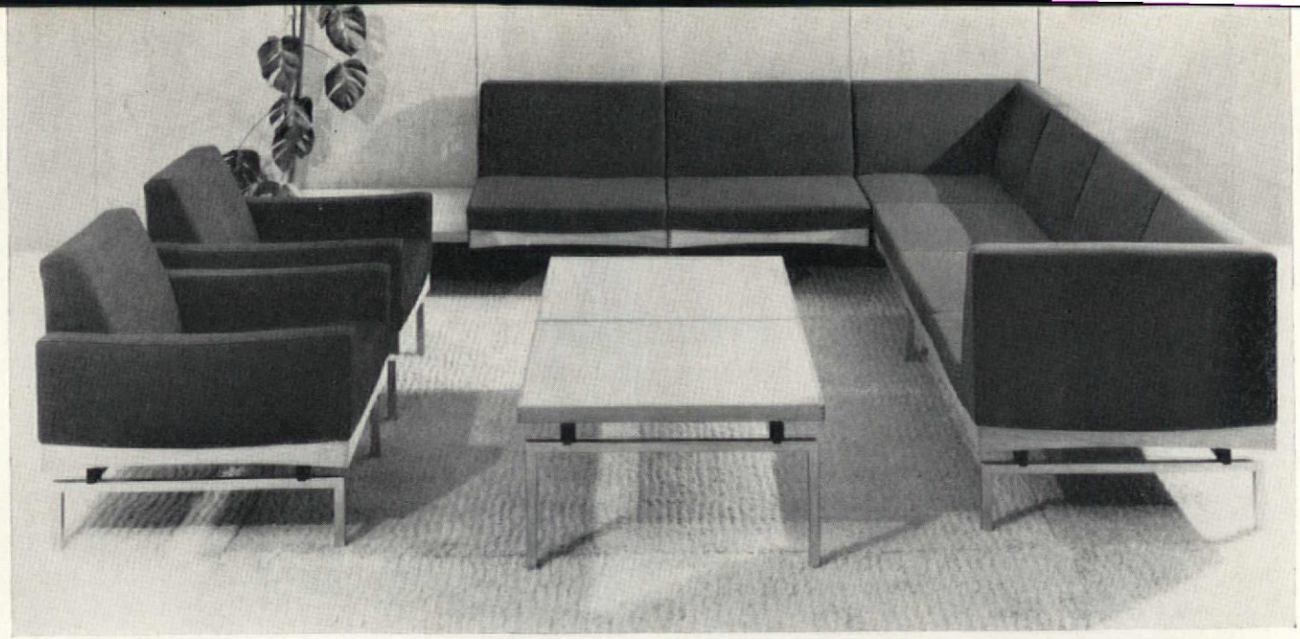
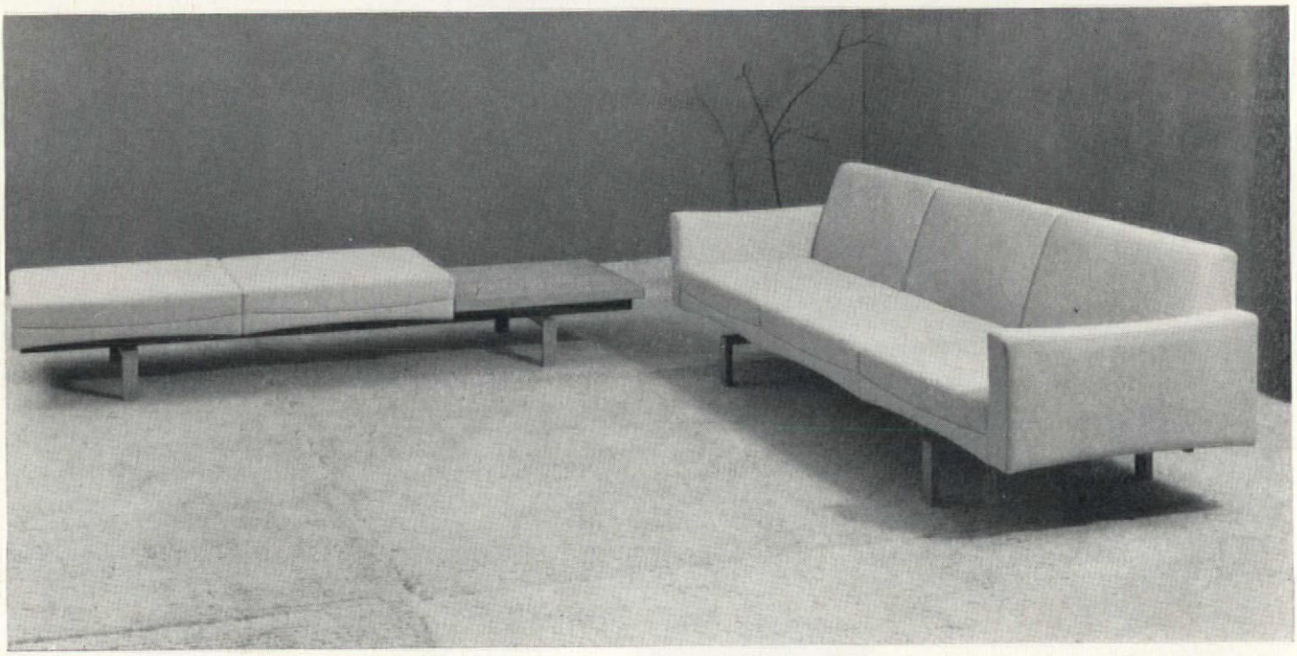
Call in the man from Shanks

Progress





concave modular seating has been developed to provide the many combinations and the flexibility necessary to suit different schemes, from airport lounges and hotel lobbies to offices and small reception areas. Built on a 28½" module it is available on chrome finished steel or teak legs. The concave seat frames can be supplied either upholstered or in teak and the multiple seating units can be fitted with high or low arms as required. Further details on concave moduler seating can be found in the Westnofa catalogue or the system can be seen in our showrooms.

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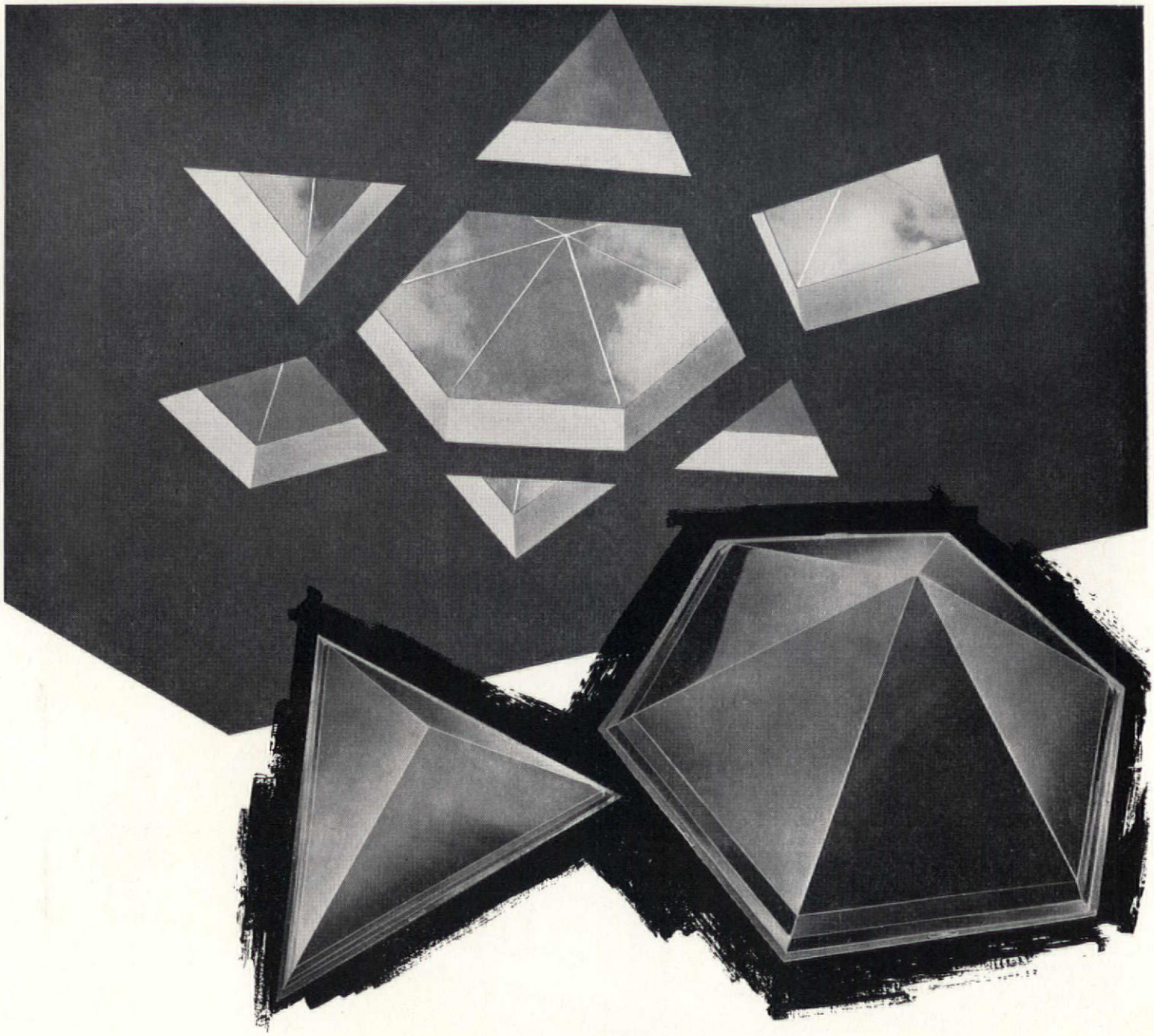

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New hexagons and triangles designed to fit together. Hexagons, triangles, cones, squares and rectangles. Light in patterns, scintillating like gem-stones - offering, with freedom in design, an entirely new conception of top lighting.
All LOPS are designed for simple, inexpensive accommodation and installation in normal roof structures. Available in Acrylic or Fire-retardant A.A. Classification Glass Fibre Polyester. Bases in white Glass Fibre Polyester.

For full information and detailing of the new LOPS write to:-

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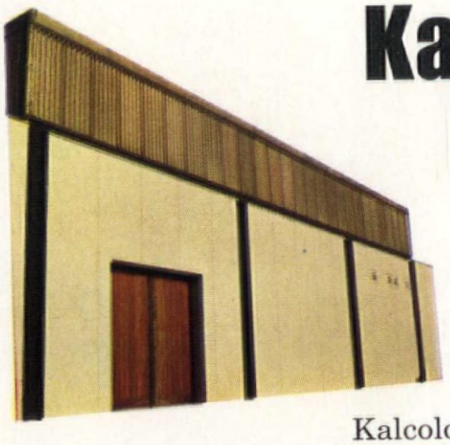
Agents throughout the world

Collapsible gates by RAX



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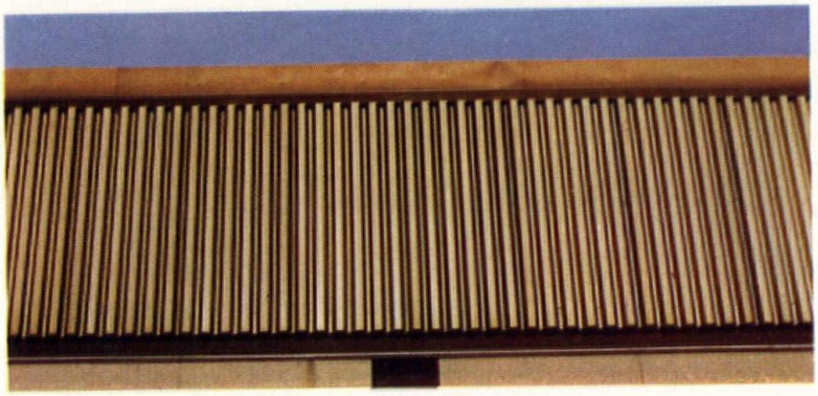
Ford knew this. That's why they're using Kalcolor aluminium from James Booth for their new-projects building at Warley. By 1978, they'll get the full benefit. Kalcolor aluminium has colour built right into the aluminium. So it won't flake off. Can't rust off. And its five modern-living colours are permanent and lightfast. With the colour built in by a unique process Kalcolor aluminium makes ordinary coloured aluminium *look* ordinary. That's why so many important buildings use Kalcolor aluminium.

Specify your architectural components—whether ex-stock or custom built—in Kalcolor aluminium.

Fabricated from special alloy sheets and extrusions they will have long-lasting beauty built in.



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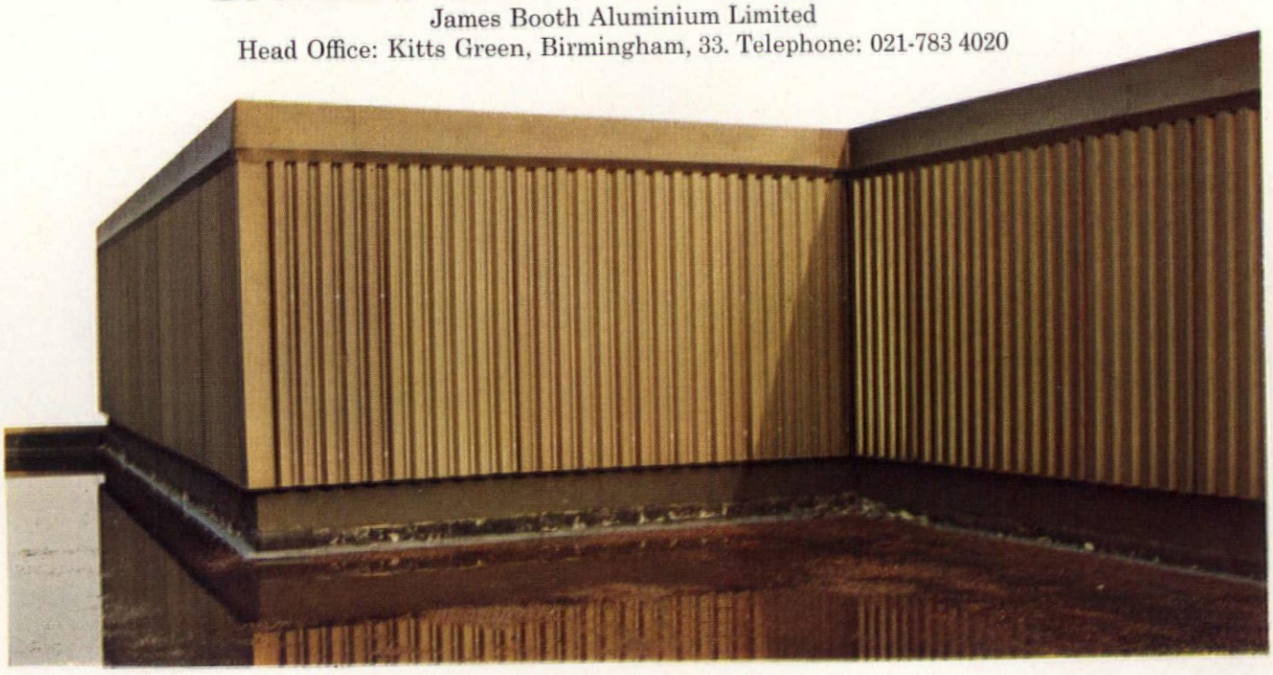
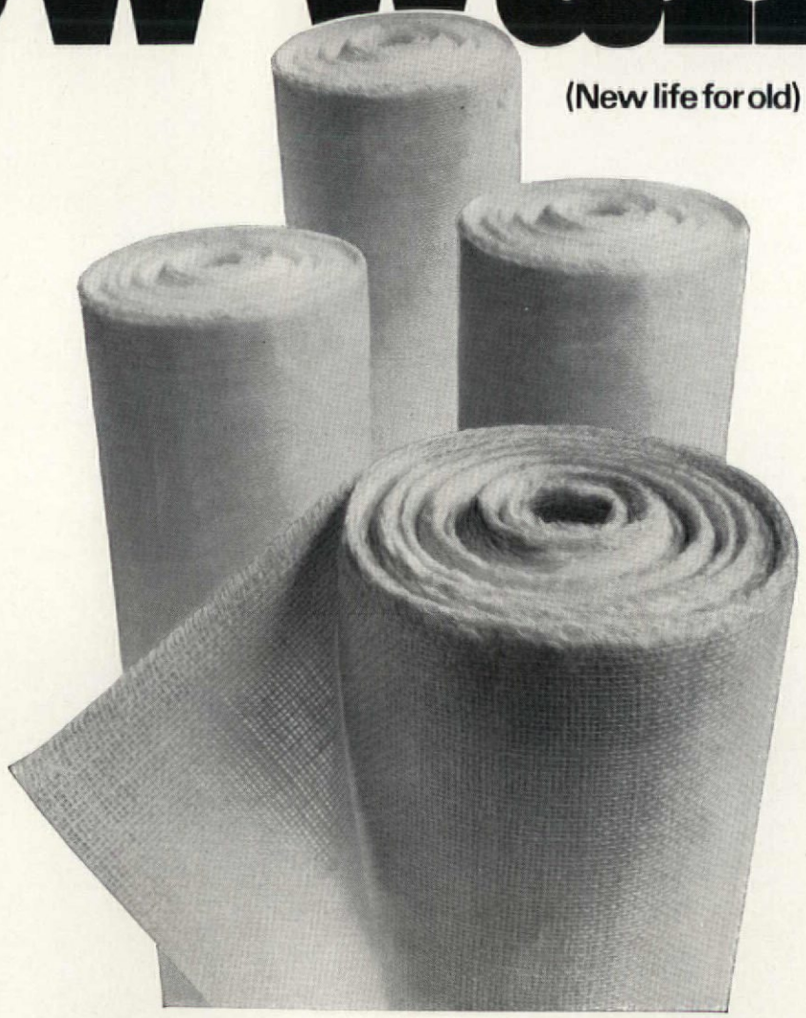


Long life for new walls

(New life for old)



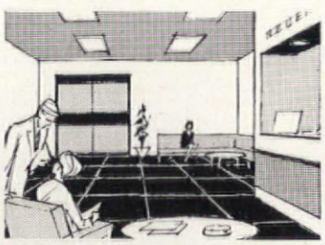
Scandatex

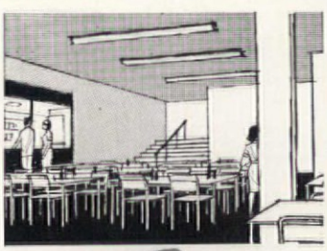
New Swedish Glass Fibre Cloth system goes directly on to concrete surfaces, offers a new kind of beauty, a new degree of toughness and durability...plus economies

Scandatex is a highly versatile new decorative medium from Scandinavia. Its attractive woven finish in combination with the recommended paint finish offers interesting possibilities for imaginative decor. Scandatex Cloth is affixed to the pre-prepared wall surface and painted appropriately to the location. The intriguing woven relief pattern creates a highly attractive decorative effect; it is especially recommended for interior locations subjected to more than average exposure to hard wear.

- ★ Goes directly on to concrete.
- ★ Obliterates surface imperfections in pre-cast wall units.
- ★ Offers fast 'follow-on' economies.
- ★ Reduces maintenance costs because of its reinforcing powers . . . and it looks new longer.
- ★ Will not stretch or shrink.
- ★ Highly resistant to impact.
- ★ Easy to apply. Perfect joints made without difficulty.
- ★ Fire resistant and washable.
- ★ Ideal for entrance halls, stairways and passageways.

Scandatex is supplied in rolls approximately 50 yds. in length by 40 ins. wide. Roll weight approximately 15 lb. Handling qualities are similar to wallpaper. (For interior use only).





To British Paints Limited, Trade Sales Division, Portland Road, Newcastle upon Tyne, NE2 1BL.

Please send me details of Scandatex applications and properties

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POSITION _____

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DP53 desk £55·15·6, with 202 chair £12·8·0. Retail prices including tax

This is a Gliksten Mark 12 door

You can buy doors that are cheaper... and look it

The Gliksten Mark 12 flush door looks beautiful in West African Cedar veneer. You can find doors that cost just a little less, but they don't have the Mark 12's looks and lasting quality. Mark 12 doors have built-in salesmanship. They create an air of elegance that impresses the prospective buyer and helps to sway a sale. It makes that little extra cost a good investment. When required, Mark 12 doors can be matched in pairs, or in sets. The Gliksten Mark 12 Door and the famous "Silkstone" door (the best door in the world for painting) can also be supplied as complete Glikfit door units, with hardwood threshold, "Yale" latch and rustproof butts.
Both these finishes are incorporated in Glikfold — a space-saving system providing the most economical and efficient form of closure for built-in cupboards and wardrobes. These doors glide easily on spring-loaded pivots, and run in an overhead track designed to eliminate the need for a bottom track without loss of rigidity.

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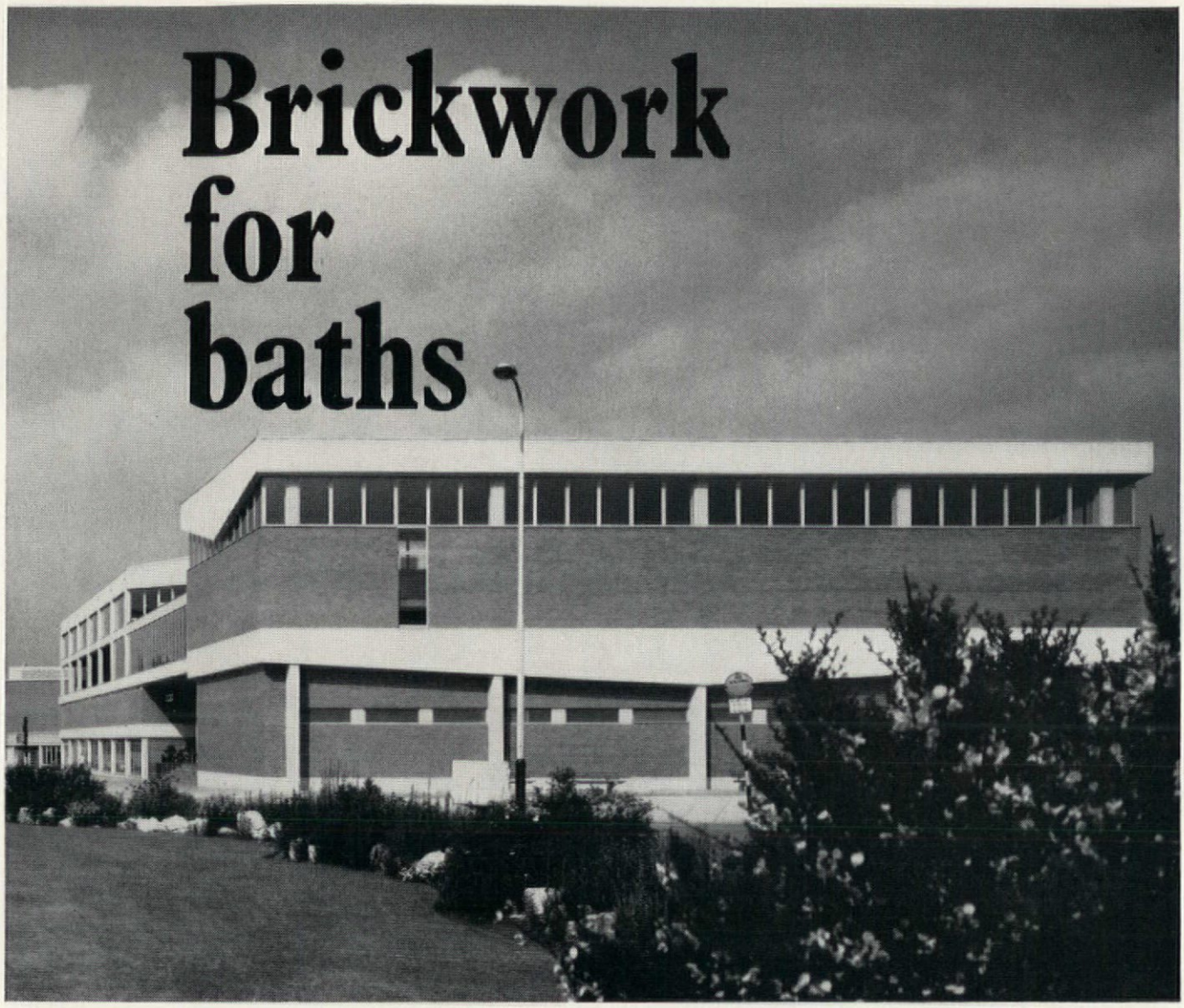


St. Margaret's Baths, Leicester. City Architect: Stephen George MC, BArch, ARIBA. One of the projects featured in the May issue of the Brick Bulletin.

Baths, public—lots of water inside—lots of water outside. How to keep the two apart? Red pressed engineering facings—smooth, dense, dimensionally accurate bricks—as near impermeable as makes no matter—tough as old boots. Unlike old boots, they'll never need cleaning. Even after years and years of severe exposure.

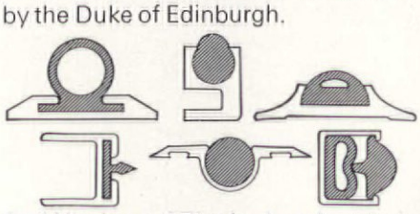
And if these don't quite fit the bill, there are hundreds of other fine bricks to choose from. All ridiculously cheap at the price....

...can you afford to use anything else?

The National Federation of Clay Industries,
Drayton House, 30 Gordon Street, London WC1

Look for the silver lining...

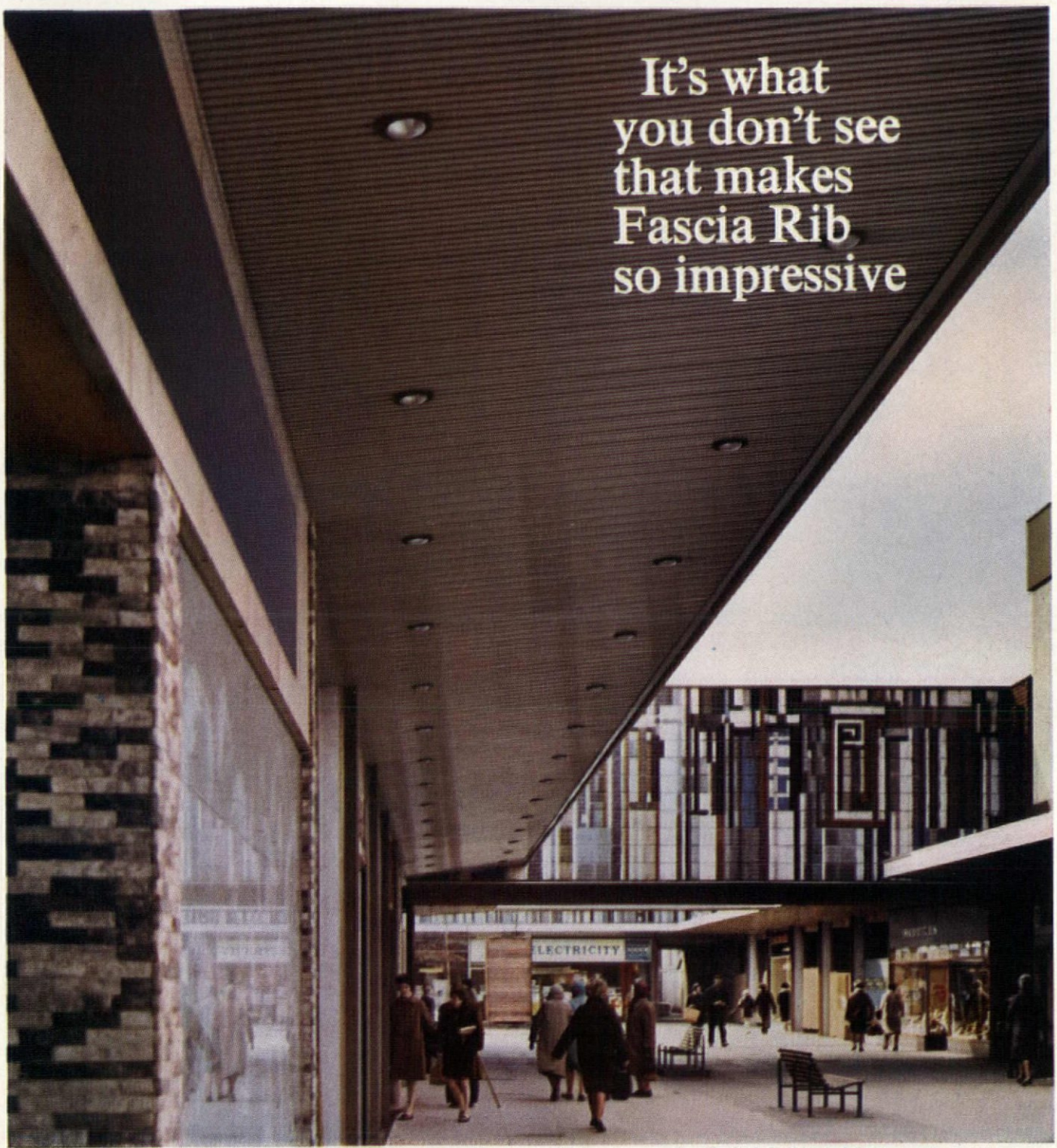
It's a black and silver lining, and you'll find it inside 100% draughtproof doors and windows. Constituents : neoprene sealing set in aluminium. The name ? Sealmaster, winner of a 1968 Council of Industrial Design Award presented by the Duke of Edinburgh.



And Harrison of Birmingham lent their extensive technical experience to realising the idea ; and produced and finished the high quality extruded sections using Alcan aluminium.
Moral: Harrison provide the expertise for the sort of link between concept and consumer that gets a ducal accolade.

Harrison of Birmingham
PRODUCE HIGH QUALITY EXTRUSIONS FROM ALCAN ALUMINIUM

ALCAN
Aluminium in action



Forum Shopping Centre, Wallsend-on-Tyne. Contractors Token Construction Co. Ltd. Architects J. Seymour Harris & Partners.

You don't see the fixings, the joints, the weather and corrosion resistance, the in-built durability. All that's visible is colourful James Booth Fascia Rib making a big deal out of plain surfaces.

Formed from Duralcote permanently coloured aluminium, Fascia Rib can be fixed vertically, horizontally or upside down as illustrated.

The panels are interlocking, no fixings are visible to mar the overall cladding effect.

You can get lengths of up to 16' 6" on an 8" wide panel — the slimline ribs being only $1\frac{1}{3}$" wide. Fascia Rib is completely maintenance free — an occasional sponging down is all that's needed to wipe off the dirt. And you get a wide choice of colours. Off-White, Fawn Grey, Dove Grey, Charcoal, Blue.

It costs nothing to find out more, so write to us for details.

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But to be exact, Conran Contracts is a company that supplies and installs furniture, carpets, curtains and accessories for offices, universities and industrial premises. One of our associate companies is the Conran Design Group, so we know about interior design problems as well.

Many of the goods are designed and made by us. We use the rather dry words 'work furniture' to describe them – though, in appearance, our desks, textiles and office objects are far from boring. (You can see them in our big new 8,000 sq. ft. showroom at 200 Tottenham Court Road.)

We say 'work' because we want office furnishing to be seen in its right perspective. It should make people feel better at work. If they feel better, they work better.

The clock above is a case in point – simple, ingenious, and it tells you the time clearly. But it's a little better than that.

You can Play with it. We consider, when decision makers are making decisions, they need something more elaborate than a paper knife to fiddle with. We give them a mechanical representation of time.

Conran Contracts' Showroom is at 200 Tottenham Court Road, London, W1 01-580 0184 Open 9.30 am

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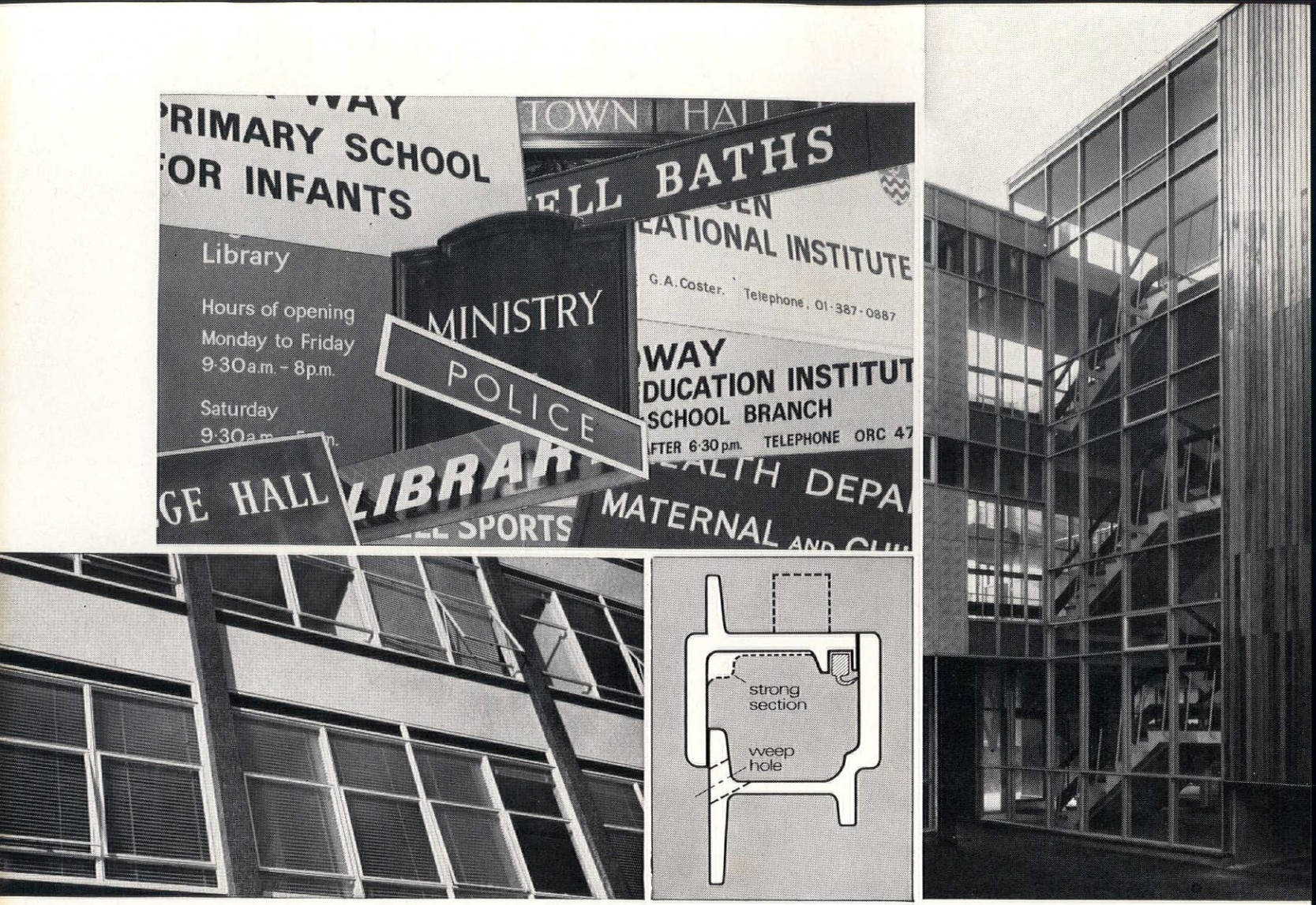

The strong case for steel 'W20 Casements'

For strength and economy in purpose-made windows -specify W20 Casements

Where robust yet elegant purpose-made windows are required, Crittall's 'W20 Casements' provide a remarkably economical solution. Since their introduction in 1965, they have been widely specified by architects for projects ranging from schools and public buildings, where economy and durability are essential, to the most elegant of office blocks. Close metal-to-metal contacts are a feature of these strong, slender-framed steel windows. Neoprene weather-stripping is available and double-glazing units can also be accommodated. Rust-proofing is by efficient hot-dip galvanizing. Extra-heavy sections give the additional strength required in larger frames—without changing sight lines.

Production of 'W20 Casements' is carried out with the aid of latest computer techniques in one of the well-equipped factories of the world's most experienced window-makers—Crittall. Ask for Crittall leaflet No. 311.

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COMPETITION

COMPETITION AMSTERDAM CITY HALL

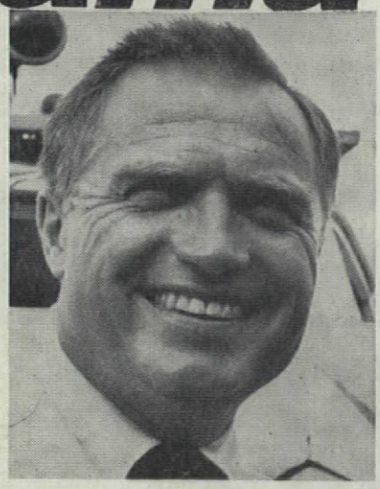
We, inserters of this advertisement, residents of Amsterdam, are trying to get in touch with the seven architects who are selected to participate in the closed competition for a new city hall.
We have some supplementary data for them, published in the July 1967 issue of the Dutch periodical *Heemschut*.
On request we will be pleased to send this issue to you, together with an English translation of the pertinent text (we will send it to an intermediary, if desired).
Please write to H. P. de Hoog, Nieuwe Keizersgracht 27, Amsterdam, Holland.

AD Competition 6/68

What, where, when, whom?

Answer
name of building or construction .....
address .....
date of construction .....
designer (if any) .....
Name of competitor .....
Address .....

cosmorama



People

Johnny Devas, David Harrison, Mike Davies, Dave Martin and Simon Conolly, authors of *Pneu world* (page 256).
Carl Koch, architect designer of the *Techcrete* system described by Alexander Pike (page 278).

What Where When Whom

There was only one correct answer to the May competition. The building shown was a timber hunting lodge at Antonin, about 50 miles north-east of Wrocaw, built between 1822 and 1824 for Antoni Radziwill by Karl Friedrich Schinkel. The photograph was taken by Brian Knox.

The sender of the first correct answer to this month's problem picture, opened in our office on the 20th of this month, will receive £5.

The entry form is on page *AD*18. Envelopes should be marked *Competition*.

Decimal point wins

The controversy of point versus comma has ended. BSI has withdrawn its opposition to the Decimal Currency Board's support of the decimal point in all systems of decimal notation in use in Britain—currency weights and measures.

Survey of air structures

The Minister of Public Building and Works, through the Directorate General of Research and Development, has commissioned Cedric Price and Frank Newby to undertake a survey into the use of air structures in the construction industry.

West German protest

The Olympic Building Company, has rescinded its earlier promise to hold an open competition for the design of the Olympic village. As a protest, members of the independent BDA (Bund Deutscher Architekten) have refused to cooperate with Olympic committees.

HfG

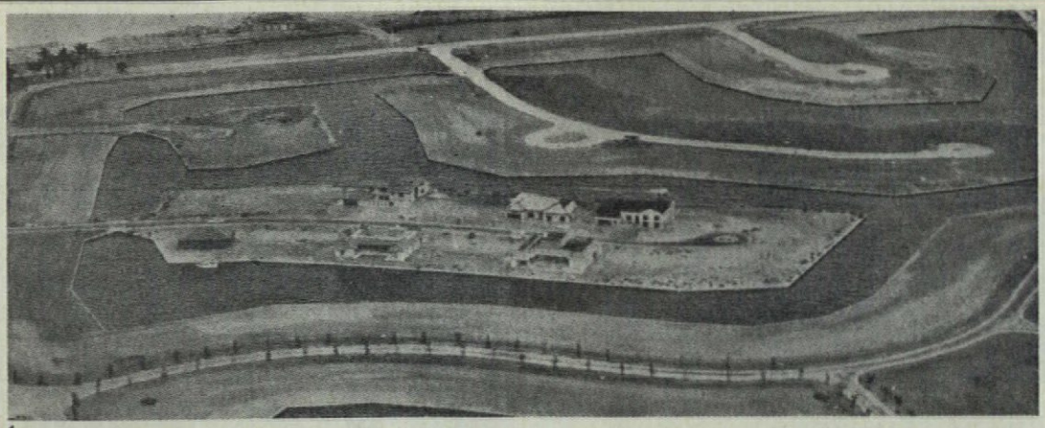
On March 26th at the RIBA, Professor Herbert Ohl of the HfG, Ulm school of design, gave a lecture 'Preparing for the future'. (On February 23rd the teachers, technical teachers, assistants and students of the HfG accepted a resolution: 'If the Landtag does not agree, by the beginning of March, to a state (province) sponsored autonomous school, the HfG will cease to exist on September 30th, 1968.') Professor Ohl's talk was cool mainstream, guaranteed acceptable at the RIBA by use of the phrase 'environmental design' which in England has associations only of Mark II new town plans. He set out his school's development since its foundation in 1953 in three phases: first as a remembrance of the Bauhaus, second in trying to develop systematic design processes, automatic design processes, automatic decision making, scientistic determinism. The third, present and possibly last and most diffuse phase involves training for solving generative problems in interdisciplinary teams, the preparatory work for which could involve 'the introduction and use of classification methods and systems definitions and dictionaries for a general design language—a design language which could be understood by other fields and languages'. The second half of the talk, after the slides, took off in more general directions: 'The democracy of human and technological factors seems to me today strongly unbalanced within the overall educational policy in the world.' 'Human sciences, as far as they still serve as cultural backgrounds, but not applied as controlling devices for technology, are allowed a zoo-like life within a foreign world.' And into Fuller country: 'Today political expressions are facets of unsolved problems of a worldwide society which has not yet developed as such, and is starting to meet and prepare for this problem.'

But the reasons for the full house at the RIBA must have been twofold. The first and more immediate was the rumours of HfG's possible closure. These have been summarized by Reyner Banham in *New Society*, March 7th, 1968, and were not expanded by Professor Ohl beyond the press releases stating the school's resolution to dissolve itself, following the dissolution of the Geschwister Scholl Foundation, if fusion with the State Engineering School were the only alternative. The second reason was the attraction of English architects to those artifacts with which the HfG's name has been associated. The Braun heater given to Peter Smithson as a leaving present from AA students in 1960, and the Thomas TC100 stacking china of 1961, were for me startlingly potent objects in their Purist other-worldliness, and we were led back from the products by occasional copies of *Ulm* to the mad world of Gui Bonsiepe's communications in *Uppercase* 5. Claude Schnaidt's crude attack in *Ulm* 19/20 on the economic system which produced the life-style indicators of the late 'fifties, could give indications of how the HfG's position had become so precarious.

Christopher Woodward

Death

Dr Sigfried Giedion died at Zurich on April 10th, four days before his seventy-fifth birthday. He was best known as author of *Space, time and architecture*, 1941 (the fifth, greatly revised edition was issued this year). An appreciation by Sert will be published next month.



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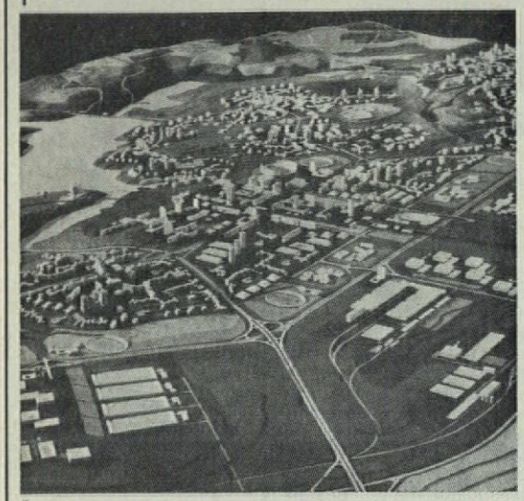

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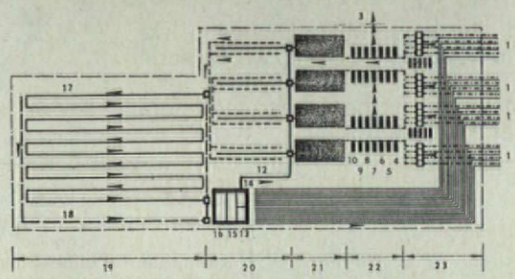


Automatic distribution centre

Key

1 400 dwellings
2 servicing
3 garbage withdrawal
4 opening of containers
5 waste removal
6 washing
7 disinfecting
8 drying
9 inspection and sealing
10 removal of address
11 stacking, 600 items stored at the rate of 1/5 sec.
12 bin conveyance, 3600/hour
13 despatch
14 cancellation of orders
15 perforated card control
16 dispatch control
17 slow conveyor, 60 items stored above each, movement rate 0·5m/sec.
18 rapid conveyor, 5m/sec.
19 supply and packing, 3600 orders/hour
21 store 3000 bins/hour
22 reception and cleaning
23 entry and despatch tubes 2880 bins/hour

Old environments for new

There is a happy assumption—or alternatively an uneasy fear—that the responsibility of the architect is likely to diminish under the impact of systems engineering, technological innovation, gadgetry and twentieth-century what-have-you. But though vital decisions might be more finely assessed and judged with the help of the computer, and services made more complex and sophisticated (yet altogether less cumbersome and limiting) the responsibilities of the architect are likely to increase. Certainly he will have to be more sure of his intentions. For those controls he now accepts as absolute limits to his creative freedom will slowly disappear; he will have more freedom than ever to operate, more possibilities to explore. Unless his aims are clearly defined there are likely to be more environmental messes than ever before. As Peter Smithson remarked of Herbert Gans' sociological apologia for American suburbia, 'it just shows how useless sociology is'.

Two recent developments, one in America, the other in Czechoslovakia, demonstrate clearly that modern technology, though it can be used to make living more easy and enjoyable, is not in itself enough to enhance our environment.

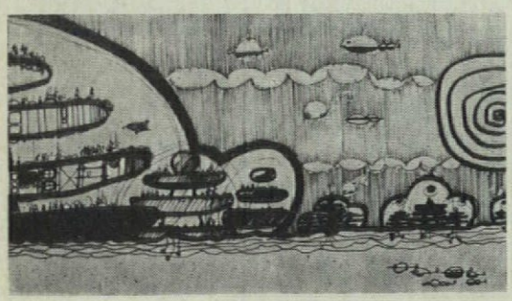
The houses in Bay Colony* in Fort Lauderdale, Florida **1** are equipped with electronic typewriters linked to an IBM computer centre in Cleveland, they have closed circuit TV systems focused on their entrances and landing stages, swimming pools and children's rooms. Yet the development is as lacklustre as any other such speculators dreamworld. The cost of the houses is another point of contention—they sell for $150,000 to $300,000.

At Etarea† **2** in Czechoslovakia (see *AD* 9/67, p. 390) the delivery of merchandise has been minutely and mechanically worked out. All goods are to be stored in centralized depots. Large objects are to be delivered either by truck or trolley-train (both underground), items weighing up to 4kg are to be delivered direct to each dwelling by pneumatic tube. Shopping for more than a thousand items will be able to be done from inside the home, merely by filling in a card and pushing a button. Goods will be delivered within half an hour. Payments will be made monthly. Newspapers, morning milk and anything else that customers might want regularly will come down the tube, rubbish will disappear down it. The ingenuity of the whole organization is a marvel, but the design for the town of Etarea is, all the same, of an unrelieved banality.

* *Fortune*, December 1967.

† *Etarea. Etude du milieu humain dans la ville*, Institut d'études de la Ville de Prague, Prague 1967

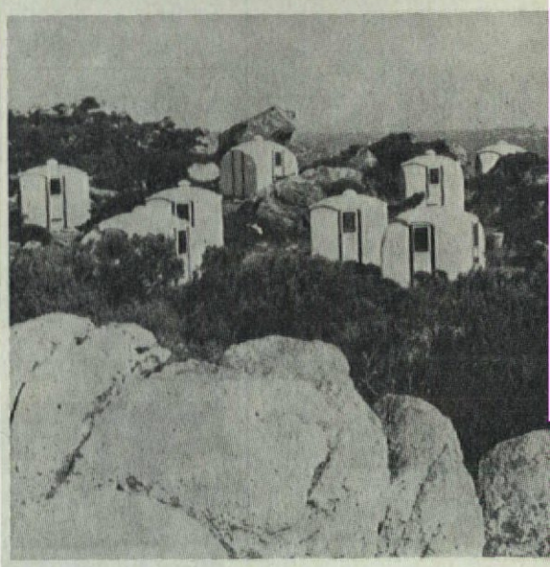
Rudolf Doernach receives the call

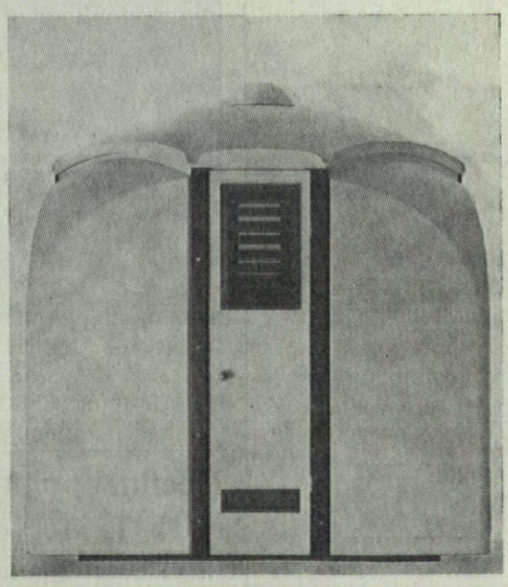


The societies of the Western world are atrophying, they are overburdened by their pasts, by outmoded ideals as much as by heavy, immobile infrastructures. Technology, however advanced, is used only as a prop to our all too precarious existence. It is used to mask our present evils. Repression and decay have accelerated in both the developed and underdeveloped lands of the world. There is no enlightened thought for the future; the social and biological evolution of MAN has been frustrated.

But salvation is at hand; Rudolf Doernach has received the call and is about to answer it. We are to get off the land. A free, interdisciplinary research cooperative CUM (Centre Urbanologie Maritime) is to be set up in Marseilles or Trieste. Industry has been invited to cooperate and to pay. The first useful application of the research is envisaged as the construction of vast seaborne leisure colonies—Habitainers (see *AD* 3/68, p. 102). We are all to find our proper sense of freedom and liberation at sea. HYDROPONIC BIOTECTURE is all.

For further information: Doernach Systemsforschung 7 Stuttgart-Vaihingen Viereichenweg 43-Gy.





Modcon

Pennsylvania State University Institute for Building Research is working on a computer program to select and specify wall and roof systems. The Institute is also studying ways to classify building materials and systems data for computers and evaluate the performance of systems and materials.

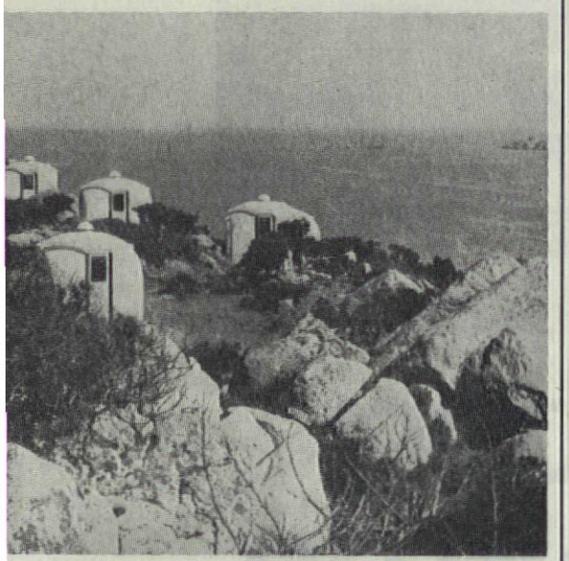
These efforts are part of the long-term Modcon (Man-Machine Interaction, Information, Communications and Computational Systems for the Optimum Design, Construction and Performance of Buildings) project at the University. So far the project has concentrated on equipment and programmes.

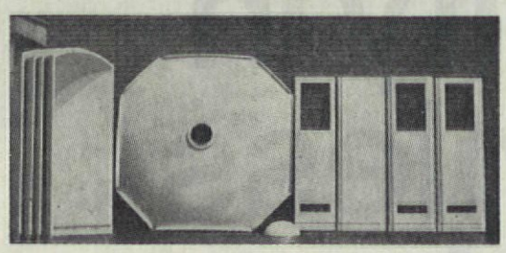
***Architectural and Engineering News*, March 1968.**

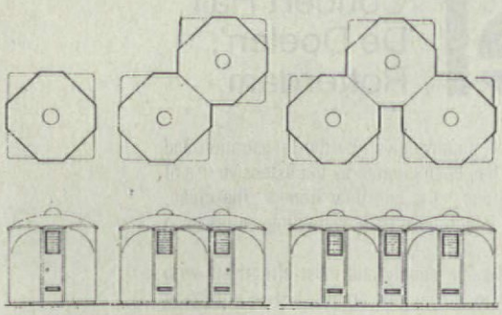
Minimal housing

Mohow: a child's playhouse, 40in high, 46in diameter, of Prestfibre, pressure moulded fibre.
Manufacturers: British Moulded Fibre Ltd., Reading.

Guscio: a diminutive shelter designed by Roberto Menghi that can be erected by two men in seven hours, made from moulded panels of expanded polyurethane foam sandwiched between reinforced polyester. The units are anchored to the ground with concrete semi-circles. They can be erected singly or grouped. They were awarded an Italian Compasso d'Oro.
***Abitare*, March 1968.**

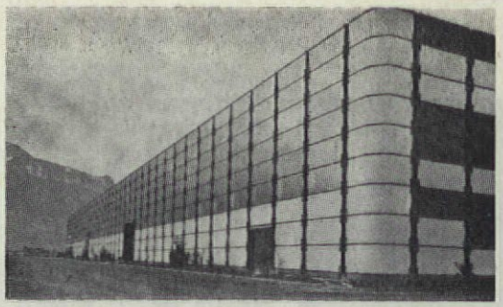


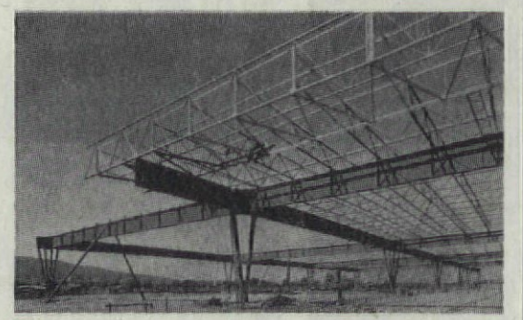




Urban 'think tank'

An Institute for Urban Development, with research funds totalling $10 million, has been announced in the US to undertake research for HUD and other Federal agencies and, later for state and local authorities and even private groups. The precise structure of the Institute will be established by a six-man panel, comprising Irwin Miller, chairman of the board of Cummins Engine Co., Arjay Miller, president of Ford Motor Co., McGeorge Bundy, president of Ford Foundation, Kermit Gordon, president of Brookings Institution; Richard Neustadt, director of the Kennedy Institute of Politics, Harvard; and Cyrus Vance, former Deputy Secretary of Defense.



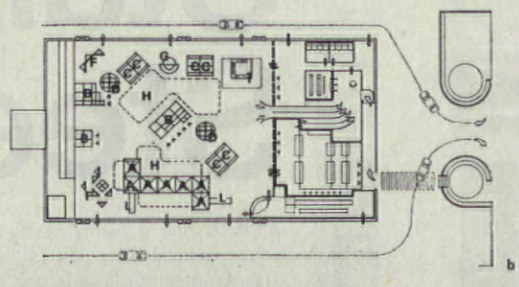


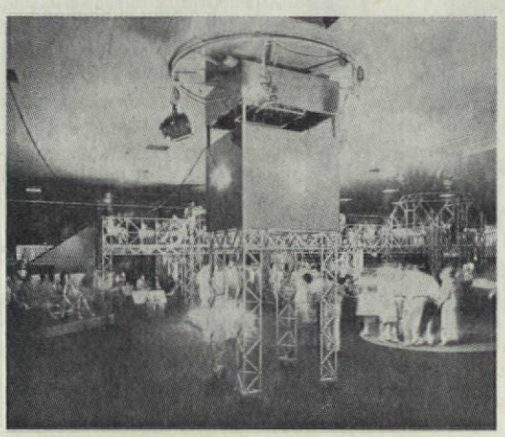
Expertise

A vast, bland and impeccably detailed *Palais des Expositions* was built at Grenoble for use first as a sports hall for the 1968 Olympic winter games and, now, as an exhibition and fair hall. The designers are Claude and Jean Prouvé. Elements throughout have been standardized to an unusual extent and, as might be expected, refined to a superlative degree of elegance.
***l'Architecture d'Aujourd'hui*, December 1967/January 1968.**

The slick hand

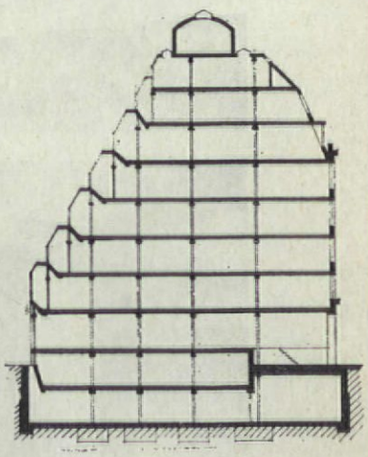
The works of Alberti and Piero della Francesca are unlikely to be rivalled as the prime points of interest in Rimini, but the most popular current attraction is the *Altro Mondo* club, designed by Pietro Derossi and Giorgio Ceretti of Turin. Crowds jostle, lights flash and sounds blare from the Mero framed pavilions built within the large hall. There are colours everywhere. But the slick hand of the designers has been laid upon it all; everything has the air of being carefully and consistently controlled by a stylist. Independence and individualism, which are such vital aspects of similar entertainment centres, is apparently discouraged—certainly discounted. That grotty, unkempt basement, The Middle Earth in Covent Garden, is still a more suitable place for a freak out.
***Domus* 458/1968**
***Bauen + Wohnen* 4, 1968.**

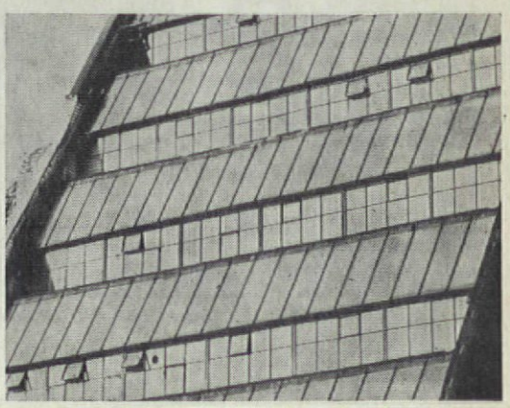


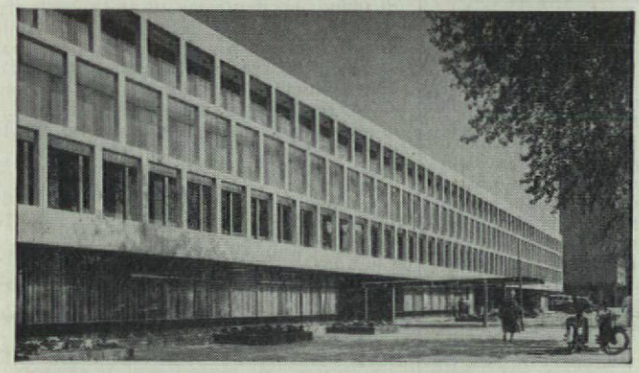


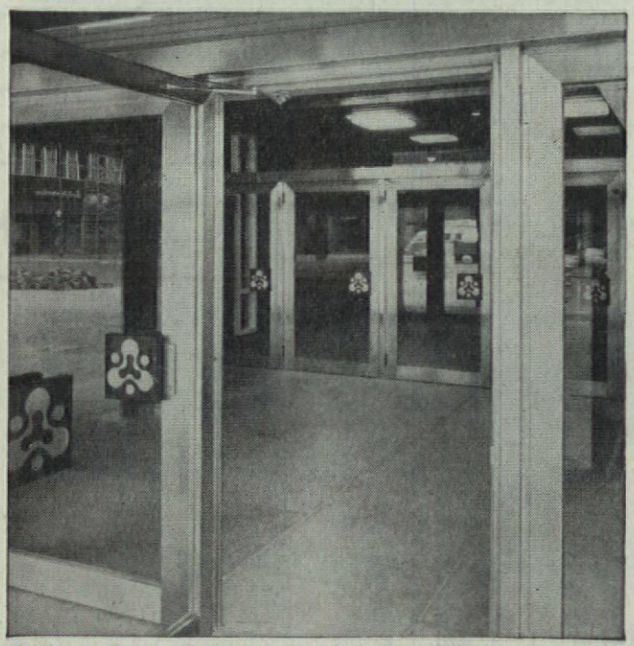
York House reprieved

So sluggish has been the interest of architects and authorities in the UK to the proposals of two Manchester students, Joseph D'Urso and John Bishop, to prevent the demolition of Harry S. Fairhurst's York House (1911) in Manchester and to turn it into a local museum of Science and Technology, that it has been left to the Museum of Modern Art in New York to publicize the building and to extoll its architectural qualities—in particular its rear wall of cascading glass (see *AD* 6/67, p. 250). During April and May an exhibition of drawings, photographs and models was held at the Museum of Modern Art. York House has now been officially listed as an historic building worth saving and the Manchester College of Art and Design is attempting to raise the money to convert it into a museum.
Photos: Joseph P. D'Urso.









Lasting dignity in Stainless Steel

Concert Hall 'De Doelen', Rotterdam

An impression of quality, strength and dignity, given by the fenestration and entrances in this large, low building, has been created by the extensive use of stainless steel cladding for the mullions, cills and door frames. The clean, functional decor of the interior areas which have natural lighting, relies upon the aesthetic appeal of stainless steel.

Glass, concrete and stone blend cleanly, simply and most effectively with stainless steel. Doors and door frames in 'Silver Fox' stainless steel withstand any amount of scuffing and abrasion – and all that stainless steel ever needs to keep it as new is a quick wash down.

Please write to the Marketing Department for information on the application of stainless steel to architecture.

Fabricators: De Vries Robbé & Co N.V. Gorinchem (Holland)
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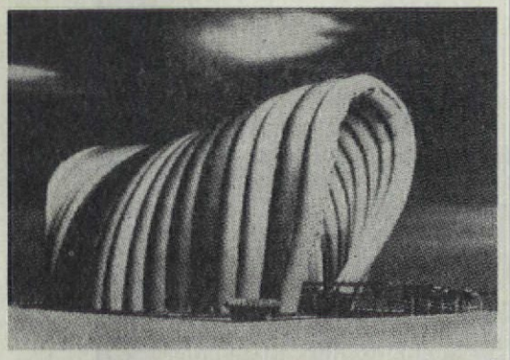
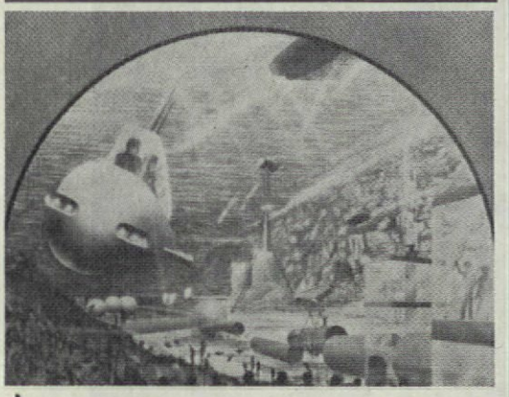
US inflatable

The architects and designers for the US pavilion at Osaka have been named as Samuel Brody and Lewis Davis together with Ivan Chermayeff, Thomas Geismar and Rudolph de Harak. They have proposed the largest inflatable structure in the world (105 metres high) set on a series of platforms. The internal environment will be dramatized with multiple images projected onto the inside of the giant bubble. The estimated cost is $30 million—not yet approved by Congress.

Below: design by Yutaka Murata for the Fuji group of companies' pneumatic pavilion, 115ft high.



Below: French pavilion by Jean Le Couteur and Denis Sloan together with a team including Jean Prouvé and Kostanjevac as engineers.



Astrorama

An Astrorama, the largest cinema screen ever, is being planned for Osaka '70 by the Sanwa Group. The fish-eye lenses for the 70mm films are expected to cost 70 million yen (£86,750); but this difficulty has been accommodated. More challenging, it seems, has been the problem of finding environments, from the bottom of the ocean to outer space, fantastic enough to stir the audience.

Japan Architect, March 1968.

The half chunnel

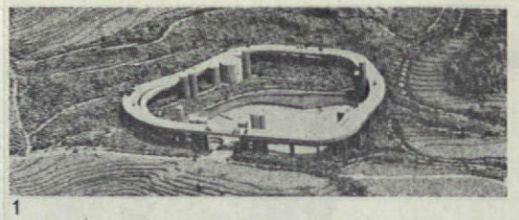
Engineers are gradually overcoming a formidable catalogue of obstacles to drive the world's longest undersea tunnel beneath the Tsugaru Straits and link Japan's main island Honshu and its northern neighbour Hokkaido. The Seikan tunnel, as it will be known, will stretch for a total of 22 miles, of which 13 will be undersea, and will provide a much-needed alternative for the growing number of passengers and freight at present using the Japanese National Railway Service ferries over a 113 miles sea route.

The Seikan venture is, admittedly, only half the length of the 44-mile Anglo-French 'Chunnel' project, which will run 22 miles undersea, but work has already started in the Tsugaru Straits.

In its present form, the tunnel will be used only by electric trains. The Japanese Railway Construction Corporation, in charge of planning, have studied plans for running a roadway alongside, but concluded it would be too costly and difficult to evacuate exhaust gases from road vehicles. It will, however, be possible to load cars and lorries on to special rail wagons.

Date for completion is 1975.

Financial Times, May 1st, 1968.



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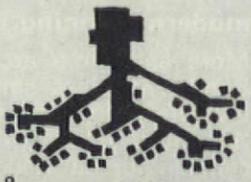

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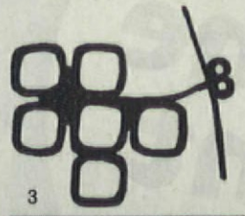

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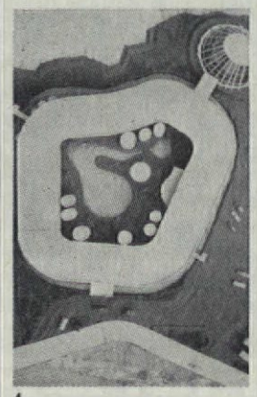

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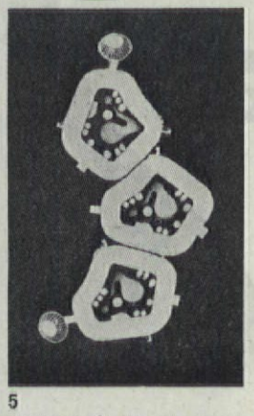

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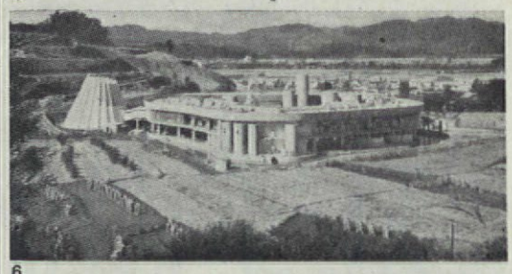

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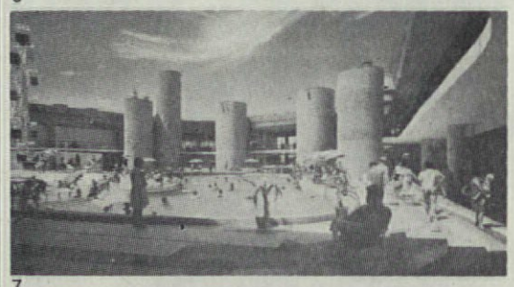

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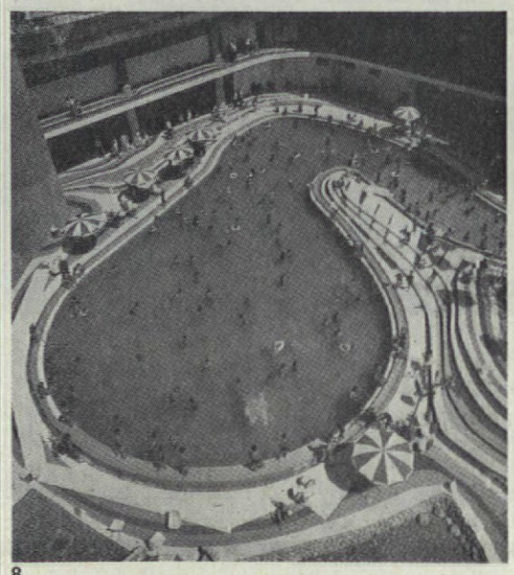

8

Interiorizing nature

Every prefecture, every town, every village almost in Japan has been encumbered during the past few years with a giant concrete community hall and administrative centre. But the spate of these grandiose and extremely costly constructed sculptures is lessening. There are now, it seems, enough. Instead, architectural activity is focused on the contrivance of vast hotels, recreation centres and rest camps. This switch has involved not only a change of programme, but also a change of architectural approach. Le Corbusier and Louis Kahn are no longer the prime sources of inspiration. Some architects have even dropped all high architectural pretention; they are content to regard their buildings as no more than constructed frameworks, intended to provide adequate shelter and excellent servicing. Summerland outside Tokyo, to be published next month in *AD*, is no more than a giant spaceframe interwoven with service pipes and ducts. The attracting features are the potted palms, the lotus boats, the totems and boojums that can be changed at will. At Osaka there is a similar serviced recreation hall, though the technology in this instance is more rarefied—the great roof floats, poised on compressed air (a technique, as noted in this month's *AD*, p. 294, that is still in its experimental stage in the USA). But the unadorned scaffold approach is not the only one open to Japanese architects. Those who still uphold the Corbusian ideal are attempting to give a new twist to the old image—none with more ingenuity and concentration than Noriaki Kurokawa. His Hawaii Dreamland (1966–67), Yamagata, **4, 6, 7, 8** is of Corbusian inspiration. Even such followers as Paul Rudolph have been commemorated in the ribbed concrete work. Though the theorizing that has accompanied the design is of a totally different order. The basic forms and shapes and their arrangement are derived from another Metabolist, Kiyonori Kikutake, in whose Floating City (1960) are to be found the indeterminate ring forms, the 'energy shafts' (i.e. service towers), the idea of 'interiorized' nature and the provision for extension by duplication alongside. These concepts Kurokawa has woven into highly complicated theories of his own. His ideas are with difficulty understood. As the critic Noboru Kawazoe has recently written in *Japan Architect*, they are 'almost unintellible.' Kurokawa considers space as divided into two categories: fibroforms (which are branched spaces) **2** and porous spaces (which are enclosed by membranes and have no hierarchy at all) **3**. These are to be related by Grouping (with varying aspects of entropy, probability and multiplicity) and Fusion (which includes ideas on connectors, polymerization, community, mediation, change and exchange, growth and shearing). For the Hawaii Dreamland, as for his earlier Odakyu Okutateshina tourist development plan (1965) **1**, Kurokawa has chosen a porous space, a topological ring; in part because the site was surrounded by haphazard, ungainly developments and it was clearly preferable to 'interiorize nature'—that is to create a screen around the main swimming bath and recreation area—but equally because he conceives of leisure as a never ending, cyclic process, expressed in the form of a continuous 'street', painted in swirls of red, blue, yellow, green, white and brown, that surrounds the central recreation area and from which are subtended the subsidiary spaces—an aquarium, a bowling alley, banqueting rooms, restaurants, tea houses, rest rooms and bath house. The surrounding 'street' is on two levels. On the roof is a go-car course. A plastic dome is planned for the central court.

The main structure and the circular service towers (Kikutake's 'energy shafts') are in concrete as they are envisaged as the most permanent elements, the internal roofs and partitions are in timber and steel so that they can be readily changed. Plans for extension follow Kurokawa's latest town planning theories. Living organisms, he has noted, grow when mature cells split to form new cells Thus extension will take the form of duplication alongside his amoeba **5**. To satisfy the conditions of Fusion, the connection between them will not be at points, but along lines; the existing cell and the new will share common routes or 'streets'.

All the biological metaphor has been accompanied by a clear understanding that leisure pastimes are becoming active rather than passive. Not everyone can be a football or ice-hockey star; they might not even want to play football or ice-hockey, but they need some sense of active participation in sport. They want themselves to use their bodies, not just to watch (which is why football crowds grow so manic). So the Japanese are exploiting the decorous compromise where people can flop around in a pool, paddle with children, toss a ball or swing in a chair and feel themselves, if only gently, active.

Kenchiku Bunka, November 1967
Japan Architect, December 1967

Get the bright idea!

modern planning is full of them!

More and more architects are specifying Fisher-Bendix stainless sink tops — from a range that's unbeatable for choice, quality and price. Made from the finest grade British stainless steel, they are suitable for all standard waste fittings or can be pierced to take either a basket strainer waste or an electric food waste disposal unit. Overflows can be supplied when requested. For the luxury sparkle that adds so much to brighter living yet so little to costs — specify Fisher-Bendix stainless sinks.

bright ideas in vitreous enamel, too!

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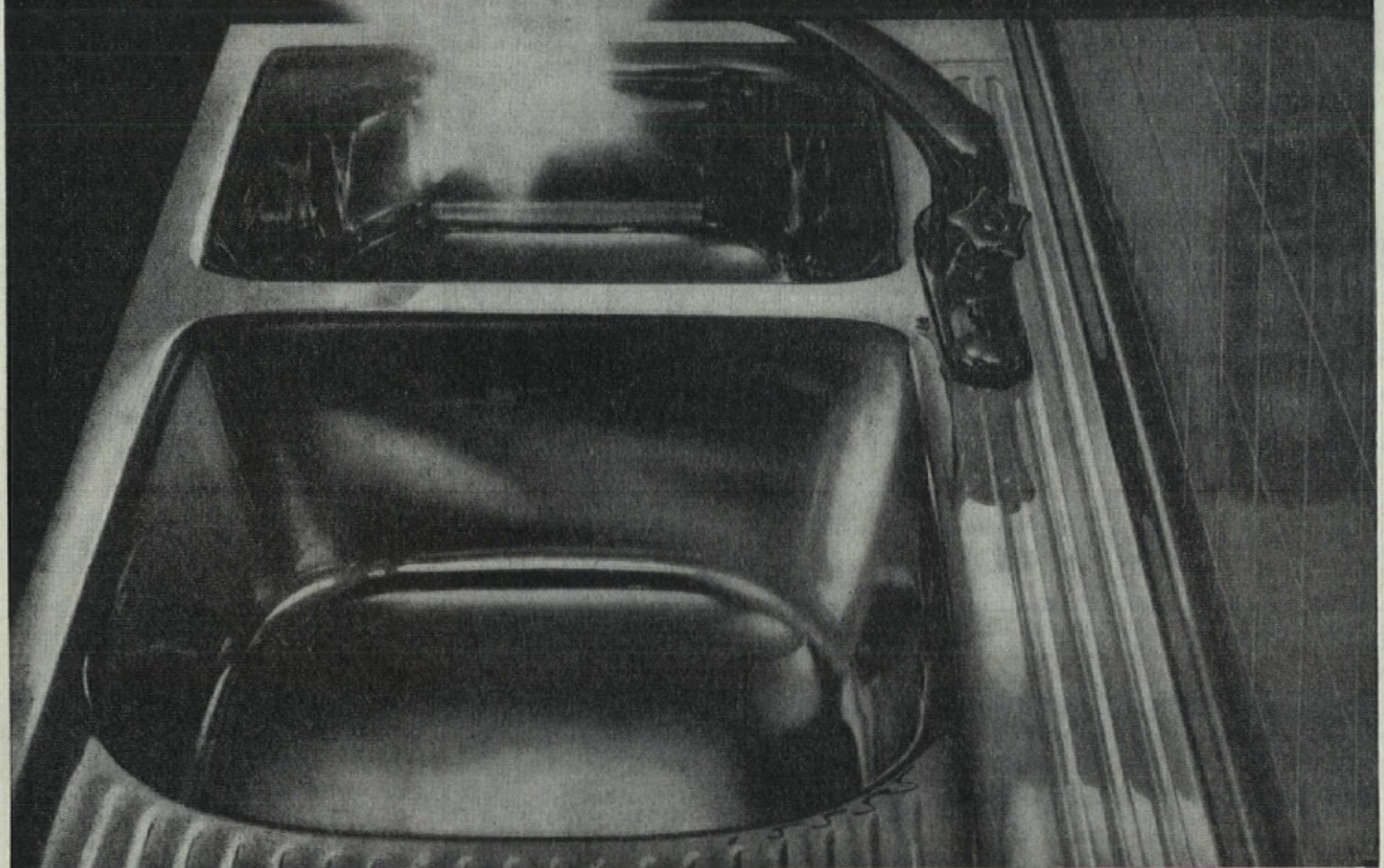

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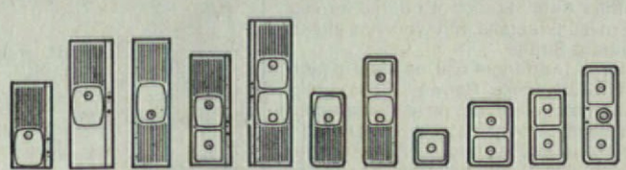


Exhibitions

Till June 30th	Chicago	Mies v.d. Rohe retrospective	Art Institute of Chicago
Till June 30th	London	Thonet furniture	Bethnal Green Museum
Till July 1st	Paris	Gothic Art (Council of Europe)	Louvre
Till July 28th	Milan, Italy	14th Triennale of Milan	Palazzo dell'Arte al Parco
June 15th to August 31st	Coventry	British Sculpture	Coventry Cathedral
June 22nd to October 20th	Venice	34th International *Biennale di Venezia*	
August 30th to October 27th	London	The surveyors craft since 2800 B.C.	British Museum
September 4th to 11th	London	Surveyors' contribution to human progress	Little Dean's Yard, adj. Church House, Westminster SW1
September 19th to 25th	Garston (Herts)	BRS goes public	Building Research Station
September 20th to October 27th	London	Bauhaus	Royal Academy, Burlington House
October 7th to 10th	Mexico City	Spaces for sport and culture	
October 3rd to 8th	Nancy, France	International exhibition of Urban Equipment	Inf. 54 Nancy 01, PO Box 593
November	London	New materials	Building Centre, London
1970			
March 15th to September 13th	Osaka, Japan	EXPO 70	

Conferences

June 2nd to 4th	Cambridge, Mass., USA	International Conference of International Design Methods Group	Inf. Coll. of Environmental Design, Dept. of Arch. re Berkeley Univ. of California, Calif. 94720
June 7th to 9th	Chipping Camden	SIA Annual Conference	Inf. SIA, 12 Carlton House Terr., London SW1
June 16th to 21st	Montreal	11th Biennial Congress of International Federation of Landscape Architects	Raymond Gascon, 1255 University Suite 729, Montreal 2, Que.
June 16th to 23rd	Aspen, Colorado, USA	International Design Conference	Inf. IDCA, Box 664, Aspen
June 21st to September 22nd	Brno, Czechoslovakia	2nd Biennial of Applied Graphic Art	Inf. Organizing Committee, Husova 14, Brno
June 23rd to 26th	Niagara Falls	68th Annual Convention of American Society of Landscape Architects	Inf. 2013 Eye St North-West, Washington DC 20006
June 26th to 29th	Cambridge, England	RIBA Conference (Building for education. Looking forward)	Inf. RIBA
June 27th to 28th	London	B.S.I.: Better Management through Standards	Inf. British Standards Institution, 2 Park St., London W.1.
June 30th to July 6th	Philadelphia	29th Congress of International Federation of Housing & Town Planning	Inf. Office of IFHP Development Coordinator, 702 City Hall Annex, Philadelphia, Pa 19107, USA
July 1st to 6th	London	8th International Congress on glass	Inf. Society of Glass Technology, 'Thornton,' Hallam Gate Road, Sheffield S10 5BT
July 6th to 13th	Greece	Ekistics tour of Greek settlements and attendance of closing session of Delos 6 Symposium	Inf. P. Psomopoulos, Athens Centre of Ekistics, P.O. Box 471, Athens
July 15th to 26th	Athens, Greece	Ekistics seminar	
August 18th to 24th	Eindhoven, Holland	3rd ICOGRADA Congress	Inf. Sjoerd Bijlsma, "Bijland", Kreiël 16, Winterle gem. Vessem, Holland
September	Rimini	17th international congress of artists, art critics, & art students	Inf. Sec. Generale del Convegno, 47040 Verucchio, Forli, Italy
September 3rd to 12th	London	12th International Congress of Surveyors	Inf. Secretary General, FIG Office, 47 Tothill St., London SW1
September 4th to 13th	Manchester	Town and Country Planning Summer School	Inf. Sec. 26 Portland Place, London, W.1.
September 9th to 14th	New York, USA	7th Congress International Bridge and Structural Engineering Assoc.	Inf. E. K. Timbly, c/o Howard Needless, Tammen & Bengendorf, 99 Church Street, New York
October 7th to 11th	Ottawa, Canada	4th International Congress for Building Research and Documentation (CIB)	Inf. Miss Milroy, Information Division, Building Research Station, Garston, Watford, Herts.
October 7th to 10th	Zacateno, Mexico	Meeting of architects under 30	Inf. Arg. Ruth Rivera, Organizing Committee for Olympic Games Avide la Fuentes 170, Jardines del Pedregal, Mexico 20DF.
October 20th to 26th	Milan	10th International convention/exhibition of automation & instrumentation	Inf. FAST, piazzale
October 21st to 23rd	Budapest	2nd Conference on Industrial Architecture	Inf. Sec. of Scientific Soc. for Building, Budapest V Szabadság ter 17. III Technika Háza.
November 13th to 15th	London	International reinforced plastics conference	British Plastics Federation, 47–48 Piccadilly, W.1.
November 15th to 17th	London	Art, technology and society	Inf. DIA, 13 Suffolk St., London, S.W.1
1969			
February	London	Reinforced plastics in building	Inf. Plastics Institute, 11 Hobart Place, London S.W.1
June	Amsterdam	6th Congress of International Prestressed Concrete Bureau	Inf Simons, Bd A. Reyers, Brussels 4
October 10th to 15th	Buenos Aires, Argentina	10th UIA Congress	Inf. UIA Secretary, RIBA, London

Competitions and awards

Financial Times Industrial Architecture Award 1968	Nominations by June 7th, 1968	Inf. F.T., Bracken House, 10 Cannon St., London EC4
Cumbernauld research awards	Entries by June 12th, 1968	Inf. RIBA, 66 Portland Place, W.1.
Civic Trust awards	Entries by June 14th, 1968	Inf. Civic Trust, Walter House, Bedford St., London WC2
Hotel bedroom suites	Entries by June 14th, 1968	Inf. Formica Ltd., Dela Rue House, 84 Regent St, London W1
Residential development	Entries for Stage 1, June 21st, 1968	Inf. Runcorn Devt. Corpn., Chapel St., Runcorn, Cheshire
Plastic light fitting	Entries by June 27th, 1968	Inf. British Plastics Federation, 47–48 Piccadilly, W1
Furniture design (dining suite) 1st prize, £750; 2nd prize, £250	Entries by June 29th 1968	Org. Donald Macpherson Group, Jenkins Lane, Barking, Essex
Carpet design, 'Gilt Edge'	Entries by July 31st, 1968	Inf. Carpet Trades Ltd., PO Box 5, Kidderminster
Investiture souvenirs	Entries by September 30th, 1968	Inf. Council of Industrial Design (Michael Kitt)
Products for children of 3 to 14 years old	Entries by September 30th, 1968	Inf. Abitare/Concorso, Bambini, 3 via Giuseppe Sacchi, 20121 Milan

Study tours

July 15th to 19th	Finland (£168)	Inf. Concrete Society, Terminal House, Grosvenor Gardens, London, S.W.1
September 1st to 15th	Germany and Czechoslovakia	Inf. Victorian Society, Dr Paul Thompson, Sturricks, Great Bently, Colchester, Essex
1969	South Africa and Australia	Inf. Concrete Society Ltd, Terminal House, Grosvenor Gdns., London S.W.1.

AA information centre

A students' information centre has been set up at the Architectural Association, London. The centre has compiled a list of projects being done within the school, who's doing what, the duration of study, and the terms of reference. The centre is in the process of expanding this index to cover all schools in Great Britain and eventually to compile such information at an international level. In the centre there are facilities for showing slides of work done both within the school and out; there are also facilities for running a recorded commentary along with such illustrations.

AA president

Francis Baden-Powell (38) has been elected president of the Architectural Association for 1968/69 session.

AIA awards

Marcel Breuer, who has just accepted the commission to design the office tower that is to be built over Grand Central Station, New York, has been awarded this year's Gold Medal by the American Institute of Architects. Other medals have been awarded to Gyorgy Kepes, Jack Lenor Larsen, Le Messurier Associates, Ernest Braun, Paul Gotz and I. M. Pei.

TCPA award

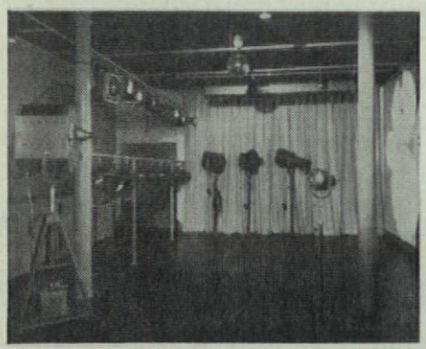
The Town and Country Planning Association's Ebenezer Howard Memorial Medal has been awarded to Sir Frederick Osborn, famous for his work at Letchworth and Welwyn Garden City.

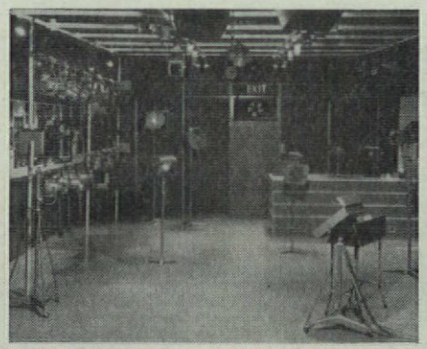
Designated area

Parts of Greenwich and Lewisham have been designated as conservation areas by the local Borough Council, and are the first conservation areas in London.

In the dark about special lighting?

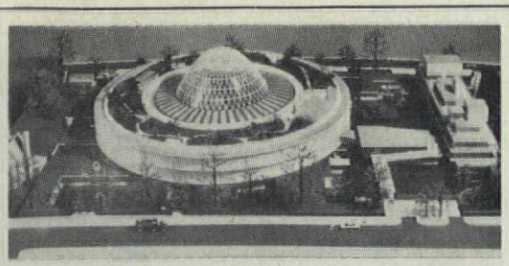
Planning run-of-the-mill lighting presents very few problems. It is only when the Architect or Designer ventures into the more creative forms of lighting that he is likely to find himself literally in the dark over ways and means. The Strand Electric service to Architects and Designers offers advice and equipment to help you achieve almost any special effects you want. A unique service of the greatest value in developing new lighting ideas it provides the facilities for Architects and Designers to try out equipment and conduct tests for their own specialised lighting projects. Lighting demonstration theatres are available in London and Manchester where you are welcome to make full use of the Strand service at any time.

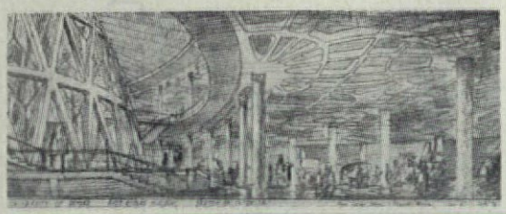




Lighting demonstration theatres in London and Manchester

STRAND ELECTRIC & ENGINEERING COMPANY LIMITED
LONDON—29 KING STREET, COVENT GARDEN, LONDON W.C.2. 01-836 4444
MANCHESTER—CONSTABLE STREET, GORTON, MANCHESTER 18. EAST 4141





Nervi again

Pier Luigi Nervi (who in March was awarded the Gold Medal of the Institution of Structural Engineers) has been engaged as structural engineer for the proposed Pitt Rivers Museum at Oxford. The architects are Powell and Moya. This is Nervi's second British venture—the first being the extension to Portsmouth cathedral (*AD* 6/66 p. 268), an unmemorable design which has no doubt been suppressed in the minds of most architects. The new proposal is scarcely more reassuring that his great expertise is demanded by the programme or used to its fullest advantage in creating a new environment. A great drum of a building with two levels below ground and two above (one devoted to the display of ethnological trophies the other to archaeology) is to be set on a four-acre site between Banbury Road and Bradmore Road. At the centre will be Nervi's special contribution; a tropical plant house. Donors are being sought for this £3 million hybrid.

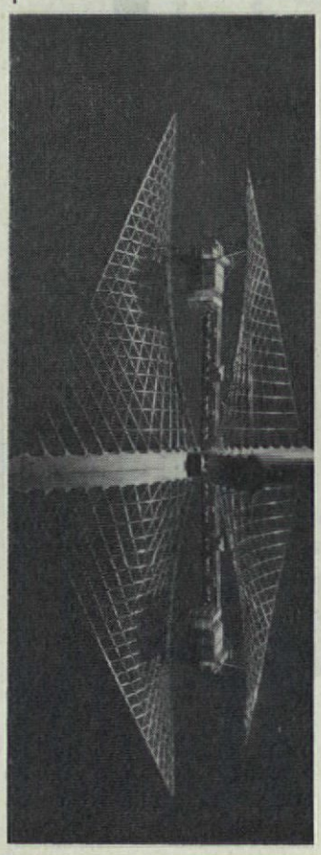
Thamesmead

The first of the GLC Thamesmead houses (see *AD* 4/66, p. 162), part of a spine running along Harrow Manor Way, have been opened for inspection—but not occupation. It is hoped that the site factory producing the precast concrete units will be able to turn them out fast enough to erect 850 dwellings a year. With two shifts output could be increased to provide 1350 dwellings a year.

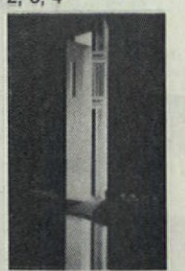
Carillon for Canberra

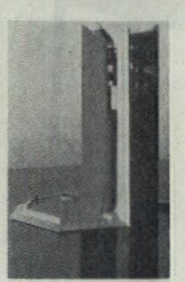
The Canberra bell tower competition has been won by Cameron Chisholm and Nicol of Perth, Australia, who submitted a design **2** for a heavy, monumentalized structure. The three British runners up were Eldred Evans and David Shalev **3**, Robert Maguire and Keith Murray **4** and Ahrends, Burton and Koralek **1**, who proposed a light dynamic construction more suggestive of the delight of a carillon call than any of the lumbering schemes selected by the judges. The assessors were Lord Holford, Sir John Overall and Sir Donald Gibson.

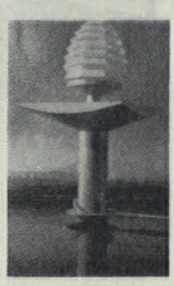
1



2, 3, 4







Twilight areas

The most interesting statistic to emerge at a West London Architectural Associations' symposium on Twilight Areas—centred on the problems of North Kensington—was that the area, at a density of 155 p.p.a. was a slum, while South Kensington at over 300 p.p.a. was decidedly not. The remedies generally agreed were more housing trusts and societies, both parties (in the persons of Sir K. Joseph and Lord Kennet) agreeing that private enterprise can't do anything and that the massive amounts of money required for a local authority effort were not forthcoming. Which, in a way, is odd, as Kensington is the third richest borough in London, and has quite simply let the area slide. Private enterprise, of the more explicit kind, continues to make a fortune by Rachmann-renting. The local firebrand, G. Clarke, made the most valid point: Housing societies are too weak a weapon for a massive social and racial problem, while thousands of local children have nowhere to play and, anyway, West Indians don't go to the youth clubs. All this points to a hardening of social attitudes and the consolidation of the ghetto.

However, it's good to find Peter Wilmot plugging away at the basic rules for improving environments:

1. The quality of the environment needs improving at the same time as the houses.
2. Along with physical improvement, social services must be used to improve the quality of the inhabitants.
3. People should be kept in their areas, to preserve community.
4. Provide for special kinds of people.
5. Mix people from different social classes.
6. Mix the races.

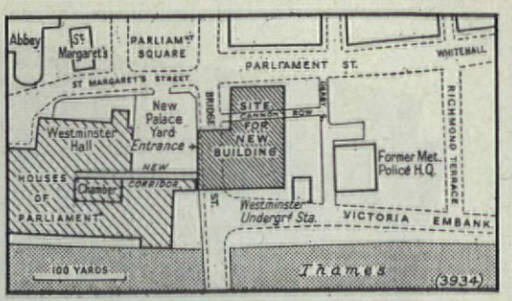
How this is to be reconciled with statutory densities, local authority finance and the housing list, Lord Kennet only knows. *Theo Crosby*

Pylons

The South Eastern Electricity Board are proposing to erect a line of high steel pylons through a remarkably beautiful stretch of Sussex, from Ninfield, through the Vale of Heathfield to Crowborough.

This is not just a parochial matter affecting only a remote part of Sussex. The line of giant pylons is by no means the last planned for Sussex, and is only one of many others planned for the country as a whole.

It should become national policy that no more permission for new pylon routes be granted until a much more thorough investigation has been made into alternative means of bringing electricity across the countryside. Undergrounding cables has always been dismissed as too expensive; yet the money spent on research into undergrounding has been derisory.



Planning in isolation

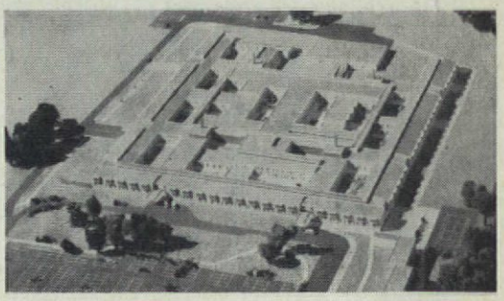
The House of Commons Services Committee considering the reorganization and extension of the Palace of Westminster changes its membership so frequently that abrupt changes of policy should be regarded as no surprise. *The Fourth Report from the Select Committee**, published in April, represents a complete reversal of the policy formulated only last October (see *AD* 11/67, p. 487), when an ungainly and ill-considered project was put forward for the enclosure of New Palace Yard, cutting off the view of Sir Charles Barry's Palace of Westminster from Parliament Square. The Committee have wisely re-considered Sir Leslie Martin's proposals of 1965 and have deigned to consult with him once again. New Palace Yard, he has pointed out, is between 8ft and 11ft below the adjacent Bridge Street, so that by raising the street level slightly, it would be possible to plan a grand entrance way, at ground level, leading direct from New Palace Yard to a new range of offices on the other side of Bridge Street. There need be no further talk of psychological and physical isolation in the new building, nor of any fear that MPs will be unable to answer their division bells. Circumspectly, the committee have published no views of the intended building, though two proposals are discussed, one for a six-storey structure, the other for one of eight storeys. The design will have to be carefully considered, not only in isolation and in its relation to other Government offices, but as part of the Martin/Buchanan plan to provide a road tunnel along the river bank and to turn Parliament Square into a pedestrian precinct. The Ministry of Transport and the GLC have deferred this project until 1974—at the earliest—but there are other interim proposals to ease traffic in Parliament Square and in Bridge Street—notably those of Mr Bruce Marsden who has suggested a traffic diversion over Westminster Bridge into a loop road through Derby Gate. No mention of this is made in the committee's report. Nor does their recommendation to build a car park under New Palace Yard seem to have been sufficiently well considered in relation to traffic problems. The Underground would prevent such a car park being approached from the north.

Some more broadly based analysis of the total redevelopment is urgently needed.

** HM Stationery Office, 1s. 6d.*

MoH rationalization

After 14 months' work planners at the Ministry of Health have put forward a design for two new hospitals, one to be built at Bury St Edmunds, the other at Frimley, which are about a third lower in price than normal. The buildings will be put up in five rather than eight years, they will be two-storey rather than multi-storey, expensive treatment units will be centralized and wards wrapped around treatment cores, circulation runs and numbers of lifts will be greatly reduced, and laundry and sterile supply areas will be built on nearby industrial estates, to serve several hospitals in the region rather than one. A triumph of rationalization it appears, but not, it seems, of environmental design.



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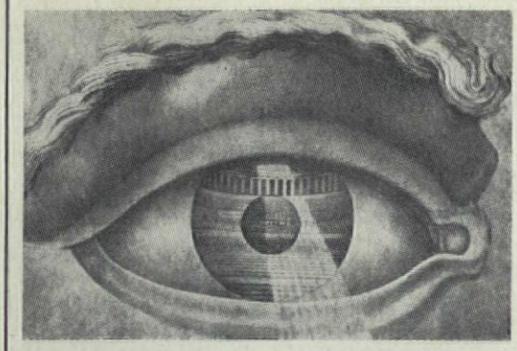
Book notes



Visionary architects

Catalogue of an exhibition of the work of Boullée, Ledoux and Lequeu, University of St Thomas, Houston.

When the University of St Thomas, Houston, the City Art Museum of St Louis, the Metropolitan Museum of Art, New York, the Art Institute of Chicago and the M. H. De Young Memorial Museum, San Francisco, combine with the Bibliothèque Nationale and the Ecole des Beaux Arts in Paris, to produce an exhibition of late eighteenth-century visionary architecture in France, the result should, at the very least, be spectacular. It might also have been edifying. But a perusal of the catalogue of the exhibition of original drawings and engravings of the works of Boullée, Ledoux, Lequeu and a handful of their contemporaries that has been touring America since October last, suggests that a display of the most ordinary sort has been organized. There is virtually nothing on show that has not been long familiar to even the most casual dilettante of late eighteenth-century French architecture. The late Emil Kaufmann's *Three revolutionary architects: Boullée, Ledoux and Lequeu* (1952) has, indeed, served as the point of departure for the exhibition. Though it must, in fairness, be noted that whatever the shortcomings of Kaufmann's studies, he cannot be held accountable for the banality of choice and the slackness of scholarship displayed by the organizers of the exhibition. Their catalogue is generously illustrated and useful in that respect, but the notes are revealing of little familiarity with the architecture and design of the period, nor are they always accurate. The bibliography provided is of the most erratic kind.

Many people have no doubt enjoyed the exhibition, and more will do so, but as the architecture of late eighteenth-century France is particularly challenging and insufficiently understood, the exhibition might have provided more than idle enjoyment, it might have been the occasion for a proper reassessment of the period, starting with the visionary—and extremely influential—works of Legeay and Piranesi, those of the French *pensionnaires* of the 1740s and 50s—Le Lorraine, Petitot, M. J. Peyre, Moreau-Desproux and de Wailly—and so to Boullée and Ledoux. Instead, those familiar and depressingly pretentious studies of Boullée and Ledoux have been presented once again, uncritically assessed, and extolled for a spurious air of modernity—a jejune and unhelpful assessment for which, Emil Kaufmann, as the author of *Von Ledoux bis Le Corbusier* (1934), can be held accountable. *RM*

Antonio Gaudì: a reappraisal
E. Casanelles. Studio Vista, London. 1967. 70s.

Antonio Gaudì
Geoge R. Collins. George Braziller, New York. 1960. $3.95.

The attraction exerted in recent years by Gaudì's work and personality has become so widespread as to produce a bibliographical avalanche unimaginable even to his most enthusiastic admirers. Two types of writing can be distinguished: one offered as serious research and analysis, the other centred on formal criticism aiming only to reveal the dazzling appearance of Gaudì's work. The books by Collins and Casanelles are of the former type. Both throw new light on a most contradictory and difficult subject, and are without doubt invaluable to anyone interested in the Gaudì phenomenon. However, their books are very differently planned.

Collins gives a global view, objective and concentrated (never schematic) of Gaudì's work and its background. Casanelles gives a more personal and polemical interpretation: 'The contention that the Sagrada Familia is the synthesis of Gaudì's art is impossible to sustain today'—and he maintains that the chapel of the Colonia Güell is Gaudì's most important and significant as well as enigmatic work, its crypt his 'testament'.

Casanelles assumes that his reader is more than superficially familiar with the theme, so he includes no plans, sections or elevations of any of the buildings. In an appendix he reproduces an interesting manuscript by Gaudì and extracts from the architect's notebook.

Collins adds extraordinarily valuable chronological and bibliographical indices and notes which include, among other things, salient facts about the leading Catalán architects of the period and about Gaudì's principal collaborators, whether architects or not.

Enric Casanelles died a few days before these lines were written. May this brief review be taken as a sincere homage to his memory.

Carlos Flores, Madrid, April 1968

Exhibitions, exhibits, industrial and trade fairs
Wolfgang Clasen. Architectural Press. £5 5s.

The description of any design that involves communication and induced understanding must surely rise to the occasion in these terms themselves.

This glossy book, despite its lip service to 'such things as moving displays and working models and mobile viewing points', is still concerned with the set piece. The whole business of exhibitions has began to lift itself out of being a rather temporary type of architecture and into areas where real technical expertise needs passing on.

The next book on this subject must involve more than just an eye with a view. *Peter Cook*

Apartments: their design and development
Samuel Paul. Reinhold Publishing Corporation, 308 pp. £11 13s. 6d.

In this book, American architect Samuel Paul sets out to describe the major factors involved in the building of an apartment project, from initial evaluation of the site, through the financing, to the detailed design of structure and services.

He concerns himself entirely with the situation in the United States with only brief observations on conditions in Western Europe and Scandinavia.

One of his purposes is to encourage a better understanding and relationship between architects and everyone else involved in an apartment project, and to make them aware of their social responsibility.

The book falls into three sections which constitute, in effect, three books aimed at different types of reader.

The first section promotes mutual comprehension by outlining, in the broadest way, the area of operations and the range of skills exercised by the various specialists concerned in a project. The value for a British reader is reduced by the absence of reference to quantity surveyors, by the assumption that the builder will himself normally be the developer, and by the fact that the finance section is specifically American.

The second section consists of agreeable photographs of apartment projects mostly American, with brief descriptions and some plans and site plans.

The third section is a moderately informative textbook offering general guidance, and random precise detail, about structure, services and sound insulation. This section is at once too detailed for a broad compendium and too general for a technical study; so it is hard to know what readership it is meant to serve.

Although it is well produced, the book costs far more than its usefulness justifies: and for the necessarily ephemeral nature of much of the contents, its format is inappropriate. A fuller bibliography is needed.

F. Goodall

Reiseführer zur modernen Architektur, Deutschland.
Gretl Hoffmann. Julius Hoffmann (Stuttgart). DM18.
Excellent handbook consisting of (separate) map guides to the modern architecture of W. Germany, Berlin, Mannheim, Frankfurt/M, Stuttgart, Cologne, Munich, Hannover, Hamburg, Düsseldorf, with keyed, illustrated indexes of the leading buildings, and an index of the architects and their works.

Publications received

Structural anthropology
Cluade Lévi-Strauss. 410 *pp. Allen Lane. The Penguin Press Ltd, London.* 50s.

The biological time bomb
G. Rattray Taylor. 240 *pp. Thames & Hudson Ltd, London.* 35s.

The sources of modern architecture and design
Nikolaus Pevsner. 216 *pp. Thames & Hudson Ltd, London.* 35s. (*cloth*), 21s. (*paper*)

Art now
Herbert Read. 128 *pp. Faber & Faber, London.* 15s.

Taming megalopolis
How to manage an urbanized world. Volume I. What is and what could be. Volume II.
Ed. H. Wentworth Eldredge. 1166 *pp. Frederick A. Praeger, New York.* $9.25 *ea.* (154s. *ea*).

Arturo soria y la ciudad lineal
George R. Collins & Carlos Flores. Revista de Occidente SA., Madrid.

London's industrial heritage
Aubrey Wilson. 160 *pp. David & Charles (Publishers) Ltd, Newton Abbott, Devon.* 63s.

Reisefuhrer zur modernen Architektur
Gretl Hoffmann. 160 *pp. Julius Hoffmann Verlag, Stuttgart.*

SEF Report E 1
Educational specifications and user requirements for elementary (K-6) schools
Metropolitan Toronto School Board. Ryerson Press. Toronto. $10.

New trends in church architecture
Justus Dahinden. 144 *pp. Studio Vista Ltd, London.* 84s.

Timber frame house construction
Check points in good practice
Prepared and Published by B.C. Timber Frame Housing Group, London WC1. Booklet 25 *pp.*

Specifications 1968
Volumes I and II. Ed. Dex Harrison. 488 *pp. and* 601 *pp. Architectural Press, London.* 55s.

House's guide to the building industry
Ed. J. H. Cheetham. Assistant Ed. D. S. Partlett, 140 *pp. House Independent Publishing Co. Ltd, London.* 65s.

Industrialized building—3
70 International Methods
R. M. E. Diamant in collaboration with Architect & Build ing News. 216 *pp. Iliffe Books Ltd. London.* 70s.

Architectural models
Rolf Janke. 140 *pp. Thames & Hudson, London.* 55s.

Engineering specifications
Heating, hot and cold water, steam and gas installations for buildings
Ministry of Public Buildings & Works. 40 *pp.* (*booklet*). *H.M.S.O. London.* 7s. 6d.

Old homes into new homes
Ministry of Housing and Local Government. 29 *pp.* (*booklet*). *H.M.S.O. London.* 2s. 9d.

Metrication
The international system of metric units. *Dr H. M. Glass.* 10 *pp.* (*booklet*). *The Gas Council, London.*

Metric conversion factors
Construction Industry Research & Information Association (*booklet*). *E. N. Mason & Sons, Colchester. Free.*

A J Metric handbook
Leslie Fairweather and Jan A. Silwa. Architectural Press, London. 15s.

Metric house shells, two-storey
National Building Agency. 5s.

A 75 metric component building design manual
Ed. Mauric Goldring. 40 *pp. A. H. Anderson Ltd,* (*Building Systems*), *London.*

Metric guide and metric conversion tables
Oldacres Computers Ltd, and Monk & Dunstone. RICS. 2s. *and* £1.

ABS 'Red Book' 1968
In the form of a brief metric annual, with free metric scale available to subscribers.

A comparison of X-way and other pedestrian crossings
G. D. Jacobs, S. J. Older & D. G. Wilson. 50 *pp.* (*booklet*). *Road Research Lab. Ministry of Transport, Crowthorne, Berks.*

It's a small world—till you try walking around it
David L. Phillips. 149 *pp. Branden Press, Boston, USA.* $6.95.

Designer's trade
Gordon Russell (*autobiography*). 328 *pp. George Allen & Unwin Ltd, London.* 60s.

The book of home decoration
Ed. Elizabeth Gundrey. 64 *pp. W.P.M. Ltd/Spectator Publications Ltd.* 12s. 6d.

Decorative art in modern interiors 68/9
Ed. Ella Moody. 157 *pp. Studio Vista Ltd, London.* 70s.

utopie

Utopie is a French student group critical of the contempory architectural and urban scene, their ideas have been published previously in their review Utopie, revue de sociologie de l'urbain *May 1st,* 1967 (*Anthropos, Paris*), *in a pamphlet* La logique de l'urbanisme, *Versailles, Nov.* 7th, 1967 *and in a series of essays in the catalogue of the exhibition* 'Structures Gonflables' *held at the Musee d'art moderne in Paris, March,* 1968.

Architecture as a theoretical problem

J. Aubert, J. P. Jungmann, A. Stinco, H. Tonka

Utopie was formed to combat restrictive *social commands* in the fields of architecture and town planning. The power structure that determines the ideals is attempting to control all space and urban organization and to rationalize this control as town planning.

Levels of architectural activity

In an *analysis of planning theory* we have recognized three concepts that provide some basis for an understanding of the urban condition and the principle products of architectural activity.

1 *Town planning,* which determines both voluntary and deliberate action, that is 'guided' planning, controlled administratively, legally and professionally. Complementary to this is *architectonic activity,* involving that organization and construction required by State and professional bodies which might—or might not—be related to real social needs.

2 *Town development,* which is dependent on a socio-economic structure (notably that of free-enterprise) taking place as a series of isolated and independent (but congruent) actions. Action in this field is dictated more by worldly attitudes and values than by those of the State—unless there be a token obeisance to a State 'planning strategy', which, in France at any rate, cannot be enforced. The power of the small groups that control the economic structure is focused at this level of planning. To it corresponds an *architectural pragmatism* supported by those socio-economic actions that contribute to the maintenance of a particular economic system. This pragmatism might or might not accord with *town planning* and *architectonic activity,* in either case its image is imposed as are its economic criteria.

3 The third concept is *urban development,* which involves world values, social practices and political aspirations. Related to the previous concepts, it includes and excludes them at the same time; it controls them historically and ideologically because it partakes of both history and socio-political systems—and because of this very fact is subordinate to the State. The *practice of architecture* is its counterpart.

In architecture, as in all disciplines providing practical solutions to social problems, it is not enough to conceive of a practical solution in order to solve a problem—nor even to go any way towards answering it. Architecture, as a social practice designed to solve social problems, has been sustained by practical ideals and practical solutions, providing thus an ideological but not a theoretical aim. It has remained rooted in pragmatism, without a 'theory of practice' that might have informed actual practice. Architectural frames of reference have been 'architectonic' rather than 'social'. Architecture has been produced both by those men thrown up by the social structure to undertake the practical task of giving spatial form to our system of values (*architectonic activity*) and by those who, as administrators make use of architecture as a practical means realizing their social practices. But, lacking a basic theory and, above all, a 'theory of practice' architecture has offered no more than space as its determining condition. It is divorced from social practice—divorced, though, only at the level of real activity and not at the level of ideology.

The impracticable practice of architecture

In the quest of *Utopie* what is the meaning of *to analyse what happens in reality and to act in accord with this analysis in the practice of architecture and town planning* (which must, alongside its critical activity, be the aim of the *Utopie* group). The analyses made in the first issue of its review and in the pamphlet *La logique de l'urbanisme* provided one certainty: *Utopie* could not participate in the development of town planning as practised in France. This it rejected as *partial planning* as it did not spring from a comprehensive practice of urbanism but was rather a psuedo-scientific activity, institutionalized and having for result the excessive rationalization of space in accord with the repressive logic of state control. The practice of architecture as an integral part of this *partial planning* involves an acceptance of its basic ideology. Architecture as an act of building in accord with the beliefs laid down by our present institutions (even in its purely technical aspect) offers no basis for an active participation by the *Utopie* group. Proper sociological investigation has been ignored in the formulation of meaningless briefs; precedence has been given to monumental and formal expression in both design and actual building. At the behest of the administrative and financial powers architecture has been diverted from its principle objective—to sustain social activity—so that today the public and its 'elected representatives' are engaged, if at all, in a discussion of purely formal questions relative to accepted images and ideologies. The idea of modernity (with implied overtones of democracy) for example, has been metamorphosed into futurism and set in apparent opposition to the calm and the stability of classicism and its bogus representation of historical and thus bourgeois values.

This hint of social content in the play of architectural forms fosters the belief that the development of these forms involves a transposition of social practices; a belief that is perpetuated in the teaching of an architecture and town planning that are required only to give spatial form to social concepts without investigating the fundamental social needs—any analysis of which, inevitably constrained by established interests in spatial and formal coherence, results in conclusions and thus in further briefs conforming to the interests of the State and financial powers. There is no architectural dialectic.

Architecture is based on a series of formal ideas that serve only to confirm the system of architectonic representation fashioned by States and amassers of wealth. They explain their values by reference to history. Having subordinated architecture to their own ends they account for it in terms of their own system of justifications. They have even invested it with a modernism which hints at an ideal of democracy, but they have rejected all basic questioning and investigation—determinism and social practice and, above all, the enquiring proletariat. French town planning and architectural practice are on trial at Les Halles in Paris (*AD* 11/67, p. 488).

To the question *are the conditions for an architectural activity based on theory and not on 'social command' satisfied today in France* the *Utopie* group must answer *NO* and stress that activity is reduced to the carrying out of dictates made by the State and private capitalists (amounting to the same thing) which is what is meant by *social command* as opposed to *social demand.* This last cannot for many reasons be properly formulated today. Foremost is the fact that *social demands* remain largely unspoken. They can but rarely be made outside the framework of an institution; this necessary involvement alters the nature of the demand in accord with the plans of the established powers and thus of the State. Diversionary tactics are a part of this strategy. The idea of public 'participation' is a means only of consolidating the acceptable ideology; it is no step towards democracy. The ruse is exposed in *La logique de l'urbanisme,* p. 12—'Participation is based on a means of obtaining prime ends. A consumer who does not participate is held to be unintelligent, he who participates is intelligent. Participation thus marks the distinction between Man and Beast. Man, as a consumer, is growing slowly more aware that he is made for something other than work, but his attention is being diverted from himself and from his social condition . . . every participant in the act of participation believes himself a socialist escaping from the constraints of society, but he achieves no more than a conditional freedom in his own free time.'

A second reason for the non-formulation of the *social demand* is the difficulty—the impossibility even—of expressing it in practical architectural terms, as there is at the moment no conceptual means of relating an architectural and a social practice. This profoundly affects architectural practice. Architectural activity partakes of social activity and, like it, involves a number of separate activities—economic, technical, political, ideological and theoretical. In architecture, economics and technics are generally understood and made use of; ideology is an uncertain item, sustained by a vestige of rationalism and other beliefs, while the politics and the theory of architecture are non-existent, having been neither analysed nor conceptualized in an industrial capitalist society.

How is one to give currency to 'architecture' in a comprehensive urban sense in modern society? In what way, by what means will it respond to a *social demand* and not simply to the isolated and limited dictates of economics, geography, demography or sociology? What relationship do *architecture* and *town planning* have with the images, concepts and principles of an established society? Can the practice of architecture be transformed into a social practice? What is the meaning of the architectural act in society? To such questions one cannot give even a partial answer without having first established what one might call *the basis of an interpretation of the practice of architecture in its urban context*—and thus in society.

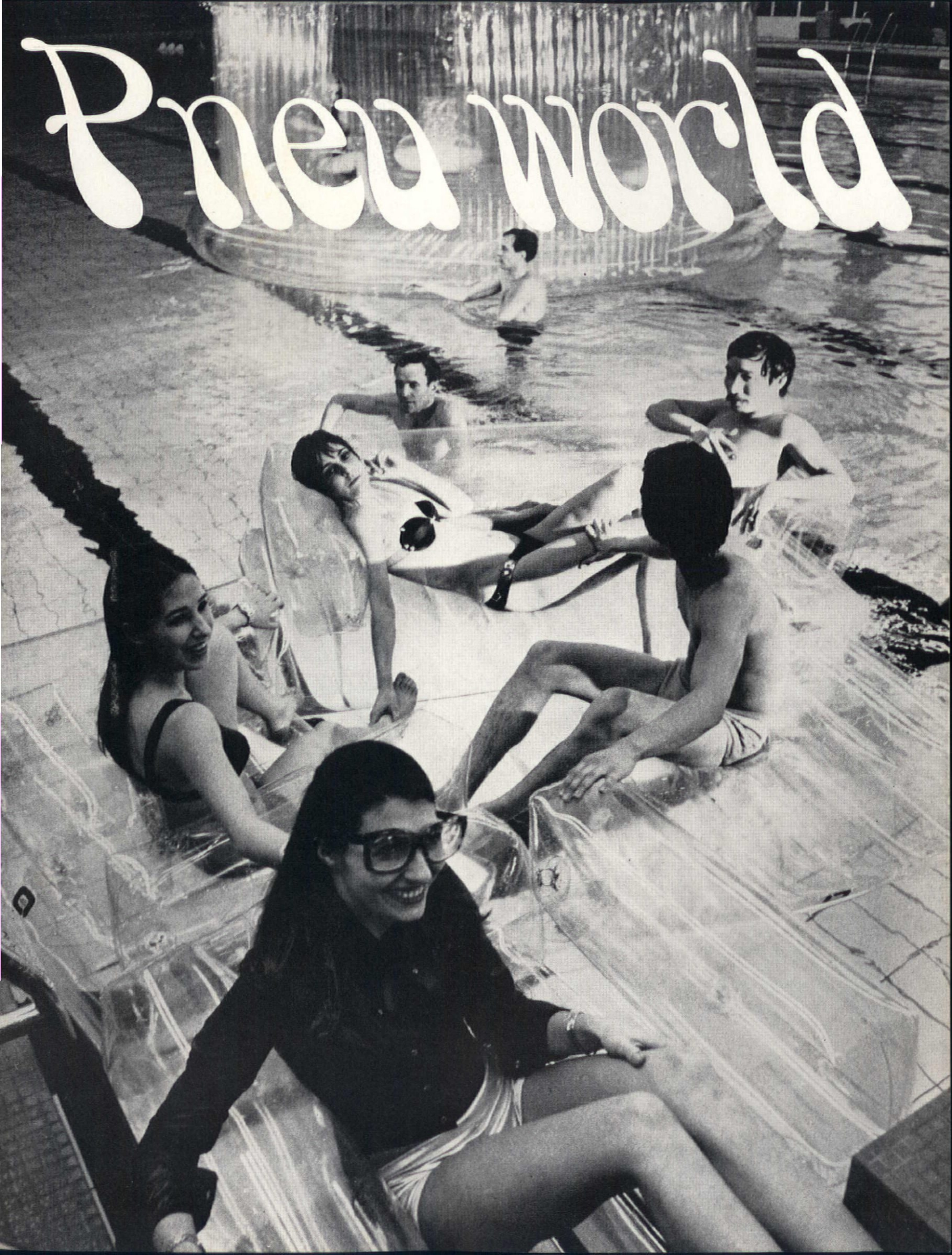
During the past fifty years, which have witnessed profound changes in the structure of society, no such study has been made. There have been treatises on architecture, histories of architecture, manifestoes, monographs and technical studies on a variety of subjects related to architecture, but nothing has given us any significant knowledge of the relationship between the practice of architecture, the practice of urbanism and society.

Architecture can be thought of only in a social context, that is in relation to an architectural practice that arises out of a political and economic structure and not as a 'humanist' ideal by which it has been sustained for more than a hundred years, and which, being an illusion, has had no impact on reality and by default has abetted those institutions and seats of power that control our social activities. On the other hand none of the so-called 'social disciplines' can fully explain the 'architectural object'. What is the specific nature of the 'language of architecture'? The question is inherent in that raised in more general terms by P. Francastel in considering visual elements as definite means of communication. The problems remain unanswered.

Architecture, given its aims, exists only in relation to the economics, politics, ideologies and ideals of a society. All must be related in a fundamental theoretical interpretation of the practice of architecture in its urban context. The information needed to evolve this basic theory is to be found in a study of the social realities of architecture and town planning—both present and past, in particular, since the advent of industrial capitalism.

The fact that no theory for the interpretation of architecture in its urban context has been postulated in France shows in what small respect it is held by the ruling classes—suggesting that architecture is not even a reflection of a space-time theorem but simply a decorative system, given some significance as an expression of a system of illusory values. If the urban context is to be regarded as the focus of conflict in an industrial society then *Utopie,* in its search for a theoretical basis, must uphold the dispossessed classes and direct its attention to these groups developing a social practice in harmony with a theoretical practice. *Utopie* will be able to contribute positively to the practice of architecture only when it has established a basic theory that specifies the form of action needed to give shape to all possible social actions. Library work will not be enough to determine this theory, nor will an abstract critique of past and present practice. An understanding of architectural practice is possible only through the practice of architecture. *Utopie* will therefore have to study and to act. Its precepts in this activity will be its radical rejection of social conventions, its development will be pragmatic and controlled by its limited means. In an attack on the *status quo Utopie* intends to establish *architecture* as a social practice. *Paris—London,* April, 1968.

PHOTOGRAPH: TIM STREET-PORTER


Pneu world

Pneu world

Simon Conolly
Mike Davies
Johnny Devas
David Harrison
Dave Martin

Students at Architectural Association School of Architecture, London

Pneumatic principles have already been widely adopted and accepted; from sailing ships, lilo's and car tyres to storage tanks.

258▷

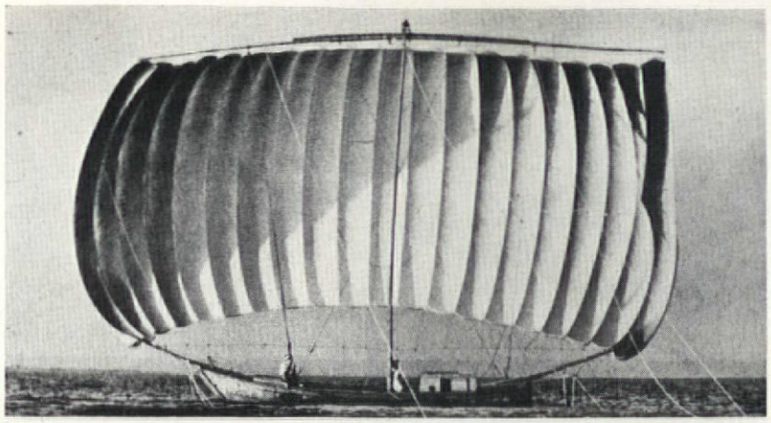
1. Japanese fishing boat
2. Instantly inflatable life jacket
3. Offshore rescue boat
4. Man descending at 25 f.p.s.
5. M. Bibendum
6. Hot air balloon
7. Car tyre. Around 25 p.s.i.
8. Gas container

9 & 10. Grain silos prefabricated from Butyl sheet. 40 and 1000 ton capacity

'You name it, someone is blowing it up right now, but it isn't quite as new as is sometimes made out. The basic patents on balloon-type envelopes go back to John Boyd Dunlops' first tyres and beyond; on air-supported buildings they go back to F. W. Lanchester in 1917. The first great monument of environmental windbaggery, the US Atomic Energy Commission's mobile theatre designed by Victor Lundy and Walter Bird, has been on the road for a decade.

What is new is a confluence between changing taste and advances in plastic technology. The taste that has been turned off by the regular rectangular format of official modern architecture and Bauhaus-revival modern-antique furniture, is turned right on by the apparent do-it-yourself potentialities of low-pressure inflatable technology. Transparent Mylar and related materials are temptingly easy to work with, and the inflating mechanism need be no more complex than a domestic vacuum cleaner.'

From Reyner Banham's 'Monumental windbags,' *New Society*, April 18, 1968.



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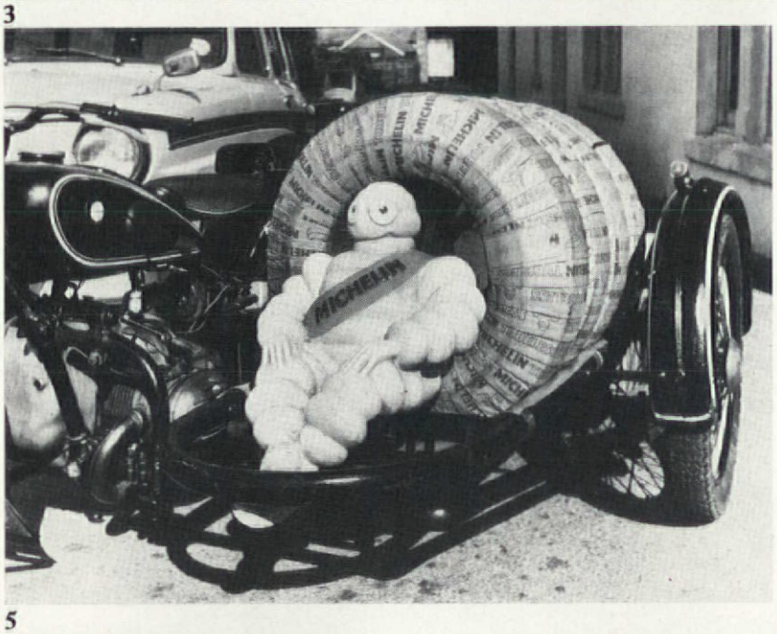

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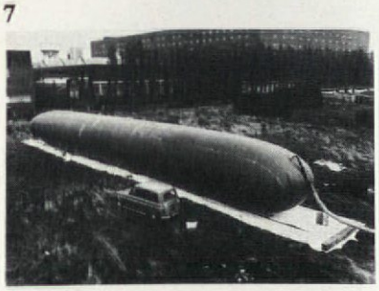

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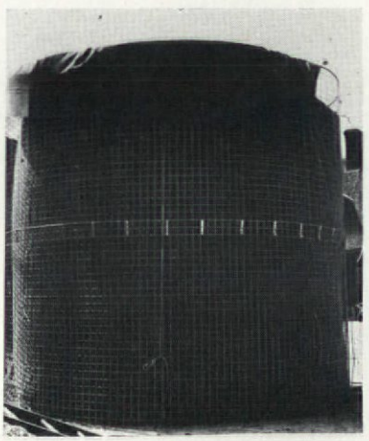


9

10

Credits

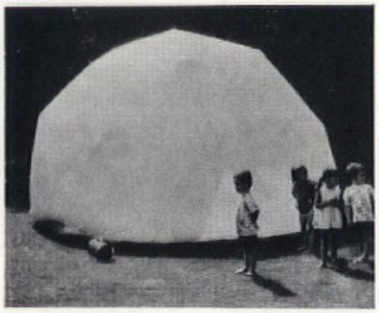
2. RFD Co. Ltd., Godalming, Surrey, England
3. Zodiac, 16 Rue Victor-Hugo, 92 Courbevoie, Paris. Photo: Neptune
4. RFD Co. Ltd., Courtesy Air Ministry
5. Michelin Co. Ltd., 160 Brompton Road, London, SW3
6. Raven Industries Inc., P.O. Box 1007. Sioux Falls, S. Dakota, USA
7. Pirelli Ltd., 343, Euston Road, London, NW1
8. Pronal, Reservoirs Souples-Containers, 139, Rue des Arts, (59)-Roubaix, Paris

9 & 10. Esso Chemicals, 6, Ave. Gambetta. 92 Courbevoie, Paris. Photo Esso

Previous page: Quasar Engineering, 20 Rue Leverrier, Paris-VI

When used for structures pneumatics fall into two basic categories:
Single-layer air-supported
Air-inflated structures.

SINGLE LAYER AIR SUPPORTED

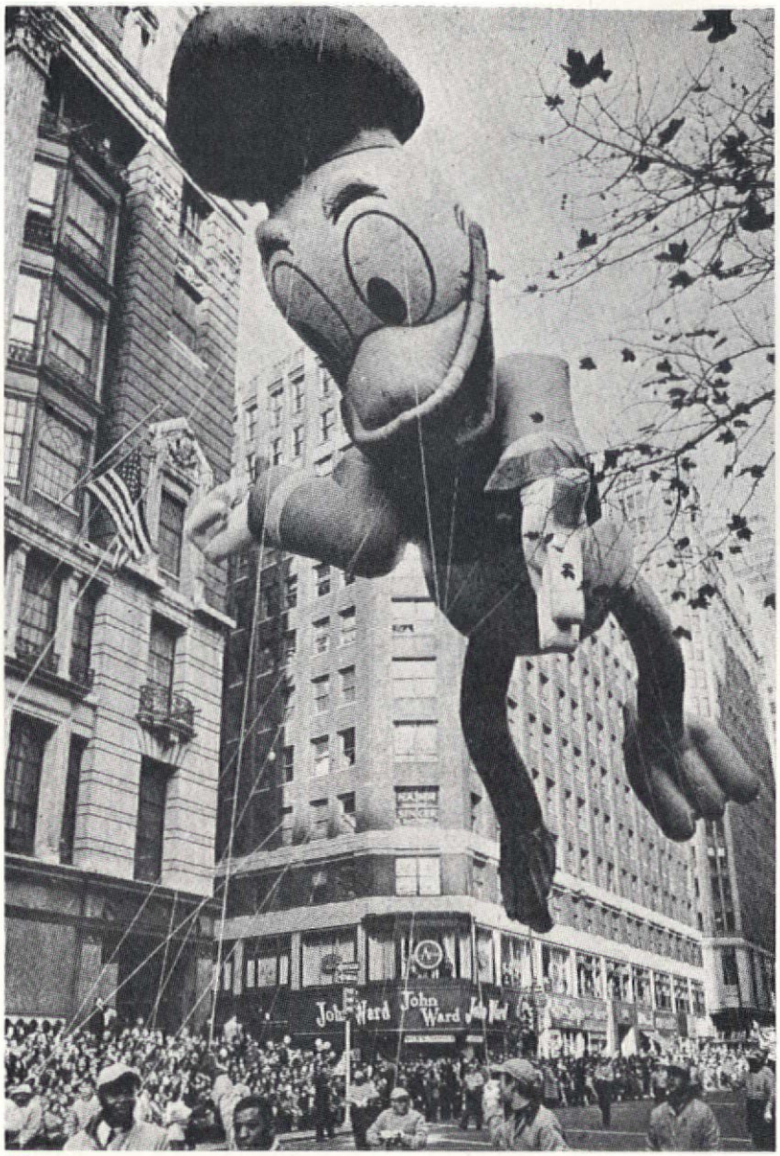


11

A flexible membrane is supported in tension by a compressed fluid which reacts against a loadbearing surface (usually the ground) **11, 12.** The used volume is usually at a slightly higher pressure than that outside—1/500th atmosphere. An analysis of soap bubbles is relevant to the study of these types of membrane under uniform stress **13.**
Basic principles may be applied even without adherence to pure theoretical geometry **14, 15, 16.**
Airlocks are generally required but cause limitations of entry, exit, and circulation **18, 20.**

250▷

11. 17ft diameter three-quarter sphere made of polythene and translucent PVC triangles jointed with waterproof vinyl tape
12. Single layer principle—an airlock is usually needed
13. Soap bubble experiments for complex-surface structures. A physical characteristic of soap film is that surface tension at any point is constant
14. Inflated 40ft polythene 'Mother of the Arts', AA float, Lord Mayor's Show 1967
15. Donald Duck in New York
16. Project for membrane spanning amorphous plan
17 & 19. Civic Centre project for Sprendlingen, Germany. Pneumatic chosen as cheap large-span structure. Incorporates transparent, opaque and reflective materials. Structure is stabilized by internal pressure maintained by the air-conditioning system. The plans numbered 1, 2, 3 & 4 show variations in the organization of the floor space
18. Basic airlock systems
20. Revolving door airlock



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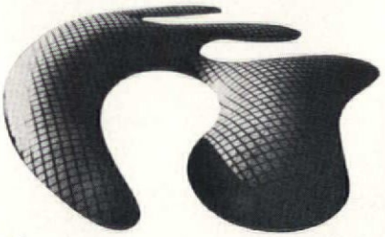

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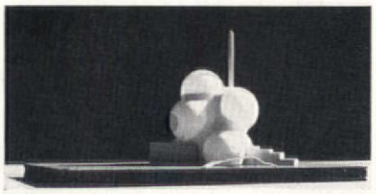

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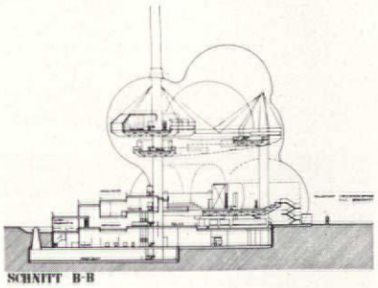

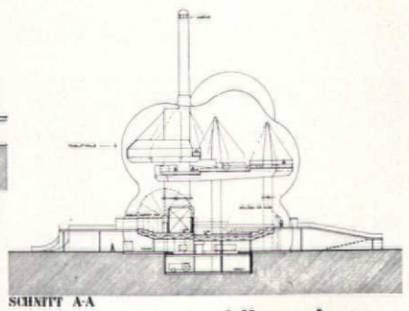

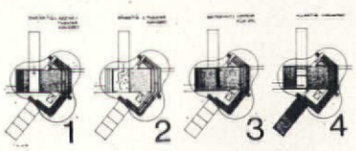

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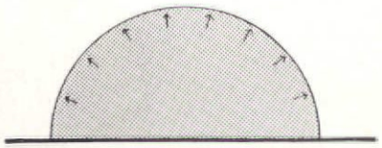

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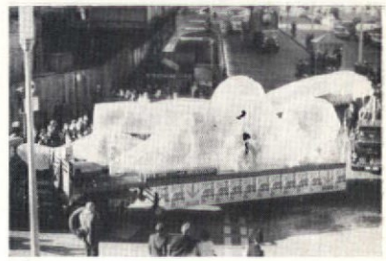

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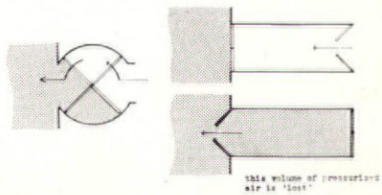

18

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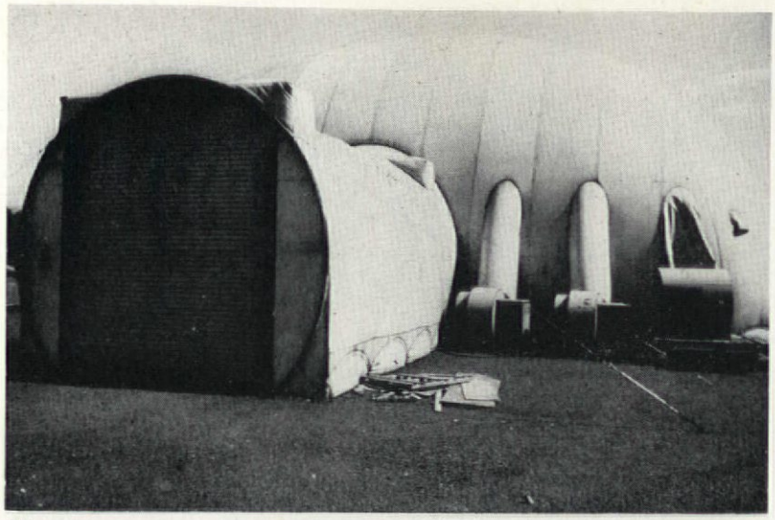
12. Authors' own experiments
13. Conrad Roland. 'Frei Otto's Pneumatic Structures', *AD* 7/66.
14. Designed by Piers Gough, AA Student
15. Alfred E. Neumann. *Mad* No. 59
16. Frei Otto. 'Tensile Structures', Vol. 1. M.I.T. Press
17 & 19. Designed by Manfred Schiedhelm, Berlin
20. Photo, Geoff Smyth

A constant air input (vital to structural stability) is required **21**. The concept of the pneumatic structure as a packaged and instantly inflatable volume **23, 24** is often incompatible with the practical problems of relating the structure to a particular site **25**. With single-layer structures anchoring and layout considerations are critical as the membrane stress must be distributed around the perimeter and air sealing ensured **26, 27**. The single-layer principle has been applied primarily where shelter and little else is required —radomes **29**, warehouses **22**, school enclosures etc. **28**. Present applications exploit the inflatable as an easily transported, quickly erected volume package **30**, but once initial inflation is complete, they take on the role of static structures at a fixed location. Once they are erected, extension can generally be achieved only by deflation of the total structure and addition of extra modules **31**. Low cost, even accepting a short life span (7–10 years average), implies a genuine throw-away product.

260▷

21 & 22. Warehouses. Nylon reinf. PVC, 40ft × 80ft × 20ft (high) Airlock 20ft × 10ft × 10ft (high) allowing vehicle access.
4 h.p. blowers maintain pressure
23 & 24. Echo 1 balloon satellite. 107 cm. diameter ball is ejected from space rocket and inflates to 30m diameter balloon through expansion of residual air in envelope.
25. Concrete base for controlled atmosphere fruit stores for Société Civile Agricole de St Georges
26. Anchoring of inflatable pavilion for the Oktoberfest, Bryant Park, New York, 1966
27. Catenary cable anchoring system distributes membrane stress evenly to base anchorage points
28. Swimming pool enclosure at Cannes
29. The world's largest Radome 210ft diameter. Telstar Earth Station, Andover, Maine, USA
30. Packaged single skin enclosure, 120ft × 60ft × 30ft (high) when inflated. Blowers and other equipment must be considered as part of total package
31. 60ft × 40ft warehouse extended to 100ft × 40ft by addition of 40ft centre section



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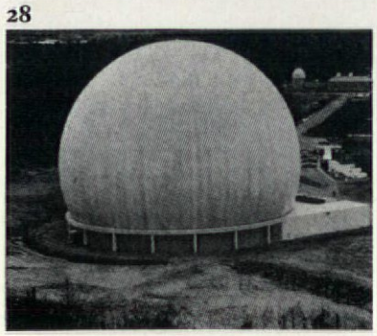

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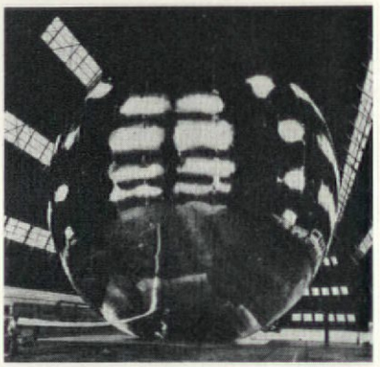

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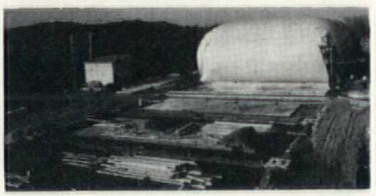

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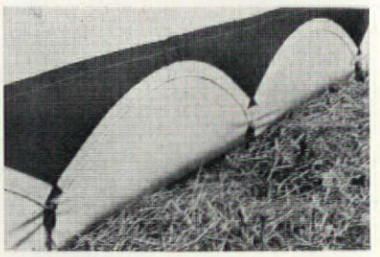

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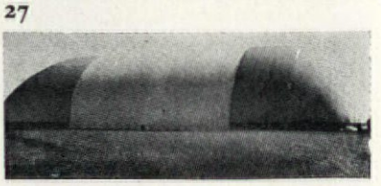

31

21, 22, 26, 30. Air-Tech Industries Inc., 9 Brighton Road, Clifton, New Jersey, USA
23 & 24. Frei Otto. 'Tensile Structures', Vol. 1, p. 21. Photo DPA
25. Laurent Kaltenbach and Guy Naizot, 3, Ave Erlanger, Paris 16
27, 29, 31. Airshelters Division, Birdair Structures Inc., 1800 Broadway, Buffalo, New York 14212
28. Roger Taillibert, 163 Rue de la Pompe, Paris 16

AIR INFLATED STRUCTURE

A membrane completely enclosing compressed air which may be analysed under two main headings.

CUSHION

Cushion **32, 33, 34.**

DOUBLE LAYER

Double-layer **35, 36, 37, 38.**
In this category apertures can be where you want them **39, 40, 42.**
Greater thermal and acoustic control is possible.
Self-deployment is a particular advantage.
The structure does not require an air seal to the ground **41.**

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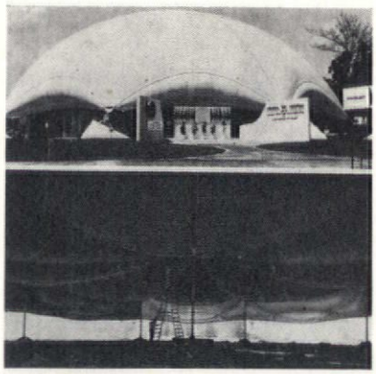
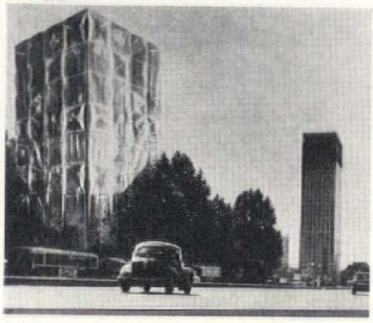


32, 33



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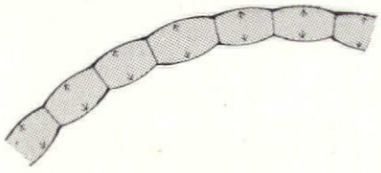

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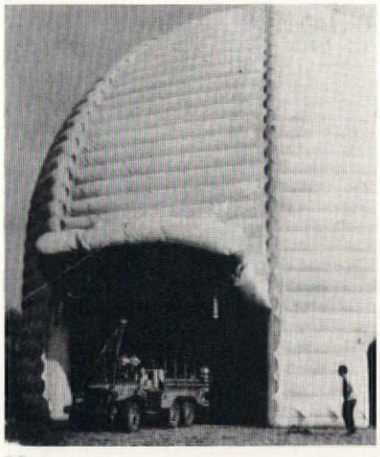

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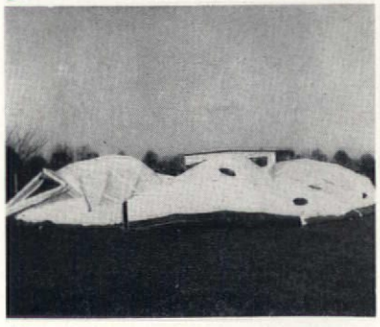

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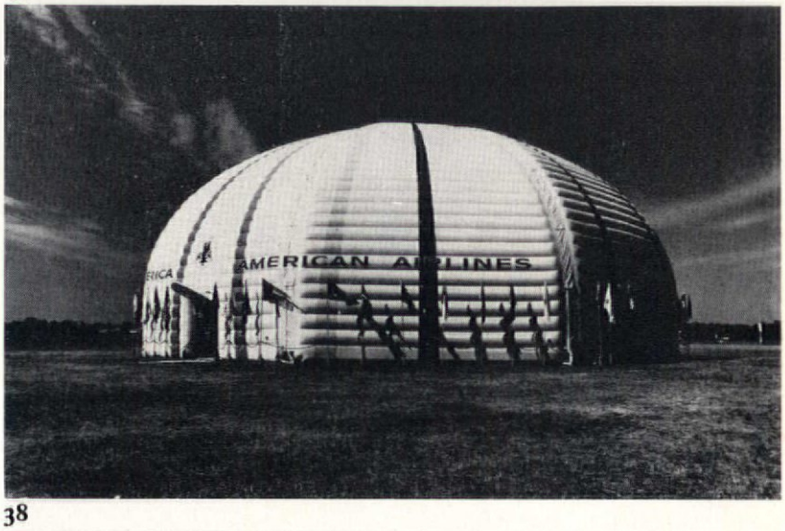

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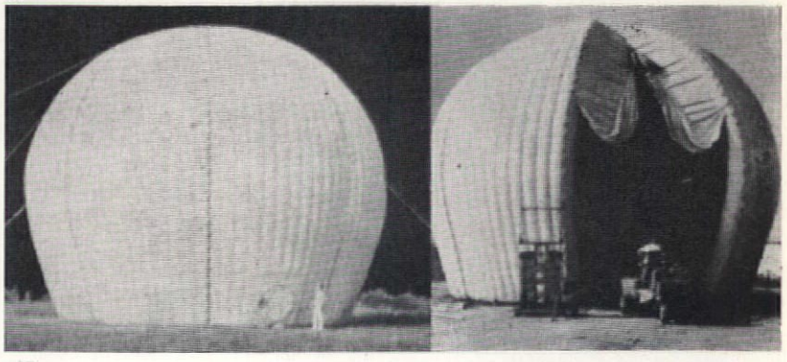


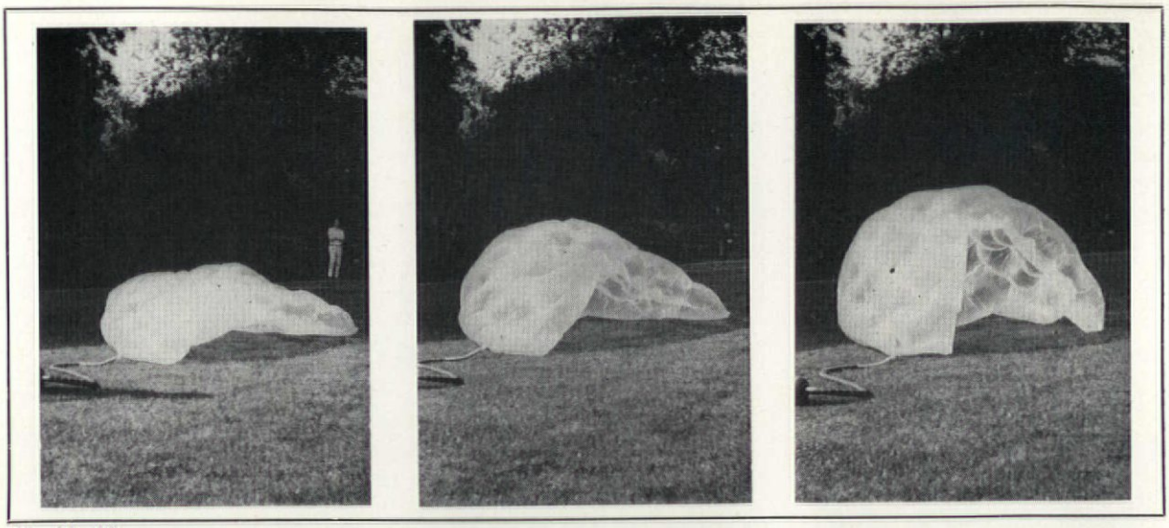
42

32 & 33. Cushion covering over US Atomic Energy Commission exhibition
34. Design for pneumatic 'curtain wall' of square air-filled panels tied back to main structural frame
35. Double layer principle. Layers tied by regularly spaced tension wires within air cavity
36. 'Airmat' slab fabric. Two layers of woven material linked by a dense matrix of nylon threads, providing a near rigid panel element with constant cavity depth of 5in when inflated
37. Double layer 'Airmat' shelter. Ballast bags around base can be filled to increase stability if necessary
38. American Airlines Astrosphere. 100ft diameter, 45ft (high) dual walled dome built up of segments in which the two layers are joined in continuous horizontal seams. An air-gap at either end of each seam allows a segment to be inflated as a single element. Total inflation time 2–3 hrs
39. Segmental military shelter. Segments can be disconnected to provide large openings, and total failure of a segment need not cause collapse of total structure. Will withstand winds of up to 100 knots
40. 'Airmat' shelter with normal door and surround panels zipped out to allow vehicle access
41. Semi-inflated, self-deploying 'Airmat' shelter
42. Military shelter. Stability unaffected by deflated section

32, 33, 42. Birdair Structures Inc., 1800 Broadway, New York 14212
34. J. M. Leon, J. Horte, J. P. Rayon, 5 Rue du Foin, Paris 5
37, 40, 41. M.L. Aviation Co. Ltd., Maidenhead, Berks, England

38 & 39. Air Inflatable Products Co., Connecticut. U.K. Agents, Ultra Electronics Ltd., Western Avenue, London, W3
Photo: 38 American Airlines

Inflation is rapid **43, 44, 45**. A relatively small air input is required for rigidity, **46, 47** and segments may be added without altering the initial construction **48, 49, 50, 51, 52, 53, 54, 56–59**. A higher pressure is required; hence a higher performance is needed for joints, seals, and the membrane itself. 263▷



43, 44, 45

43, 44, 45. Inflation sequence. 6ft diameter double layer polythene hemisphere. Layers connected with nylon thread. Inflated in 10 sec. from vacuum cleaner

46. A 21 cu. ft/min. compressor powered by a 1¼ h.p. 230 volts A.C. motor can inflate a 27ft diameter 'Airmat' shelter to 4 p.s.i. in 20 min

47. Inflator for military segmental dome. 40¼in high × 40¾in long × 35in wide. Weighs 475lb and can operate on limited local power supplies

48. Additional section being zipped into 'Airmat' shelter. Structure normally deflated, but addition can be made to erected structure

49. Detail of segmental military shelter showing external joint between segments and continuous horizontal seams joining inner and outer skins

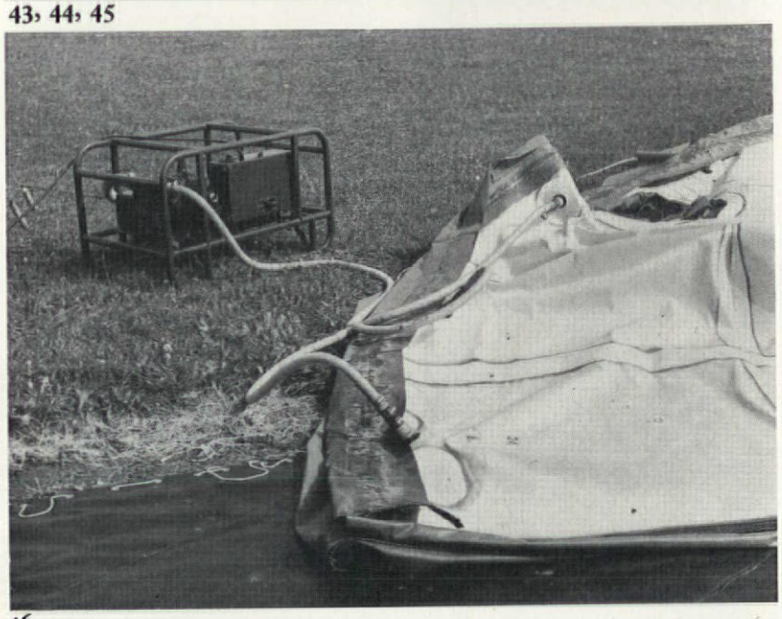
50. Sections can be added to 'Airmat' shelters without deflation of total structure

51, 52 & 54. Three sizes of 'Airmat' shelter designed on a basic module. Additions, if conforming to standard configurations, can take place on site

53. 51ft × 28ft × 14·5ft Airmat shelter packed into 4·5ft × 3ft × 1·75ft bags

55. Entrance canopy to USAEC exhibition leading to internal air-supported hall

56–59 MUST hospital (see *AD* 4/68, p. 189, 5/68, p. 231) consisting of three basic elements: dual walled inflatable structures for wards, fold-out operating theatre units and utility elements



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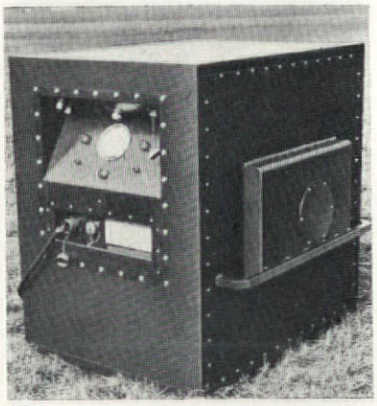

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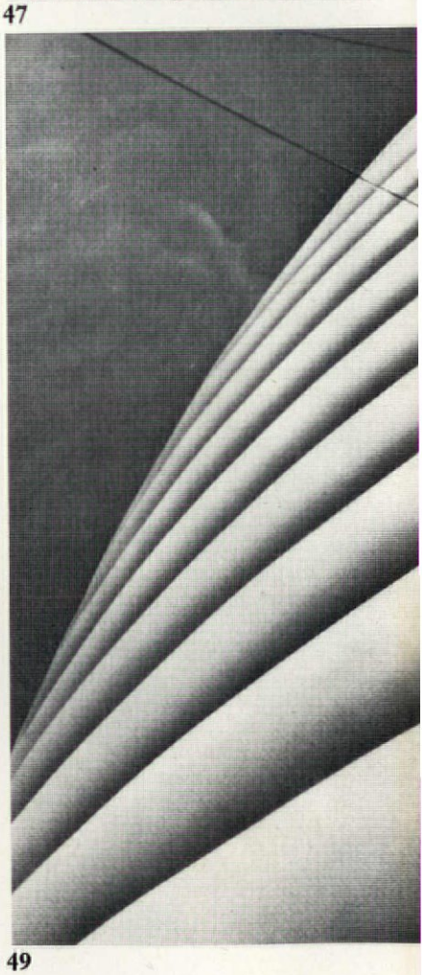
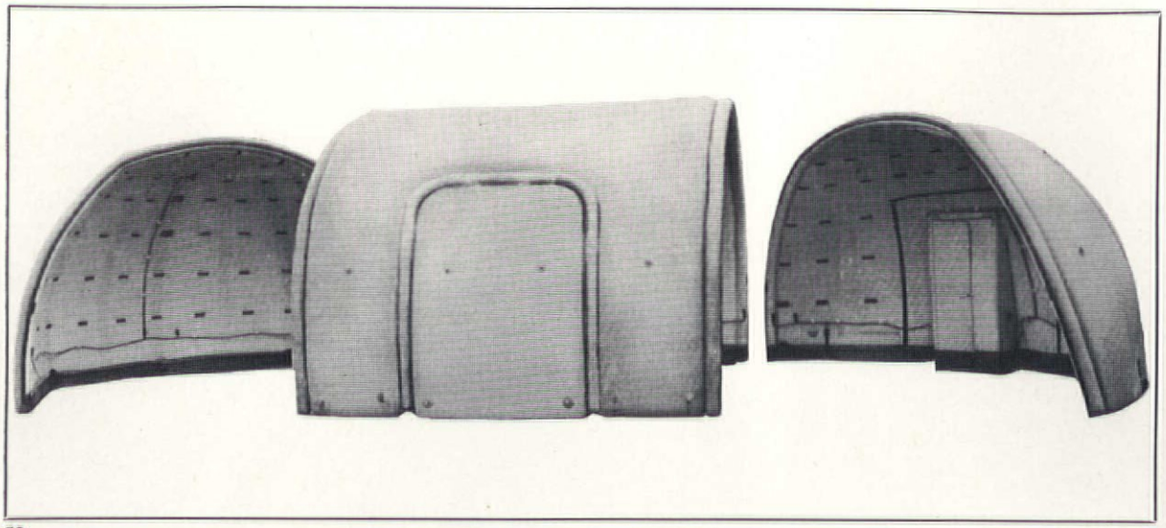


49

43, 44, 45. Authors' own experiments
46, 48. M.L. Aviation Co. Ltd., Maidenhead, Berks, England
47. Air Inflatable Products Co., Connecticut. U.K. agents Ultra Electronics Ltd., Western Avenue, London, W3
49, 50. Air Inflatable Products Co., Connecticut. U.K. agents, Ultra Electronics Ltd., Western Avenue, London, W3
51, 52, 53, 54. M.L. Aviation Co. Ltd., Maidenhead, Berks, England
55. Designed by Victor Lundy with Birdair Structures Ltd., 1800 Broadway, Buffalo, New York 14212
56–59. Garrett Corporation/AiResearch for US Army Medical Service, 1625 I St. N.W., Washington, DC, USA



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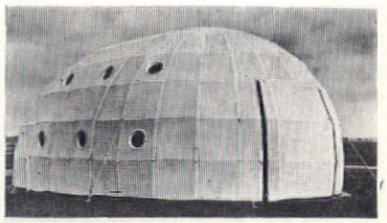

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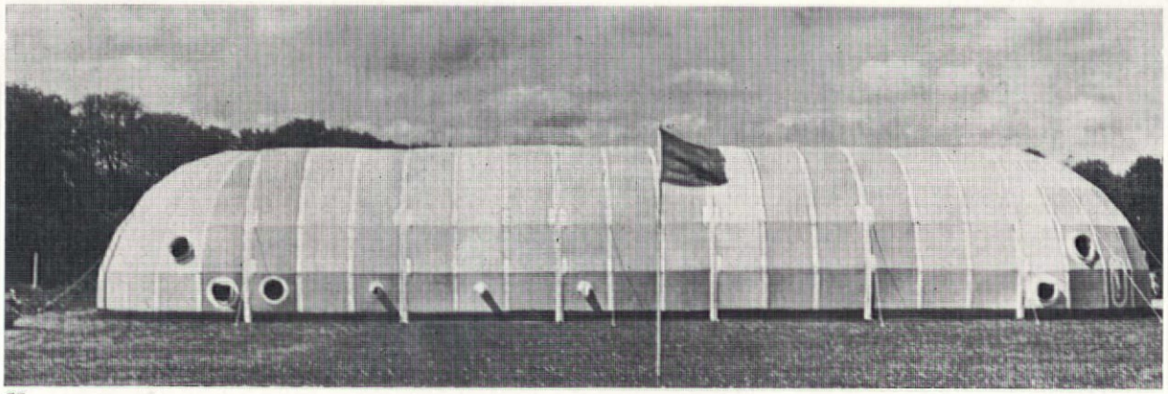

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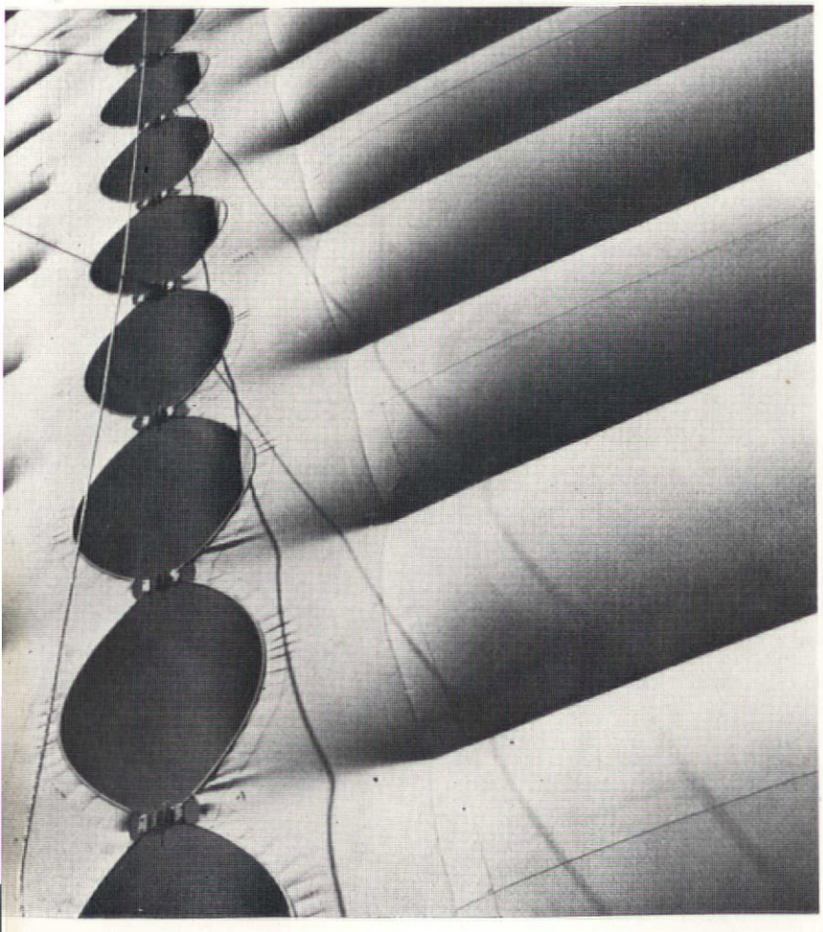

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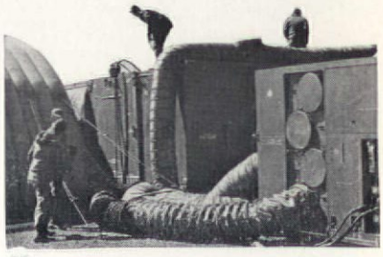


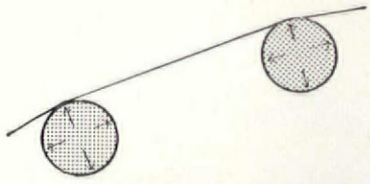
59

INFLATED RIBBED STRUCTURES

High pressure tube frames **60, 61, 63.**
Freedom of structural form **62.**
The membrane is independent of the rib structure **63, 64, 65.**
The membrane can be changed easily, allowing greater control of heat, light, and sound.
At present it is difficult to add to a pressure tube structure.
A kit of standard joints and rib sections may resolve the difficulty.
Inflation is instant **69.**
Initial air input is very small.
High pressure, however, requires high performance joints, seals, and fabric.
Self-deployment—the pop-up package **66, 67.**

264▷

60. Inflated ribbed principle
61. Experimental dome with pneumatically tensed cylindrical struts
62. High-pressure ribbed cocoon. Tubes inflated to 100 p.s.i. The inflated arch construction is resilient and can thus withstand higher wind loads than a rigid metal structure. The small diameter, high pressure ribs are unaffected by atmospheric pressure variations
63. Ribbed frame made from 10in diameter, 500 gauge polythene tube with taped joints. Fully inflated by vacuum cleaner in 15 sec
64. Four-way ribbed frame joint in polythene tube. Covering removed
65. Radome erecting device, using high pressure tube frame
66 & 67. 26-man self-inflating life raft Inflation time under 30 sec
68. Ribbed frame shelter made from nylon-neoprene tubes and covered with a coated fabric. The frame is divided into two isolated air compartments to prevent total collapse should a tube be punctured. 10·3m × 5·6m × 2·9m high
69. 75ft rocket-borne space antenna



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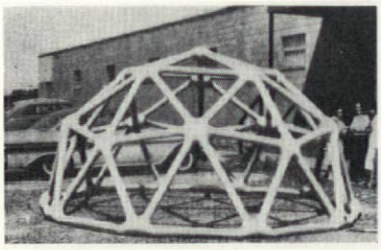

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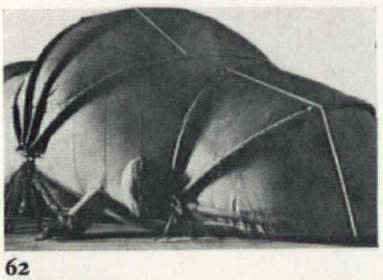

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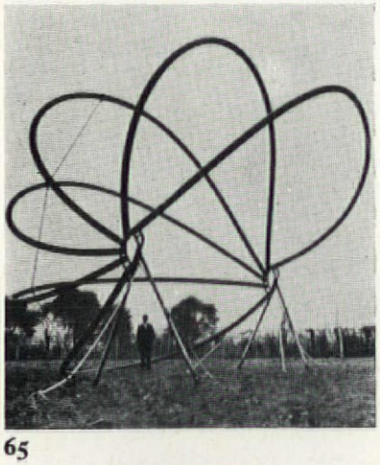

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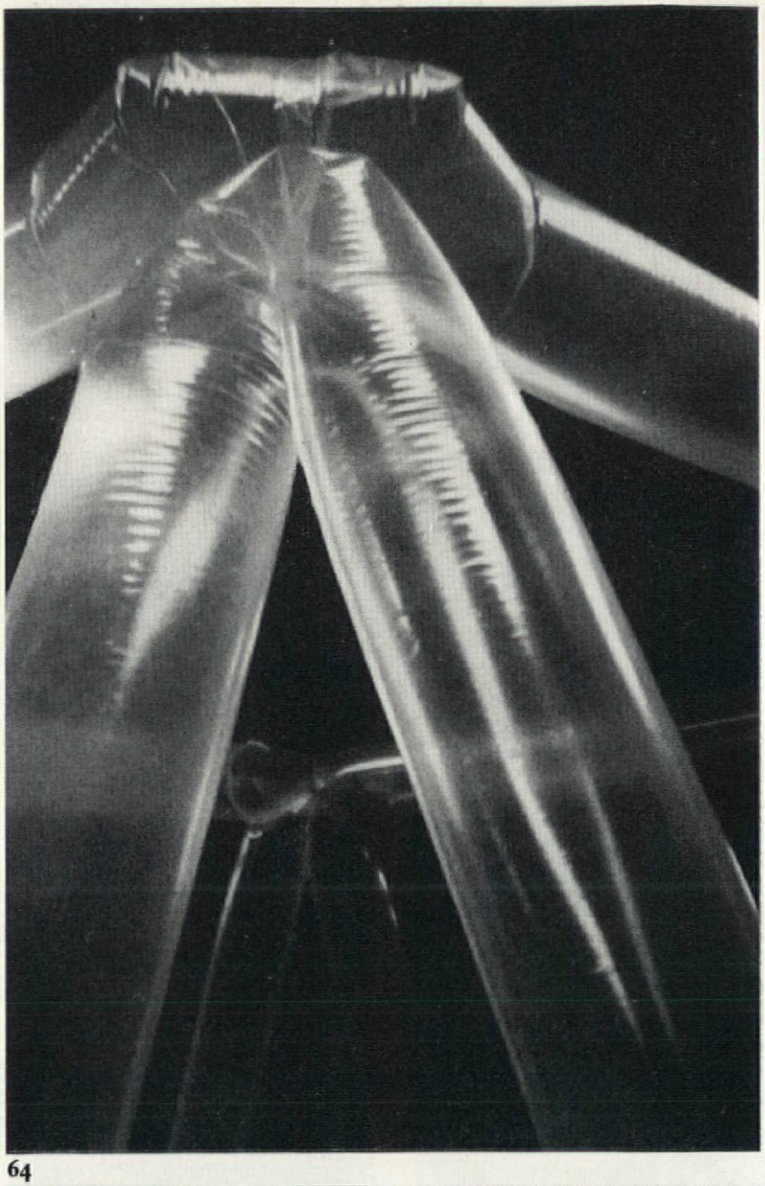

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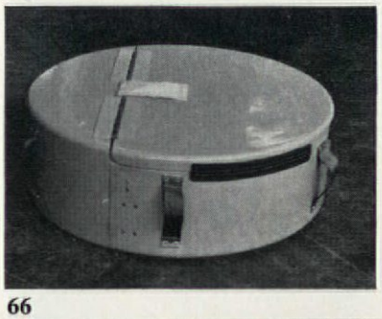

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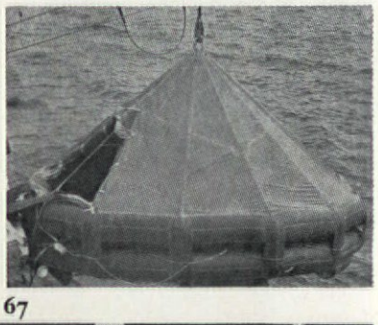

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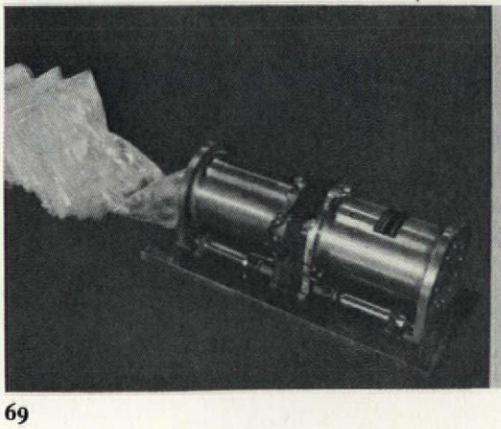
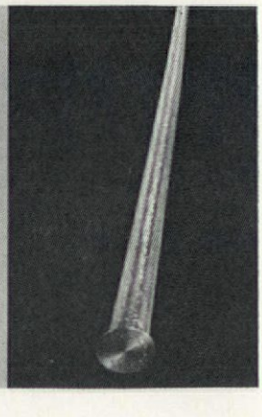




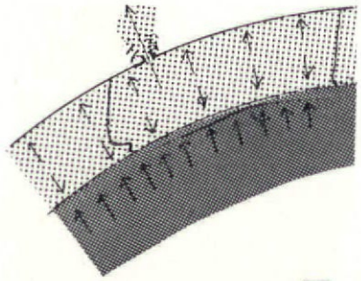
69

61. By R. Buckminster Fuller, from Frei Otto, 'Tensile Structures' Vol.I, p. 87
62, 65. Frankenstein Group Ltd., Manchester
63, 64. Authors' own experiments
66, 67. RFD Co. Ltd., Godalming, Surrey, England
68. Zodiac, Paris. 16 Rue Victor-Hugo, 92 Courbevoie, Paris
69. Raven Industries Inc., P.O. Box 1007, Sioux Falls, S. Dakota, USA

PERFORMANCE DEVELOPMENT

The satisfaction of specific performance requirements such as thermal, acoustic, and light control and safety may be solved by the combination of the basic principles of inflatables—either in parallel, or integrated within one system—the true hybrid **70, 71, 72, 73, 74, 76.** Specific requirements may sometimes suggest that the pneumatic cannot exist in isolation—integration with other 'structures' may be necessary. At a simple level, integration with masts, cables, and nets **75, 77, 78.** 265▷

70. When punctured the weight of the outer layer is supported by the inner layer
71. One layer inflated inside another, the weight of the inner layer being supported by wires attached to the outer layer
72. If a 'double double layer' is punctured the sealed inner layer supports the deflated membrane
73 & 74. 300ft × 120ft × 54ft high pneumatic structure for US Atomic Energy Commission travelling exhibition designed by Victor Lundy (shape inspired by his wife lying on the beach). Main structure used dual single-layer principle. Internal pressure 49mm water, interspace 38mm, 4ft gap between layers for heat insulation and safety reasons. Double-layer entrance porches. Structure required concrete foundations. Assembly time 3–4 days, inflation time 30 min
75 & 77. Cover for snack bar at New York world's fair
76. Additional internal support can be provided to counteract a snow load
78. Experimental structure using cables and cable nets. Tensions in the superimposed domes are comparatively low since the forces are taken by the cables



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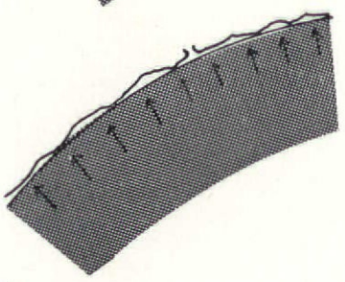

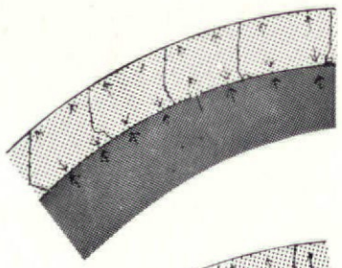

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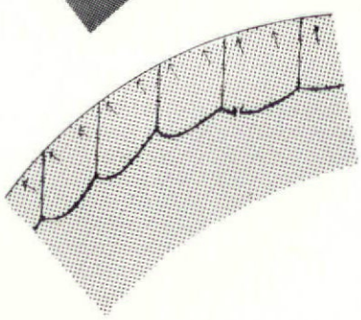

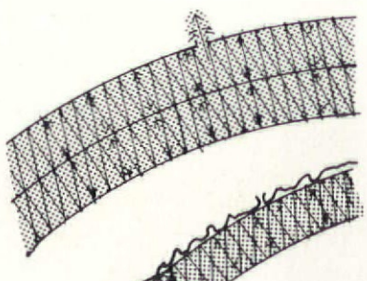

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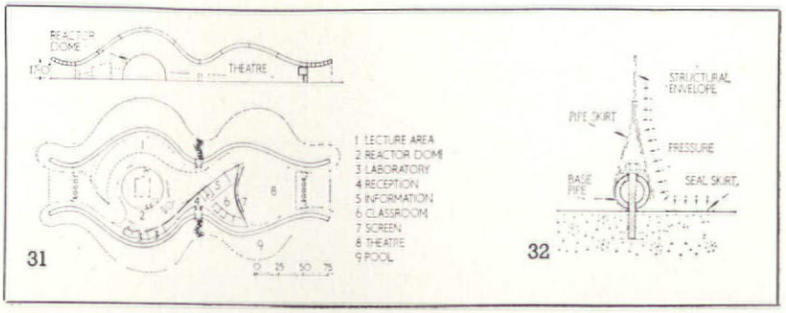

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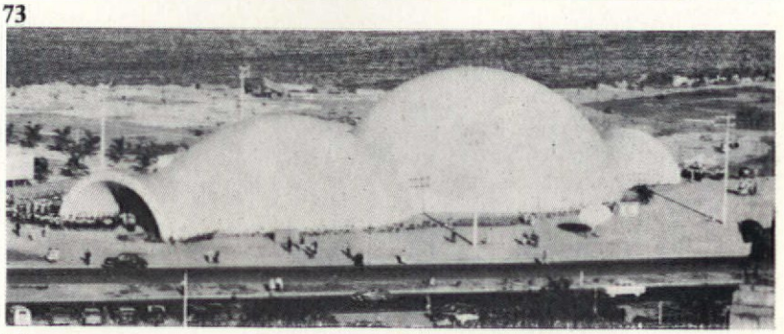

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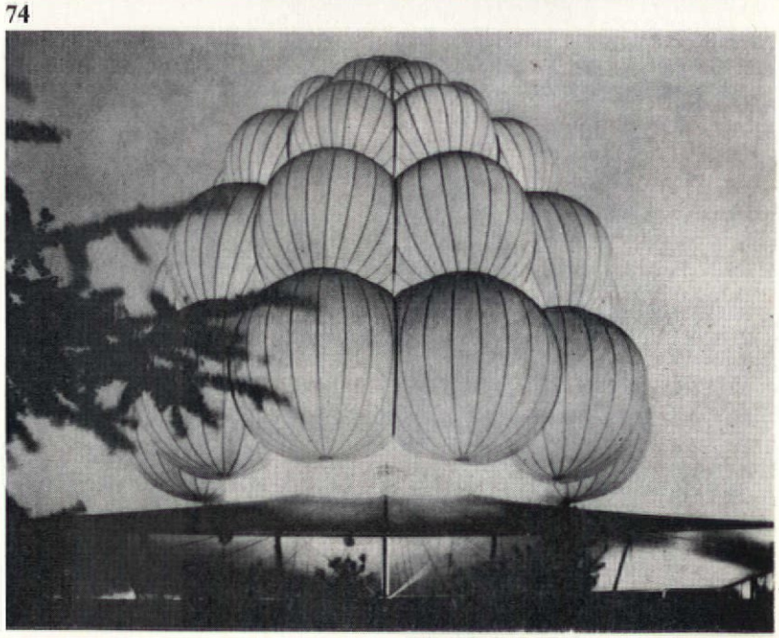

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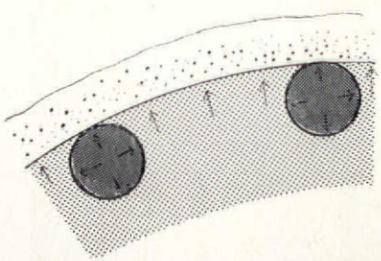

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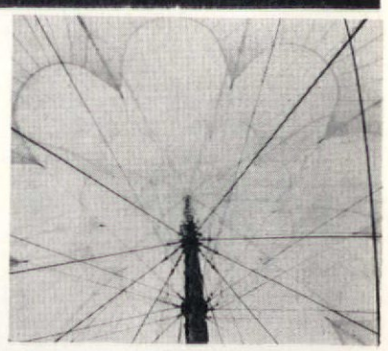

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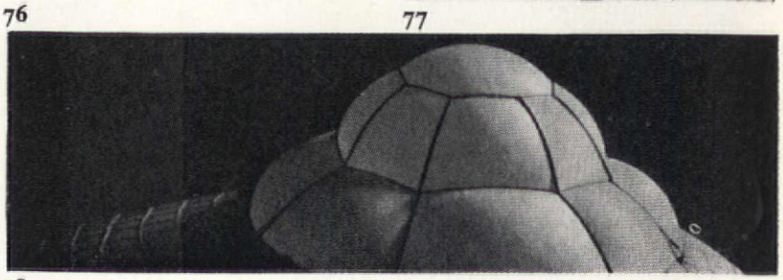

78

73, 74, 75 & 77. Designed by Victor Lundy and Birdair Structures Inc., 1800 Broadway, Buffalo, New York 14212
78. Frei Otto, Tensile Structures, Vol.I, p. 69

Only at rigorous design levels, e.g. for disaster, military, and outer space requirements are pneumatics integrated with any degree of refinement **79–83**. In general, designers and manufacturers have not recognized the possibilities of such high performance requirements for social application. Automation and mechanization of production techniques cannot be justified without parallel development of materials and markets. Chemical technology can now produce materials to almost any performance requirements **85**, but the capital for such research and development must ultimately be covered by returns from sales **86**. Designers and manufacturers need to initiate research and development for wider applications **87** and new markets.
Our own experiments **88** have not only provided much useful information, but have also prompted exploration of a wide range of possible developments.

BASIC AMENITY

Pneumatics (as packaged volumes) offer a choice as to whether a structure is there or not, **91** but once erected, the structure is inflexible in terms of physical response, apart from a limited expansion by addition.
The life-raft is a sophisticated instant structure **89**.
Could instantly inflatable volume packages be clipped to existing structures to respond to immediate volume-change requirements? What if there were a common material with the elastic properties of a toy balloon? **90, 92**. Controlled volume-change **93, 94, 95** as a responsive enclosure for **96**. Variable length, self-packing structural element **97**. 267▷

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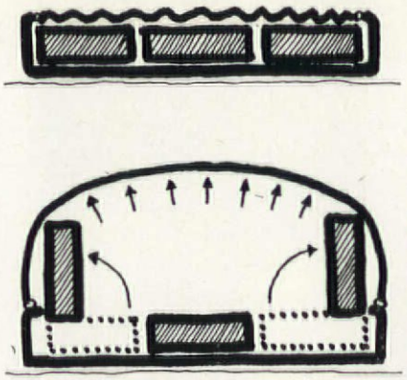
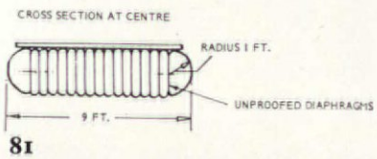


BASIC FORM OF BRIDGE



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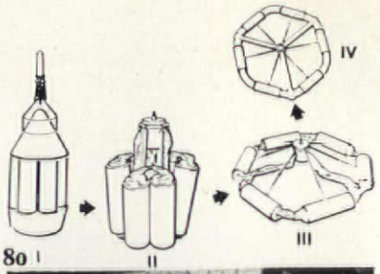

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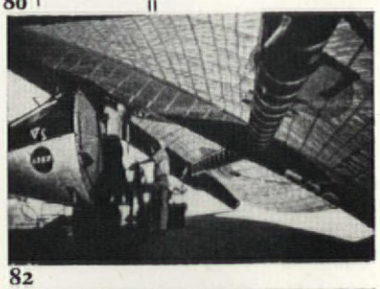

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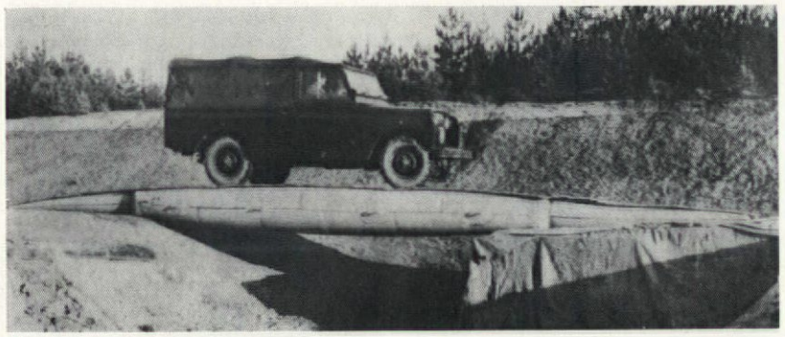

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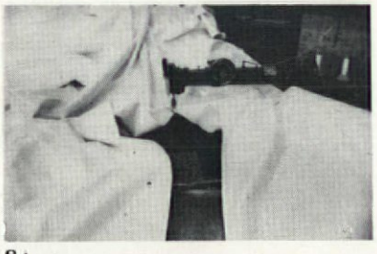

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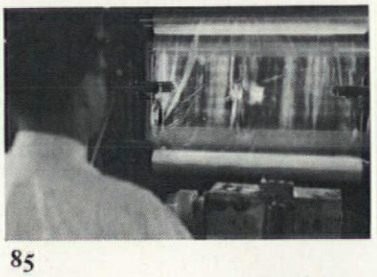

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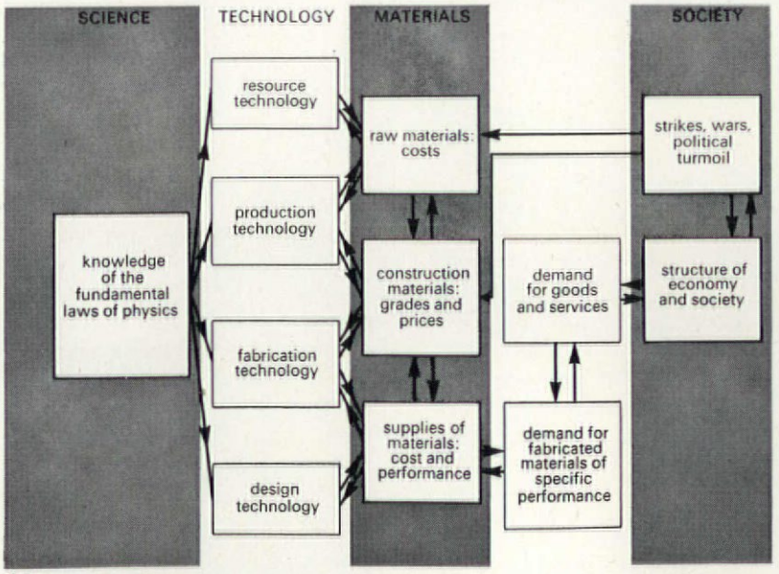

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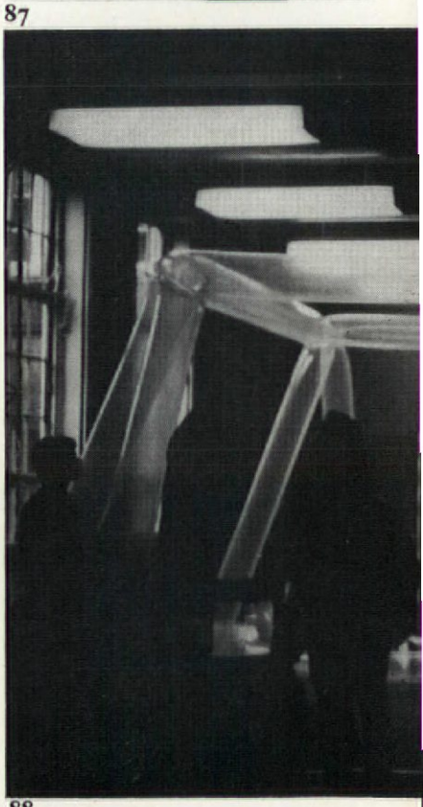
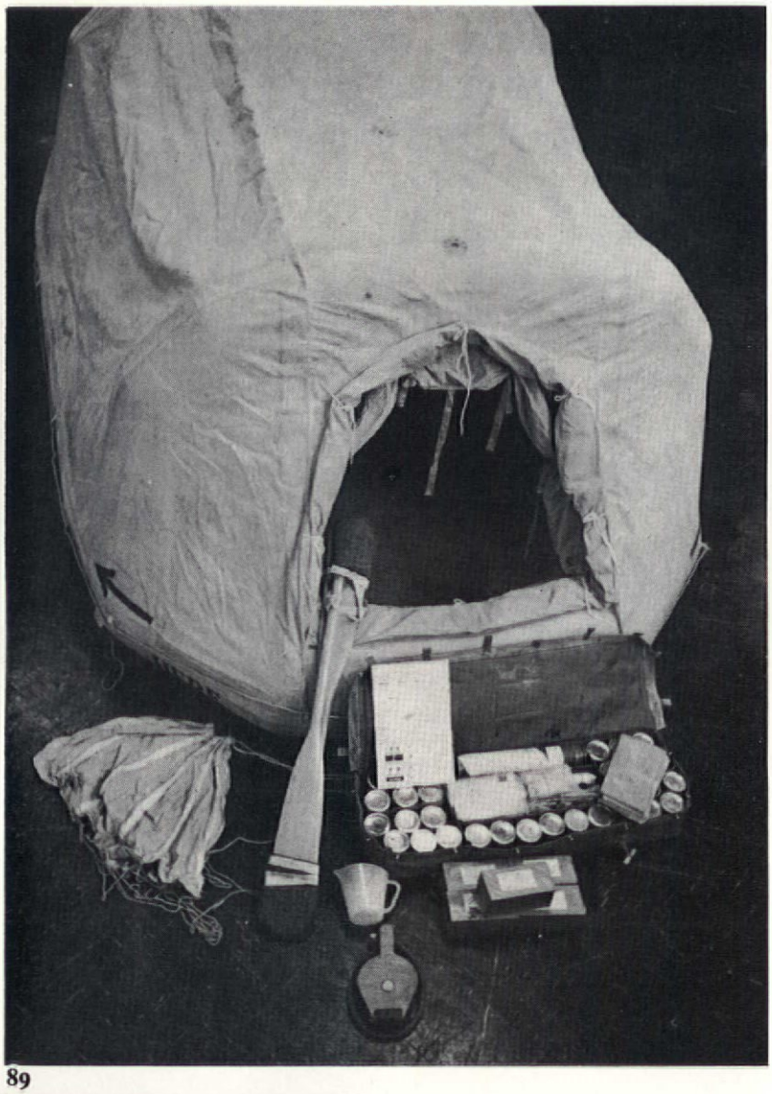


88

80. Pneumatic deployment of orbiting space-station
81, 83. Air-inflated bridge
82. Re-entry paraglider inflated in space to decelerate vehicle
84. Production using handicraft techniques
85. Detection of flaws in plastic film under polarized light
86. The complex relationships between technological and economic factors
87. Project for multi-storey air-inflated cylinder, working pressure approx. 2 atmospheres
89. Life-raft
90. BP advertisement
96. Drive-in housing (*AD* 11/66 p. 573)
97. Child's blowing-whistling toy, a variable length self-packing structural element

80 & 82. National Aeronautics and Space Administration, 400 Maryland Avenue, S.W., Washington, D.C., USA
81 & 83. P.S. Bulson B.Sc. PhD., Military Engineering Experimental Establishment, Barrack Road, Christchurch, Hants., England
85. Raven Industries Inc. P.O. Box 1007, Sioux Falls, S. Dakota, USA
86. From an article by W. L. Swager in *Science Journal*, Oct. 1967
87. Jens Pohl Dept. of Architectural Science, University of Sydney, Australia
88, 93, 94 & 95. Author's experiments
89. Spartell life-raft. Photo John Moss, courtesy *New Scientist*
90. BP advertisement, *Punch* 27/12/67
91. Airshelters Inc. 1800 Broadway, Buffalo, New York 14212
96. Drive-in house design by Michael Webb (AD 11/66 p. 573)



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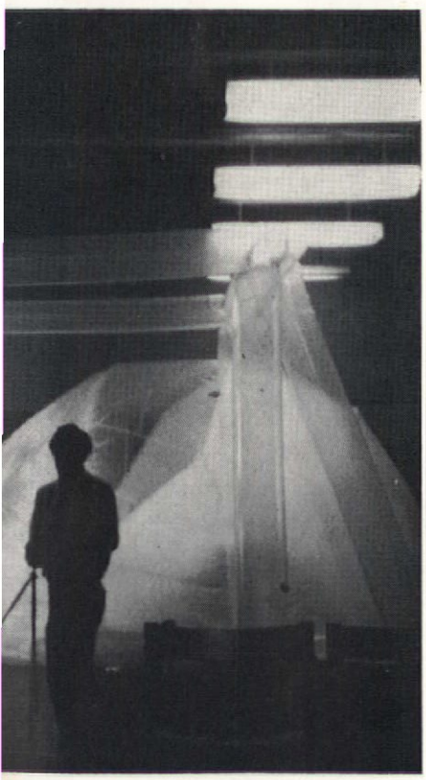

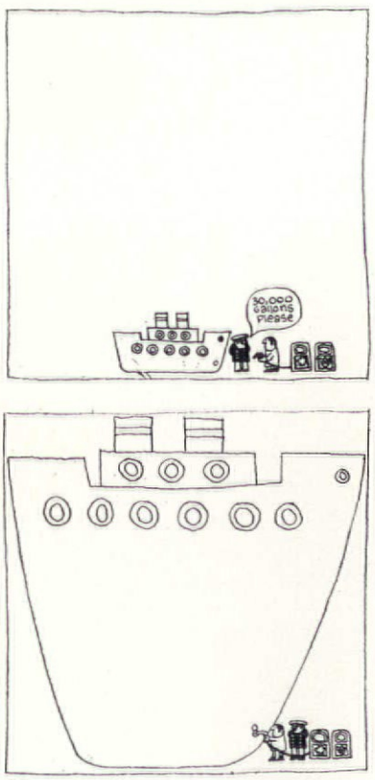

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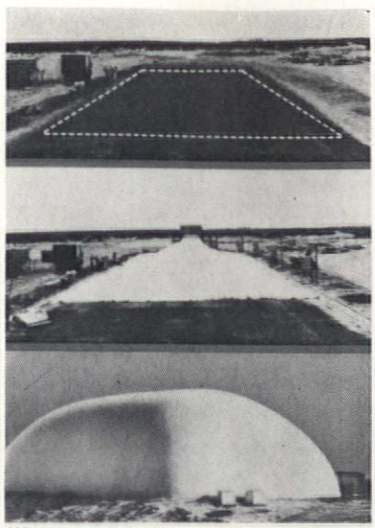

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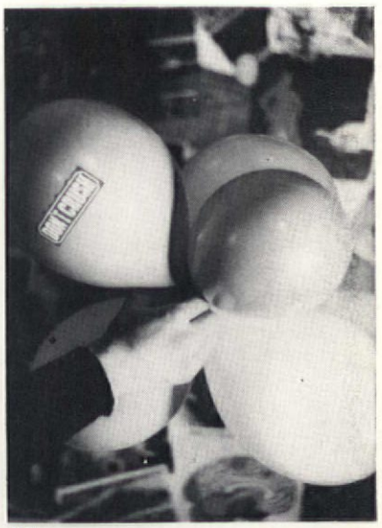

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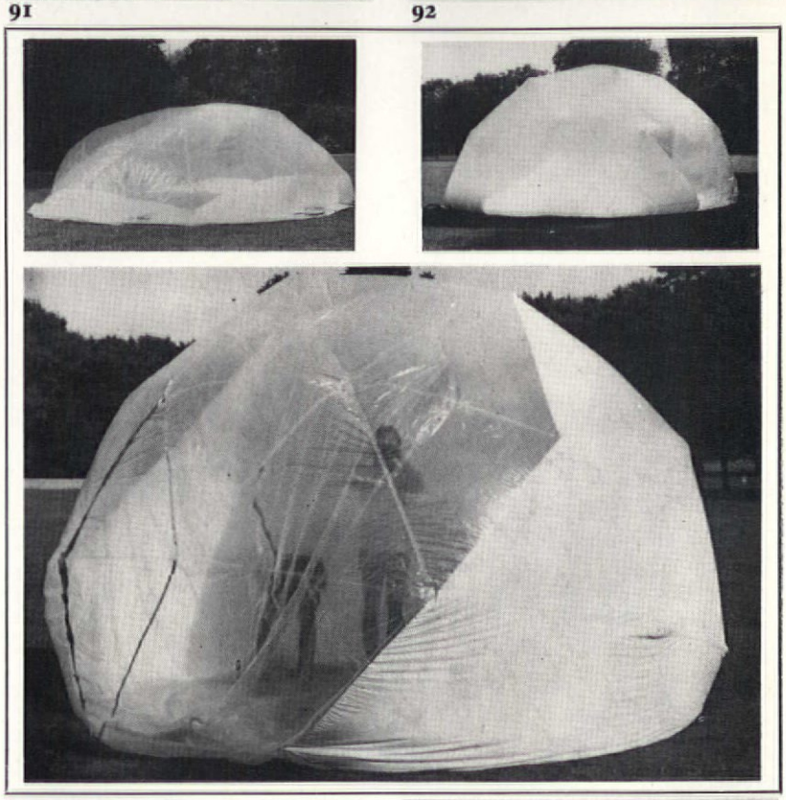
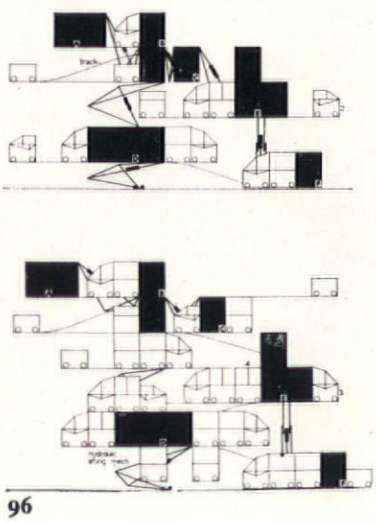


93, 94, 95



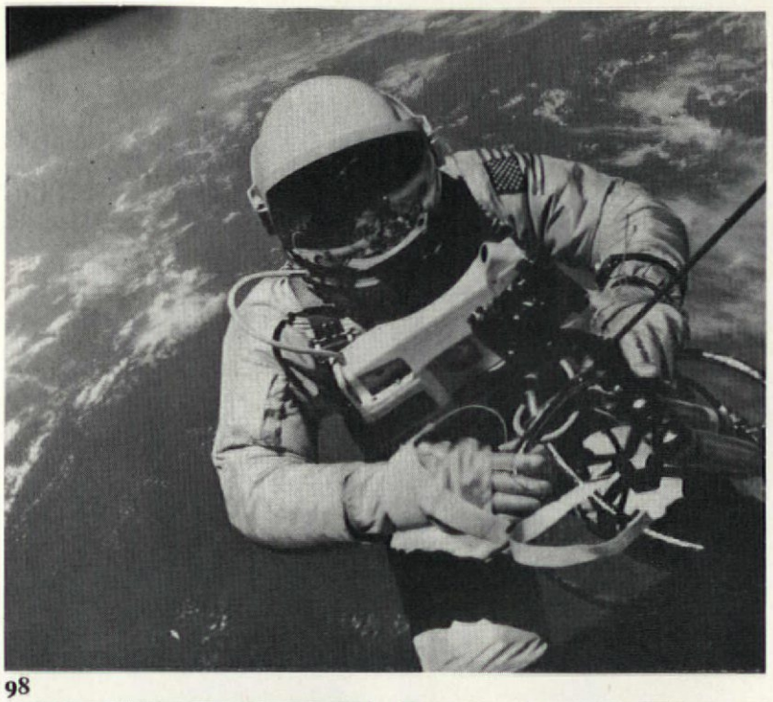
96

97

Control **98** can only be justified by resultant freedom **99**. The non-personalized environment is suspect.
Growing food in large-scale artificial climates requires precise overall control, but does not necessarily provide a human environment **101, 102**.
One should be able to select and regulate one's immediate environment, **100, 103, 104** even if there is generalized control **105**.

HIGH AMENITY

What can pneumatics offer in furthering the relationship between environmental control and the individual?
They could act as sophisticated mechanisms for controlling heat, light and sound, rather than a basic enclosure with control equipment inside.
The most sophisticated work in this field has been carried out by Nikolaus Laing **106, 107**, who has designed a multi-layer skin system incorporating heat-reflecting and heat-absorbing elements, which can be dynamically controlled solely by air pressure. These regulate precisely air temperature, light, humidity, rainfall and air circulation, with solar radiation as the only energy input, except for negligible amounts of subsidiary energy for control purposes (air pressure to deploy the membrane elements).
Tropical climates can be created in Newfoundland, and zero temperatures in the Sahara. . . . extending the human habitat beyond the presently favoured regions.
There could be one cheap and portable element combining all the functions of the usual climatic control environmongery. 269▷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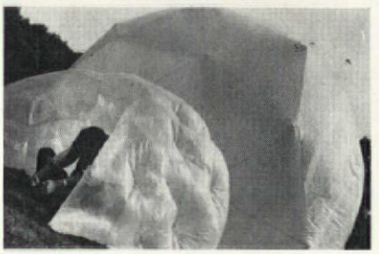
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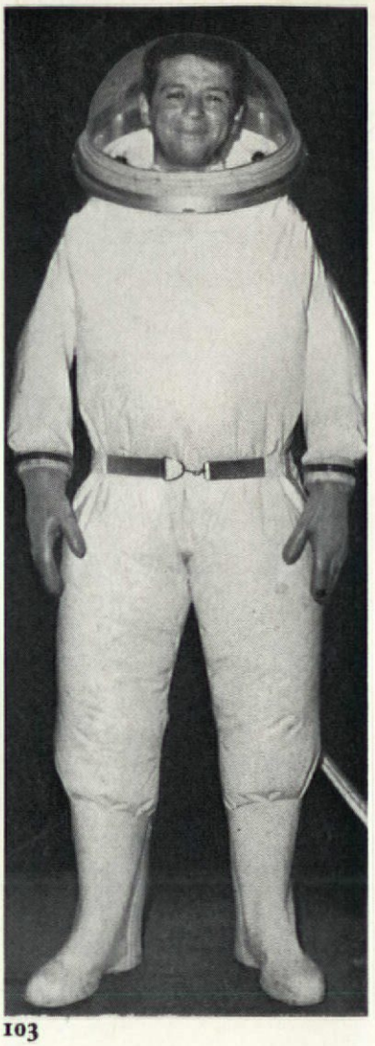
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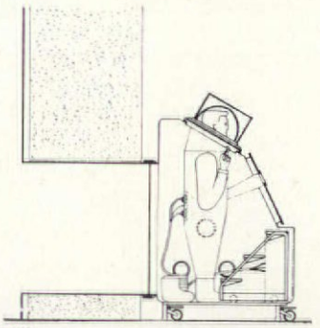
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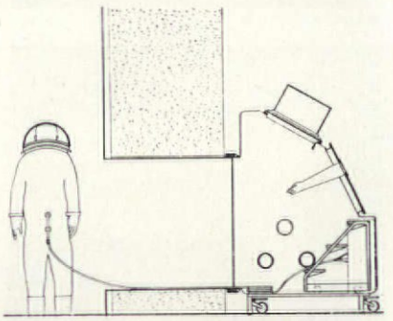
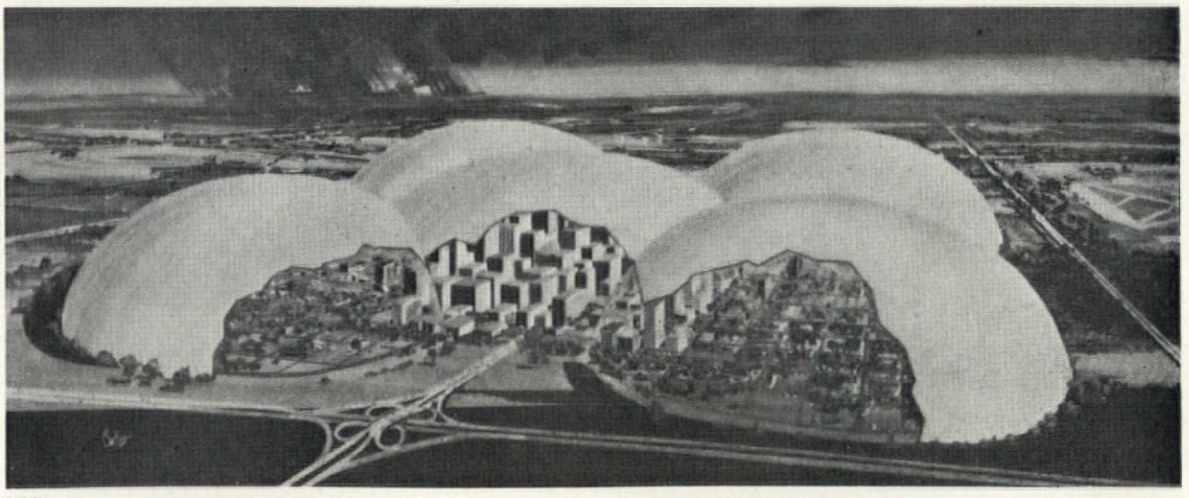
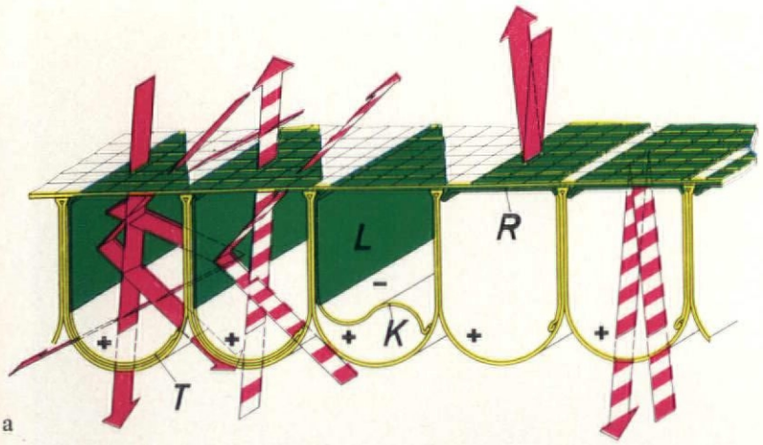



105

101. Palm House, Kew Gardens, London
102. Photo collage of large greenhouse covering forest. A cable net roof lined with clear plastic foil whose transparency will vary according to the degree of solar radiation. Fresh air must be constantly blown in and when necessary can be warmed by the opposing stream of extract air
103 & 104. Mobile airlock, permitting passage from uncontrolled environment to controlled (contaminated) zone
105. Application of Laing's climatic control system to a city project

98. National Aeronautics and Space Association, 400 Maryland Avenue, SW Washington DC, USA
102. Frei Otto. See 'Frei Otto's Pneumatic Structures'. Conrad Roland, AD 7/66
103 & 104. La Calhène, 5 bis, Rue Daniel-Baron, 92, Bezons, France
105, 106 & 107. N. Laing. 'The use of solar sky radiation for air conditioning of pneumatic structures' from *Report of the proceedings of the First International Colloquium on Pneumatic Structures, 1967*, University of Stuttgart. Published for the International Association of Shell Structures by Institut für Modellstatik, Technische Hochschule, 7 Stuttgart, Postfach 560, W. Germany



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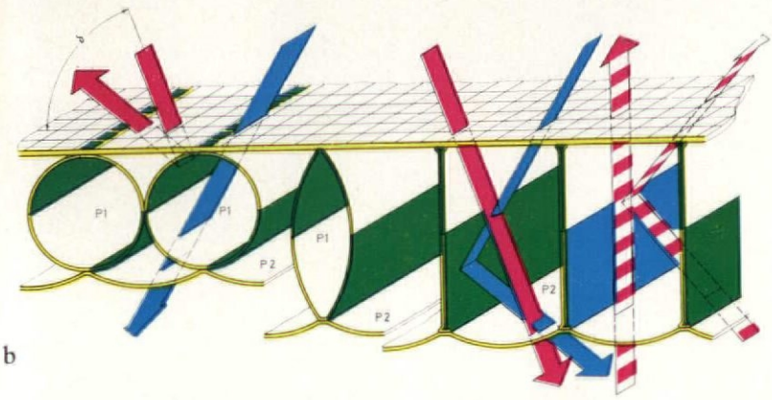

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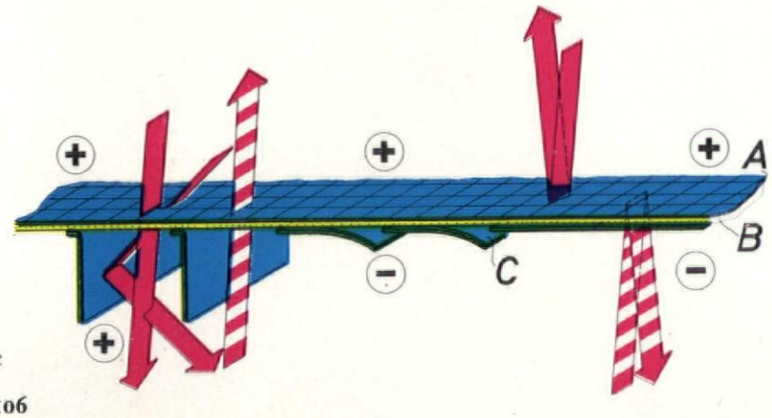

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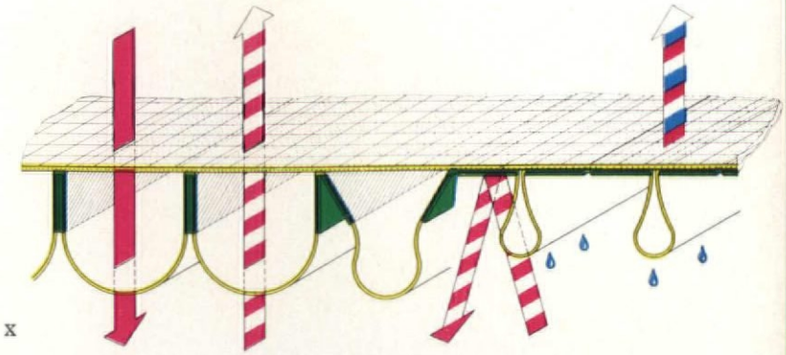
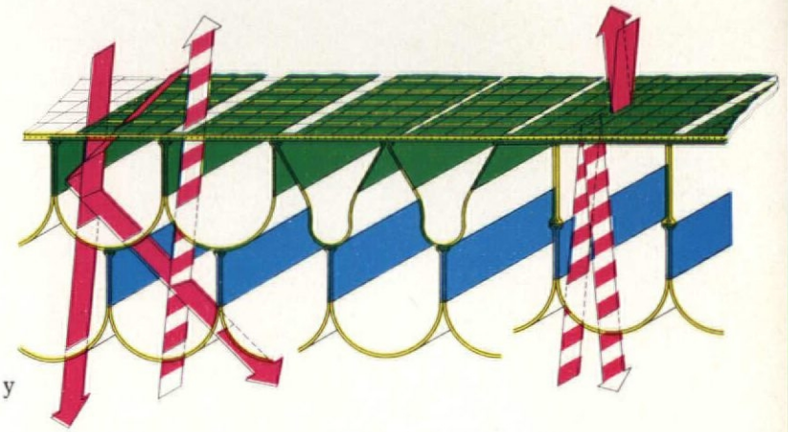
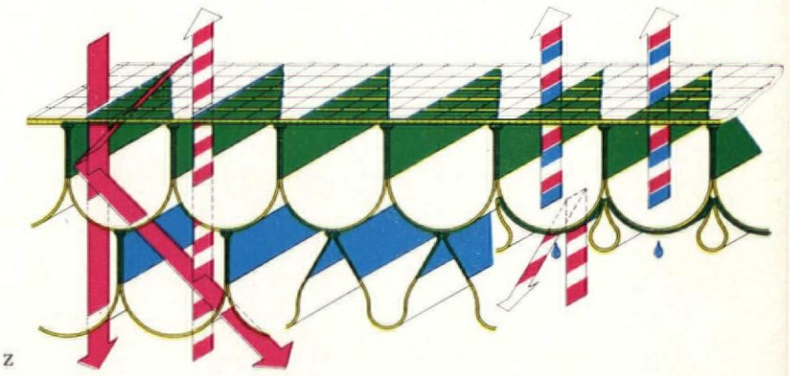


x



y



z

107

106a. Wall element with pneumatically operated folding film K inside the air chamber L, on the left in 'transmission' position T, on the right in 'reflection' position R. (Markings: yellow = transparent film, green = reflecting metal coating, solid red arrows = solar radiation, dotted red arrows = ground-radiation

106b. Wall design incorporating cylindrical air chambers P_1 reflecting the total direct insulation up to a maximum angle of altitude δ. They are partly metallized and at the same time transmit the diffuse sky radiation. If the chambers P_1 are deflated, the wall element is highly transmissive

106c. Electrostatically controlled wall design:
A = transparent, conductive outside layer
B = insulating, transparent support layer
C = metallized folding layer.
If A & C are equally charged electrically C assumes a vertical position (thus realizing full transparency); if the charge is opposite, C will cling to B (thus realizing complete reflection)

107x. Pneumatically controlled wall design which in 'closed' position (to the right) turns a reflective surface to the outside. The strong cooling effect of this wall during the night by ground radiation will induce the condensation of water inside the building

107y. Dual chamber system providing increased heat insulation

107z. The same chamber system in a position to produce black body effect during the night, similar to 107x

If a dynamic air-pocket system can regulate solar radiation, heat loss, and humidity, could it not act also as a communications and entertainment medium and a mood stimulus **108, 109, 110, 111**, thus providing a more beneficial interaction between the individual and his immediate environment.

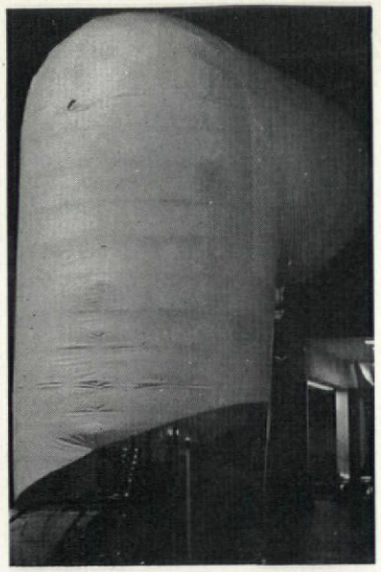
FRAGMENTATION FOR FREEDOM

Energy supply to pneumatic structures, or part structures, should not limit the choice of location **112, 114, 115.**
Solar radiation, wind, magnetic fields and electro-magnetic waves (radio communications) are world-embracing networks **113, 116.**
Technology is now beginning to harness these as energy sources **117.**
The increasing development of portable living equipment **118, 119** will allow a wider variety of experience and pleasure through changing location.

271▷

109. Relaxation cabin. Adjustable on two rollers. Container houses sound and projection apparatus as well as the structure before inflation. The patient reclines inside, being soothed or stimulated by appropriate audio-visual effects
113. Global satellite communications. Travel and keep in touch
114. Hoverplane with pneumatic landing pad can land anywhere
115. Hovercraft as image of free-to-roam movement system
116. Radio wave receiving dish
117. Solar radiation collector
118. 300W portable generator

108



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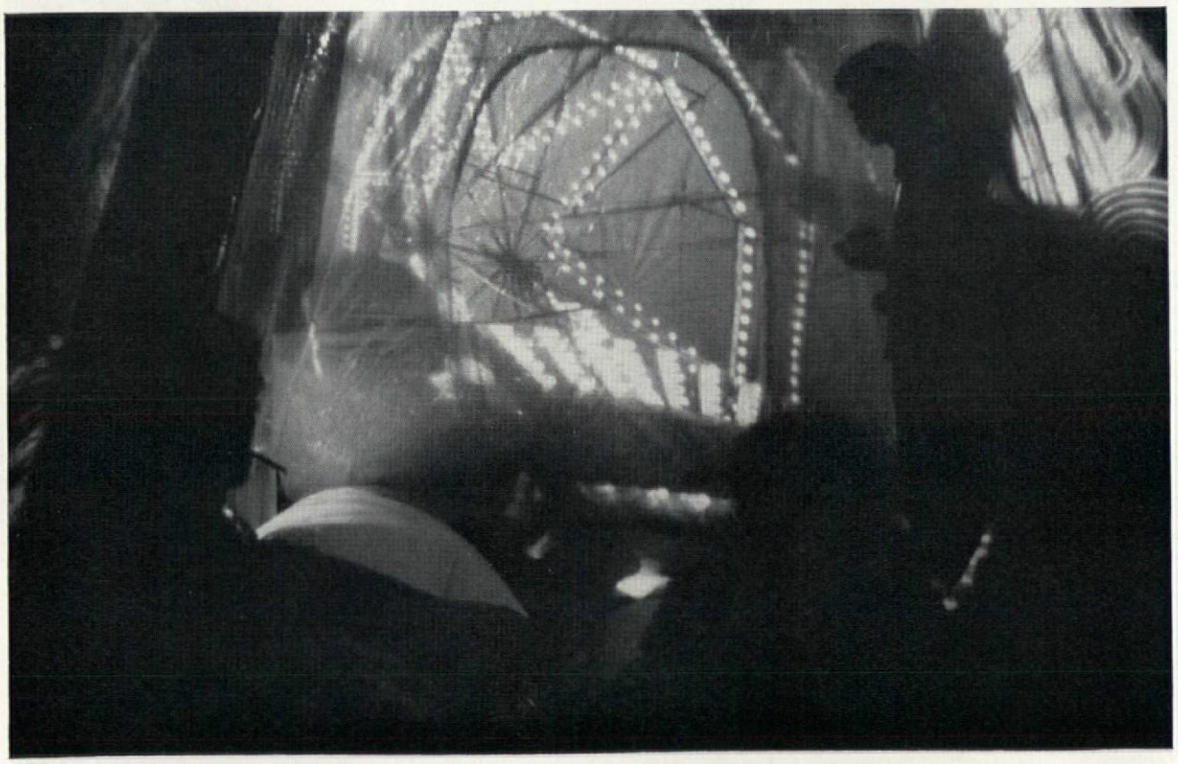
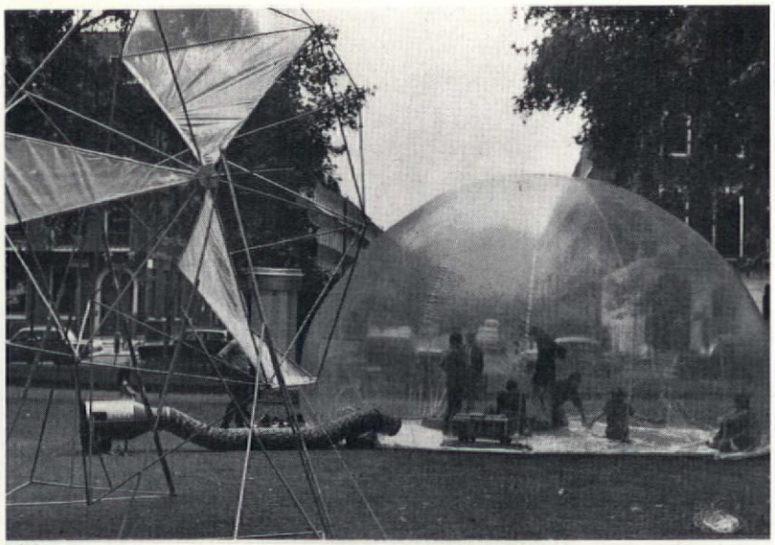


111

108. Mother of the Arts, by Piers Gough. AA
109. Inflatable PVC structure for audio-visual effects, Hans Walter Muller
110, 111. Authors' experiments
112. Windmill by Veronica Hasilow and Ed Tillotson. Photo, Keith Critchlow. *Nova* dome Peter Murray and Tony Gwilliam
113. Communications Satellite Corp. USA
114. Bell Aerosystems. Industrial Design 9. 1967
115. Photo J. Czaky. Saunders-Roe, Cowes, Isle of Wight
118. Honda (UK) Ltd., Power Road, London, W24
119. Margaret Duckett. Courtesy of *Weekend Telegraph*



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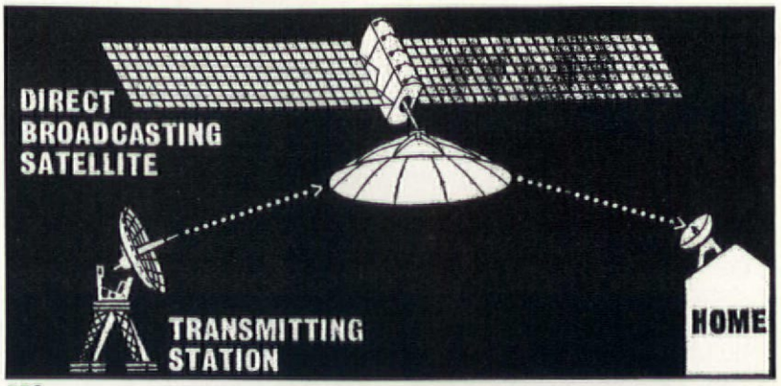

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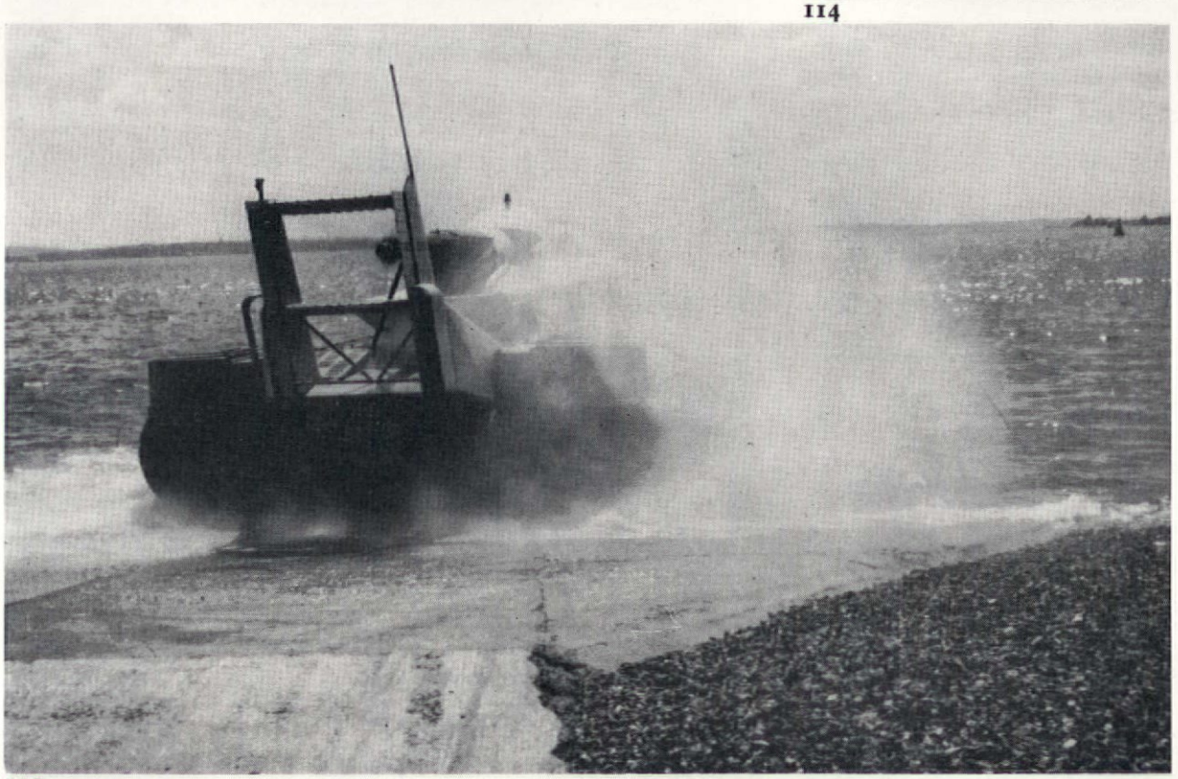

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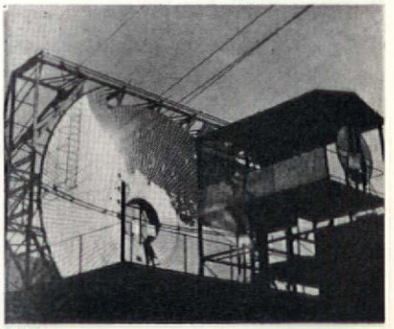


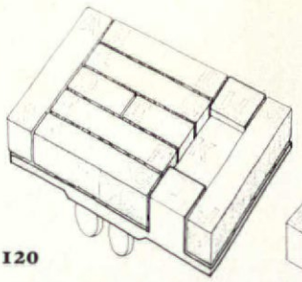
117

118

119

The potential of pneumatics as instant variable volume packages capable of providing high control and response to demand, could realize the concept of nomadic existence as elements within a kit of other high amenity systems. . . . jet-pack, hoverdeck, air-floor, cybernet, energy sponge, power pack, exoskeleton (what about the camel?), and cheese spread. Hard and soft utilibles for the developing nomad.

In order to relate the current vocabulary of communications equipment, pneumatic elements, flexible frameworks, travel hardware, etc., to our speculations and the immediate future, we are presently working on a high-amenity amoebic kit with which we shall travel Europe **120, 121, 124**. The single element enclosure becomes irrelevant when thinking in terms of a kit of metamorphic parts, and maybe the kit itself becomes transmutable when the parts are less than tangible. □



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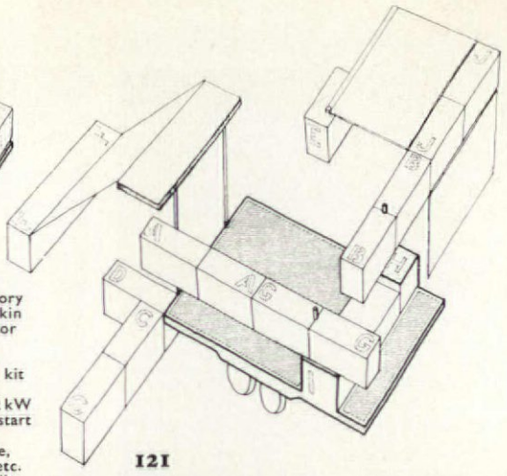
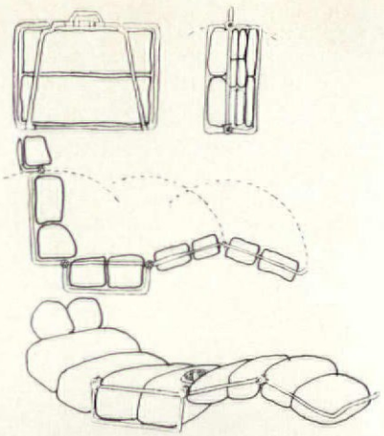


121

MULTI-USE FRAMEWORKS: Inventory
A Boom extension module: 1 single skin 1 ribbed frame screen. 1 auto projector
B Boom fulcrum module: tools & materials for inflatables, selling stock
C Living equipment module: comfort kit lilos, pneuseats, sleepbags, clothing
D Main generator module: generator 2 kW
E Portable generators module: hand start 300 w cables, extinguisher, etc.
F Living equipment module: hardware, cook, ablute, foodstore, Gaz, water, etc.
G Boom fulcrum module: cushion walls, awnings, auto projector, speakers
H Mast platform: pipe Meccano, hydrogen cylinders, tools
I Mast platform: electrical equipment, air blowers, cables lighting
J Boom extension module: cushion screen, 1 ribbed enclosure, 1 auto projector
K Control/performance module: tape decks, amplifiers, 'gram, remotes, etc.



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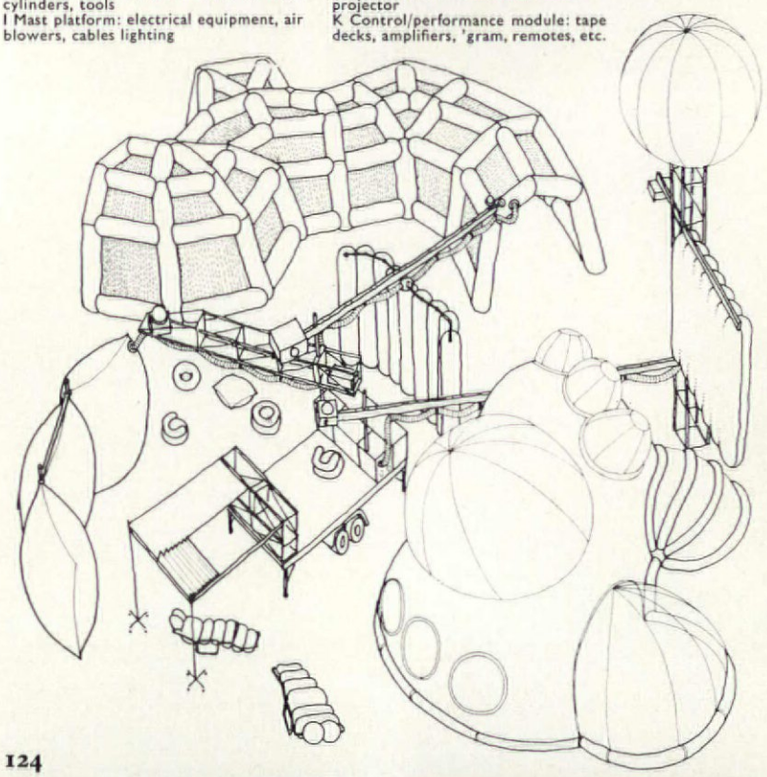

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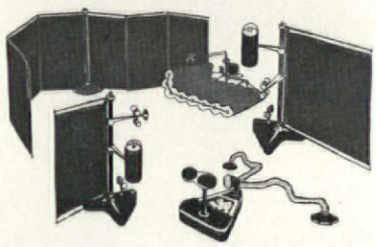

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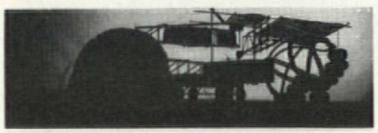

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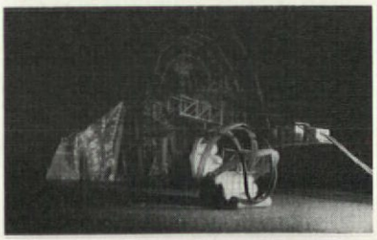

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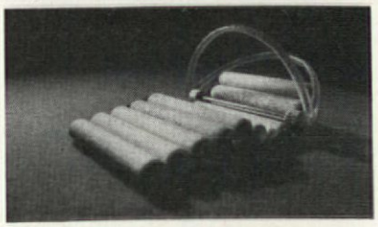

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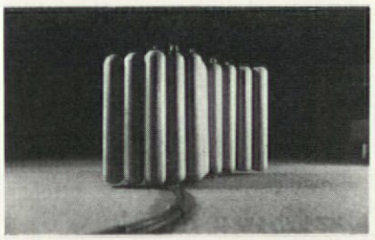

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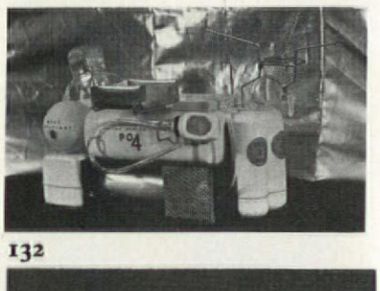


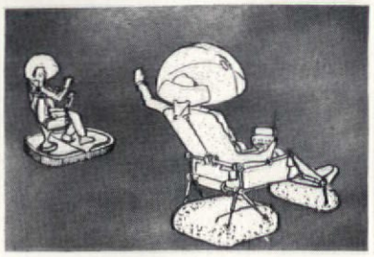
132

133

120, 121. Sketches of trailer element, folded and unfolded, for the authors' proposed mobile living/fair
122. Pneumatic couch and services appliance designed to fold into a suitcase, used in the living/fair
123. Interacting living and display elements for the living/fair
124. Sketch of the living/fair
125–129. Models of the separate elements of the living/fair and their arrangement in combination
130. Magic carpet living, with directional air-jets for support and levitation and even for enclosure
131, 132, 133. Models of an inflatable camper, consisting of an inflated double-walled dome and a miniaturized high-performance servicing package, 2ft 3in × 2ft 0in × 1ft 0in. The total package contains the aluminium impregnated plastic dome, a pressurized water tank, a ventilation, heating and cooling and secondary inflation system, an inflatable floor, a sink, a chemical waste-disposal unit, gas cooker, personal foam cleaning equipment
134. Rocket belt, invented by W. F. Moore, manufactured by Textron's Bell Aerosystems Co.
135. High amenity travelling chair on traction and suspension cushions
136. Exoskeleton harness, designed to pick up motor impulses from nerves *and* muscles and to feed them into artificial muscles
137. Overcoat with zipped-in inflatable seating
138. Picturephone, transmitting a visual image as well as sound
139. Suitaloon, a development of the cushicle (see *AD* 11/66, p. 576)
140. Flooring box partially unfolded
141. Flooring panel fully formed with living envelope partially inflated
142. Flooring panel fully formed, living envelope fully inflated and inhabitant plugged in at power connexion point in preparation for exploded entry
143. Suitaloon with rider in pressurized service suit in travelling position
144. Suitaloon pivoted to deposit rider
145. Boy meets girl, both in high-pressurized service suit. Plugging-in their respective power points results in an explosive merger

120–129. Authors' experiments
130. Mike Webb, Virginia Polytechnic Institute, Blacksburg, Va USA
131–133. Project by John Bradford and Charles Ansell, students at Virginia Polytechnic Institute, Blacksburg
134. Bell Aerosystems Co.
135. Project by Mike Davies
136. Cornell Aeronautical Laboratories Inc.
137. Authors' project
138. Bell Telephone Laboratories
139–145. Mike Webb, Virginia Polytechnic, USA

134



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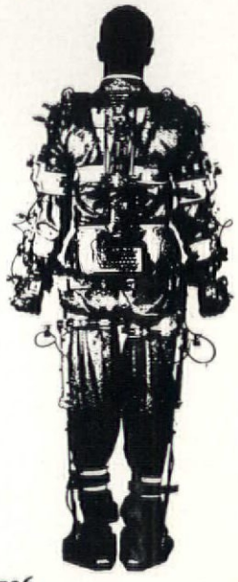

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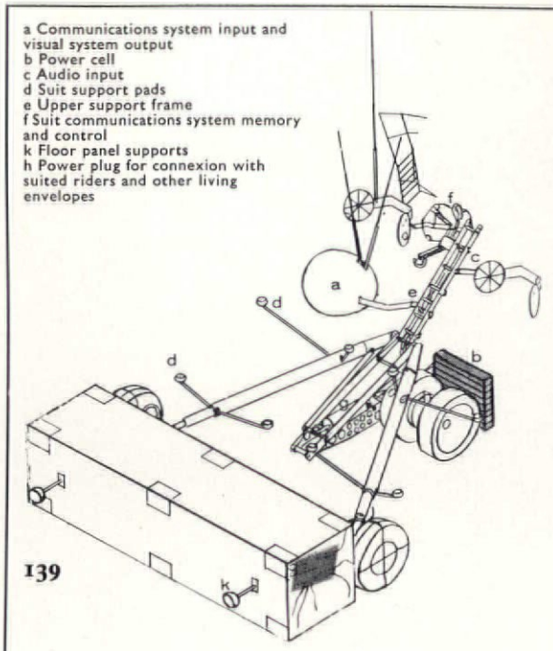
137

138

a Communications system input and visual system output
b Power cell
c Audio input
d Suit support pads
e Upper support frame
f Suit communications system memory and control
k Floor panel supports
h Power plug for connexion with suited riders and other living envelopes



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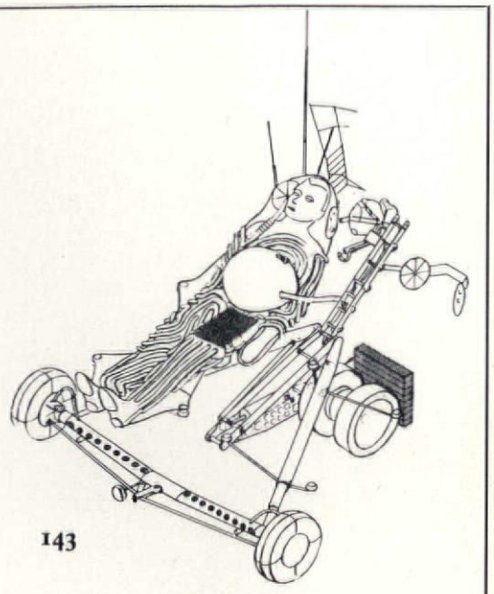

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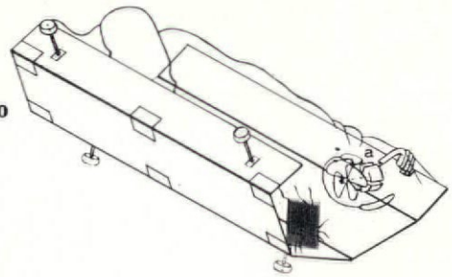

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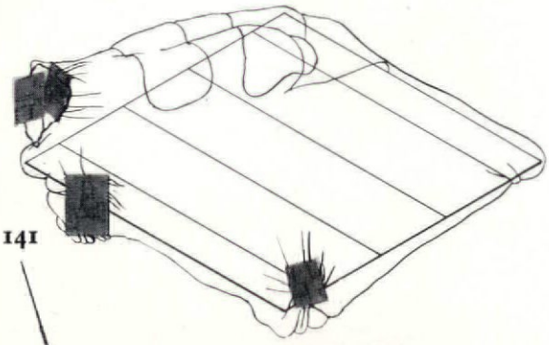

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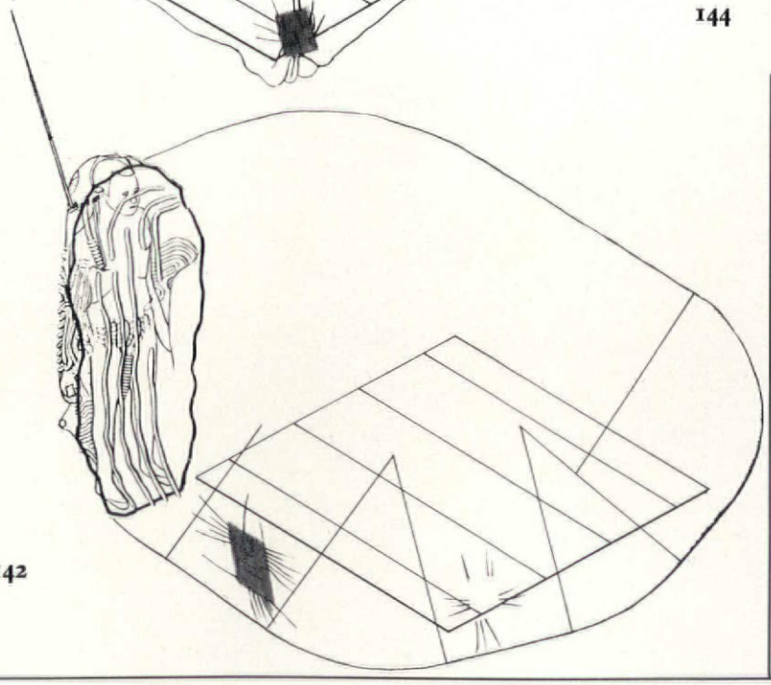

142

a Sensor and service network
b Automatic connectors to suit support pads
c Communication system
d Manual control
e Visual communication

145

Clothing for living in—or if it wasn't for my suitaloon I would have to buy a house

The space suit could be identified as a minimal house. In the previous cushicle (*AD* 11/66, p. 576), the environment for the rider was provided by the cushicle—a mechanism like a car. In this project the suit itself provides all the necessary services the cushicle being the source of (*a*) movement, (*b*) a larger envelope than the suit can provide, (*c*) power. Each suit has a plug serving a similar function as the key to your front door. You can plug into your friend and you will both be in one envelope, or you can plug into any envelope, stepping out of your suit, the suit being left clipped onto the outside ready to step into when you leave. The plug also serves as a means of connecting envelopes together to form larger spaces.

The cushicle shown is for one rider only, various models of cushicle envelope and suit would of course be available ranging from your super sports to family models. *Mike Webb.*

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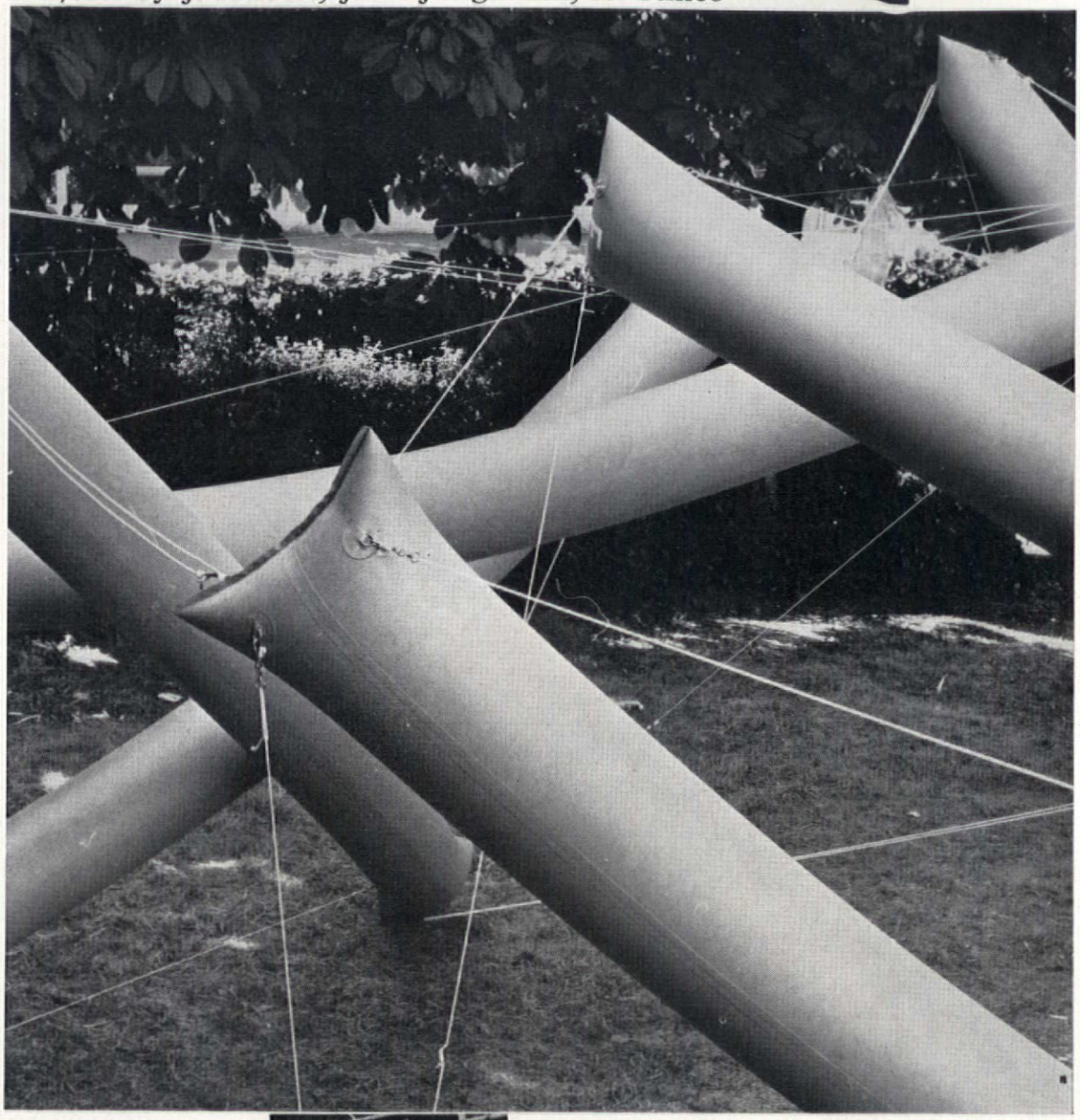
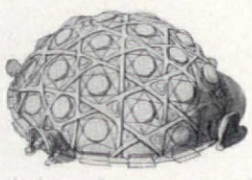
THE QUEEN'S AWARD TO INDUSTRY 1967

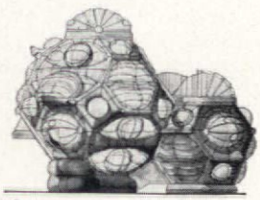
MFA 2

LA PNEUMATIQUE

Projects by J. Aubert, J. P. Jungmann, A. Stinco







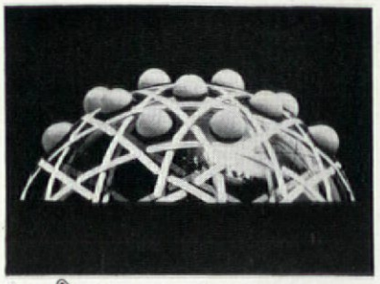
Aubert, Jungmann and Stinco were the organizers of the spectacular *Structures gonflables* exhibition held at the Musée d'Art Moderne in Paris last March. But their greater claim to recognition is as members of the *Utopie* group, who have swiftly established themselves as the French architectural conscience. The first issue of their review—a review of urban sociology—was published in May 1967, revealing an agonized, tortured questioning of all established architectural values. Everything that they had been taught has had to be tested in the light of firmly held social ideals. Their utopian credo is to be read as rallying call for a new idealism in architecture; it is *not* intended as an excuse for other-worldly fantasy in design. Indeed so stringent are their ideals for the new architecture (read Aubert's article on page 254 of this issue) that it is something of a surprise that they are willing and able to design anything at all. Yet they have committed themselves—and explained their commitment at great length in the review—in the proposals illustrated overleaf. Blow-up expendability is their present prospect. ▷

TRAVELLING THEATRE

J. Aubert

A demountable easily transported theatre, music hall, circus or cinema for an audience of 5000. The structure is a self-supporting dome (80 metres diameter, 27 m high) made up of inflated tubes arranged in geodesic pattern. The tubes are incorporated in the canvas covering. The weight of the superstructure is 16·5 tons; the total weight of all the elements is 24·5 tons. These are to be transported on a fleet of 31 trucks, some of which are fitted as offices, service units and changing and cloak rooms.

1 Model showing the structural pattern of the tubular elements and inflated spheres which act as stiffeners.
2 Plans and sections of panels
3 Plans of the basic tubular ribs, in isolation and in geodesic pattern
4 Composed structural elements
5 & 6 Perspective and section of junction between the tubular structural elements and the infilling panels
7 Junction of tubular elements
8 Jointing detail
9 Plan of theatre and trucks
10 Isometric of inflatable tiers
11 Perspective of pneumatic canopy
12 Cross-section through dome
13 Perspective sketch of dome



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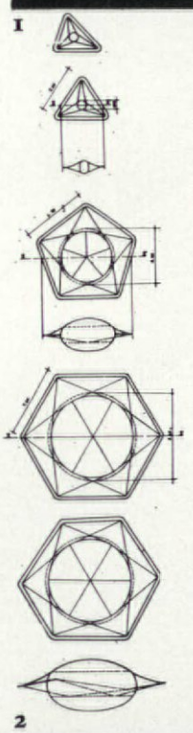

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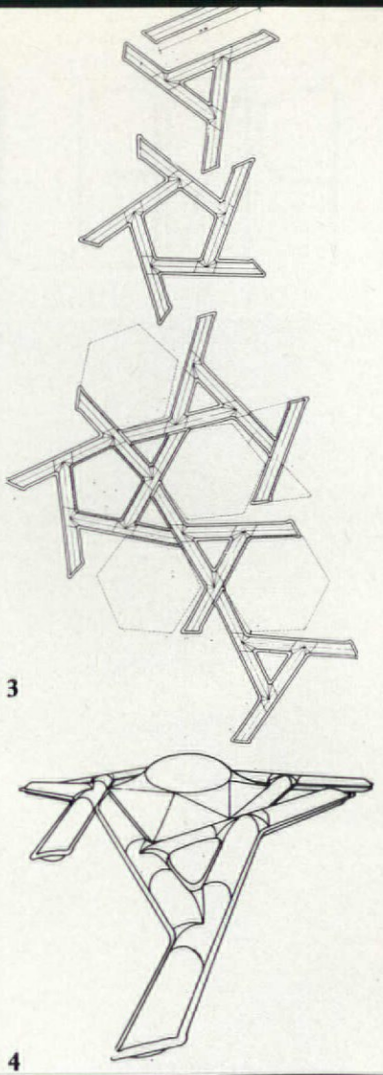

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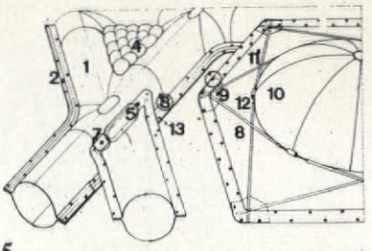

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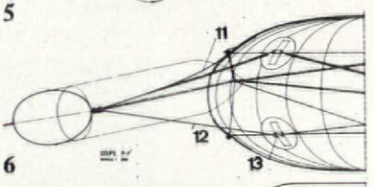

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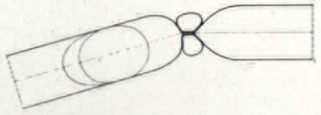
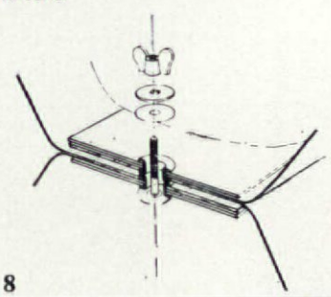


7

1 Inflated tubular element
2 Edge and joint reinforcing
3 Adhesive tape
4 Reinforcing mattress
5 Compressed-air-cushion
6 Eyelet and butterfly nut joint
7 Screw fastening
8 Covering fabric coated on both sides with a synthetic elastomer
9 Reinforced gusset
10 Inflated sphere designed as a stiffener
11 Polyester/polymide reinforcing cable
12 Conduit for the reinforcing cable
13 Valve



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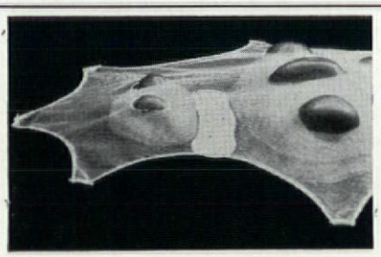
TRAVELLING HALL

A. Stinco

A transportable exhibition hall divided into two separate areas, the one for large scale exhibitions, the other for documentation and detailed information. The halls are formed of portions of spheres inflated internally to a pressure of about 50 gr/m². They are separated by an entrance chamber or lobby acting as an air-lock. Inflated ribs form the base of the two halls and serve to stabilize both the shape and the structure. The ribs are secured by cables to the tented covering of the whole, which is laid out and positioned in part by means of water-filled balloons, in part by the transportation trucks, before the membranes of the halls themselves are inflated. No anchorage to the ground is necessary.

14 Detail of model of travelling hall
15 Sketch of revolving door and junction with inflated base ribs
16 Sketch of roof-light acting as a lock between spherical vertical supports and the tented covering
17–23. Erection sequence
24 Ground plan of hall
25 Exploded diagram of halls, B documentation, A exhibition



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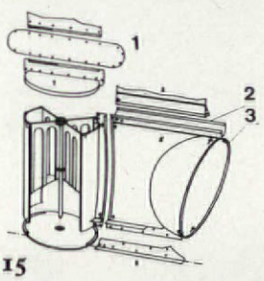

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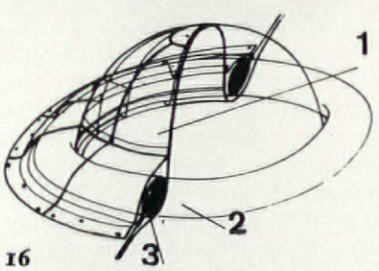
1 Cover pieces in PVC 5/10, fixed with butterfly screws, sealed with tape
2 Cover strip
3 Show-case:— PVC 5/10, sealed with nylon zipper



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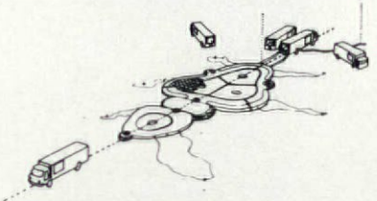
1 Dome PVC 3/10
2 Inflatable ring of synthetic fibre, neoprene coated
3 Fabric of synthetic polyester fibre, neoprene coated

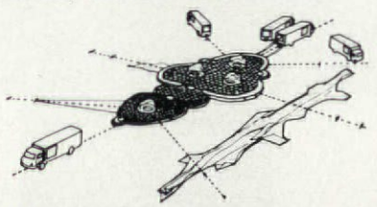


17

The axes of the hall are marked out on the ground. The flooring is laid. The ballast balloons are prepared and the trucks positioned. The base ribs of the halls are positioned and inflated. Subsidiary membranes are fixed to the ribs

18

The tented covering, in three sections, is laid out and joined



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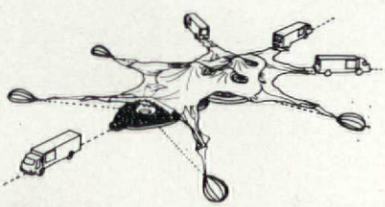
The tented covering is rolled aside. The supporting spheres and domes are inflated and fixed to the floor. Guide lines for the positioning of the cables are set up

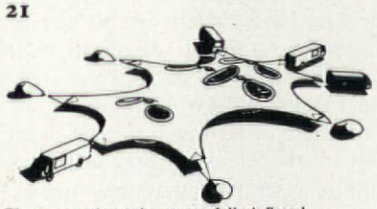


20

Ballast balloons are filled with water and trucks accurately positioned. The tented covering is set in place and fixed to the supporting spheres and domes

22

Exhibition cases are set up, doors and entrance lobbies installed. Ventilation ducts are introduced and all leakages sealed



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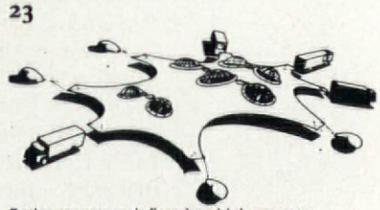
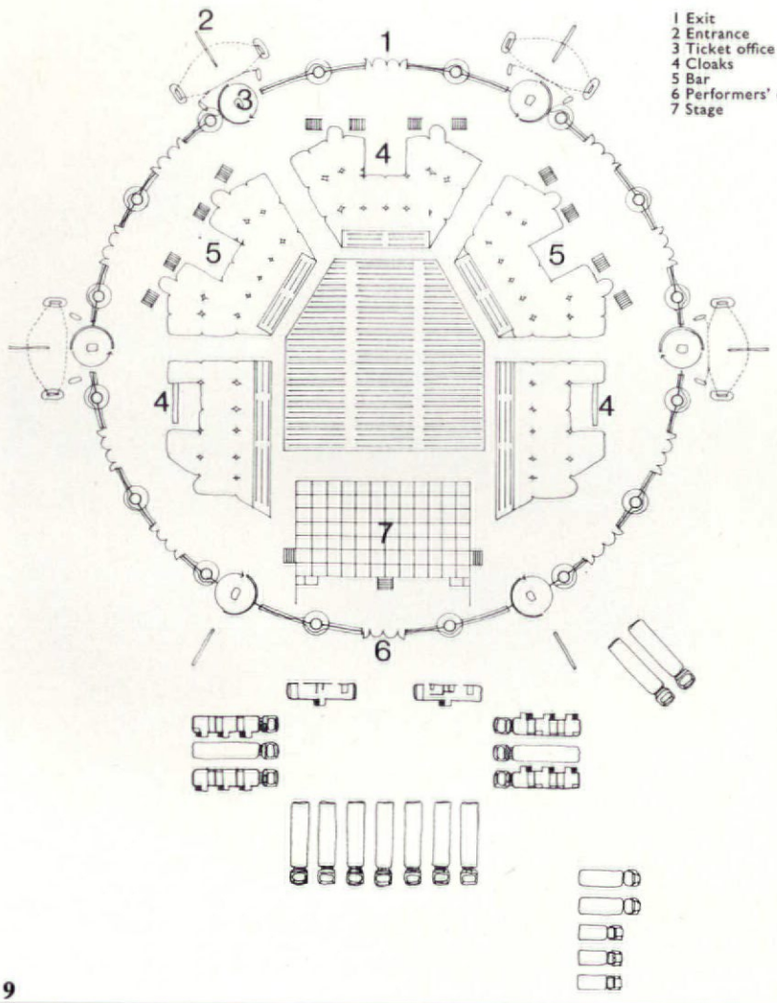
The supporting spheres are fully inflated, together with skylights and edge tubing. The tension in the tented covering is adjusted and final position of supporting cables fixed



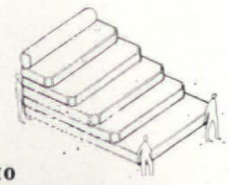
23

Entire structure inflated to high pressure



1 Exit
2 Entrance
3 Ticket office
4 Cloaks
5 Bar
6 Performers' entrance
7 Stage

9



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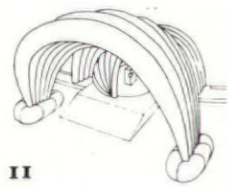

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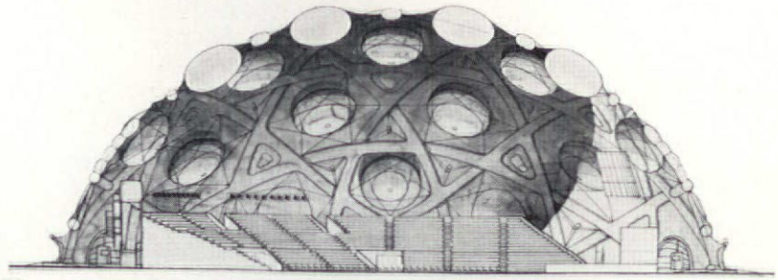

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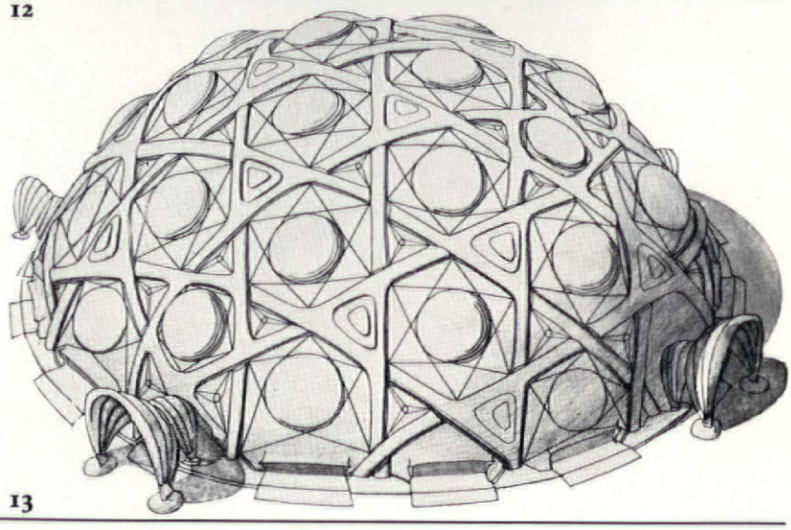

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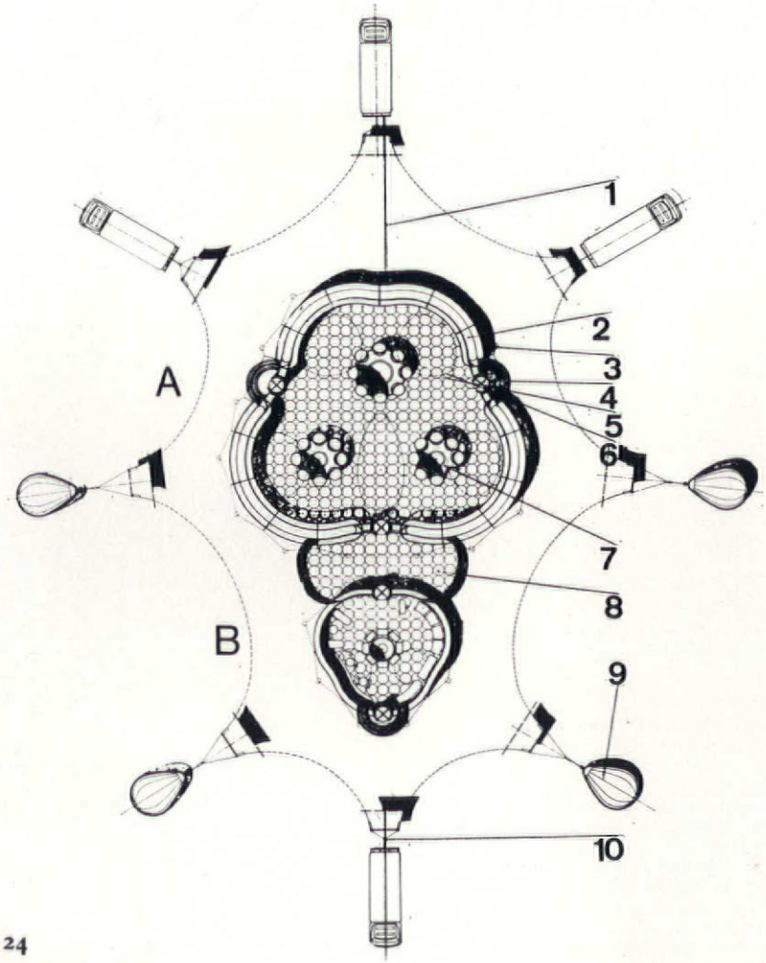

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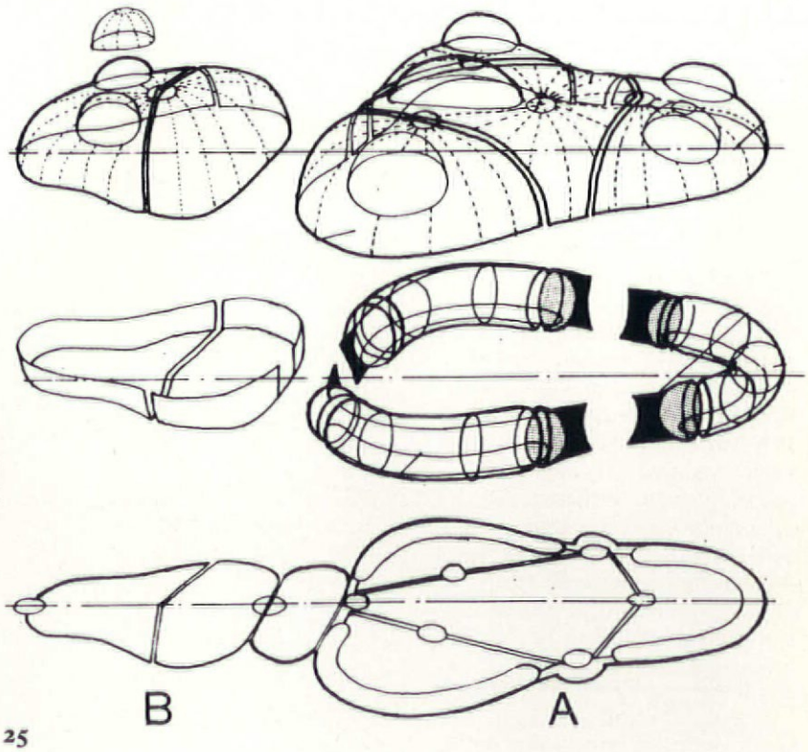


25

1 Tube for inflation from compressor truck
2 Inflated ribs with PVC show-cases attached
3 Cable links between ribs and tented covering
4 Air lock
5 Revolving doorway
6 Section through tented covering
7 Spherical support acting as a light well for attached show-cases
8 Cylindrical flooring drums
9 Water filled ballast balloons
10 Truck anchorage

PNEUMATIC FURNITURE

Aubert, Jungmann, Stinco

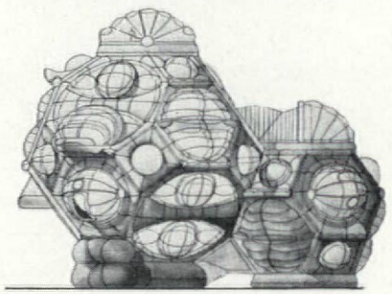
1 Part of a range of inflatable furniture made of variable and variously assembled elements, sold under the name AJS Aerolande at 4 rue d'Arsonval, Paris XV[e].

1

DYODON

J. P. Jungmann

An experimental pneumatic dwelling in which *everything* is inflatable—structure, membrane, flooring, partitioning, furniture and equipment. It is intended to provide a complete experience of the pneumatic-way-of-life. The whole is made up with transparent, translucent or opaque equal-sided panels, square, hexagonal and octagonal, forming a rhombicuboctahedron. The panels are filled with air, water, coloured gas, helium and even earth. Deflated, the component parts are easily transported. The house can be adapted to a wide range of climatic conditions, it can be buried in snow, it can be suspended or floated.



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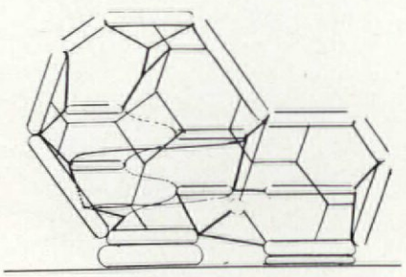
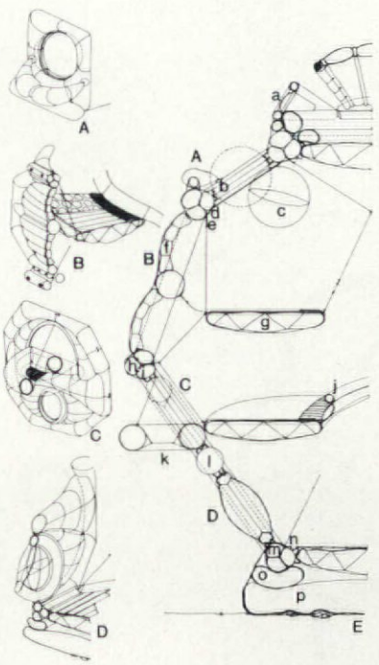
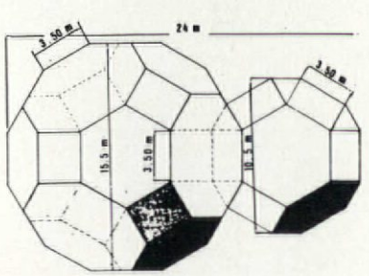




A Square window panel with access gallery
B Opaque octagonal panel with cross section through adjoining ramp
C Octagonal window panel with opening section
D Axonometric detail of junction between flooring foundation and base panels
E Foundation
a Porthole (plastic, removable)
b Reinforced, translucent plastic tubular frame
c Window sphere
d Compression ring
e Suspension cable
f Quilted infill panel
g Helicoidal ramp
h High pressure reinforcing rib
i Service duct with attached valves
j Tubular handrail
k Opening panel
l High-pressure bulb
m High-pressure framing
n Obturator
o Foundation levelling pad
p Ballasted foundation cushion

4



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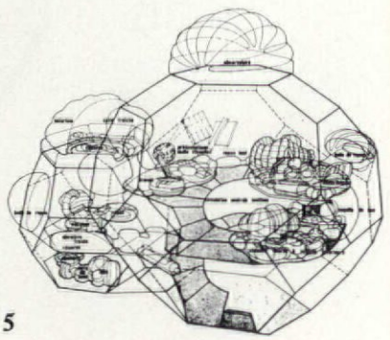

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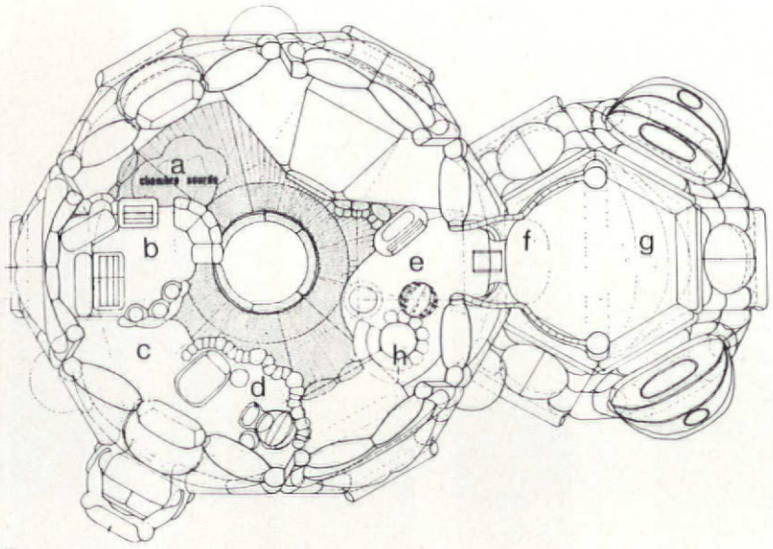
2 Side elevation
3 Elevation and plan showing the basic geometric construction of the Dyodon with equal sided square, hexagonal and octagonal panels
4 Detail section through the outer framework with perspective sketches of opening and viewing panels
5 Sketch showing the position of inflated service and furnishing elements within the Dyodon
6 Plan of an upper level
7 Cross section
8 The basic Dyodon dwelling shown with possible extensions around it
9 Dyodon suspended
10 Dyodon set in a terrain unapproachable by road
11 Dyodon set in a snow-bound terrain
12 Dyodon floating
13 Inflatable service and furnishing elements
14 Elevation
15 Perspective



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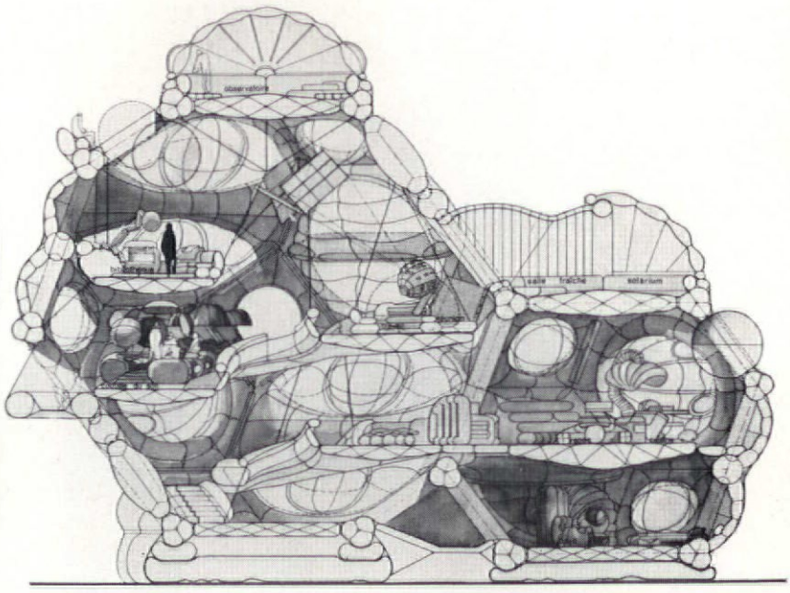
a Quiet area
b Library
c Upper sleeping area
d Bathroom
e Work
f Open-air room
g Solarium
h Living area



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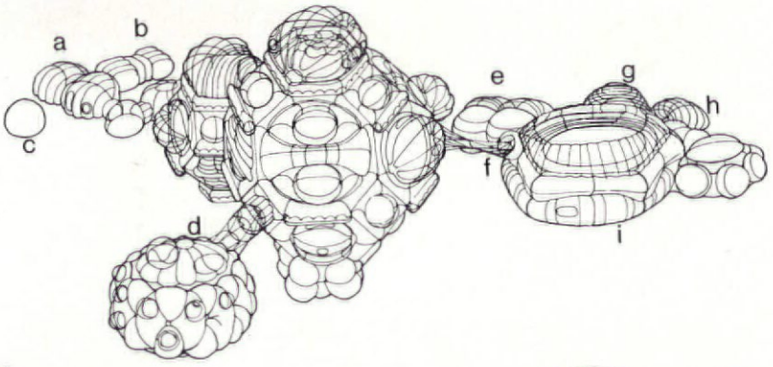
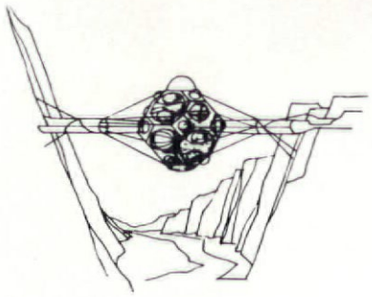


8

a Children
b Playroom
c Guest room
d Garden room
e Greenhouse
f Slide
g Tent
h Outdoor room
i Winter swimming bath



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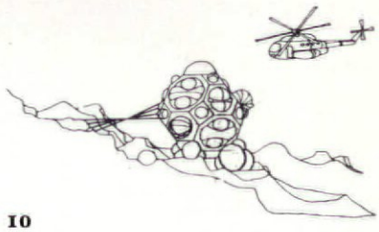

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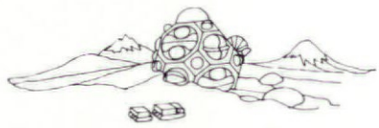

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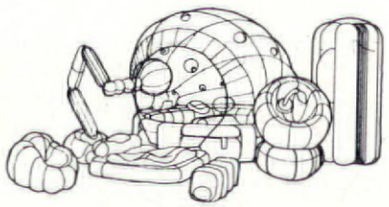

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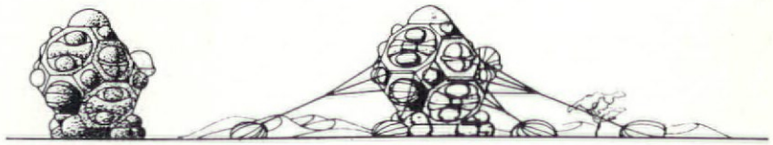

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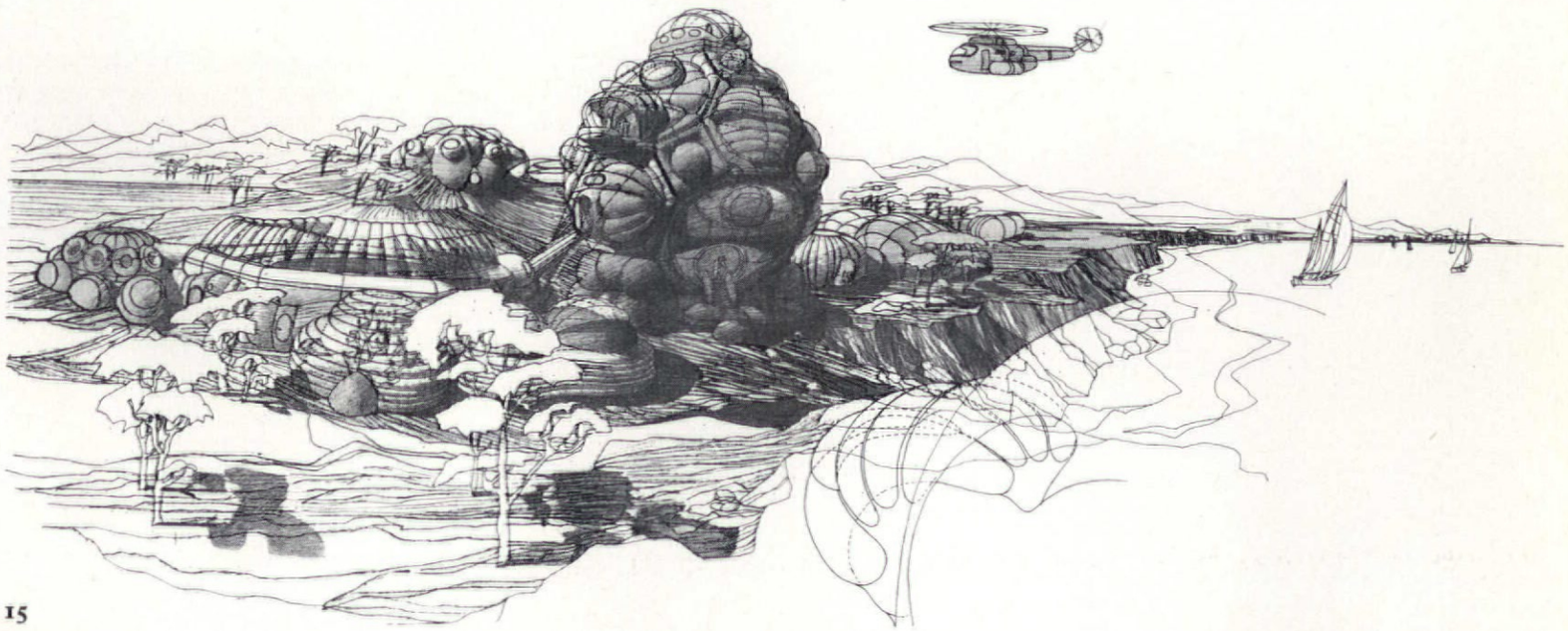

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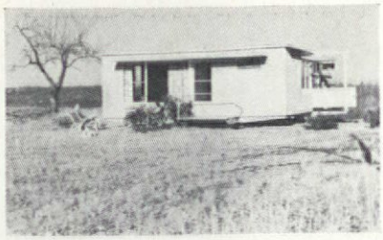


1

2

3

TECH

PHOTOGRAPH BY PHOKION KARAS

4

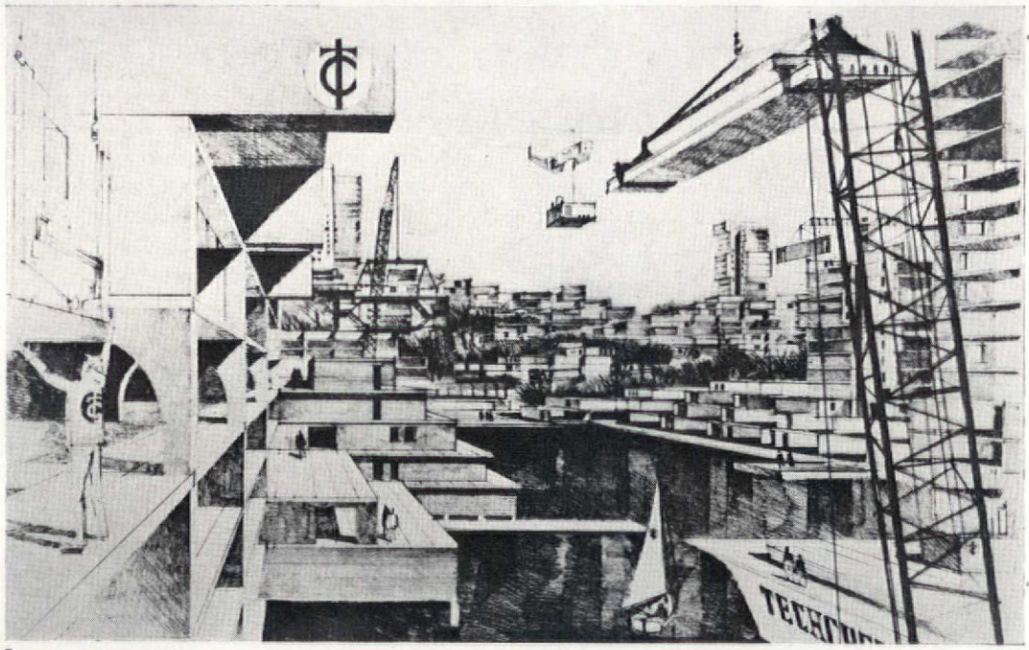
New industrialized building systems usually emerge with no documented research to justify their inception, inadequate prediction of the potential market, and no indication whatever of the cost advantages the system will offer over alternative methods of construction.

It is therefore refreshing to record that an American system is now under development, for which the designers are proud to publish the very thorough studies preceding its production. The designer of the system, Carl Koch, has been a strong proponent of industrialized building, in one form or another, for over 25 years. His ingenious Acorn House suffered the fate that befalls many new innovations; it was commercially unsuccessful at the time, but the principles employed have since been used effectively by several commercial concerns. Later, his Techbuilt house relied more completely on factory produced components and achieved a fair measure of success.

CRETE

An American industrialized building system designed by Carl Koch and Associates, with Sepp Firnkas. Described by Alexander Pike

1
The Acorn House was delivered to the site with floor, roof and walls folded flat against a central utilities core. Erection consisted of placing the unit on prepared post foundations and unfolding to form the complete house. 1947
2, 3
Two views of Techbuilt houses. 1954
4
The first Techcrete development, 200 housing units in Washington Park, Roxbury, Boston. 1963
5
A possible Techcrete environment.



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The Techcrete system, designed by Carl Koch and Associates, with Sepp Firnkas as structural engineer, was first used in a project for 200 housing units in Washington Park, Roxbury. This development, and a subsequent second stage, drew the attention of two other organizations to the work. The Kaiser Industries Corporation, manufacturing and distributing steel, aluminium, chemicals, cement and gypsum, and participating in many building operations using these products, showed an interest in the project as part of their search for better methods for using their products and building more efficiently. The Battelle Memorial Institute, a non-profit making research and development organization with considerable experience in the construction field on mechanical engineering, construction materials and materials engineering, were also interested. They have recently completed an exhaustive study of building systems throughout the world. ▷

In October 1967 the US Department of Defense awarded a research contract to Carl Koch & Associates with the objective of determining the feasibility of obtaining a significant reduction in the unit cost of military family housing by the utilization of new materials, advanced technologies and other innovations, without reducing the quality or habitability evident in the present methods of military housing. Attention was also drawn to the applicability of any solution to the needs of urban mass housing.

It was clear that the objectives required by the Department called for an amalgamation of resources for the design, production, distribution and marketing of a building system. For this reason Kaiser Industries Corporation, Batelle Memorial Institute and Sepp Firnkas Engineering agreed to join with Carl Koch and Associates as sub-contractors to meet the objectives of the contract.

The self-evident truth, so frequently overlooked, that a significant reduction in the cost of housing is dependent upon a large, guaranteed and predictable market, was fortunately realized at the outset. The Department of Defence and other cooperating Government agencies of course recognized the importance of this requirement, and were in a position to satisfy it.

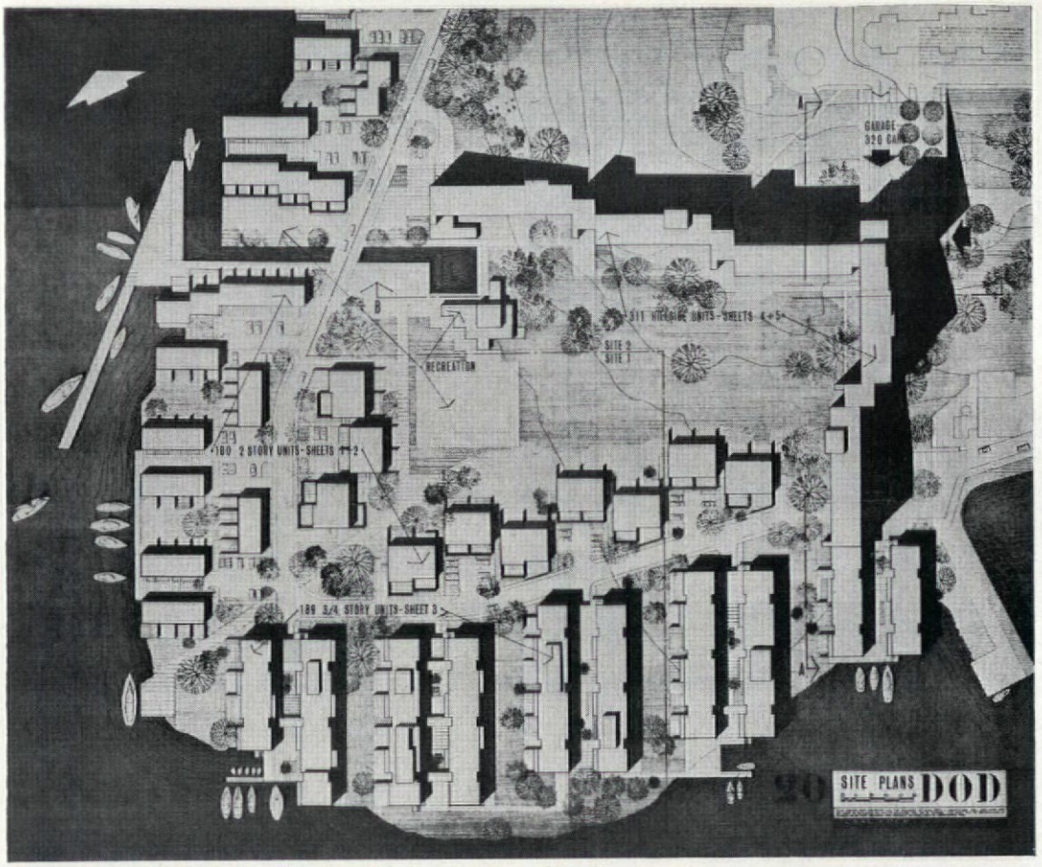
The second essential consideration for cost reductions was considered to be the development of a product flexible enough to meet the demands of the market, and at the same time standardized enough to be subject to effective mass-production and distribution, rational organization and rapid construction.

This problem has, in the past, always proved to be insurmountable, usually because the necessary large market did not exist, and therefore flexibility has had to be sacrificed to meet the limitations on tooling and capital expenditure.

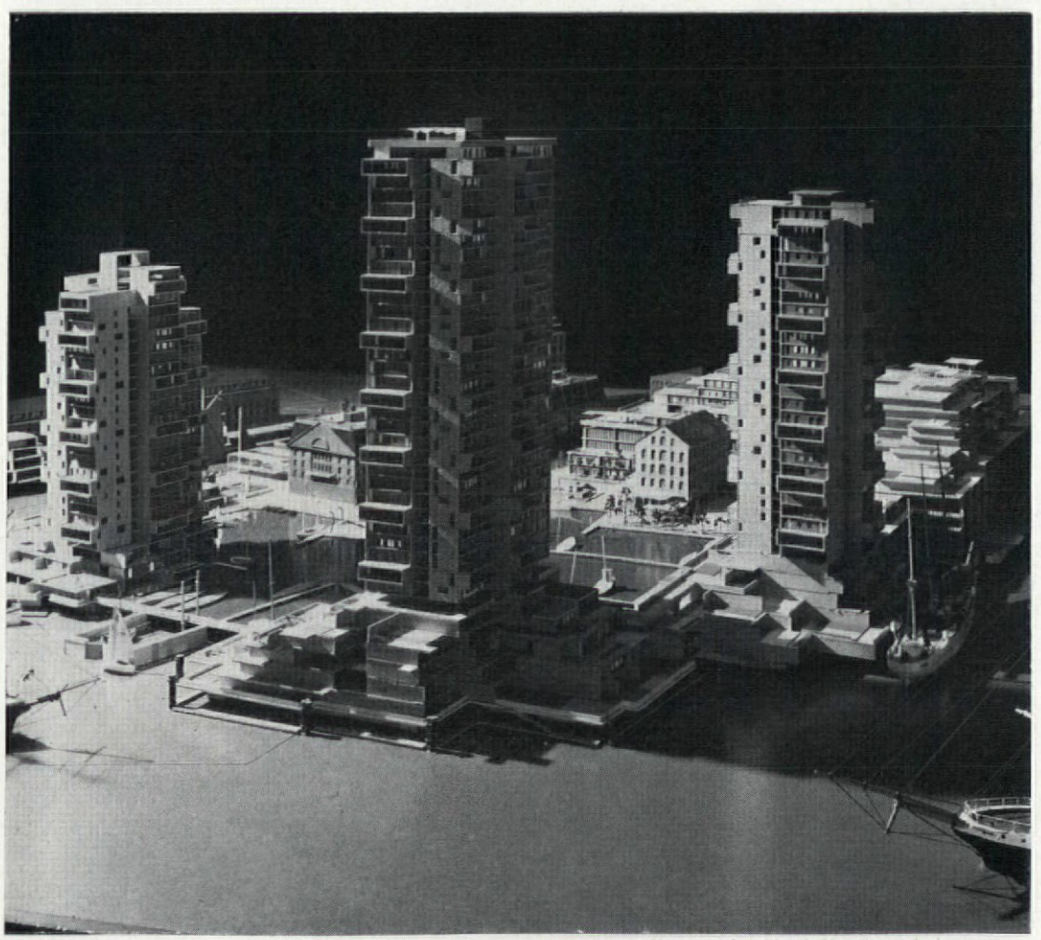
In this case, it was considered that a successful solution could be provided, and the contract is believed to be a necessary catalytic agent in providing a focus for a number of now unrelated, but relatable, innovative outputs.

Following the Second World War, the urgent demand for dwelling units, shortage of manpower, need for reduction of construction costs and need for rapid erection of building, has led to the increased adoption of building systems. Currently it appears that industrialized methods are being used for approximately 25 per cent of all the construction being put into place throughout Europe, and it has been estimated that by 1975 approximately 50 per cent of all construction will utilize industrialized systems. Many of the factors leading to the use of these systems in Europe are starting to emerge in the US, and it was felt at the outset of the project that a number of questions needed to be answered before a meaningful analysis could be made:

1. What is an industrialized building system?
2. What are the shortcomings of the European systems?
3. What is the current status of building systems in the US?



Project for mixed housing for the US Department of Defense.
Associates with Carl Koch on this project were Gardner Ertman, John Cummings, Leon Lipshutz, Margaret Ross, Urs Gouchat, William Schroeder.



Project for the redevelopment of Lewis and Sargent Wharves, Boston, by Carl Koch and Associates, using the Techcrete system. *Photo, George Zimberg*

4. Are the European systems applicable to the USA?

To answer these questions, a section of the research team was allocated for the task of investigating and evaluating many of the current building systems.

It is perhaps, due to the fact that it eludes definition, that the non-traditional building has acquired different names at different times. Prefabrication has given way to building systems, system building and industrialized building. In the context of the Techcrete project the definition for a building system is taken as 'the application of modern management techniques to coordinate design, manufacturing, site operations, and overall financial and managerial administration into a disciplined method of building'.

Analysis of the European systems showed that they were initiated by four different types of organization:

1. Contractors, such as Larsen and Neilson of Copenhagen.
2. Engineers, such as Camus of Paris.
3. Clients, such as the Greater London Council and the Ministry of Housing.
4. Manufacturers.

Several interesting facts emerged when a comparison was made of the European acceptance of the various building systems. For instance, the French systems appeared to dominate the market in West Germany, Italy and Belgium; but the UK was essentially domestic, with the only successful foreign system being Scandinavian. This was attributed in part to the fact that the Scandinavian systems have greater flexibility and architectural content.

Another significant factor was that the French systems were nearly all large concrete panel systems, and had load-bearing external walls and interior party walls, whereas the Scandinavian systems were usually of cross-wall construction. This enabled lightweight curtain wall or cladding panels to be used with the Scandinavian systems, allowing the architect more design flexibility. The major reason for the selection of this form of structure in Scandinavia appeared to be that the architect was more influential than in France.

Furthermore, it was felt that whilst the large panel systems, such as Camus, had been quite successful in France thus far, there were signs of an increasing demand for greater flexibility in design. This was substantiated by the progress of the Costamagna system, which is quite flexible, and requires only a low capital investment, since it utilizes on-site factories.

The analysis also reinforced the findings of other investigators in this field, and came to the conclusion that the key to success seems to be a company's ability to manage, organize and market its system. A prevalent viewpoint appeared to be that the organization of a company was more important than the technical aspects of its system, and a technically competent system in the hands of a weak organization was usually doomed to failure, as the company would not have the ability to market its product.

The research team discovered that the European building systems had relatively few disadvantages, but that those it had would present formidable obstacles to their ultimate success in the US:

1. Their 'stacked'[1] method of construction would not meet most US building codes because of lack of structural continuity.
2. The overall dimensions of the rooms were small, and below the standards expected by the potential occupant in the US. This would be a difficult problem to overcome because most of the systems employed cross-wall construction, and the majority appeared to produce panels with a maximum span of about 24 feet.
3. The adoption of a European system by an American company would entail payment of a royalty fee to the European sponsor which would undoubtedly make it difficult for the system to compete economically with conventional methods of construction.
4. To utilize a European system a large capital investment would be necessary, which would be excessive for most of the organizations currently active in the US building industry, which has always been oriented towards low capital investment.

Consequently, it was felt that most of the European systems would require modifications to meet the demands and constraints of the US market before a successful entry could be made.

Analysis of the current systems at present in use in the US revealed that there were only a few instances where a partial 'building system' had been used in high-rise construction. The most notable achievements in this field had been the Precreate system conceived by Lord and Den Hartog of Boston, and the Techcrete system, both of which used precast concrete elements and represent modifications of some of the popular European building systems.

Investigations into the European systems applicable to the US showed that there were a number of European building system sponsors currently attempting to find licensees. The list included such companies as Balency, Camus, Sectra, Larsen & Neilson, Bison, Wates. However, it was felt that the building codes, the competition and the existing structure ofthe industry with its various participants and practices, would prevent the rapid acceptance of a European building system in America.

Koch's design philosophy for the Techcrete system has been based on two convictions: 'that the machine, with its possibilities and limitations, is a better tool for architecture than any ever available before; and that the machine, creatively used, is the essential means of achieving economy, quality and splendour.'

'How does this philosophy apply to the design of a building system? It requires the kind of planning and thought which can break down a physical living environment which satisfies a unique assortment of human requirements into a series of parts: first the inter-related buildings, spaces, and services which finally subdivide into the absolute minimum number of standardized mass produced parts, components or sub-systems which are so designed as to reassemble with an absolute minimum of effort in an infinite number of ways to provide endless numbers of unique solutions. It is demanding work requiring knowledge of the industrial process, as well as the needs and aspirations of human beings. It requires a discipline and knowledge which does not appeal to most architects. The parts must somehow go together with the idiot proof simplicity required to bolt an automobile wheel to an axle—to build structures that can call forth the human response of a cathedral or a traditional village.'

One of the first basic design decisions was the choice of structural material. Koch's office had been working for 12 years on studies and consulting work in a range of materials including wood, steel, aluminium and plastics, and finally settled on reinforced concrete as the best choice for an urban building material. The reasons given for this conclusion sound convincing:

Reinforced concrete is the cheapest and most widely available building material in the world; costs of fabrication and erection are subject to great reductions in a period where conventional costs are rising rapidly; it has better sound; fire; and weatherproofing characteristics than any low-cost alternative; its weight is not a great disadvantage in the good transportation situation of a metropolitan area where it is needed most. ▷

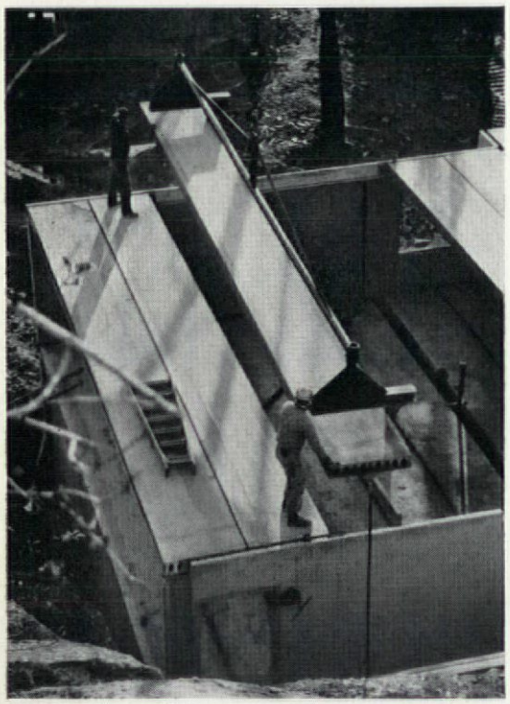
[1] *This method relies on gravity and the fixity of connection between the elements. In the US two considerations accentuate the importance of connections between prefabricated elements: the tendency for the building codes to be conservative, and the necessity to consider the effect of earthquake shock. These lead to the adoption of designs which incorporate ductility within the structural system, important for lateral loads resulting, for example, from earthquakes or differential settlement of foundations.*

The Techcrete connection is an 'active' dry connection in which definite controlled stresses are applied to the joint by post-tensioning forces. This facilitates variation of connection strength depending on intensity of lateral loads, without influencing any individual member of the system. It is claimed that the use of high-strength prestressing steel enables a ductility to be achieved equal to or better than a steel framed building.

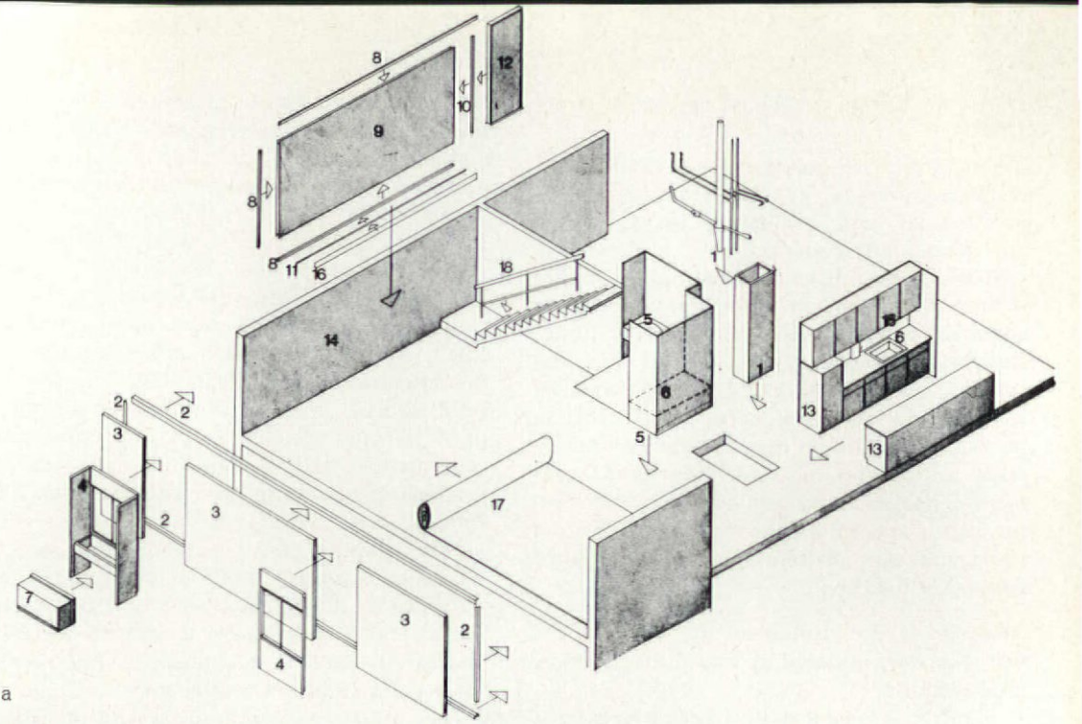
◁ The system has finally evolved as a 32ft span open-ended framework of precast concrete units, stacked on top of each other for heights of up to 12 stories[2] and extended horizontally for any distance. Precast, pretensioned slabs 32ft long and in widths of 1, 2, 3 and 4ft wide, are supported on bearing wall panels. The remaining two walls are infilled with non-loadbearing materials.

The system employs prestressing rods which run continuously through the walls from foundation to roof, clamping the floor panels and bearing walls together in a rigid frame. This alone is satisfactory for buildings of up to 5 storeys, above which shear walls are provided.[3] 284▷

The completed shells of the Roxbury 9-storey units, ready to receive the non-loadbearing curtain walls



Placing the 32ft long precast, pretensioned concrete slabs in position

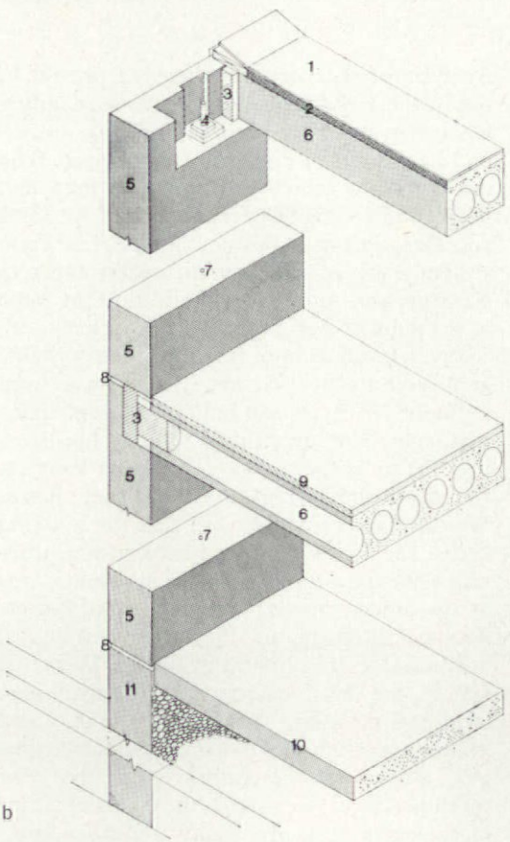


a

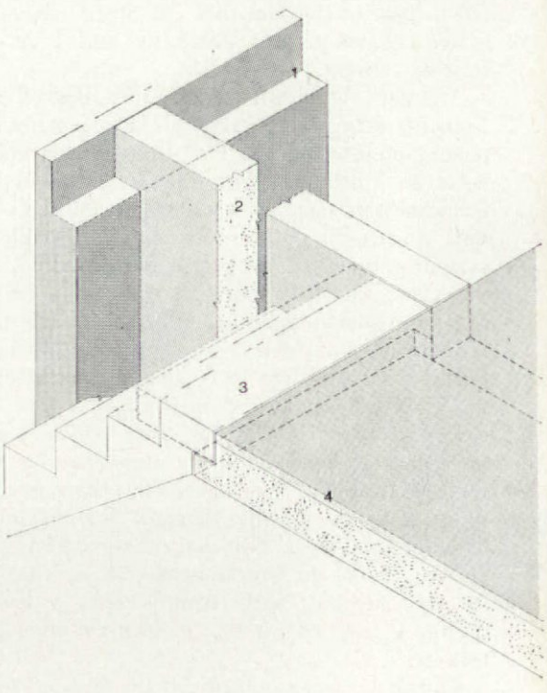
Installation sequence for interior units and finishes

Key for drawing (a)

1 Plumbing tree, vent, duct, mech. service
2 Frame for curtain wall
3 Curtain wall panels
4 Window panels
5 Bath unit—walls and lavatory
6 Tub and w.c. and kitchen sink
7 Heating/a.c. unit
8 Runners for interior partitions
9 Interior partition panel
10 Door post
11 Electric harness
12 Door panel
13 Kitchen cabinets
14 Painting
15 Vinyl wall covering
16 Vinyl base
17 Finish flooring
18 Stair rail



b



c

The Techcrete structural system

Key for drawing (b)

1 Roofing
2 Rigid insulation
3 Grout filled
4 Post tensioning rod
5 Precast concrete wall
6 Precast concrete plank
7 Hole for post-tensioning rod
8 Compriband
9 Flooring
10 Concrete slab on grade
11 Concrete pier

Key for drawing (c)

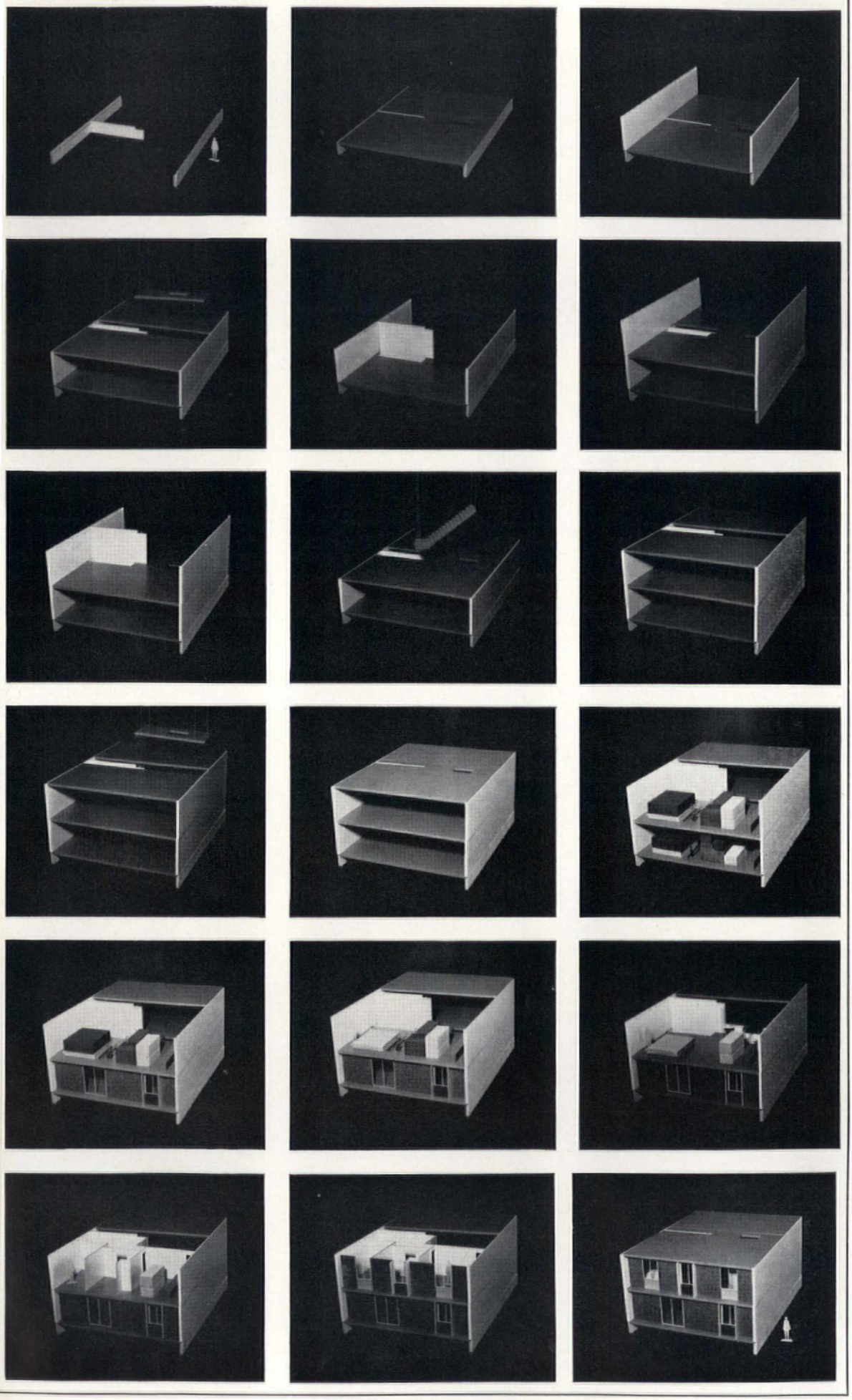
1 Precast concrete wall
2 Precast concrete shear wall
3 Precast concrete stair
4 Precast concrete floor plank

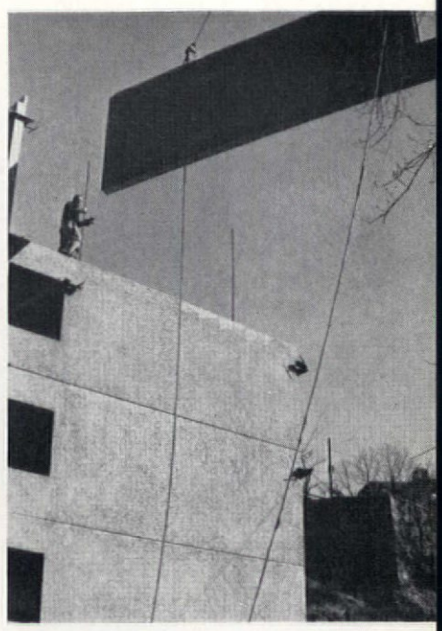
[2] *Basic calculations have been made for a thirty-two storey building, which requires walls thickened to 18 inches at the base. It is considered that a wall mould might be used which provides the 18 inch thickness all the way up for bearing, but provided with inserts at the upper levels for reducing weight.*

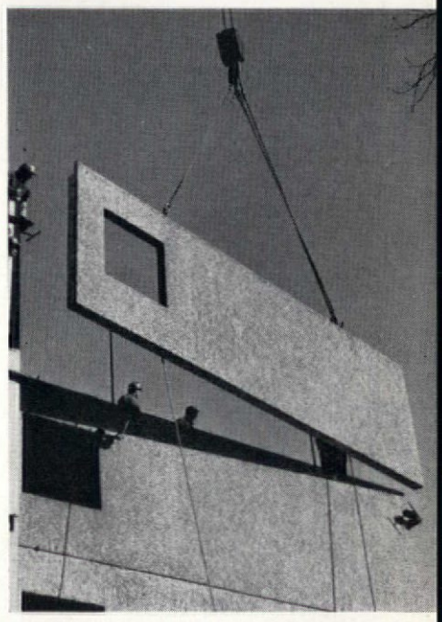
[3] *This type of connection can accommodate fairly large variations of component dimension, and also within the connection itself, which do not compound over the whole building but can be compensated at each floor level.*

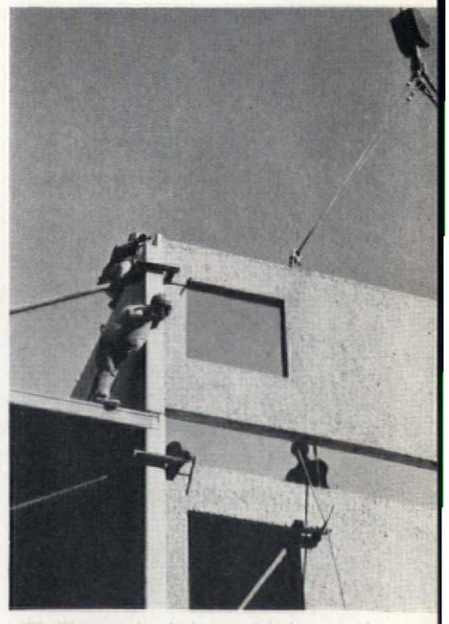
Acceptable tolerances can be established for the desired accuracy to be obtained for each project. The designers claim that deviations of plus or minus 1 inch fram the designed dimensions can be absorbed by the connection detail without creating structural or erection disadvantages, and will still result in a building that falls within the tolerances generally specified for comparable in-situ concrete structures.

Models showing the erection sequences for structure and finishes









Walling units being guided over the 8ft long post-tensioning rods and placed in position.

◁ Apart from this basic structural system, the other component sub-systems are:

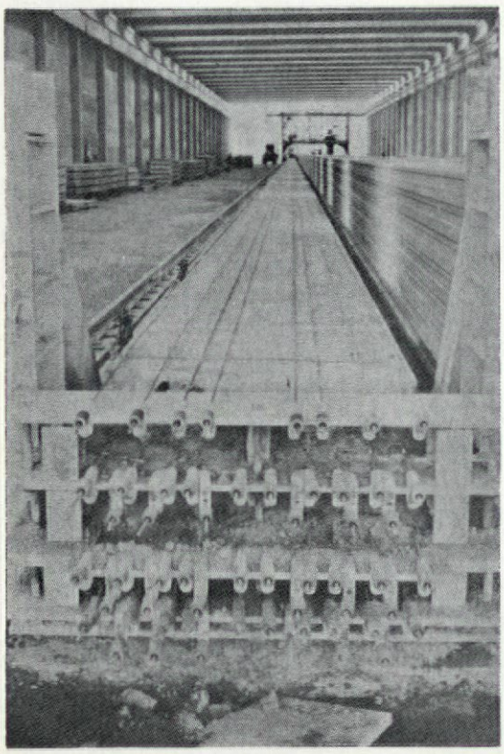
1. A standard bathroom composed of two wall units, one containing lavatory and w.c., and the other a bath, shower or washer-dryer, each of which can be used separately, serviced by a standard plumbing tree from a chase formed by the wall units.

2. A precast concrete stair and elevator unit.

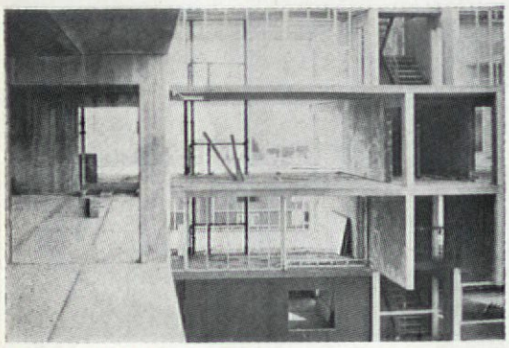
3. A panel-type curtain wall system, metal-faced with an insulating foam core; with the option of several other prefab and numerous conventional infillings.

4. A plaster board sandwich interior partition system with a simplified metal-framed, pre-hung door system.

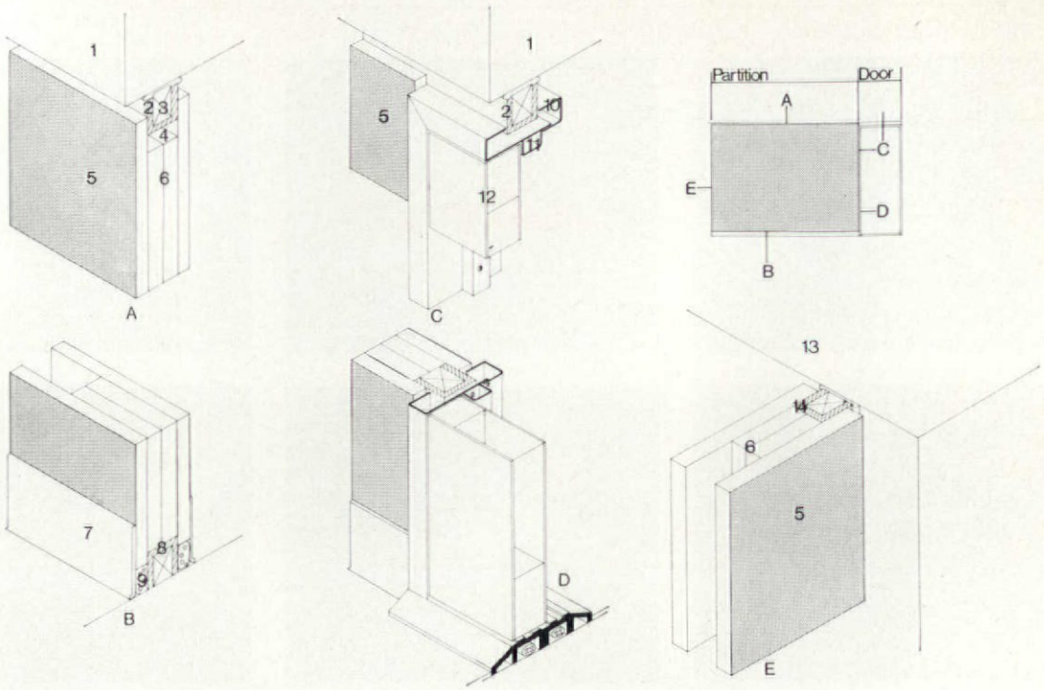
5. An electrical system carrying both 110 and 220 volts, supplied as a harness, which runs along at the base of the partition behind an applied skirting. ▷



Manufacture of concrete floor planks. Wires are pretensioned between anchorage points and the planks are then cast continuously by an extrusion unit. After casting, the planks are sawn off in 32ft lengths

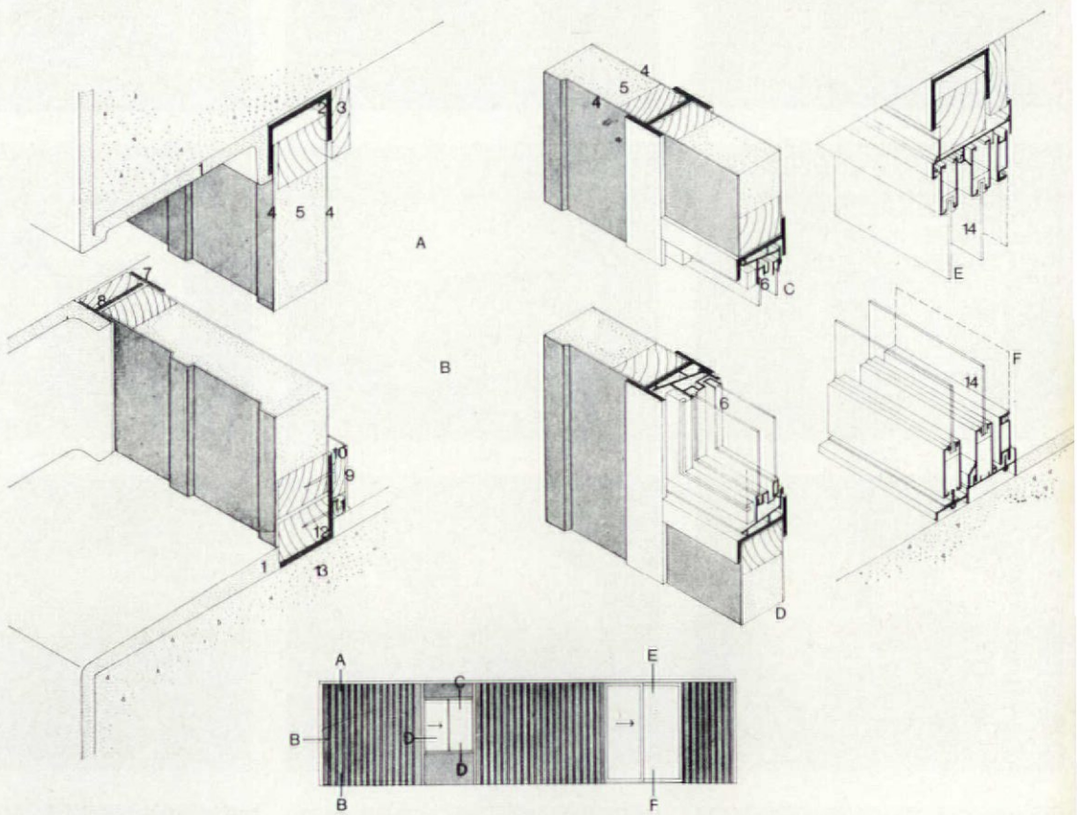


Kitchen, bath and heating components are always vertically in line and slots are left between floor planks for pipework



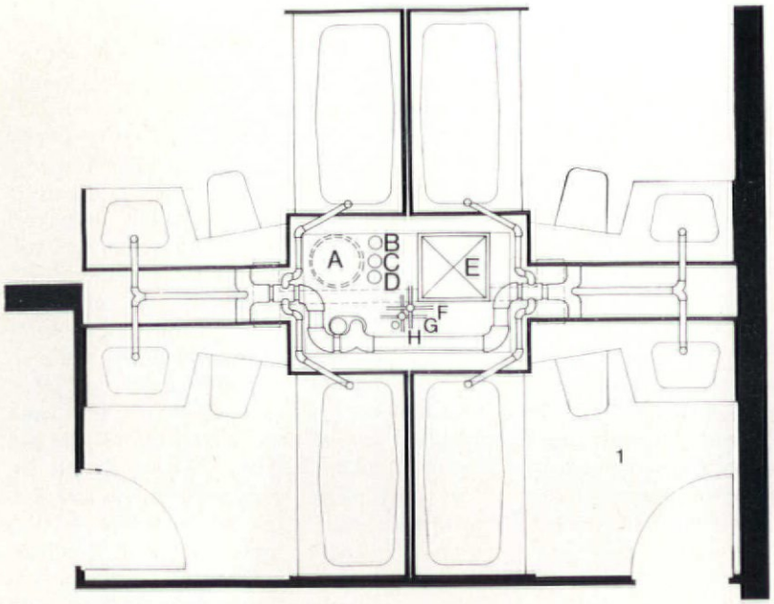
Elements of the partitioning system

1 Ceiling planks
2 Ceiling runner
3 Foam gasket
4 Allowance for movement
5 Gypsium board
6 Laminated gypsium stud
7 Vinyl base
8 Floor runner
9 4 wire romex
10 Cover strip
11 Planted stop
12 Prehung door
13 Intersecting wall
14 Wall runner



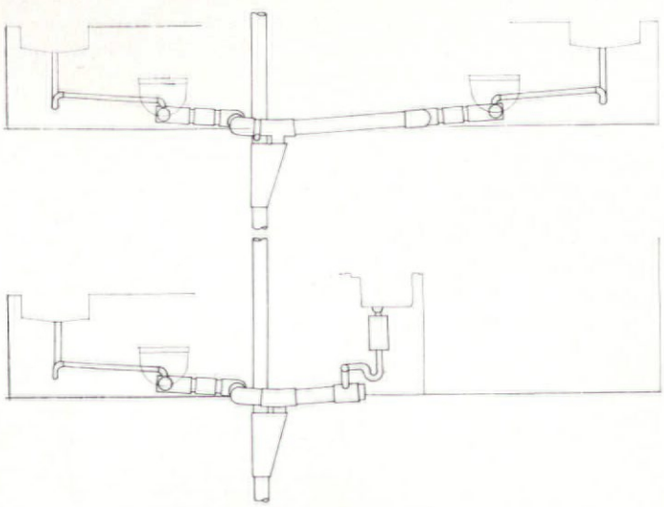
Although the Techcrete system is intended to take any suitable standard curtain wall, series of units have been designed which are particularly applicable

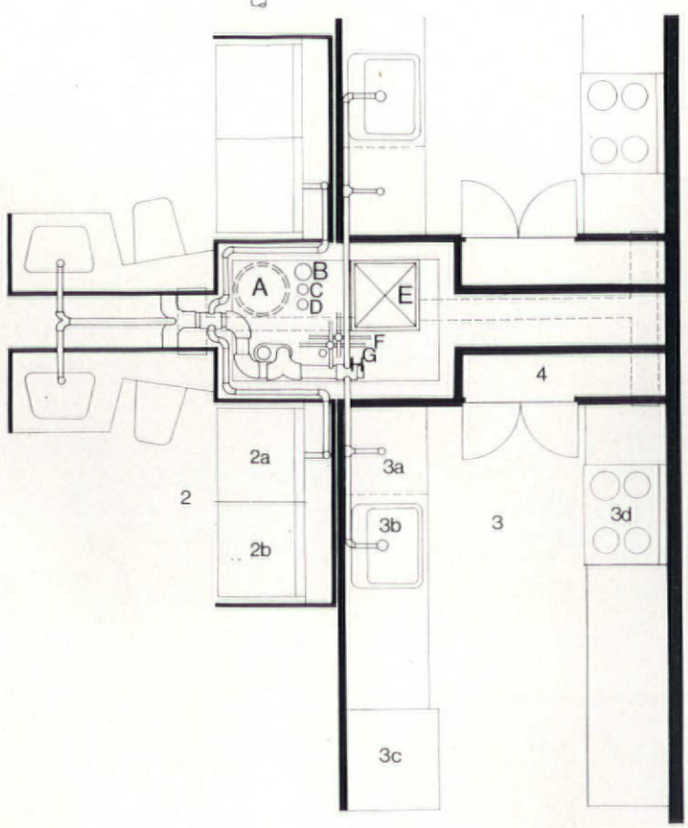
1 Coated urethane cover (optional)
2 Metal channel
3 Wood cover strip
4 Aluminum skins
5 Polyurethane core
6 Sliding window
7 Metal cover strip
8 Metal tee
9 Vinyl base
10 Wood base
11 4 wire romex
12 Metal clip angle
13 Floor slab
14 Sliding glass screen doors



The Techcrete mechanical core

A Optional trash chute
B Optional rain leader
C Electricity
D Telephone
E Exhaust duct
F Cold water supply
G Hot water supply
H Hot water return
I Bathroom





A Optional trash chute
B Optional rain leader
C Electricity
D Telephone
E Exhaust duct
F Cold water supply
G Hot water supply
H Hot water return
2 Laundry-lavatory
2a Washer
2b Dryer
3 Kitchen
3a Hot water heater
3b Sink
3c Refrigerator
3d Range
4 Brooms etc.

6. An electric heating, ventilating and air-conditioning unit, part of the curtain wall; plus other more conventional options.

The floor planks are cast continuously by the use of an automatic extrusion machine, after the wires have been pre-tensioned and anchored. The planks are then sawn off in 32ft lengths.

The system offers several advantages:

1. It is economical for both low- and high-rise housing.

2. The 32ft span permits a wide variety of plan shapes.

3. The structural envelope has few elements.

4. The units can be disposed to permit stacking of pipes for heating and plumbing.

5. The 32ft span allows the use of standard 4ft sheet materials without cutting.

The marketing rigidity of factory production methods is avoided, but advantage is taken of its economies and quality control. It employs existing mass-produced building products and construction equipment, and, since both materials and techniques are familiar, ordinary labour can be used.

Whereas continental practice tends to favour the provision of elaborate precasting machinery producing a wide range of differing components, the Techcrete system aims at the continuous high production of similar items. Despite the degree of development already carried out on this project Koch claims that the strongest possible recommendation for the system is its potential for further improvement. Conventional building construction is at the flat part of its learning curve and cannot expect more than minor improvements in the ratio of cost to quality. This system, on the other hand, has had only a fraction of the refinement in methods, material usage, and techniques, and already offers startling savings.

If space standards are to be maintained, the amount of material used in house building will vary only marginally, and beyond a certain point bulk buying of materials will yield no further economies. The ratio between materials and labour costs becomes the key to further cost reductions and it is to the vital labour content that our attention must be applied. The designers of the Techcrete system have given considerable attention to this problem, and Koch quotes as an example an NAHB study several years ago, when time and motion efficiency techniques were brought to bear on single family detached house construction. Two prototype houses were studied, one before, and one after the implementation of improved methods in an already good operation. The result of these studies produced a ratio between materials cost and site labour costs of four to one or 80 per cent to 20 per cent. This was a change from approximately a 60 per cent to 40 per cent ratio before the study, and represented an improvement of 20 per cent in cost. This ratio was taken as an index of an efficient building operation. ▷

In the Techcrete system, the concrete for the wall panels, brought ready mixed to the portable plant, and the reinforcing steel, delivered for insertion in the wall forms, add up to approximately 65 cents per square foot of wall surface. Installed in place the wall costs an average of $2.75 per square foot, or a material to labour ratio of 24–76 per cent. Koch claims that if sufficient industrialization of this process can be achieved to begin to approach the 80–20 per cent ratio, the size of the potential savings becomes apparent. It would indeed show phenomenal savings, if anything like the 81 cents per square foot figure represented by the 80–20 per cent ratio could be achieved.

Demonstrating an approach to a fully integrated building system, the studies have included work on scheduling procedures which would enable contractors to take maximum advantage of the system. It was realized that whilst each contractor could evolve his own scheduling, this would not take any advantage of past experience. Accurate cost data and time predictions would depend on the continued use of the same system, or improvements arising out of the schedule. It is proposed that computers programmed for the system could alter variables for site and equipment conditions, labour force, etc. Each foreman would receive a card every morning specifying work for the day, and would indicate at the end of the day the degree of completion. With these inputs from the foreman the next day's work would be planned. Work for the labour force ahead or behind schedule would be controlled by critical path diagram. Cost analysis would be kept in the form of man hours, improving the system cost information for future projects, and making accurate tendering possible.

It has been estimated that if work is organized in this manner, the first unit in any scheme could be ready for occupation in less than ten weeks, and others ready thereafter in a rapid and predictable sequence.

The cost reductions achieved by the system have been encouraging. When used for a project of 385 housing units the cost was $10.70 per square foot, which showed a saving of at least 10 per cent over the nearest comparable construction. As most of these savings were effected in the concrete structure, which comprised approximately 25 per cent of the total cost of the building, the true savings are very considerable. Further reductions are envisaged once the market for the standard components is increased and cost studies indicate that savings of over 40 per cent of present high rise building costs can be achieved in some areas.

The system is undergoing continual development and the future work programme anticipates several improvements. The first of these will be to reduce the weight of the concrete and reinforcing used in the system. Lightweight concretes, and, in the near future, cellular concrete, will become commercially practical. When high production rates justify the capital cost for moulds, sculptured panels will materially reduce weight and reinforcing. It is expected that within a few years the study of glass fibre and epoxy reinforcing, and epoxy binders with new lightweight aggregates will produce mixes to replace those at present used for commercial applications. Techcrete are also interested in the re-introduction of ferrocement, the material pioneered by Nervi in which the weight of reinforcing is increased from about 3 per cent to 30 per cent, and dispersed through the concrete in the form of a fine mesh. This will be used initially in the form of flat panels to form bathroom and w.c. enclosures, but it is believed that further research and development on more sophisticated components, sufficiently standardized to warrant the tooling costs involved, can reduce the weight by a factor of 5 or more from present concrete practice.

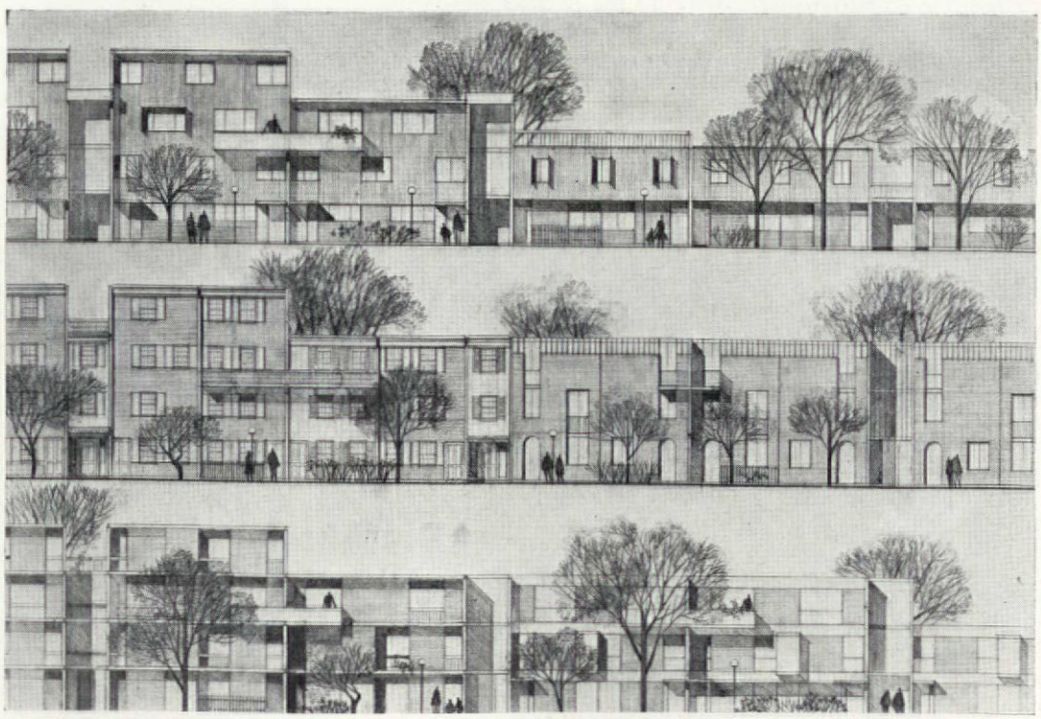
In order to further the acceptance of the Techcrete system and thereby increase its effectiveness, it is proposed that it should be made more generally available. For this purpose Carl Koch and Associates are exploring with interested participants several organizational approaches to a greatly expanded

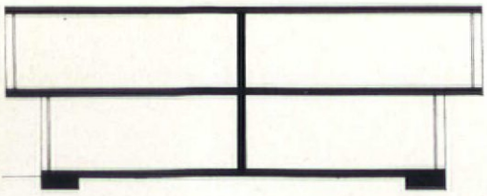
289▷

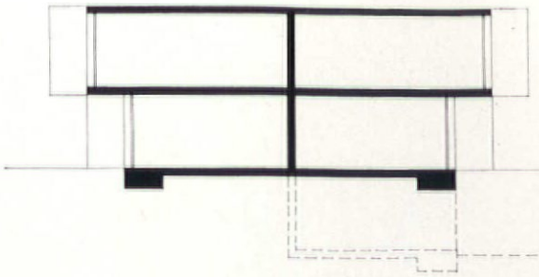
(*Right*)
The system is claimed to be capable of wide variations in elevational treatment

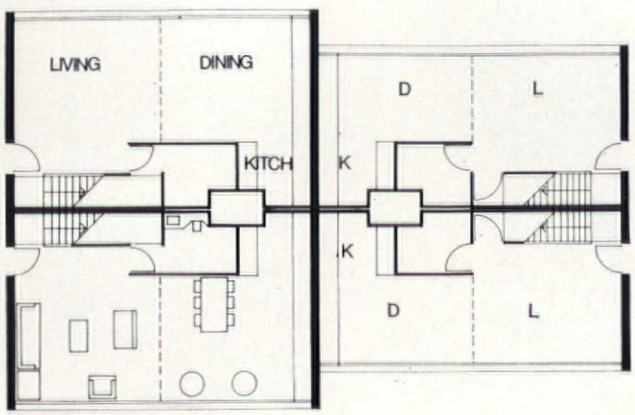
(*Opposite above*)
Floor plans and sections of typical 2-storey back-to-back 3 and 4 bedroom house types

(*Opposite below*)
Floor plans and section showing application of the system to 3 and 4 bedroom high density housing









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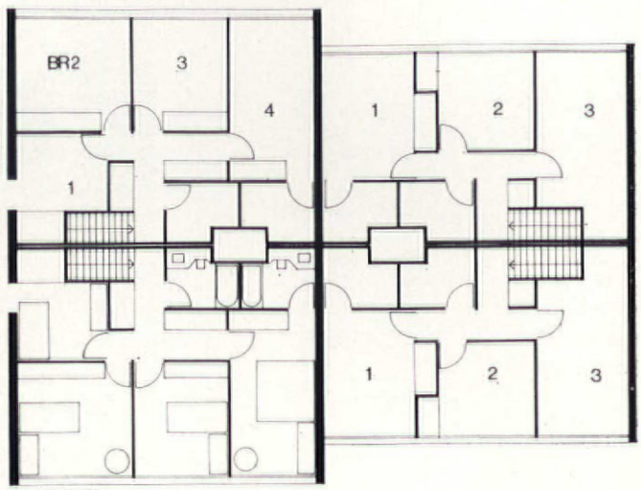

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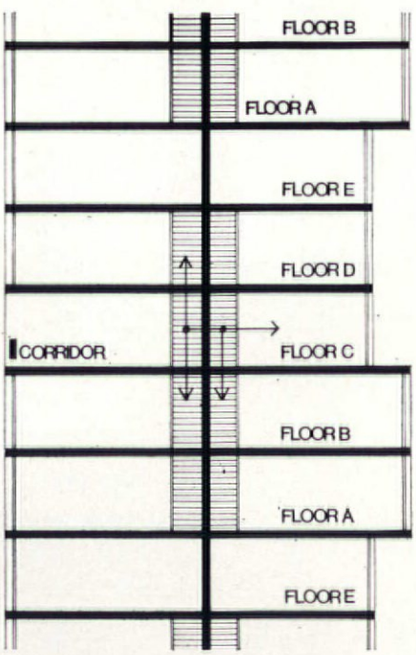
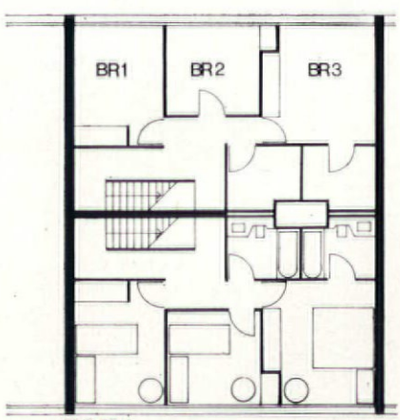
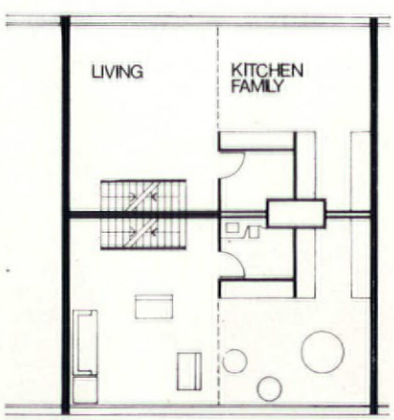




FLOOR A



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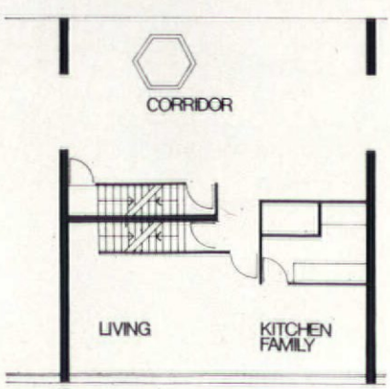

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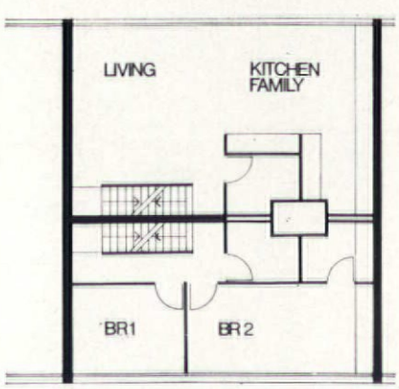

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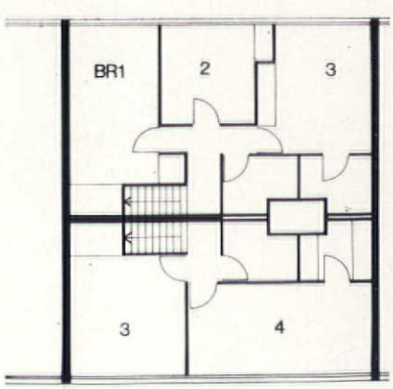

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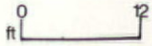
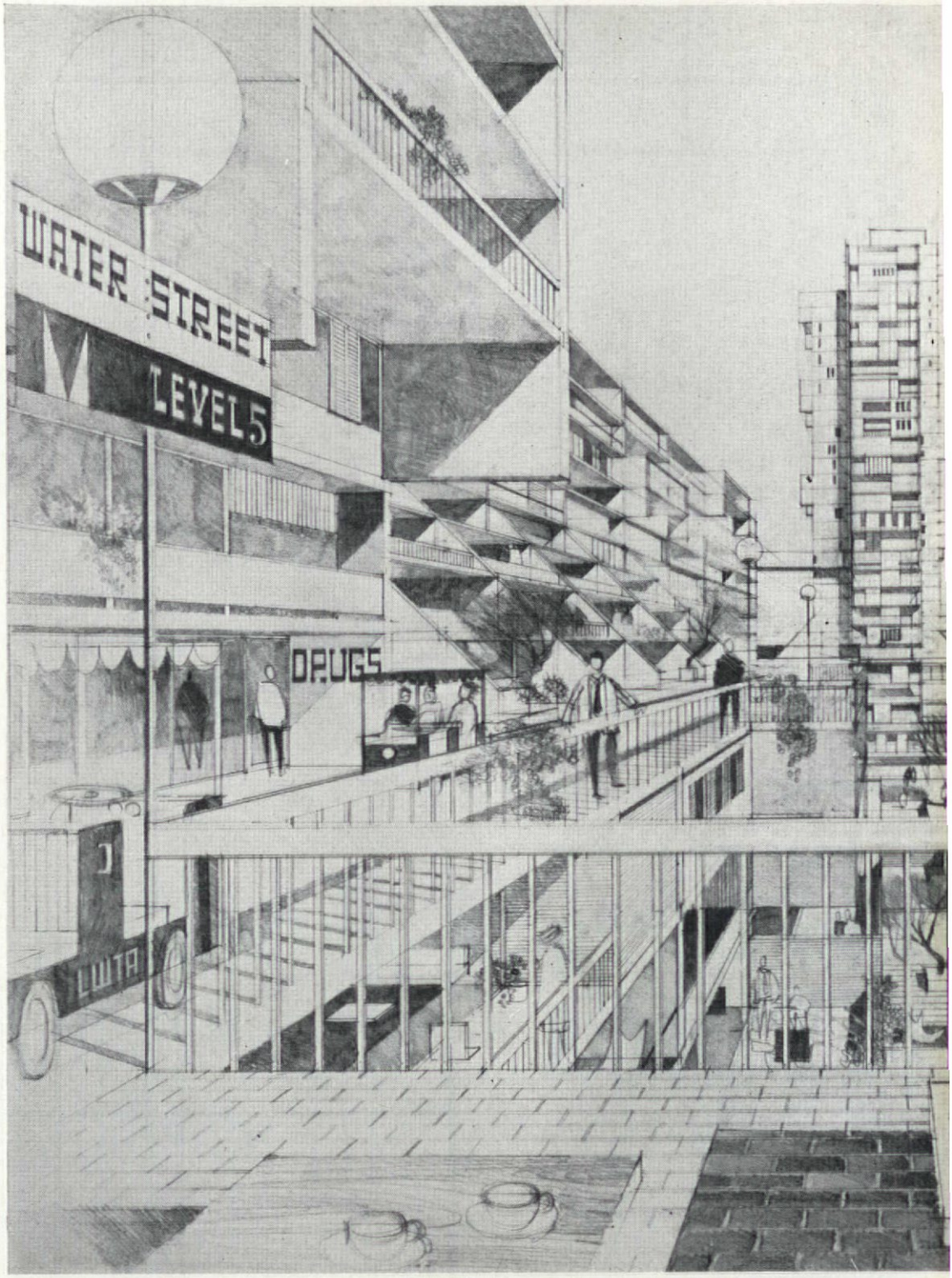
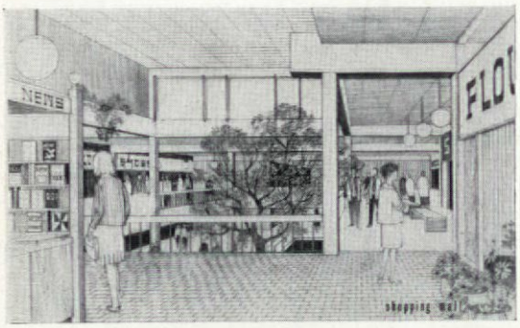
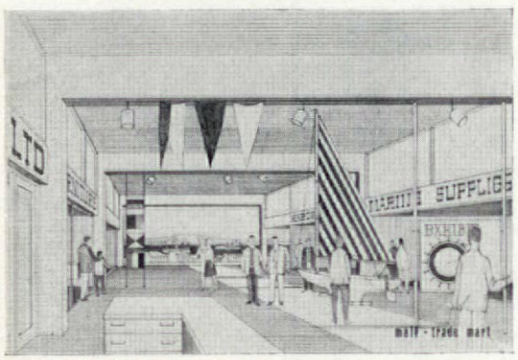


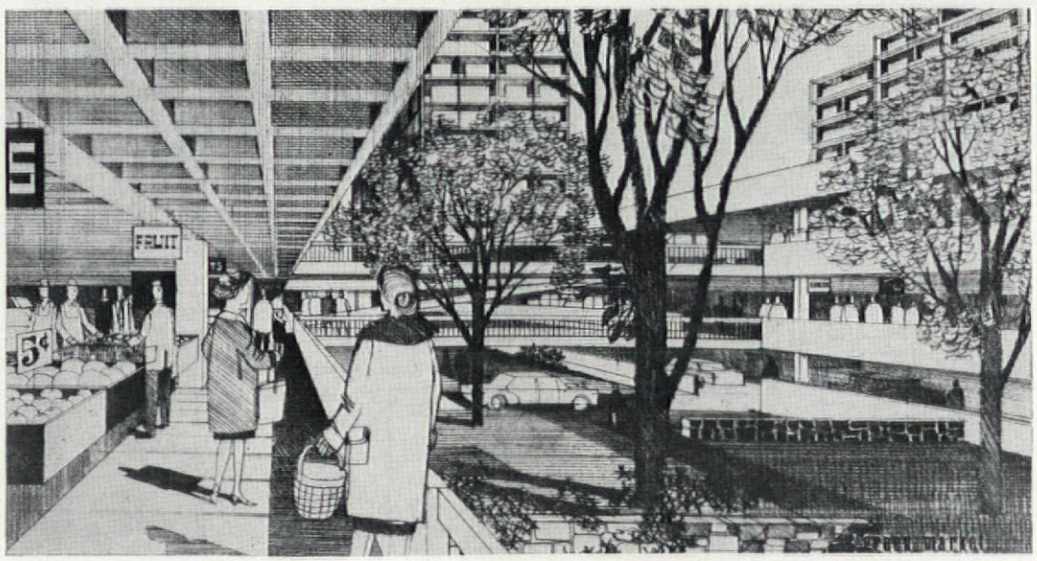
(*Right*)
Proposal for a Techcrete development at Lewis Wharf, Boston



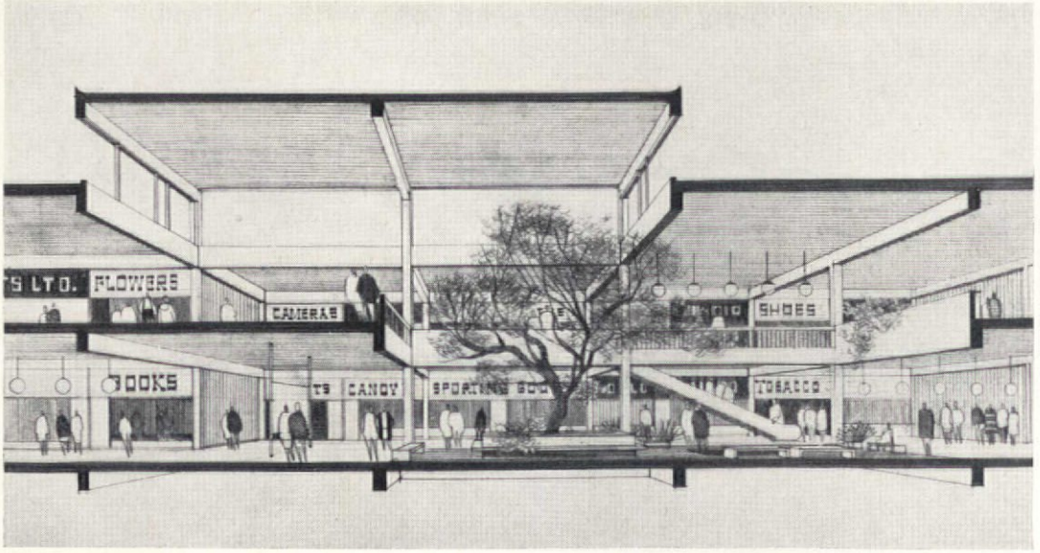




(*Above and right*)
Mixed development at Halifax



(*Far right*)
Application of the Techcrete system to shopping centres



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building system service corporation. It is hoped that other architects will be among the first to make use of Techcrete as a catalyst for focussing the tremendous potential of the building industry on a system of related, flexible but standardized building components to provide a real technological breakthrough for exciting, high quality, mass urban housing at reasonable cost.

Some building systems give the superficial appearance of a complex, well-coordinated design, but on closer examination often reveal insufficient attention to detail and lack of design organization. In a similar way, solutions which have an immediate apparent simplicity often achieve this result by considerable effort on the part of the designer. When examining an example of industrialized building it is often difficult to assess whether it achieves simplicity as a result of the design process, or whether it is merely simple as a result of crude omissions. The well designed system will be capable of a range of combinations far beyond that exemplified by the single design under consideration, whereas the crude design will probably reveal all its combinations in the one example with no further alternatives.

The Techcrete system quite clearly falls in the former category and displays a very positive design approach and assiduous examination of the problems, resulting as one might expect, in a seemingly naïve solution. Unlike so many previous examples, which attempt to create a total system and provide all the necessary units, this example employs as many standard, normal mass-produced units within its fabric as is possible. This gives the designer considerable freedom in choice of materials and permits the fullest economies of those materials, but at the same time gives the greatest scope for abuse in inexpert hands. This is the hazard facing the designer of an industrialized building system, and one for which there is, unfortunately, no simple answer.

Koch's attitude towards industrialized building, which has obviously been used as the basis for the system, can be summarized by this statement:

'Pure design in the grand manner was, is and always will be part of good building. Functionally adequate buildings can be built without an architect. Our goal as architects should be to strengthen our function, that of a coordinator of the building process, into a meaningful accomplishing position, where we can apply our design talent effectively. When and if this is done, it will give building a dimension which most of it now lacks—a unity contributed by design which will make a related whole of the disparate pieces contributed by architect, developer, manufacturer and building authority.

There is no question in my mind that this unity can be accomplished. It must and it will. Our government is taking a new look at how to do it. Industry is getting ready to tackle it on its own. Good or bad, there is one thing certain. In 14 years we will either be working for General Electric, General Dynamics, General Motors, or General Cities—or they will be working for us. Which do you prefer?'

With 150 plain colours, patterns, woodgrains and marbles, Arborite's a match for almost anything.

A really versatile collection – and every one of Arborite's colours and patterns is immediately available. There are 52 plain colours (42 of them exact or close matched to BS colours). 45 woodgrains – so realistic you can't tell them from trees. 11 perfect reproductions of Italian marbles. And 42 attractive graphic designs. Every colour and pattern in the range is available in three finishes: high gloss, furniture finish (semi-matt) and texture finish.

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Peacock by courtesy of The British Museum, Natural History.

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WCW 11

Sterility for hip surgery

Current thought on hospital operating theatre planning is turning from the twin corridor concept with its strict segregation of 'clean' and 'dirty' traffic towards single corridor layouts with 'dirty' items for disposal carried back through the 'clean' area in suitable containers, giving greater freedom of layout and some economy in building cost. Whether this relaxation of a once firmly held principle results from progressive thinking or from economic strictures is a moot point; all too often in the past it would seem that hospital architects have sheltered behind established tradition or conservative medical opinion and followed precedent rather than the thorny path of progress.

It is therefore stimulating to find a consultant who is sufficiently progressive and enthusiastic to go back to first principles and re-think the order and method of a particular operation and then go ahead and create the ideal functional conditions in which to carry it out.

At Wrightington Hospital, near Wigan, Mr John Charnley has initiated, and with such assistance

PHOTOGRAPHS BY BUILDING DESIGN PARTNERSHIP

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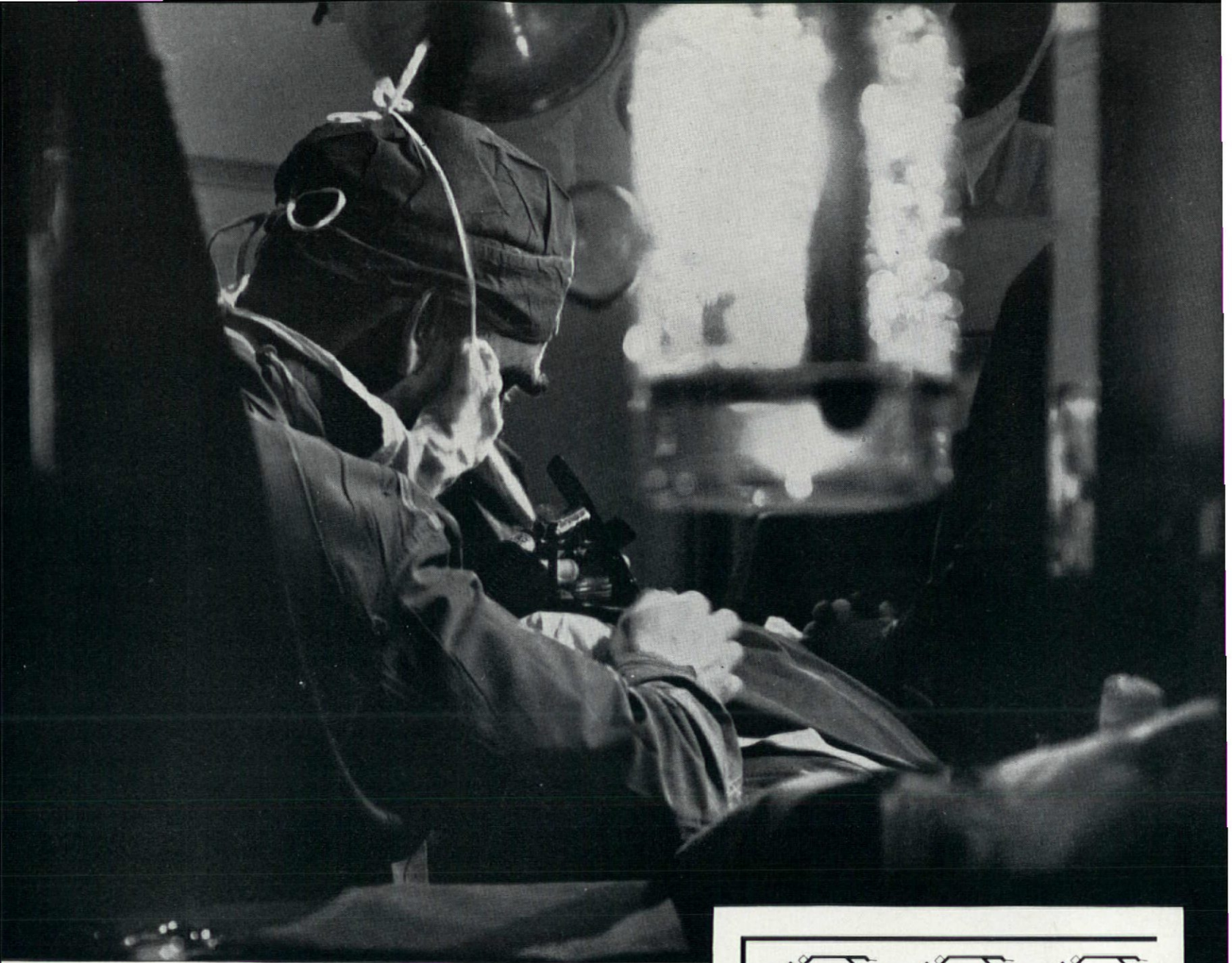
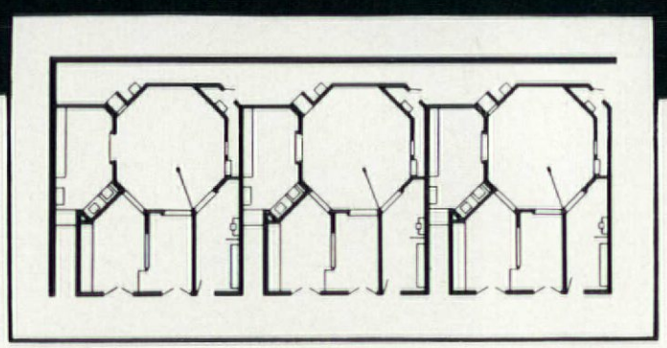


the highest surgical skills...



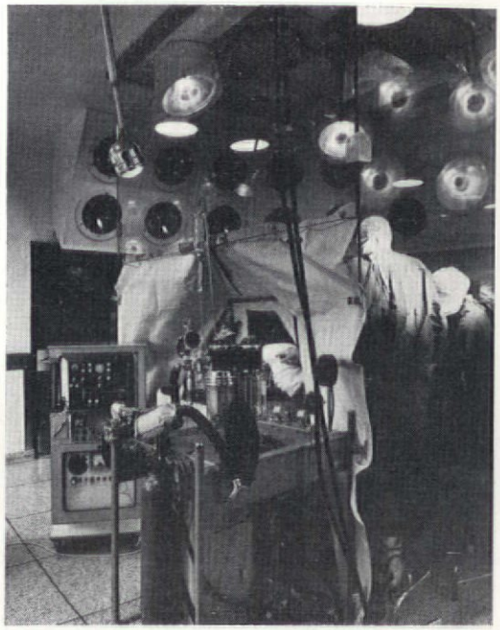
deserve the finest possible environment

This environment is provided by the Honeywell Modular Operating Theatre System. Architecturally designed modular components, manufactured under quality controlled conditions, ensure the uniform high standard of finish required for speed of erection and immediate use after sterilization. The System allows versatility in the planning of single and multiple theatre suites as well as accommodating specific surgical requirements. Honeywell Theatres are readily absorbed into new or existing hospitals and are the economic answer to theatre modernisation requirements. A small team of skilled erectors can install a Modular Operating Theatre with minimum interference to hospital routine and maximum saving of on-site time. The same capability and concern for standards is evident in the wide Honeywell range of hospital equipment, physiological monitoring systems and many other items of specialised medical apparatus. Write for details to Honeywell Controls Limited, Medical Equipment Division, Great West Road, Brentford, Middlesex, ATLas 9191.

Honeywell

Sterility for hip surgery

It is theoretically possible to set up half a dozen of these in an old barn and operate with perfect safety



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from architect and engineer as required, has created within an existing complex an operating theatre providing near ideal conditions for his own speciality—hip surgery. One of the prime conditions for success in this field is absolute sterility of the operation, and in a word this is achieved at Wrightington by carrying out the operation in a stream of clean air.

The patient, or such parts as are necessary, and the operating team are contained within a glass walled enclosure of minimum dimensions which is fed with clean temperature and humidity controlled air from above, putting the chamber under pressure, which finds its own way out at low level under the side walls, through an instrument hatch in the front wall and past the patient's trolley entrance which is partially closed by sterilized canvas curtains replaced for each operation. Thus the exposed area of the patient is continually fed with clean air and any air-borne pollution carried away out of the chamber. Exhaled air from the operating team is removed by face masks worn inside a head mask and connected to an exhaust system. Experiments are to be made to extend this to include the whole body area to prevent the passage of skin particles which may still be released from the body and conveyed to the patient by penetration of the operating gown.

The anaesthetist with necessary equipment and monitoring gear remains outside the glass chamber, as also do supplementary nursing staff with sterile instrument packs to be handed in to the hatch as required, and disposal containers. So efficient is the outflowing stream of air that the degree of sterilization of personnel and equipment outside the chamber is not nearly so great as in a normal operating theatre. This and the facility to get so close to the operation without hindrance to the surgeon must prove to be of great value in teaching.

As with all good ideas, the construction of the Wrightington unit is very simple. The glass box, 7 ft square, is formed from single sheets of $\frac{1}{2}''$ armour plate glass with polished edges and open joints at the corners to facilitate cleaning. The two sides reach from ceiling housing 3″ above the floor; the 'front' has a hatch for instrument delivery and disposal with a solid panel below, and the back is open to door height to allow for entry of trolley and patient. A minimum number of stainless steel clips is used to hold pieces of glass rigid.

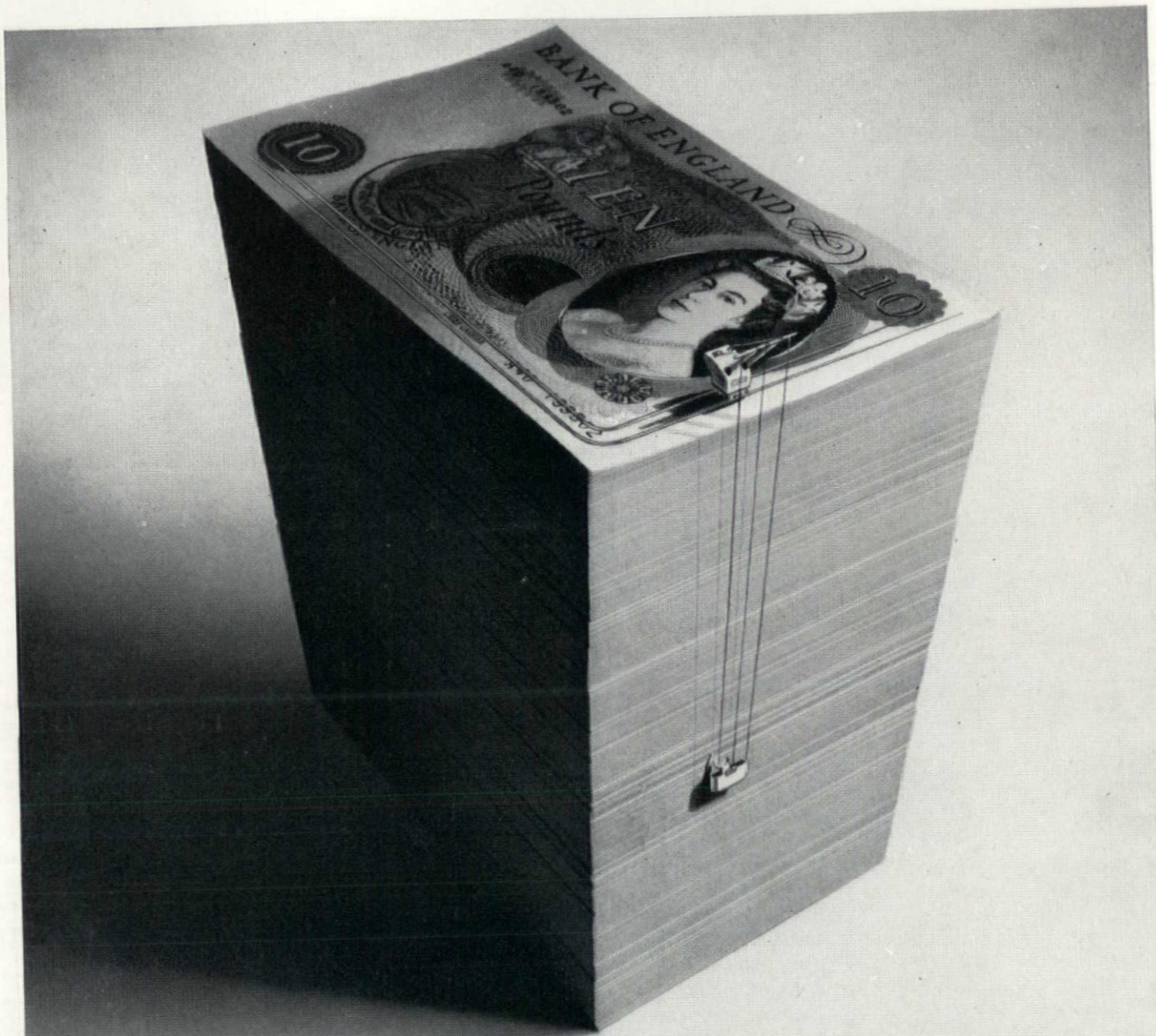
The air-conditioning plant is housed on top of the theatre and fresh air is filtered, washed, humidified, warmed and passed over ultra-violet light before being delivered downwards at the rate of 4000 cu. ft per minute through a simple baffle system designed to prevent undue turbulance at operating level. Smoke tests in the chamber have shown that even with the obstruction of operating staff around the patient, airflow is such that the exposed area is continually fed with clean air.

All controls are located on the walls of the theatre and the system is kept in continuous operation to ensure sterility and readiness for use at any time. Lighting is by specially developed units, four within the chamber for general use and two batteries of lights mounted in a large ceiling cove to give light at 45° as required for hip surgery.

The implications of this system could be far-reaching. In the first place it must surely be beneficial in other branches of surgery to be able to operate under such sterile conditions, and the result on operating theatre planning and design could greatly reduce the area and complexity of building at present considered necessary; likewise the extent of air-conditioning plant—perhaps to a single 'clean' space containing several operating cells of varying size as required for different operations with necessary ancillaries, some of which might be shared.

As Mr Charnley himself said: 'It is theoretically possible to set up half a dozen of these in an old barn and operate with perfect safety'. □

G. Kenneth Seed (Building Design Partnership).



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It will lift the cradle over a height of 400 ft., traverse it to any point, move it in and out from the face of the building to clear a projection, such as a clock or sculpture. In addition, it will slew the cradle around to land on the roof. The glass fibre cradle is perhaps more elegant than any cradle has a right to be. The Board of Directors could ride up in it! Safety factors are almost over-abundant—far ahead of all existing or pending standards.

The Palmatic traversing cradle is a status symbol worthy of your finest project. Ask us to send you a book on it.

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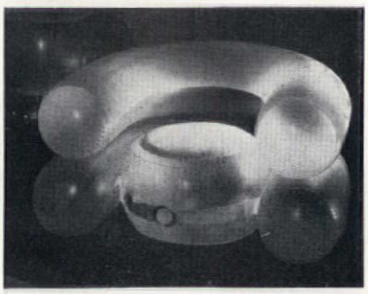
DESIGN



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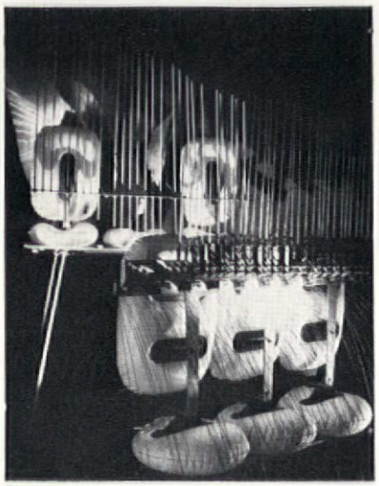

2

More inflatables

Sitting on air
Air-inflated high-frequency-welded pvc forms are fast engaging the attention of designers. Pioneers of the air-chair race were the architects Aubert, Jungman & Stinco (organizers of the recent Paris inflatable structures exhibition. See also page 273) **1**, designer Quasar Khan and his firm Quasar Engineering **6**, and the architects Scolari, Lomazzi, d'Urbino and De Pas with Zanotta **7**.

Now, in England, Goods & Chattels Ltd. market Paul Woods' tubular build-ups **3, 5** and Brainos' *Ufo* pouff **8**. The latter retails at about £3 12s. 6d. The 'settee' and 'chair' are about £16 and £9, with additional tubes (about a quarter the price) that can be bolted on *ad infinitum*, turning them into fashionable floor lounges.

Seen at the recent Paris exhibition of inflatable structures: welded polyethylene *splints* for broken limbs **4**.

The Musical instruments **2** are made by the brothers François and Bernard Baschet: the 'Crystal' has plastic bladders as amplifiers and piano wires as 'echo chamber' to the sounds made by stroking the glass rods with wet fingers. Behind it stands a percussion instrument.

It all started when, in 1954, F. Baschet toured with a guitar and discovered the necessity of having a manageable guitar: 'Considering that a banjo has a membrane stretched on a frame, why not have a self-supporting membrane—that is to say, a balloon? I, therefore, made a guitar where the sound box was replaced by a plastic balloon, with the strings elastically supported on a frame'. (*New Scientist*, No. 337).

1 *4 rue d'Arsonval, Paris 15me.*
2 *11 rue Jean de Beauvais, Paris 5me.*
3, 5, 8 *Goods & Chattels, 26–28 Neal Street, London, WC2. Photos: Pat Hunt.*
4 *Svend Andersen, Nyholms Alle 21, Copenhagen, Vanløse, Denmark.*
6 *20 rue Leverrier, Paris 6me.*
7 *Via Fratelli, Bandiera 31–33, Lissone-Milano.*

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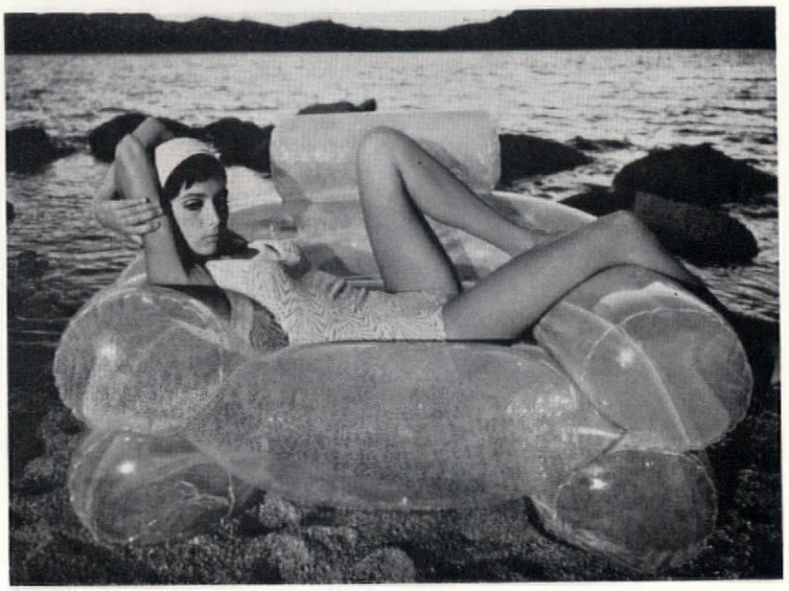

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8

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We lavish the same care on our fluorescent fittings, too.

That's why they win acclaim. And prizes.
Our Silverspan range has just won a CoID design award and our Silverline won the British Aluminium Design Award. Prizes are very nice, but what we really want is the satisfaction of completely meeting your design needs. That's why we take extra care. We use a lot of crisp, extruded aluminium, anodized for permanent finish, and precisely moulded and die-cast components. Our fluorescents can be used with Lytespan lighting track. And they are *absolutely silent.*

LIGHTFRAME:
A twin-light super shallow general illumination fitting—has a floating anodised bezel and a sharply defined prismatic lens. List Price: 5′ (complete) £14.2.7. (4′ also available).

SILVERSPAN:
A single-light all aluminium fitting $1\frac{3}{4}$″ across, with integral hinge and snap lock action. Full range of accessories for general illumination, wall-washing, directional and decorative lighting.
Bonus feature—Matchmaker provides any finish in any texture of your choice.
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SILVERLINE:
An extruded anodised aluminium directional fitting. Rotates through 350°. Perfect for museums, art galleries, blackboards, wall displays. Only $2\frac{1}{4}$″ x 2″.
List Price: 5′ fitting £7.6.0. (3′, 4′ and 6′ also available).

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DESIGN

1

Lie abouts

Johannes Larsen, civil engineer, has patented and copyrighted a brilliantly simple 'rocking cushion' in fabric-covered polyester **10**.

The French obviously want to recline, but do it more expensively than Mr Larsen judging by the moulded foam shapes offered by Bernard Govin for Roset of Montagnieu-Ain **2**, and by Olivier Mourgue for Airborne of Montreuil-sous-Bois **6**.

Not to be outdone, Pierre Paulin has designed an articulated carpet **8, 9** for Mobilier International, Paris, consisting of fabric-covered wooden slats (14 cm wide and 140, 181 or 226 cm long) joined together in lengths of 3 m, 6 m, 9 m, etc., and adjustable on a rachet to any desired position.

Archizoom **4, 7**, by Poltronova (Agliana, Pistoia, Italy) is about the most flexible in use of the lie-abouts.

Marco Zanuso's *Lambrico* modular seating **3** for C & B (Meda, via Tre Venezia, Italy) can be ordered by the meter, so to speak, with five 'ribs' to every support.

Ingvar Sunesson, student at Göteborg's Konstindustriskolan, herds the young into an enclosed circular seat **1.**

1 *Domus* 3/68.
2, 5, 6, 9, 10 *Mobilia* 2/68.
4, 7 *Abitare* 1–2/68.
8, 9 *La Maison Française* 4/68.

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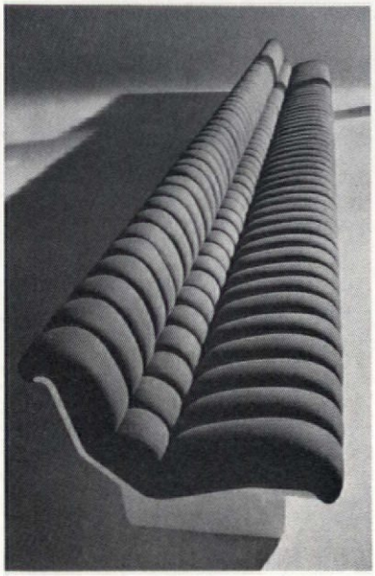

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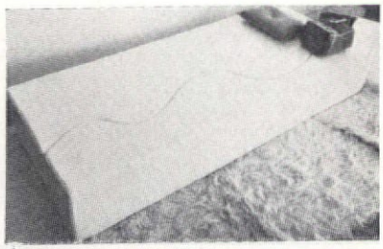

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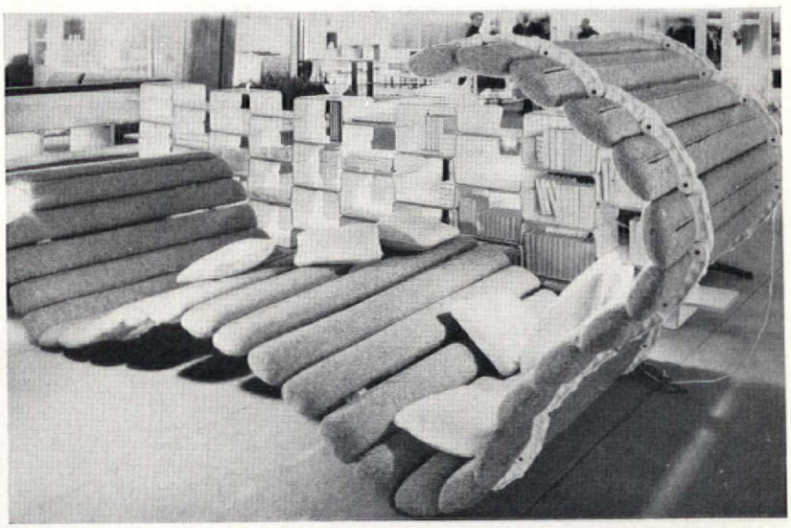

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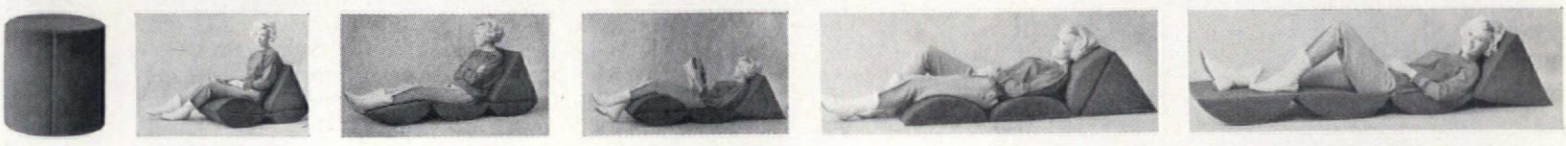


10

Design plagiarism

Addressing the Royal Society of Arts, London, on March 6th, Mr A. D. Russell-Clarke, barrister-at-law, discussed the prevalent increase in design plagiarism resulting from modern technical skills, particularly in the field of industrial design, and the inadequacy of the law to deal with it.

Under the present Copyright Act 1956 (Section 10), designs can only be protected if registered under the Design Acts before publication—a troublesome process and so lengthy in execution as generally to prove ineffectual. It is based on the principles of *patent*[1] law. But the 1962 Report of the Departmental Committee on Industrial Designs proposed that the *copyright*[2] concept, 'based on originality, should be introduced for designs, with its attendant advantages of speed and simplicity. . . . The design to be protected would have to be an "original" work. . . . As a condition of obtaining Design Copyright, the proprietor would be required to deposit at the Patent Office a representation of the specimen of the design,' the purpose being to record its authorship and date and to permit the trade and public to know, by a search at the Patent Office, which articles were protected and not 'in the public domain'.

[1] *Patent.* To qualify for the grant of a patent, the invention must be novel compared with what has been previously published. Infringement will depend on whether or not the defendant is using the invention, and it is immaterial whether he has or has not actually copied it. The grant of a patent, in other words, confers a monopoly upon its owner.

[2] *Copyright.* For a work to qualify for copyright it must be original, i.e. the product of the labour and skill of the author of the work. Copyright is only infringed by a person who copies the plaintiff's work. If the defendant happens to arrive at the same result independently, i.e. without copying, he will not infringe. A grant of copyright does not therefore confer any monopoly on the author of the work.

Room for improvement?

Most homes have it, if only in a small way. And in this room there was plenty of scope — for the owner, for the designer, for the installer, for Leonard thermostatic showers.

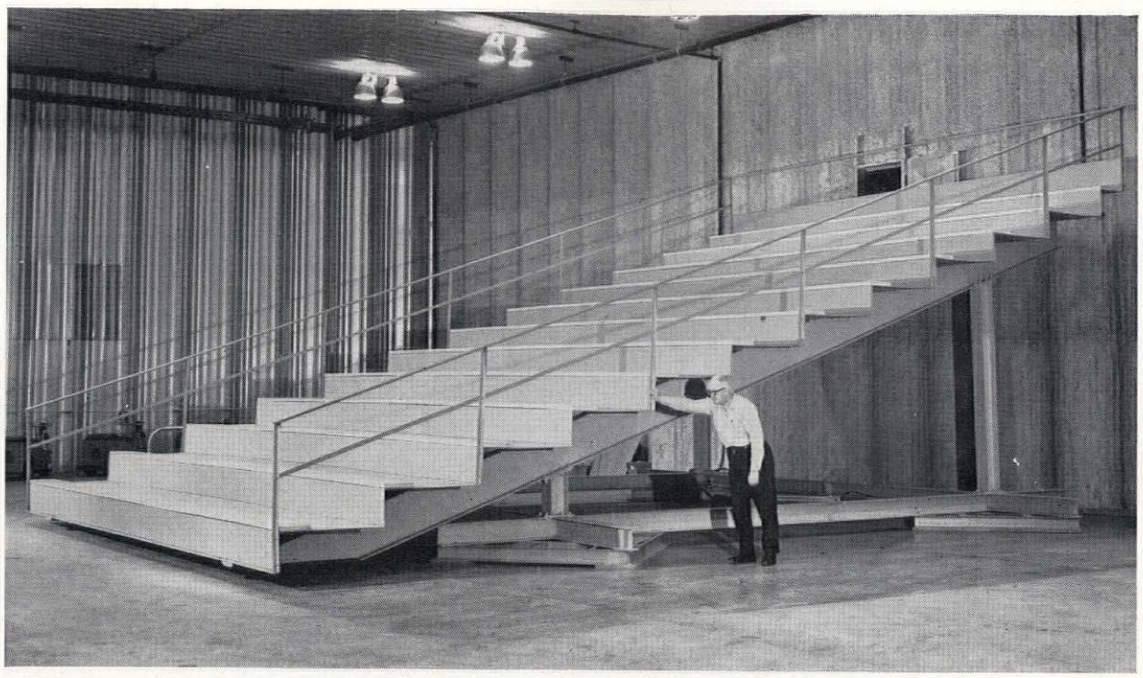
Room for a shower...

Every home can use a handy, hygienic shower-in-a-moment! Most homes can find unused space somewhere for what is virtually a second bathroom. And remember — in certain circumstances Local Authority grants are available.
This is the type of suggestion we have been making to the general public. They, in their thousands, have been writing to us or seeing us at exhibitions, showrooms, etc. If you would like to know what we have been telling them see us at The Shower Centre, 138 Theobalds Road, London, W.C.1, or write to The Shower Information Bureau, Whaddon Works, Cheltenham.

a Leonard thermostatic shower

ALEXANDER PIKE DEVELOPMENTS

To obtain additional information about any of the items described below, circle their code numbers (H1, H2 . . . etc.) on the Readers' Service Card inserted in this magazine.



H1 Air flotation for stadium seating

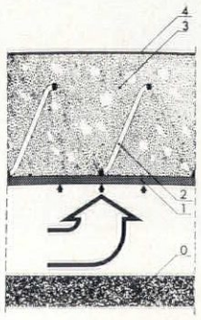
The Behlan Manufacturing Company, Columbus, Nebraska, 68601, USA

By employing air flotation, it is claimed that large units of stadium seating can be moved quickly to provide extreme flexibility of arrangement for different activities. The firm already manufactures a steel, stressed-skin roof system spanning up to 1000ft without interior supports, and points out that giant-sized covered arenas can be economically justified if they meet spectator requirements for a variety of sporting events. A recently completed prototype section of stadium seating measures 24ft × 36ft and weighs 12 tons. Urethane rubber 'pillows' are secured to steel pads at the base of four supporting columns. When these pads are inflated with 2 to 5 pounds of air pressure a thin layer of air escapes from beneath and the stadium floats, and may easily be moved to any desired position, employing 50 to 100 pounds of lateral push per flotation pad. The company is presently examining the possibility of using air flotation to move their wide-span arched roof in situations where an indoor-outdoor sports facility is considered desirable.

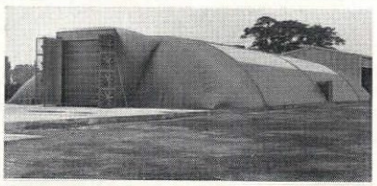
H2 Inflatable forms for concrete vaults

Binishells., Viale Masini 20, Bologna, Italy
C/o Du Pont, 18 Bream's Buildings, Fetter Lane, London, EC4

A new construction technique for thin shell habitable domes employs an unreinforced sheet of neoprene synthetic rubber to lift pneumatically and mould fresh concrete. Developed by an Italian architect, Dr Dante Bini, the method employs an airtight flexible neoprene membrane anchored to a peripheral foundation. Reinforcement and concrete are placed over the sheet and the entire assembly is raised to the desired height by inflating the membrane. The reinforcing steel controls the bubble growth and keeps the mix from sliding off as the structure is inflated. The thin shell cures quickly and is self-supporting when the membrane is deflated and removed. Insulation can be evenly adhered to the interior of the shell by reinflating the membrane which applies the necessary pressure. Openings are simply cut into the shell using rotary saws. It is claimed that a dome of 2in wall thickness, 100ft in diameter can be constructed by this method in 30 minutes by eight workmen.



Cross-section shows growing air-chamber between ground (0) and neoprene membrane (1), which lifts reinforcing steel mesh (2), fresh concrete mix (3) and waterproofing film (4) to form thin-shell dome structures with Binishells new construction technique. After concrete has cured, membrane is deflated, removed and is then ready for re-use.



H3 Inflatable warehouse

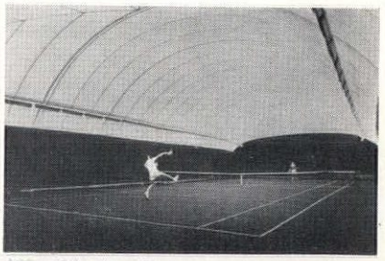
British Road Services Ltd., Argosy House, 215 Great Portland Street, London, W1

British Road Services have installed their first inflatable warehouse on a site at King's Lynn. It is a 'Barracuda' air-hall 150ft × 50ft, and is provided with two airlocks, one for pedestrians and a much larger one used as a vehicle entrance. The warehouse is used to accommodate a variety of goods varying from strip steel to tinned foods.

H4 Pneumatic forms for cavities in concrete

S.A.T.U.J.O., 54 Avenue de la Motte-Picquet, Paris XV

Flexible forms, available in any diameter from 1¾in to 10ft can be used for forming cavities in concrete and are particularly suitable for forming concrete pipes. The moulds are manufactured of flexible, anti-abrasive, rubber-coated canvas, including one or more layers of canvas specially woven from high resistance long fibres.

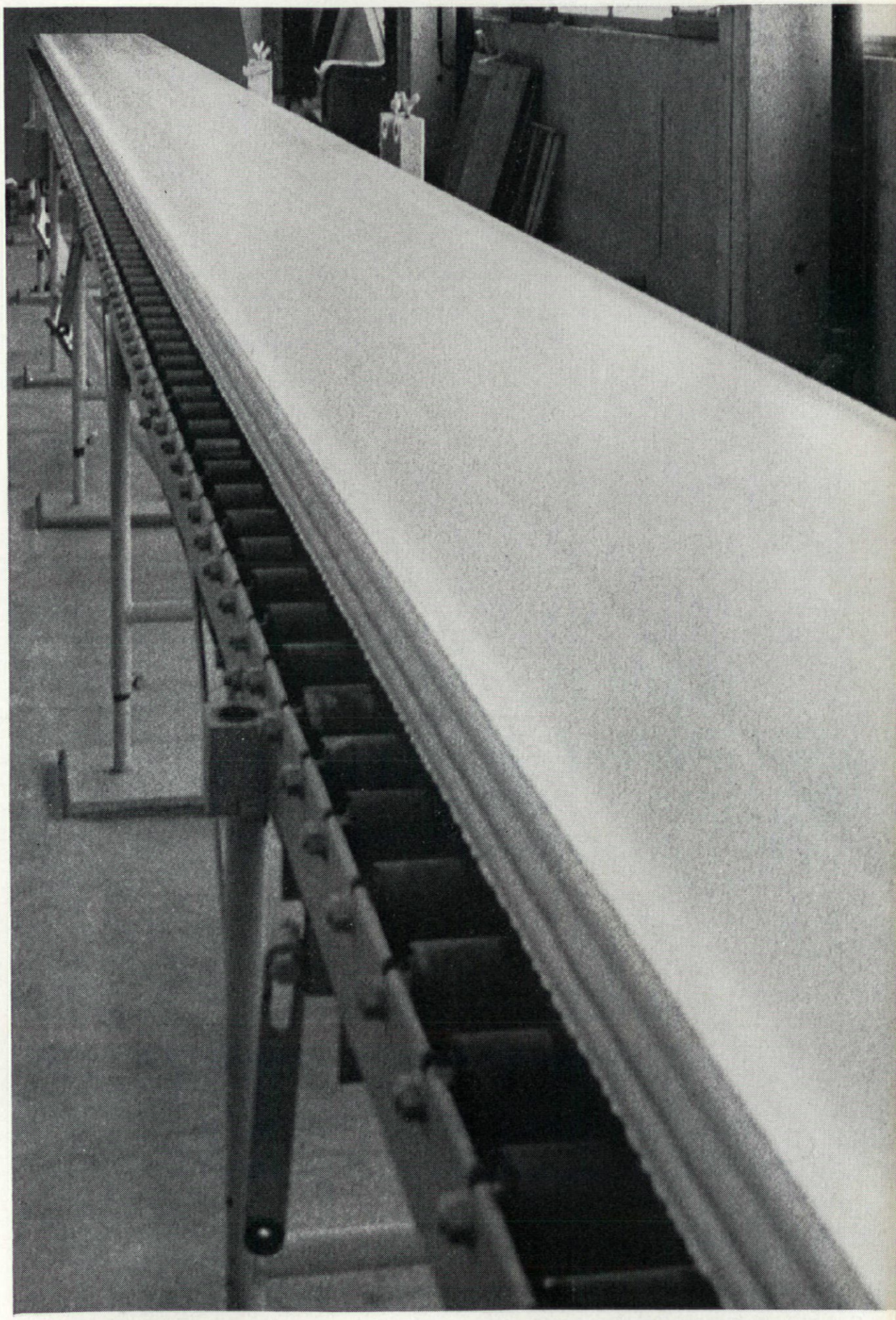


H5 Air structures

Glancrest Ltd., 189 Bickenhall Mansions, Baker Street, London, W1

Polydrom air structures are made of nylon reinforced PVC, and can be used for tennis courts, sports halls, warehouses, factories, exhibitions halls, etc. Any sections of the structure can be formed in translucent PVC which allows approximately 90% light penetration. Artificial lighting can be provided by floodlights on tubular steel stands, and if heating is necessary this can be supplied by an oil-fired hot air system located in a small hut outside the main hall, connected by two tunnels, one for warm air, the other for return air. The heater incorporates a mixing unit which draws outside air into the system. The body of the Polydrom structure is supported by air supplied by a propeller type fan maintaining an internal air pressure of ·4in W.G. If there is a risk of power cuts of more than a few hours, the air and heat-generating equipment can be equipped with standby units.

▷295



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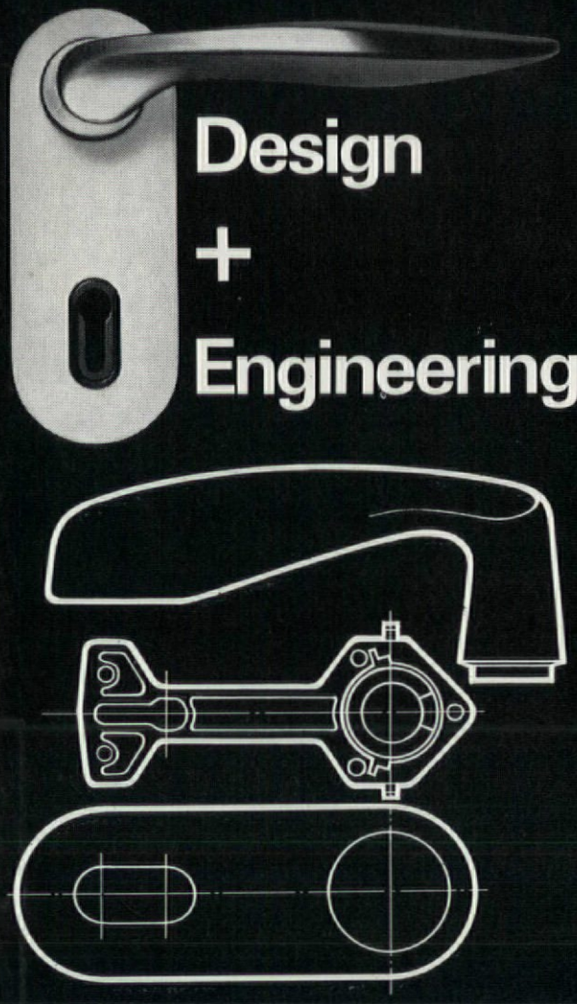

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DEVELOPMENTS

◁1294

H6 Linear motor for hovertrain
Merlin & Gerin, rue Henri Tarze, Grenoble, France
The Bertin Aerotrain which has been operating over an experimental track at Gometz-le-Chatel, for the past two years is about to be improved by the installation of a track enabling the vehicle to use a linear induction motor. Of the two components forming this type of motor, the fixed element is the track. The moving element travels in a straight line along the track when current is applied because it is constantly repelled. The advantages offered by this type of motor are that it provides a forward drive at high speed without requiring contact between the vehicle and the conductor rail, and it is completely silent in operation. This in itself represents a distinct advantage over the turbo-jet engine now employed, which is particularly noisy.

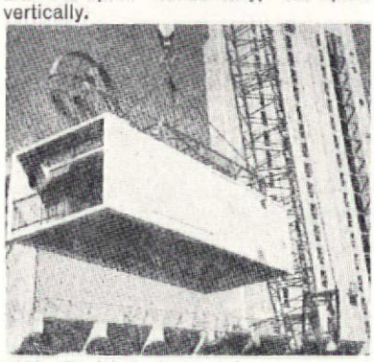
H7 Enlarging device
3M, 3M House, Wigmore Street, London, W1
Five years ago a small team of young researchers were given the task of producing an enlarging system in which the images would be formed by light and developed by heat. At that time a number of expert consultants felt that this was not technically possible. The work has resulted in a device primarily intended for educational purposes but which will obviously have many other applications. The apparatus will print and enlarge photographs in a matter of seconds without the use of chemicals or a dark room. The images can also be viewed, edited and projected with the unit. The image-forming paper employed has a high resolution and latent images remain stable for long periods. Designed at St Paul, Minnesota, price in the US is $30.

H8 Electronic room service
Captain International Industries, Vancouver, BC, Canada
A hotel room vending unit, claimed to give a better service without increasing charges, provides a wide variety of choice of product ranging from drinks, cocktail snacks, cigars and cigarettes to the latest novels or any other commodity in high demand. A refrigerator built into the unit provides chilling facilities and a supply of ice cubes. To obtain any of the goods, the hotel guest inserts a key and presses the appropriate button. The cost of the purchases is automatically recorded on a machine in the cashier's office. The unit also incorporates an electronic communication system which indicates to the hotel management whether rooms are occupied or unoccupied, being vacated or serviced, as well as the location of all maids.

H9 Rack and pinion escalators
W. J. Furse & Co. Ltd., Traffic Street, Nottingham
The German Beckhenkel escalator employs a pushing rack and pinion drive claimed to offer advantages over the conventional pulling chain drive method. Performance is said to be smooth and quiet, with no danger of backward running in the case of electrical or mechanical failure, and lengths can be increased, in some cases up to 60m. Beckhenkel escalators are available in 2ft, 2ft 8in and 3ft 4in widths, with capacities of 6000, 7000 and 8000 persons per hour respectively. The glass-sided Crystalator has a capacity of 9000 persons per hour.

H10 Selective document conveyor
Lampson Engineering Co. Ltd., Hythe Road, London, NW10
The Ralfs Selective Document Conveyor is fully automatic, and provides both horizontal and vertical travel between offices and departments at different

levels. Any number of stations may be served from small inter-office installations to complex networks involving up to 660 stations. Documents are placed in a plastic wallet on which the station destination is set by means of sliding metal tags. These actuate contact brushes at the station positions, forming an electric circuit which routes the wallet into a bin at that point. Conveyor speeds are 140 f.p.m. horizontally, 100 f.p.m. vertically.



H11 Prefabricated hotel
H.B. Zachry Company, San Antonio, Texas, USA
A new system of hotel construction employs preformed room units constructed on the ground, complete with carpeting, furniture and even the room number on the door, which are then hoisted into position stacked one above the other. During hoisting a rotor assembly is attached to each box to maintain orientation during the lift. The units are stacked against a lift core and end wall previously formed by sliding shutters, and spaces are left between the boxes to form duct work. A 500 room hotel 21 storeys high, intended for the 1968 World's Fair in San Antonio, is scheduled for construction in nine months using this method, construction proceeding at the rate of 18 rooms per day.

H12 Gas-fired central heating unit
Bradley-Nicholson Ltd., Braby House, Smithfield Street, London, EC1
Designed primarily for installation in the average semi-detached, two- to three-bedroomed house, or in older properties which are being converted into flats, the Answer central heating system can be housed in an average chimney breast. The minimum space required is 49½in wide × 14in deep. The 31,500 BThU gas-fired boiler provides a full hot water surface and over 70 square feet of radiator surface, as well as delivering warm air, by means of a heat exchanger, to the living room at a rate of 6000 BThU per hour. It may, or may not, be a recommendation to record that the unit is provided with a mahogany-finished wood surround with 'a welcoming simulated log-fire as a focal point'. Recommended retail price, £155.

H13 Sub-soil heat storage
Smith-Gates Corporation, Farmington, Conn., USA
Working on the principle that heating the ground beneath a building to the temperature required within the building will produce a self-regulating system, experiments are being carried out into the storage of heat in the sub-soil. Using off-peak electricity, the test building incorporates mats containing heating cables with a capacity of 22W per square foot embedded in a layer of sand 1ft thick beneath the 6in concrete floor slab. To prevent horizontal heat loss the footings at the edges of the building were insulated. The floor ceases to emit heat when the temperature within the building reaches the desired level and will only give off heat when the temperature falls below that level. It is claimed that in the test building the soil and sand beneath the building stored sufficient heat to keep it warm for 16 hours when the external temperatures was 0°F.

H14 Ready-mixed concrete in dry form
Markham & Co. Ltd., Broad Street Works, Chesterfield, Derbys.
The Markham Mobile Concrete Stower consists of a diesel-powered stowing machine with a blower, pipeline and discharge unit connected to the water mains for feeding a water curtain. A dry mix is forced pneumatically through the pipeline to the working surface at distances of up to 300 yards. It is claimed that a stowage rate of up to 25 tons of concrete per hour is possible. A high quality of mix is produced and, due to the high speed of ejection, compaction is good.

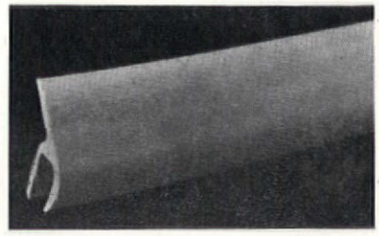
H15 Smash-resistant glass
Shepherd Tobias & Co., North Circular Road, Cricklewood, London, NW2
Thriglas is a laminated safety glass developed to give protection against smash-and-grab raiders. It is formed from three or more layers of plate glass, firmly fixed together under pressure and high temperature, with inter-layers of a clear elastic material in which the glass splinters are claimed to remain firmly fixed in the event of a breakage. Test results from over twenty blows with a 10lb sledge hammer showed only cracking of the outer laminations on a sheet of ¾in thick triple-layered Thriglas. Other versions of this glass include one strengthened by additional steel wires and another, alarm glass, containing very fine wires embedded in the interlayers, which can be linked to a burglar-alarm system.

H16 Pre-insulated plasterboard
Plaschem Ltd., Crystal Mill, Dale Street, Radcliffe, Manchester
The high-speed production of industrialized building components can be assisted by casting concrete directly onto an inner skin of walling consisting of ¾in thick plasterboard pre-laminated with ½in thick Polyurethane foam. The system is claimed to provide excellent thermal insulation, to eliminate condensation, and aid fast interior finishing.

H17 Structural adhesive
BFG Industrial Products Company, 500 S. Main Street, Akron, Ohio, USA
A new adhesive consisting of reclaimed rubber disolved in solvent may be used structurally either internally or externally. When used to hold floorboards, nails can be eliminated and the floor will be permanently free from squeaks. It may also be used for sticking boarding to battens. It is claimed to be waterproof, capable of resisting heat up to 200°F, and to retain elasticity indefinitely.

H18 Rust-resistant tiles
Burgess Products Company Ltd., PO Box 11, Hinckley, Leics.
Zinc-coated mild steel trays are treated by a new dipping process, which ensures that all surfaces are covered with a tough, waterproof plastic coating. This is claimed to make them ideal for acoustic treatment of locations with a high degree of humidity and where condensation is likely to occur, such as swimming baths, kitchens, etc., and also for external applications. Available either perforated or plain, in a choice of twelve colours and a range of sizes.

H19 Laboratory furniture
Assab Ltd., 69–71 East Street, Epsom, Surrey
The Assab system of laboratory furnishing has been developed to provide maximum flexibility and is based on a series of components with which it is possible to form wall benches, peninsular and island benches with shelving, and over- and under-bench storage units. The system employs channel sections, either as wall mounted rails or free-standing posts, from which brackets are cantilevered to support the bench tops or storage units. Bench or shelf heights are variable from 9in above floor level to 3ft for 'wet' benches, and to 7ft for 'dry' benches. Future additions or alterations to any installed system can be made very rapidly, in most cases by the laboratory staff themselves, without the aid of specialist fitters. For 'wet' benches a separate service plate or spine carries the pipework and taps, leaving the worktop entirely free, with the facility to adjust the height of the bench at will.



H20 Draught seal
Warmsil Ltd., 60 Lansdowne Place, Hove, Sussex
The Warmsil Draught Seal is designed to clip on to the frame of any standard metal window and can be easily cut to fit using a sharp knife. No screws or glue are required. In white flexible PVC, price 3s 9d per yard.

H21 Road cutter
The British Steel Piling Co. Ltd.,
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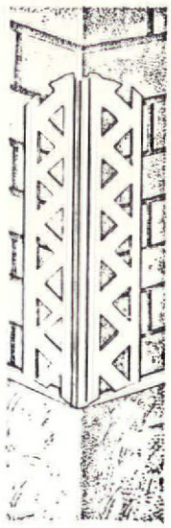

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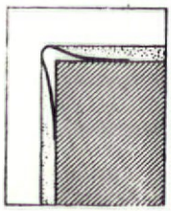

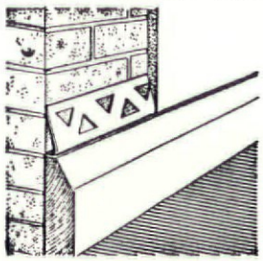

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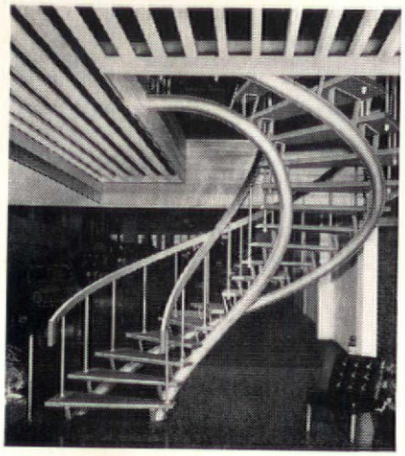

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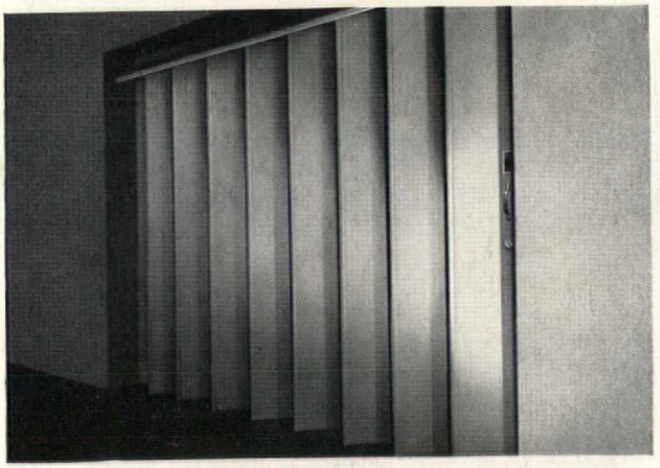

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