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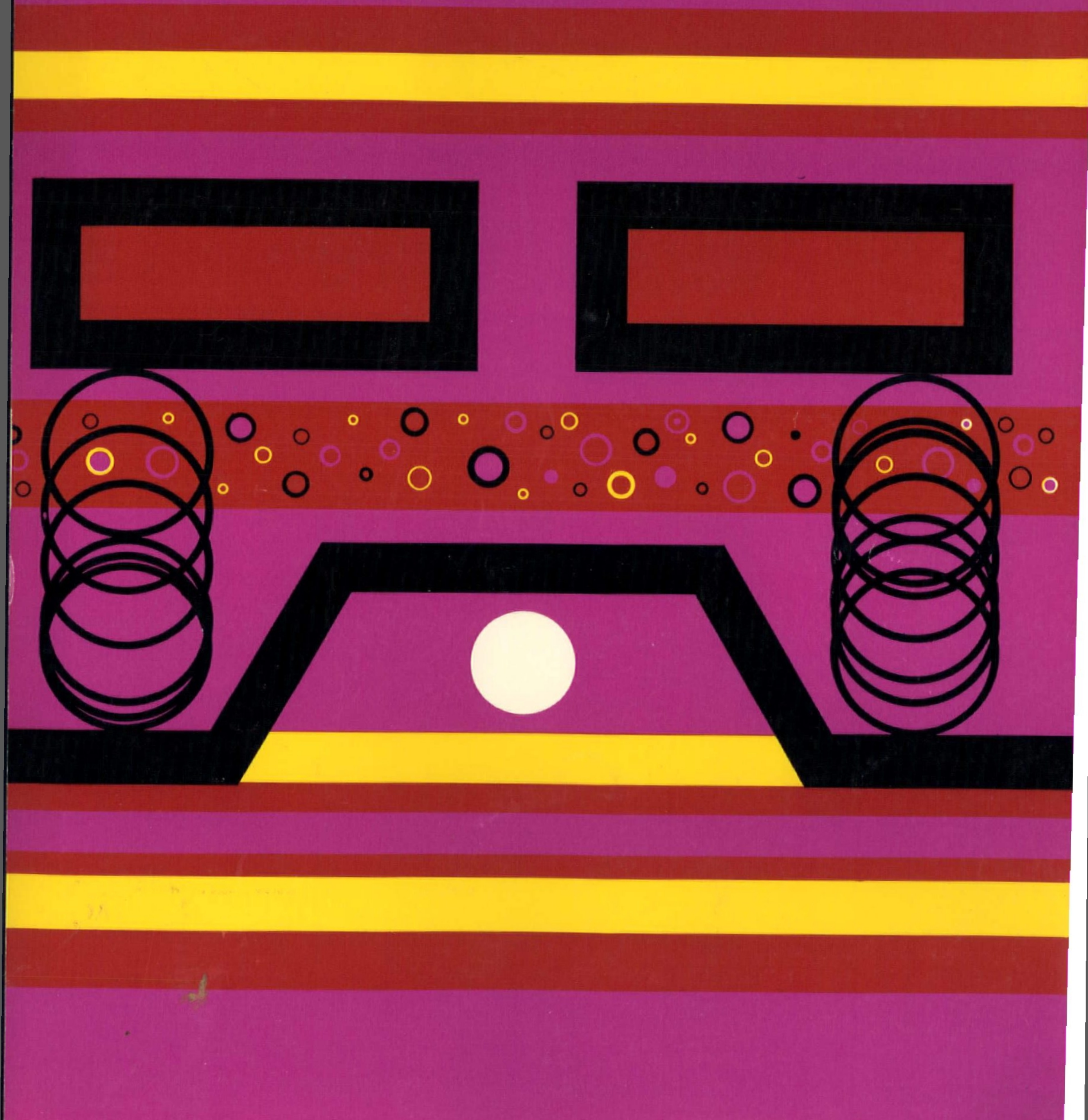

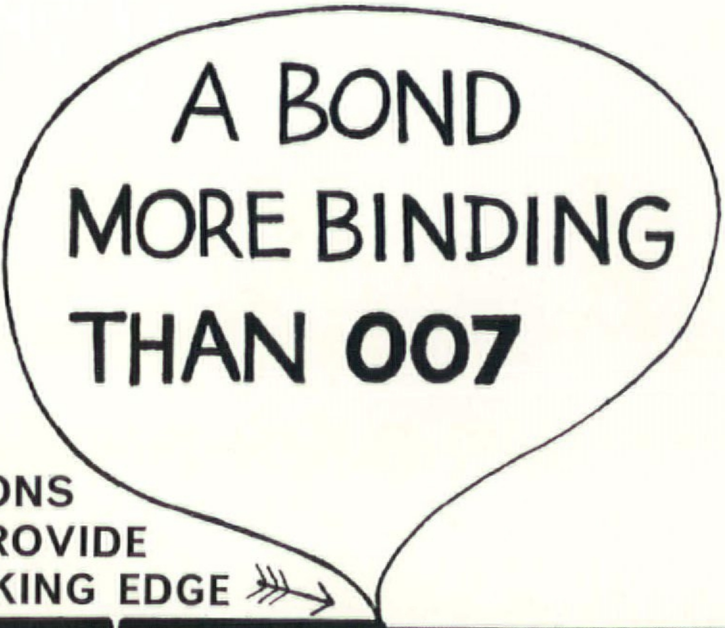

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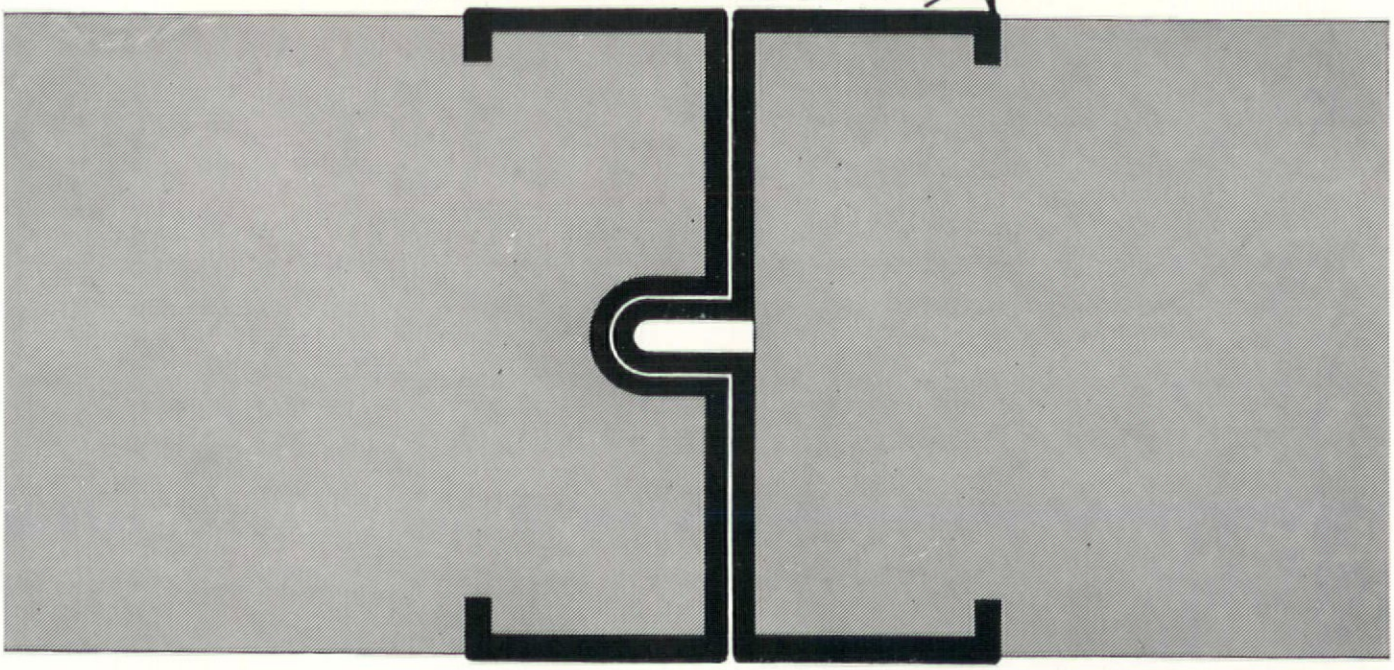

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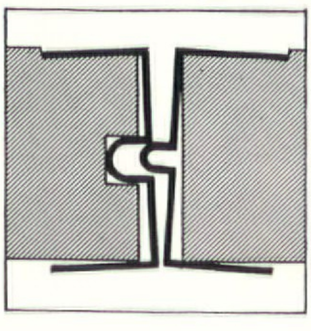

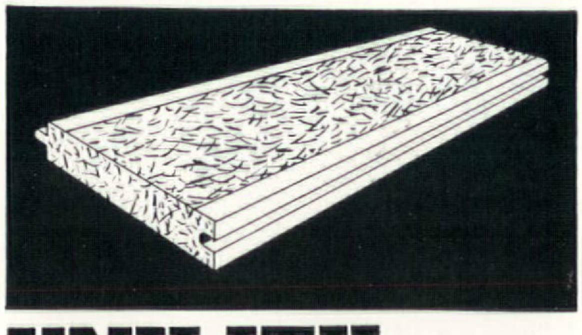

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Volume XXXV
July 1965

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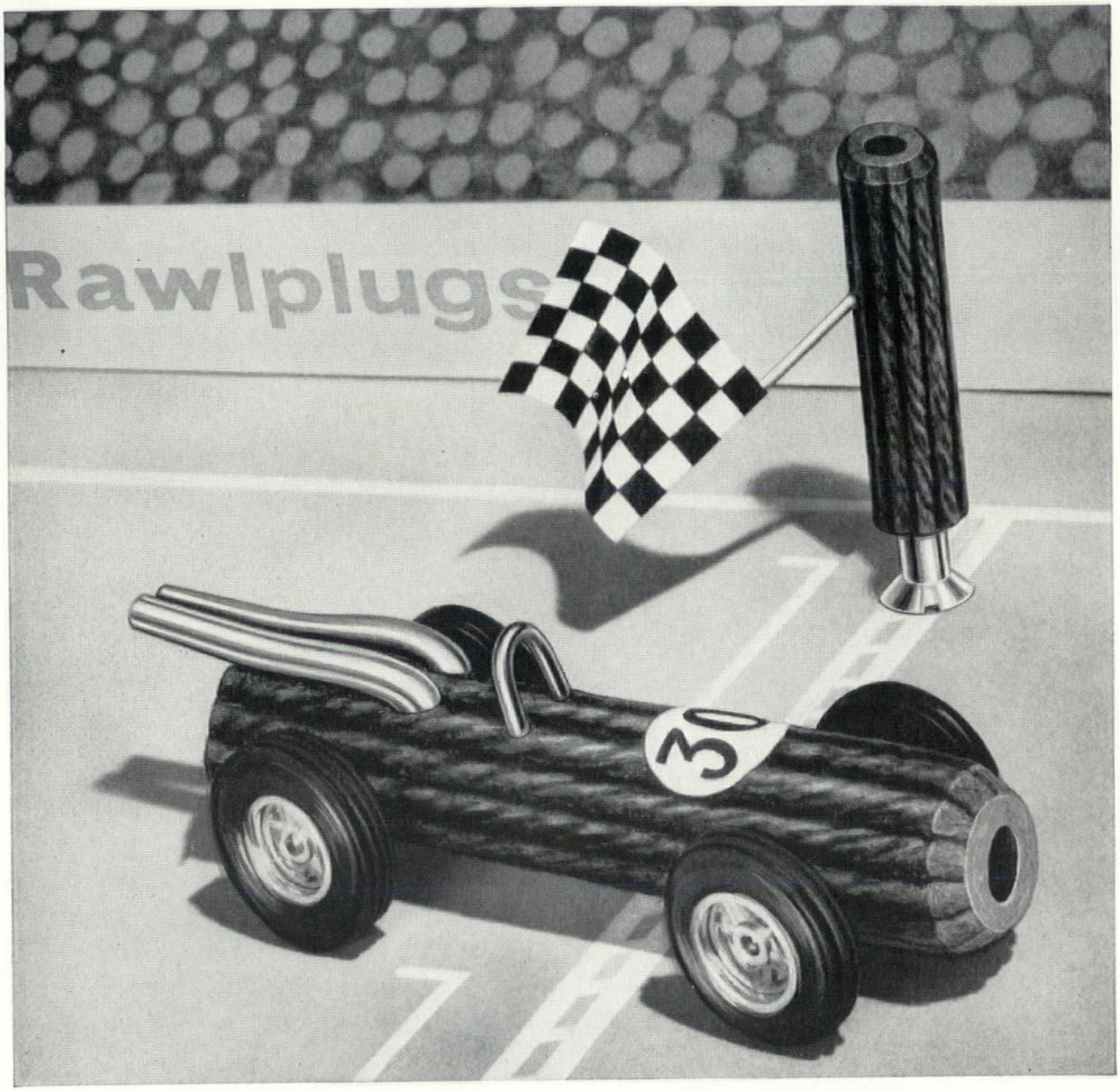

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Book notes

Various dwellings described in a comparative manner

Richard Saul Wurman. Joshua Press (322 South Camac St., Philadelphia 7., Penn. USA) $7.33

Fifteen second-year architectural students of the School of Design, of the University of North Carolina, working under Richard Wurman on a house design project, made descriptive perspective drawings to scale of 35 dwellings of significance in the world. These, together with 15 further plans, have now been published in book form and make invaluable reference material. The catholicity of choice is delightful, ranging from Katsura to Caius, Pompeii to China, pre-Christian Greece to present-day USA, from trulli hut to high Renaissance palace. The drawing and presentation is first-class.

Arquitectura argentina contemporanea

Francisco Bullrich. Nueva Visión (Buenos Aires)

That there are good architects in Argentina is indisputable. But with the political upheavals of the past decade and the consequent social climate, it is hard for them to find clients other than developers of luxury flats or offices. Indeed a depressing situation—which makes it all the more remarkable that Francisco Bullrich, himself a young architect, has been able to scrape together enough good work to fill this little book, including, among the unbuilt projects, his own competition-winning design for the National Library. Unfortunately, the probability of this latter building—or of some of the other projects illustrated, such as the Bank of London and South America—ever being built, is unlikely.

Motif 12

Edited by Ruari McLean, Shenval Press £1 2s. 6d.

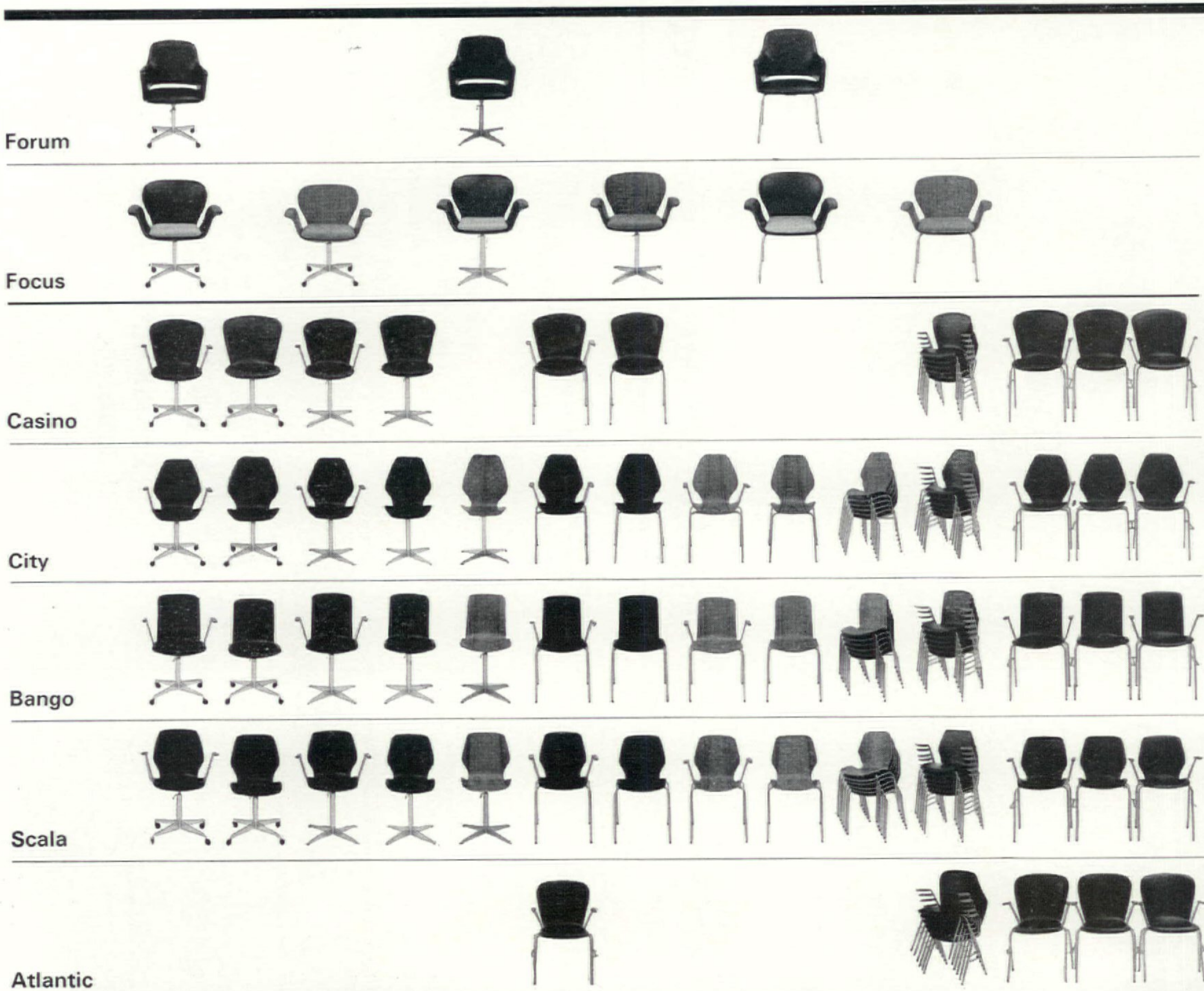
The thing about *Motif* is that in terms of production it gets better with every issue. So that even if the subjects do not appeal to you, you cannot help but be seduced by the current offset reproductions of *Playboy* art director Art Paul's drawings and prints, or the full colour letterpress prints of Ceri Richards' *Cathédrale engloutie* series of pictures which dominate in the current number. Other visual arts are featured by: de Sausmarez on the British sculptors Oliffe Richmond, Neil Stocker, Clive Sheppard and Anthony Hatwell; M. Corbett on early title page engraving; P. M. Handover on typefaces; Peter Goodliffe on photography of trees.

Islamic architecture and its decoration A.D. 800–1500

Photographic survey, Derek Hill. Introduction, Oleg Grabor. Faber & Faber £6 6s.

The photographer-author is a painter who spent 10 years travelling and photographing Islamic-decoration in Turkey, Persia, Afghanistan, Russian Central Asia. Oleg Grabor is Professor of the Department of History of Art, University of Michigan. The first studied and collected material illustrating the multiplicity of ways in which the Islamic decorated surfaces; the second sorted the material and gave it form by placing it in its physical and historical setting. Such a book as this that they have together produced (aided by a Gulbenkian grant) is of considerable value, particularly as it also includes photos of buildings which have not previously been published, and which will inevitably suffer the erosion of time.

continued on page AD7



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Architecture : City sense

Theo Crosby. Studio Vista & Reinhold. 10s. 6d.

Theo Crosby writes such concentrated horse sense about so many things, and makes it all sound so simple and obvious, that one is left gaping. Briefly, he loves and believes in and understands what 'the city' is all about—what it has been in the past, what it is now, and what it should be; wherein lies its value ('a place to which talent is drawn, which provides a sufficient cross-section of society for everyone to find someone he *wants* to know, a great stage where everyone plays a part'). He describes the sort of things that can 'kill' it, and he makes concrete proposals for action that we can take to meet the challenge of tomorrow.

He reckons that we should build at densities no lower than 300 ppa, in groups of 50,000 people; 10 such groups, linked by efficient roads and arranged to the overall density of our present new towns, would form a city. He seconds Holford's long-ago proposal of corporations to undertake development on the part of the community; and Koenigsberger's proposed 'action planning' for completely redeveloping a whole area of a city with high density housing round a civic commercial/entertainment centre, linked to it by covered pedestrian ways segregated from traffic.

All this he substantiates plausibly in economic terms, the community preferably owning the land and profiting from the development of the centre which can then subsidise the unprofitable low-cost housing. He also advocates single-tier housing (with individual subsidy for those who cannot meet the cost) so as to maintain land values.

Crosby knows what he is talking about, and is confident that it is merely a question of time until society catches up with him. Meanwhile, he goes on hammering it in. We quote his closing paragraph:

'A society can only sustain an improving technology and high material aspirations if it uses its leisure creatively. Out of play comes the creative urge; out of social intercourse comes social concern. And that's what the city is about.'

The best in 20th century architecture

Selective Eye V: a Bernier Book
Edited by G. & R. Bernier. Reynal & Co. (N.Y.). £5 5s.

Beautiful photographs of beautiful buildings are irresistible. The art magazine *L'Oeil* consistently publishes them, and now, in a large and splendidly produced book, we find a concentration of the best to date.

Individual architects' and engineers' work is studied in one section (Frank Lloyd Wright, Corb., Aalto, Mies, Gropius and Breuer, Nervi, Niemeyer and Saarinen); followed by individual recent buildings (Scharoun's Philharmonie, Saarinen's Dulles Airport, SOM's Yale library, Sert's Baghdad Embassy, the Finns' Tapiola, some Neutra houses, Johnson's Dumbarton Oaks museum). Then a section on integration of the arts; another on skyscrapers; a short but perceptive piece on prefabrication; and a final chapter on materials—metals, concrete, glass and plastics.

Theatres and auditoriums (Second edition).

Harold Burris, Meyer & Edward C. Cole. Reinhold. $20.00.

When the first edition of this book appeared fifteen years ago there was no other comparable English language treatment of the subject of planning theatres. In both the United States and Britain the commercial theatre dominated the scene and much could be said which applied with equal force on both sides of the Atlantic. Since then the attitudes have diverged; and in Britain, as the principle of public subsidy for the arts is increasingly accepted, a new approach to the theatre is evolving.

The second edition of the book has not caught up, though it has been revised and expanded to include a number of new American university theatres and now attempts, rather grudgingly, to cover open forms of staging as well as the more orthodox proscenium type. However, the old Radio City Music Hall fixation of the first edition is still there. The photographs have been updated (they now have fluorescent lighting in the wardrobe) but the costumes, which include spangled top hats, look strangely old fashioned. Financial viability looms larger than artistic standards, but most aspects of theatre design are touched upon.

Fortunately it is no longer alone in the field, for the whole subject has been more thoroughly and informatively treated by the Association of British Theatre Technicians in their book *Theatre Planning.*

Roderick Ham

The new churches of Europe

G. E. Kidder Smith. The Architectural Press. 73s. 6d.

Church design is pure architecture and for that reason is the Achilles heel of the profession. Mr Kidder Smith has assembled sixty of the best of Europe's modern churches. However, even of these only a handful are really outstanding. But any architect commissioned to design a church needs this book. He needs it for the superlative illustrations and for the rational and constructive

continued on page AD9

criticisms of each building and for the practical and erudite foreword. He needs it most of all to resist the temptation to 'ride no hands' and thus avoid the pitfall of another of what Mr Kidder Smith so aptly describes as so many 'wretched, jazzed up churches' that 'at present affront the world's suburbia'.

Michael Manser

Demuroes Parisiennes—l'epoque de Louis XVI

Michael Gallet. Editions du Temps, Paris. 22 N.F.

To have written a book on the domestic architecture of late eighteenth-century Paris consisting of little more than fifty full pages of text that supersedes both the fourth volume of M. Louis Hautecoeur's *Histoire de l'architecture classique en France* and Emil Kaufmann's *Architecture in the age of reason* would have been an extraordinary feat even if it had been no more than a dull compilation of facts. But M. Gallet is never dull. Absolutely he is the most sensitive and engagingly informed historian of French Neo-classical architecture. And if he has verified innumerable and vital dates and attributions for the first time his very pedantry is pedantry irradiated by a deep understanding and a sincere love of the architecture of the period.

The only misgiving his book might provoke is that it is too often directed at those *amateurs distingués* who regard architecture as an affair of mouldings and decorations. There is insufficient analysis of the plans with which it is lavishly illustrated—M. J. Peyre's radical departure in the planning of the Folie de Neubourg, for instance, is not stressed—and one may question the primacy given to Ledoux rather than Boulleé. No mention, moreover, is made of that turmoil of ideas and controversies that conditioned the rise of a rational theory of architecture and led, ultimately, through the writings of Viollet-le-Duc, Choisy and Le Corbusier, to our own concepts of functionalism in architecture. For all clarity such discussion was perhaps best left out of the present book.

M. Gallet is concerned mainly to discover those houses and *hôtels* that were built in late eighteenth-century Paris and to record what remains. The new facts he adduces would alone make his book invaluable, and they are most usefully set down in an appendix. The *oeuvre* of all architects who built anything in Paris between 1760 and 1792 is here rigorously reviewed and itemized. There are many surprises. Brongniart has lost his first work, the Hôtel de Bérule; it goes to P. C. Convers and is dated 1775. Louis has had to surrender many chateaux in the Guyenne, also St Nicolas at Nerac which is by Barreau de Chefville with Oudot de Maclaurin in the final phase. The Désert de Retz, disgracefully mouldering away, has at last been ascribed to Barbier. Gondouin (correctly?) gets a 'u' in his name. There are literally hundreds of similar discoveries which will best be appreciated by scholars, and though they will be irritated that they are not properly annotated, it says much for the confidence inspired by M. Gallet that his findings will be accepted with little questioning.

The format of the book is disappointing and the photographs and extremely useful line drawings little revealing of the grandeur of late eighteenth-century Paris, for they record—not very well—those buildings that are little known or not often illustrated.

R. M.

Paris : Städtebau von der Renaissance bis zur Neuzeit

H. Speckter. Verlag Georg D. W. Callwey (Munich). DM19.50.

In the January issue of this journal, Ionel Schein hazarded the paradox that French town planning and architecture are 21 years young. This does not necessarily contradict the fact, shown by the book under review, that Paris town planning started 2100 years ago. Then it was that Lutetia was first established on a wisely chosen site in the Seine island that is now the Cité. With time, it developed on both banks of the river, but by medieval times Paris had become a huddle of mean streets and tangled yards, housing nearly 200,000 people in dreadful promiscuity. The sixteenth century witnessed the blossoming of plans for the rebuilding of the city on monumental lines: the two Jacques Ducerceau, father and son, and Jacques Perret, presented to the king designs of those geometrically drawn avenues and squares, lined with identical houses, which were to become one of the characteristics of the French capital, and of which the Place des Vosges and Place Vendôme remain classic examples. As the city outgrew its fortifications, under the reign of Louis XIV, they were razed to make way for the now familiar boulevards. The majestic Place de la Concorde was laid out in the eighteenth century by Jacques-Ange Gabriel, the arcaded rue de Rivoli started in 1815 under Napoleon I, then, under his nephew Napoleon III, were initiated the far-seeing plans of Baron Haussmann, of his chief architects Jacques Hittorf (who designed the Champs-Élysées as well as the Bois de Boulogne), Eugène Belgrand (creator of the Paris sewage system), of Jean-Charles Alphand (the engineer whose genius conceived and executed most of the city's parks and squares).

Dr Speckter's book gives a comprehensive, fully illustrated history of these developments and it takes in the latest evolution of the Paris conurbation.

René Elvin

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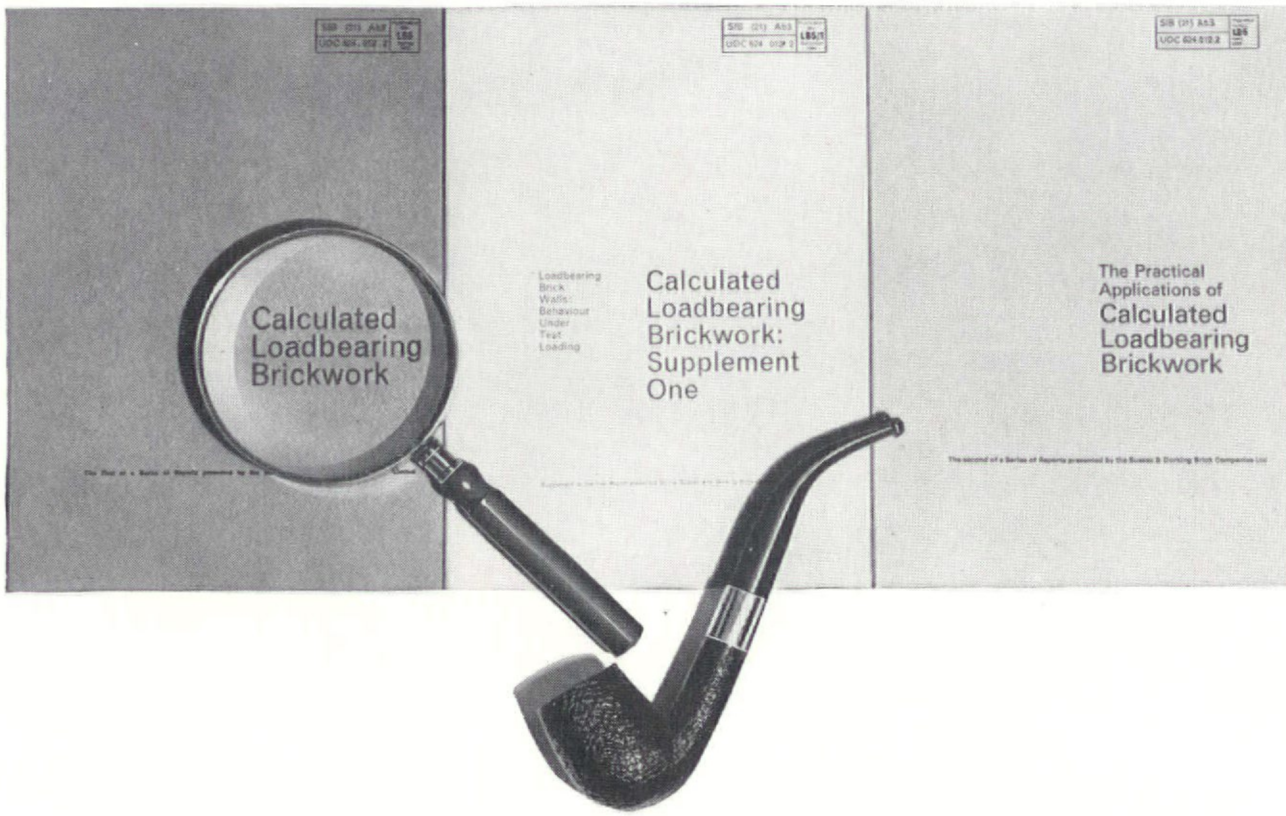

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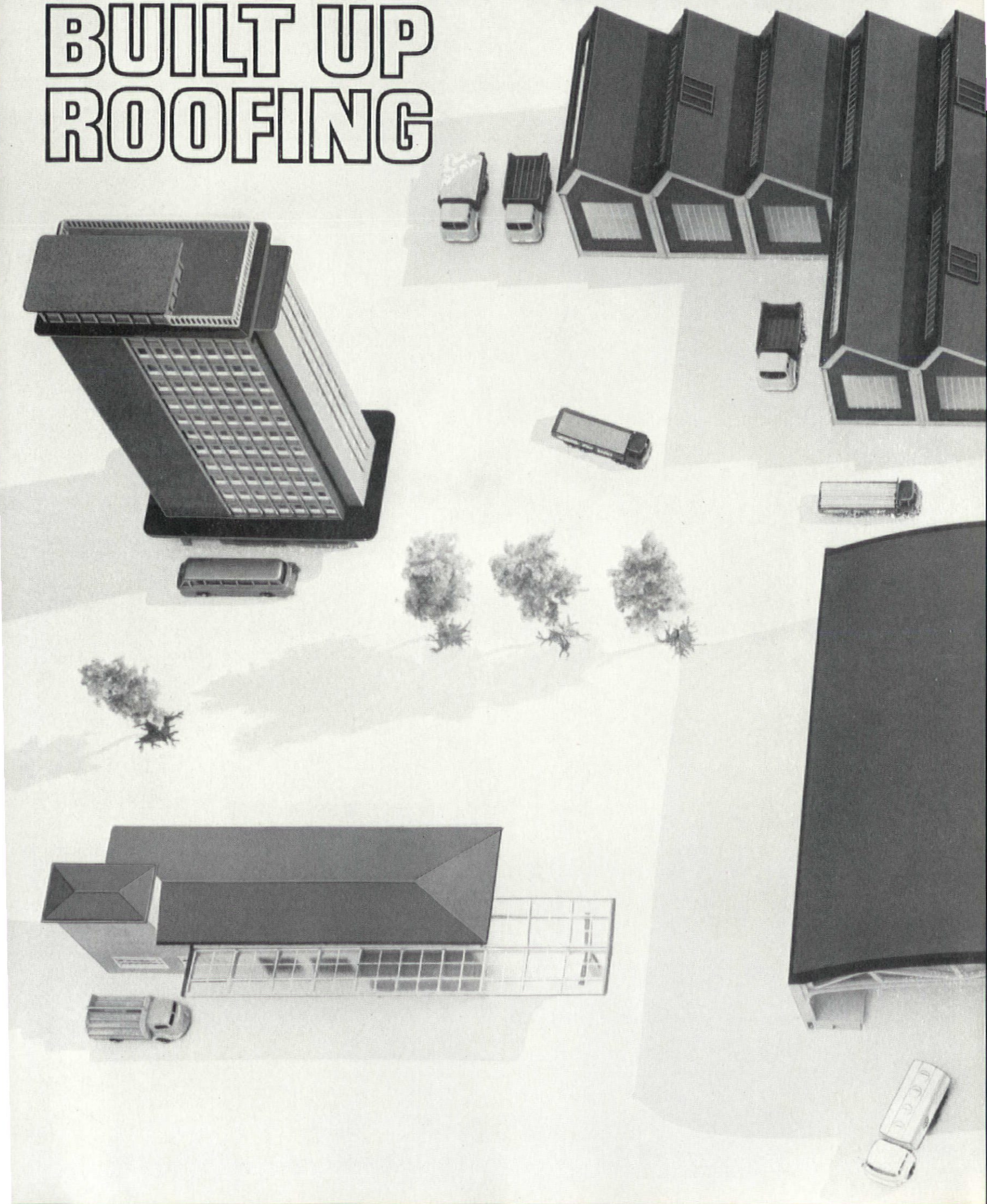

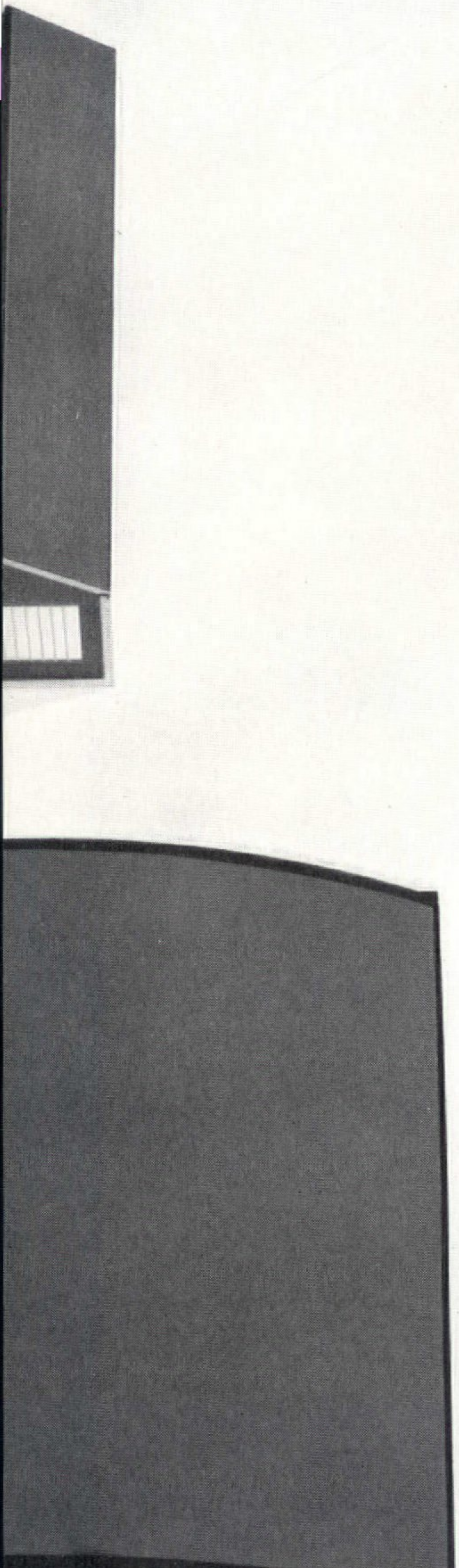

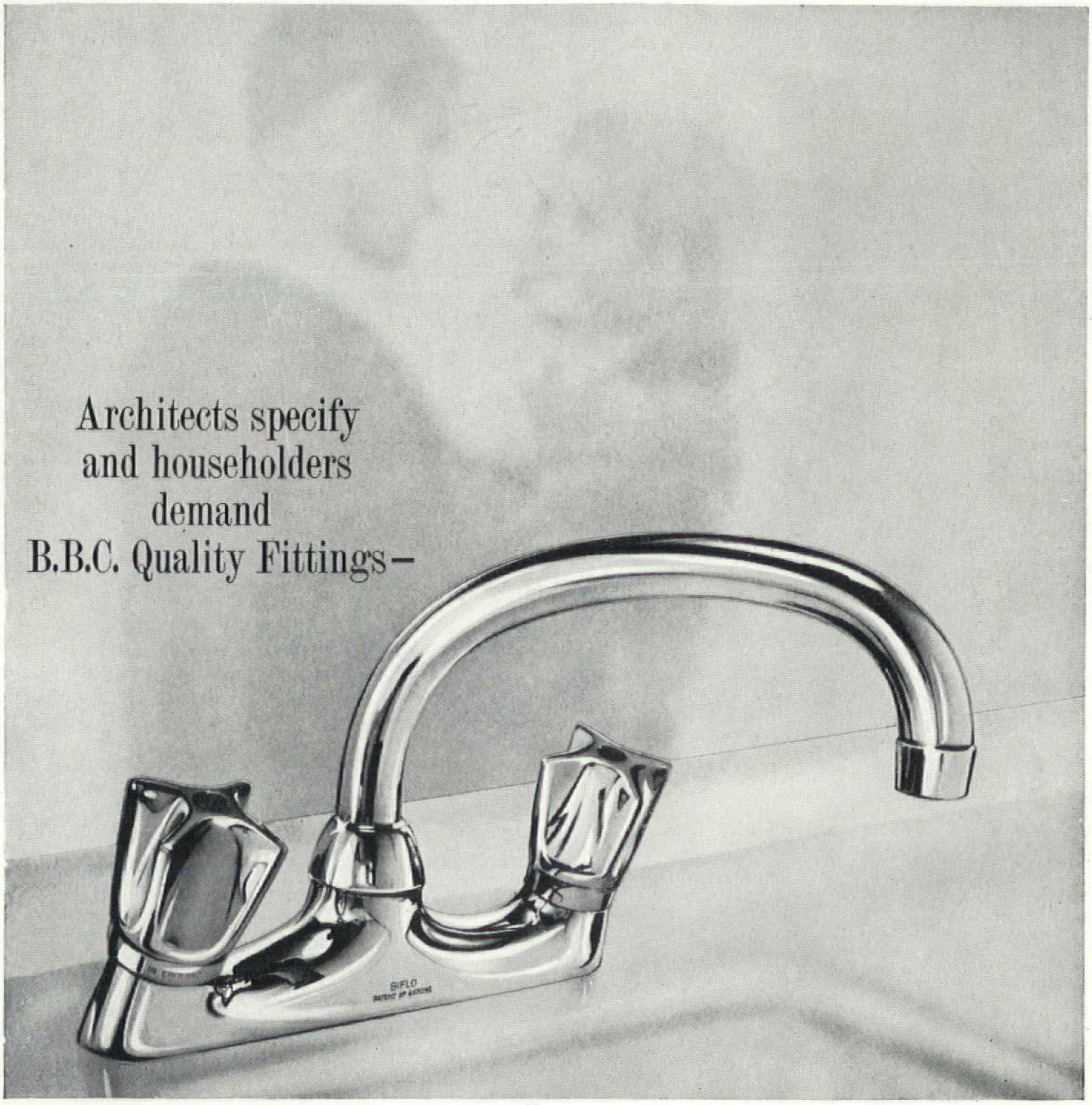

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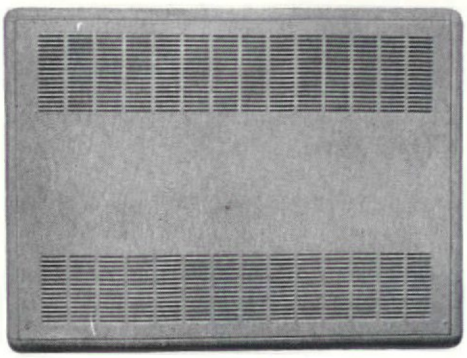

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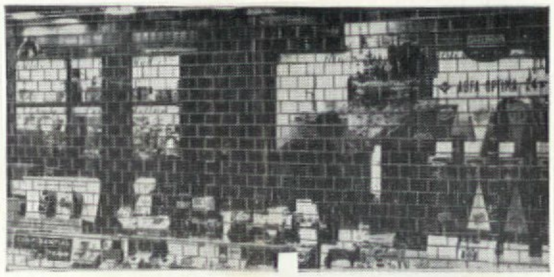
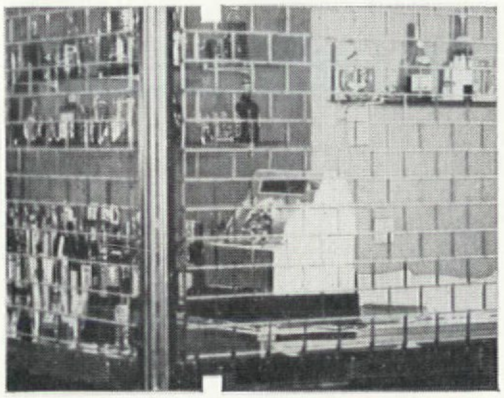


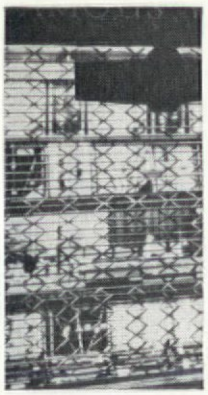


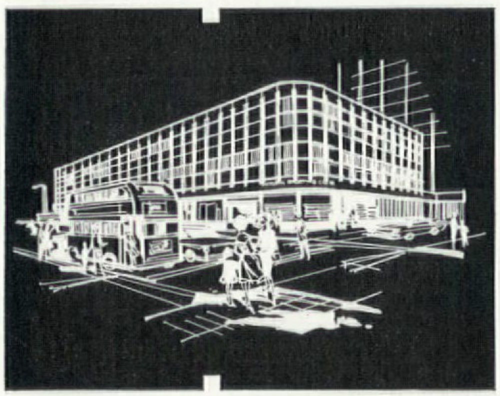


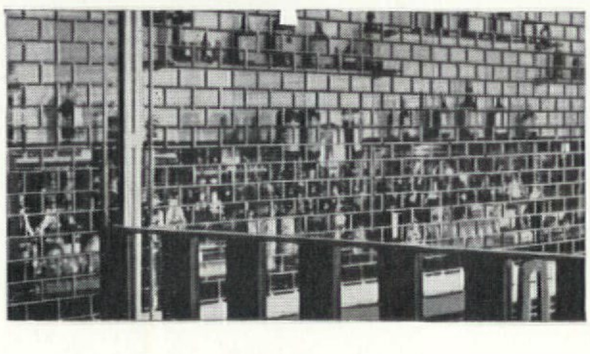
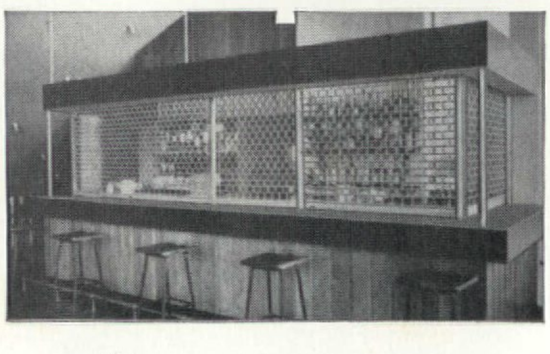

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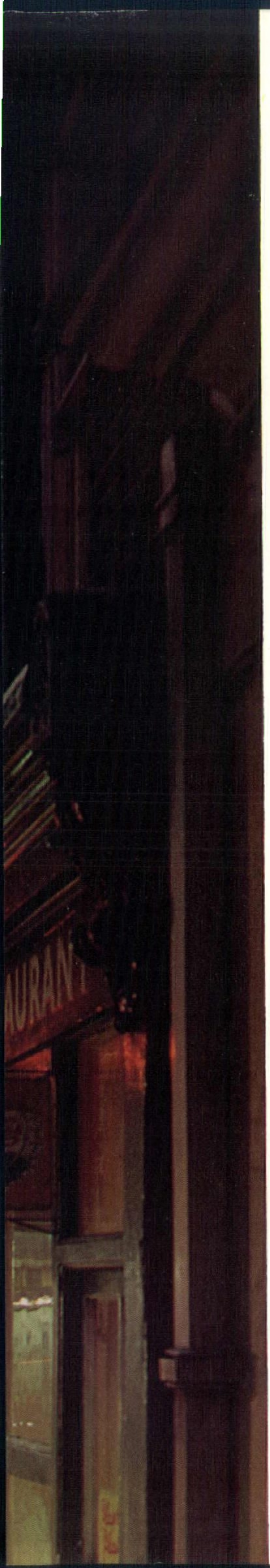

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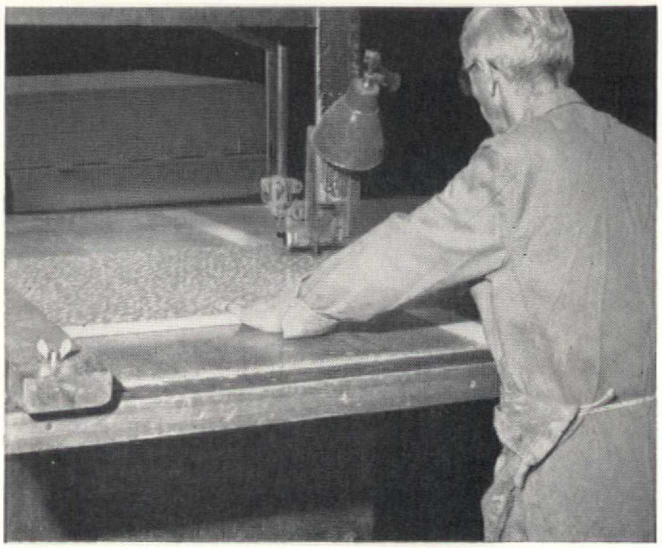

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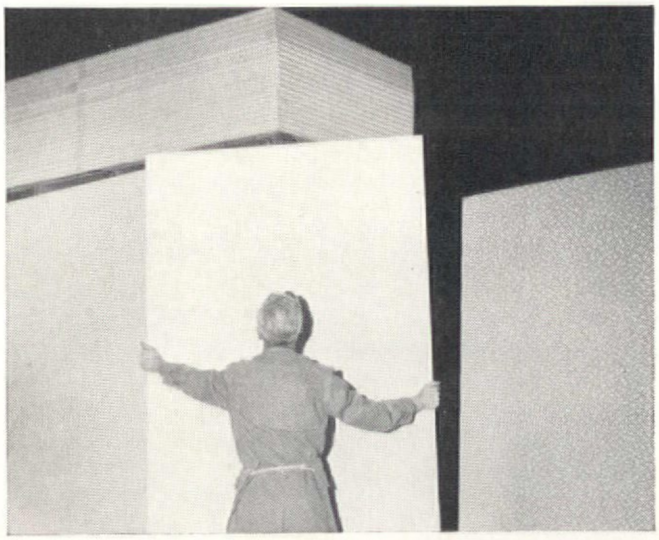

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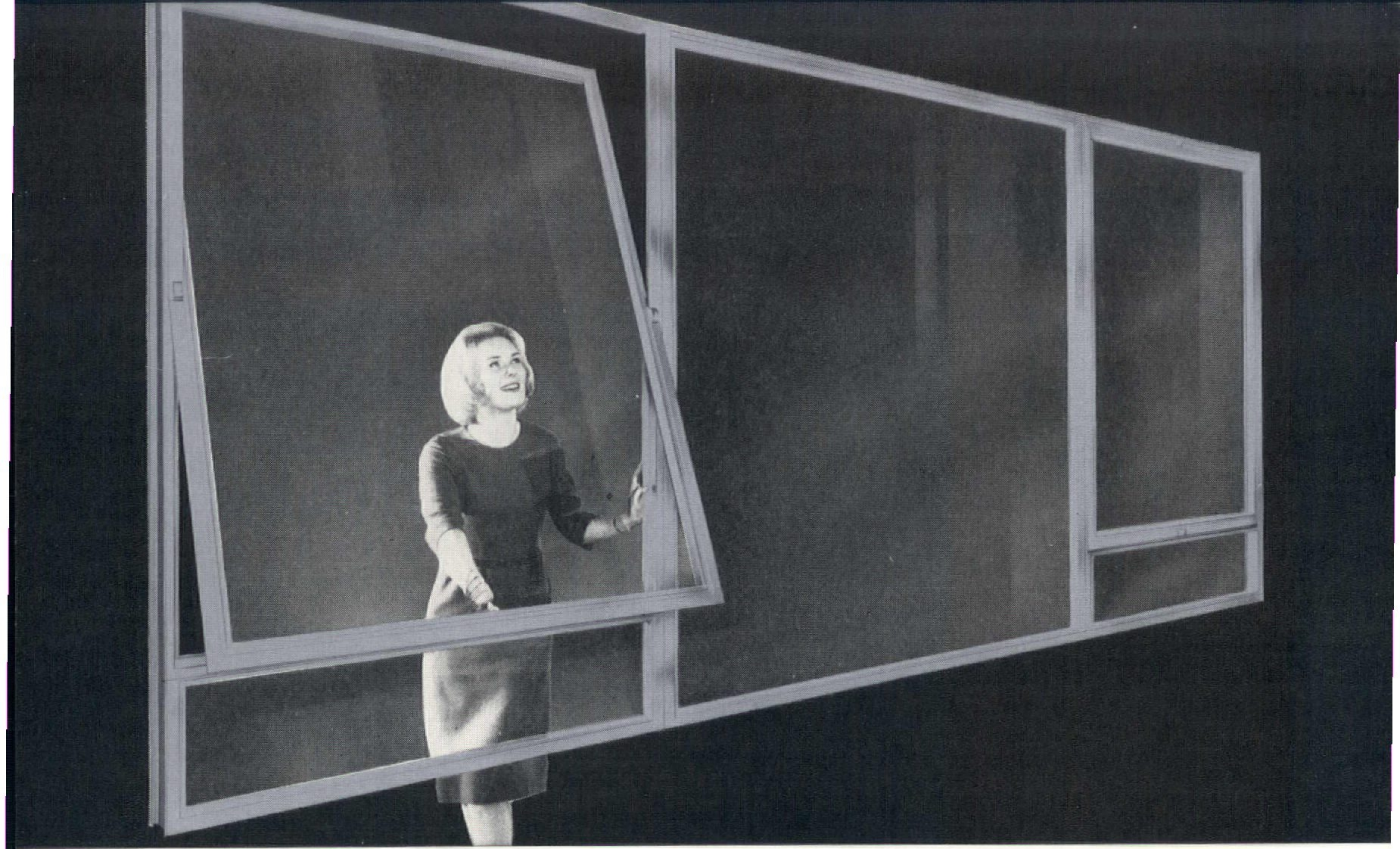

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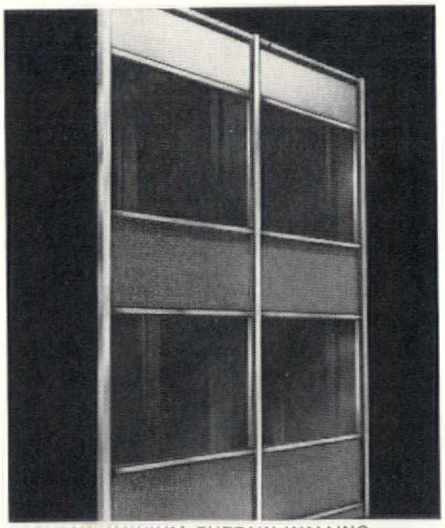

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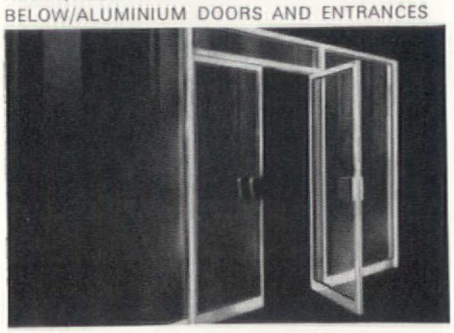

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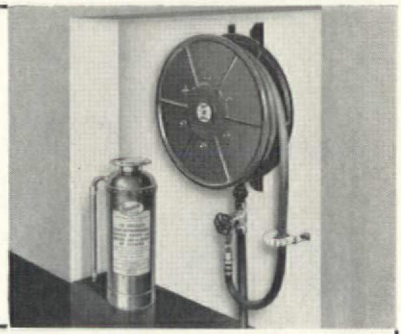

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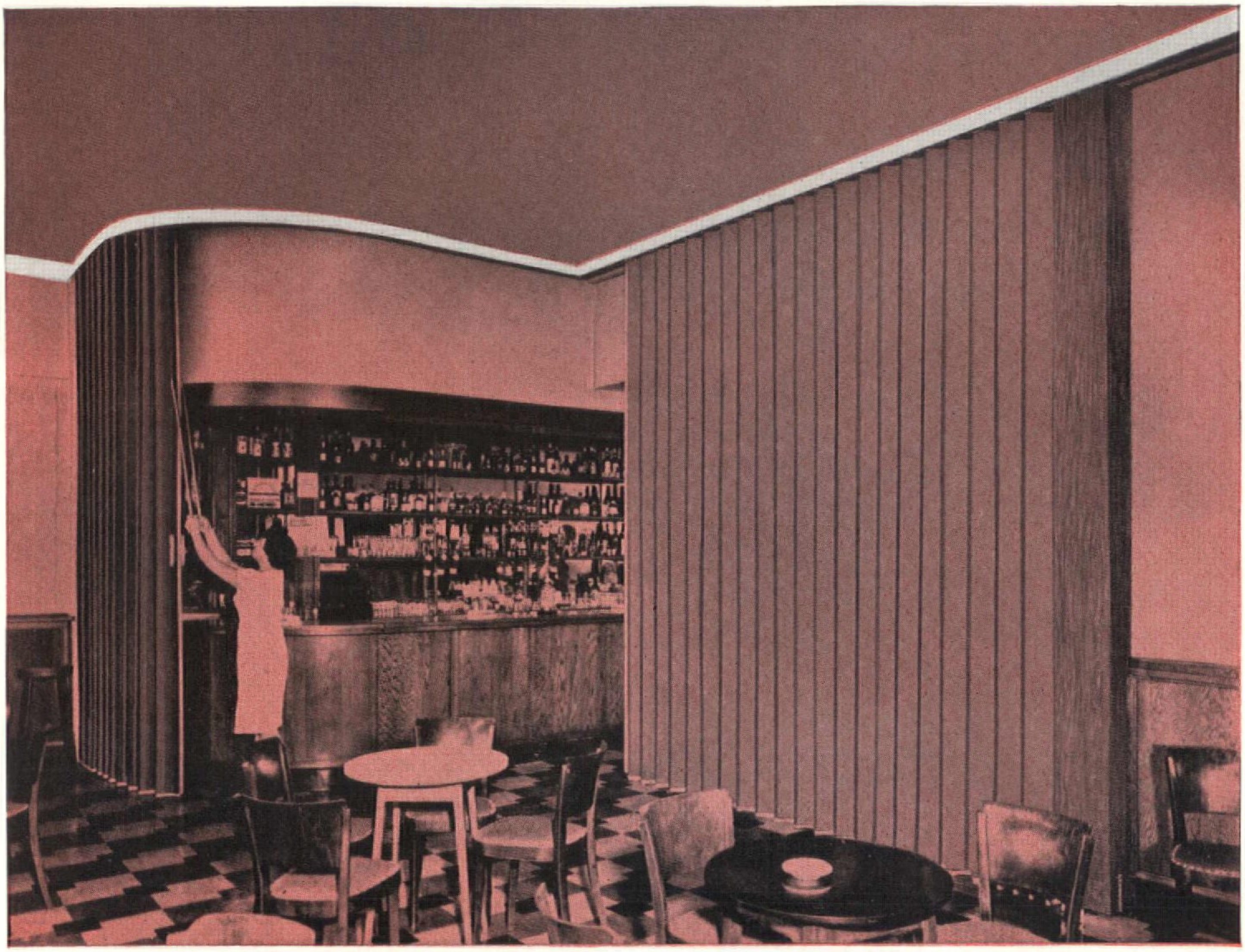

MODERNFOLD SPOTLIGHTS ANOTHER FEATURE

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TOUGHENED GLASS

SfB (21) Ro8
UDC 69.022.1

This advertisement reviews some recent and adventurous uses of toughened glass. As the photographs show, this exceptional material is capable of quite astonishing applications—applications that a few years ago would have been thought dangerous and, with ordinary glass, would in any case have been impossible. The majority of the illustrations come from a slide strip by the firm's architectural adviser, called "Structural Glass in Europe". It and its commentary on a L.P. disc can be had on free loan on application to Pilkington Brothers' London Office, Selwyn House, Cleveland Row, St. James's, S.W.1.

Toughened glass, as most people probably know, is a material of quite different characteristics to normal flat glass. In most of the flat glasses, the inherent strains that are set up when the glass cools are removed by the process known as annealing. Toughened glass, on the other hand, has stable balanced stresses deliberately induced in it by a carefully controlled heating and cooling treatment. The main result of this treatment is to make toughened glass up to four or five times stronger than ordinary annealed glass of comparable size or thickness. The generally used method of toughening is to suspend the glass in a furnace rather like a huge toaster and heat it almost to softening point. It is then withdrawn and rapidly cooled uniformly by jets of cold air. Glass being a poor conductor, the surface zones set rigid while the centre is still plastic and a substantial temperature gradient is established from surface to centre. As cooling continues, the centre sets, but the gradient is still maintained. The centre has further to cool than the outside and therefore wants to contract more which produces high compression in the surface and high, but compensating, tension in the centre.

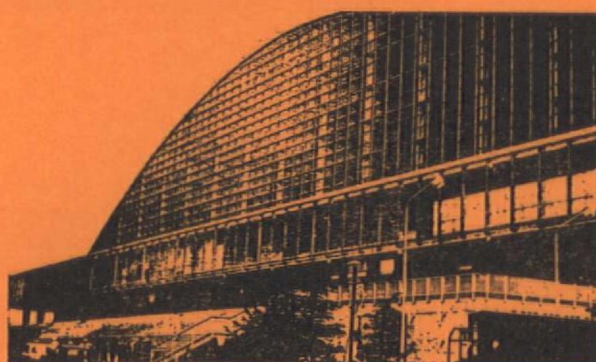
The degree to which the resistance to mechanical loading of the glass is increased by toughening can be varied but is dependent to some extent on the thickness and nature of the glass with the strength of thinner and worked glasses increasing the least. The toughening process does not increase the resistance of the surface to scratching or abrasion. When broken, toughened glass fractures into granular particles which are unlikely to inflict serious cuts such as can be caused by broken annealed glass.

With toughened glass, such as Pilkington's "ARMOURPLATE" or "ARMOURCAST", one has available a material with considerable structural potential. In fact it is even possible that the long anticipated hope for glass as a structural material is being fulfilled without it being generally realised. On the Continent the properties of toughened glass have been appreciated by many designers resulting in the appearance, in the last six or seven years, of some quite astonishingly original architectural features. In Britain, toughened glass seems to have been used predominantly for door and shop front assemblies but even this rather limited field of application is being expanded and in the last few years several suspended toughened glass assemblies have been installed. Suspended glass assemblies are really all-glass walls, rather than window-walls as they are devoid of conventional mullions or frames.

One of the outstanding early uses of a semi-unframed toughened glass window wall was in the Rome railway station of the mid 1950's. Here toughened glass panels about 5 ft. wide and 3 ft. high butt one above the other between vertical structural mullions. The first SGA as such was the Wepler cinema in the Champs-Elysées, Paris, to be followed in 1958 by the marvellously experimental French pavilion at the Brussels Exhibition and, quickly, many others. Some of the newer examples are shown here. After seeing them and, perhaps too, our slidestrip from which many of these photographs come, you may agree with us that nowadays there are ways of using glass that a few years ago could not have been thought possible.

1 & 2 The huge arches beneath the concrete shell of this exhibition hall are infilled with panels of toughened glass about 5 ft. x 3 ft. held in stainless steel mullions. The panels have no horizontal framing and are arranged as slightly open louvres so that the outside of the glass can be cleaned by men standing on a movable cradle suspended inside the building. As the detail shows, the glass on the lower projecting floors is 'stitched' onto the stanchions by bolts passing through holes drilled in the glass. Both bolts and mullions are masked with resilient washers to prevent glass to metal contact. The panels butt together horizontally in joints sealed by an inverted PVC channel. (CNIT Exhibition Hall, Neuilly, near Paris, finished in 1959.)

3 & 4 Below (left) is a detail of the corner of the Co-operative store at Worthing. The suspended glass assembly is 26 ft. high and has a frontage 61 ft. long and a return of 17 ft. Three courses of $\frac{1}{2}$ in. "ARMOURPLATE" are used braced by $\frac{3}{4}$ in. "ARMOURPLATE" fins 9 in. wide. To meet fire regulations the gap between the mezzanine floor and the glass is closed by horizontal plates of polished Georgian Wired glass. The assembly weighs $16\frac{3}{4}$ tons. The Museum of Culture in Le Havre (below, right) is approached by a footbridge which has a toughened glass balustrade to which a solid handrail is fixed. The balustrade is braced by vertical toughened glass fins and its top edge is finished with a light aluminium channel.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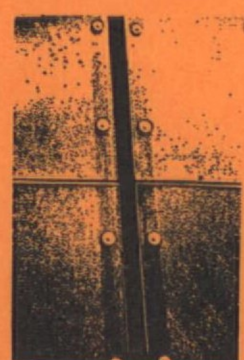
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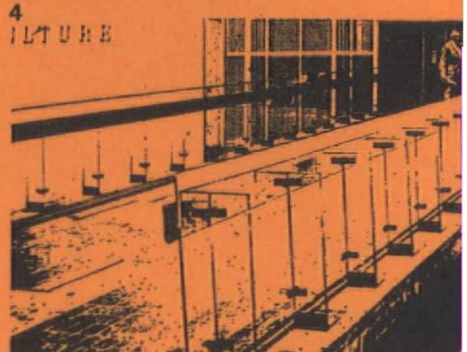
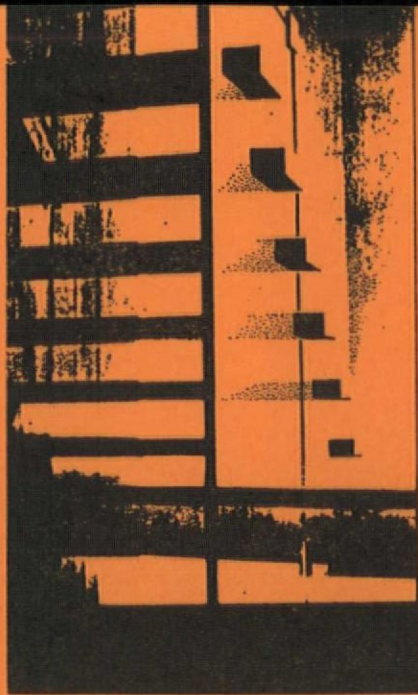


4

5 & 6 An advanced use of glass is shown in these two details (right). The wooden stair treads are too thin to permit them being cantilevered from the wall on the left so they are supported at the ends on a glass wall that runs from floor to ceiling and which also acts as a balustrade. The ends of the treads are bolted to the glass and the bolts are covered by wood that matches the treads to give the impression of the whole flight projecting through the glass. The glass panels are about 7 ft. x 3 ft. and are fabricated from two plates of $\frac{3}{8}$ in. toughened glass laminated by a $\frac{1}{8}$ in. thick clear resin. Individual panels are connected by simple metal fittings. (Levitan Jeune shop, Champs-Elysées, Paris.)



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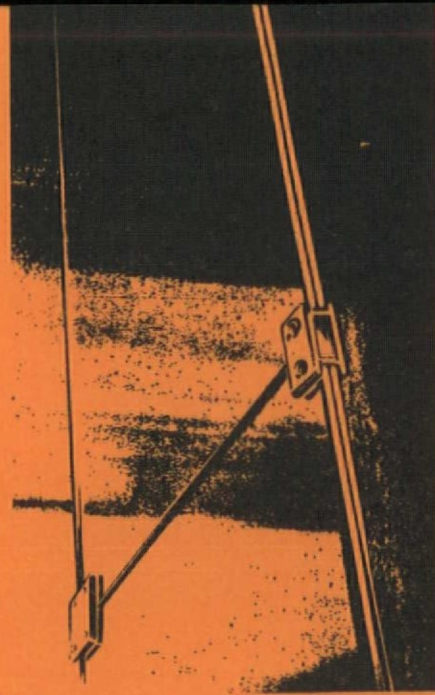
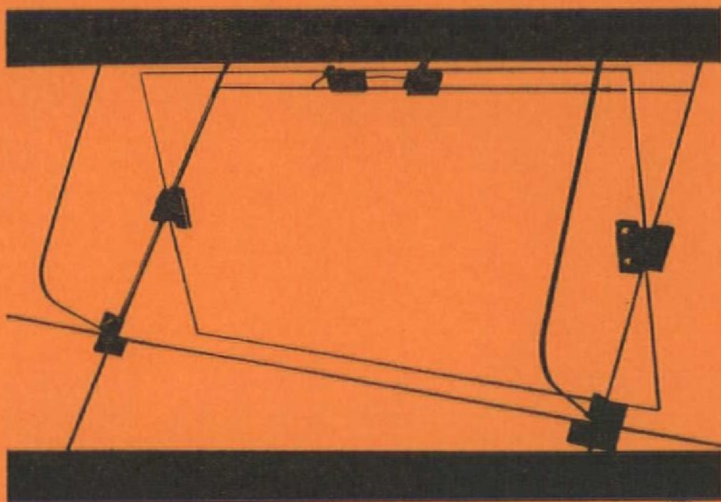


6

7 & 8 This roof garden pavilion, 90 ft. above street level, is entirely enclosed by toughened glass. The only protection at the edge of the roof is given by a toughened glass balustrade supported by widely spaced stanchions. Against this a man is confidently leaning. Behind him is a projecting porch whose roof, walls and doors are toughened glass and are self-supporting. The detail shows one of the fanlights in the pavilion's glass wall at the junction with the ceiling. The unframed panel pivots on hinges bolted to the glass and the opening itself is braced by glass fins. Closing is by push-pull wire-operated catch, remote controlled. (Le Printemps department store, Paris.)



7

8

9 A very recent example of the properties of toughened glass is this balustrade in the entrance hall of our new Head Office at St. Helens by Fry, Drew & Partners. The toughened Rough Cast glass panels are $\frac{3}{4}$ in. thick and the largest are 4 ft. 6in. high and 3 ft. 6 in. wide. Each is free-standing and 2 in. from the next—minus any form of handrail. Each panel stands 3 ft. 3 in. above the finished floor level and is bolted, with two bolts each, onto three steel brackets that project $3\frac{3}{8}$ in. from the face of the mezzanine floor and staircase. Where the bolts pass through the glass they are masked by fibrous washers to prevent glass-to-metal contact. Each bracket is covered by a polished brass box. Photograph is looking down on the entrance doors from the mezzanine.

9

'Armourplate' and 'Armourcast' are registered trade marks of Pilkington Brothers Ltd. in many countries.

PILKINGTON BROTHERS LIMITED, St. Helens, Lancashire, Telephone: St. Helens 28882
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Britain's latest civic theatre, the Yvonne Arnaud at Guildford, is completely equipped by Strand. All stage lighting and lighting control equipment and the entire electrical wiring system throughout the theatre. Strand are world leaders in stage lighting design, equipment and installation. Write to Strand for copies of the quarterly "Tabs", "Stage Planning 1965", and the current catalogue.

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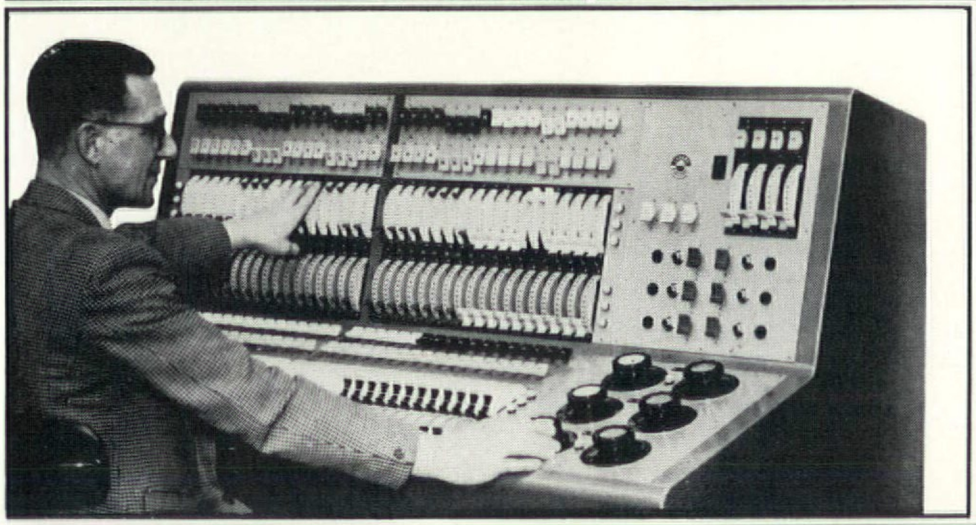

Strand system LC preset remote control desk for 72 all-electric dimmers.

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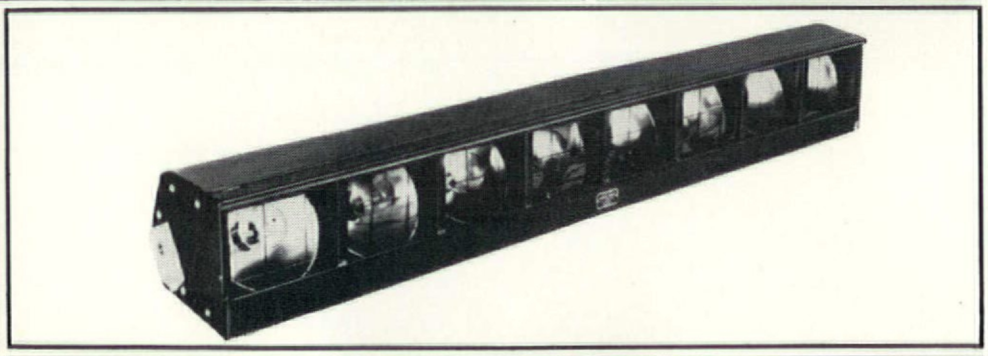

Left to right:—
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Fresnel Soft Edge Spot,
1000 watt.
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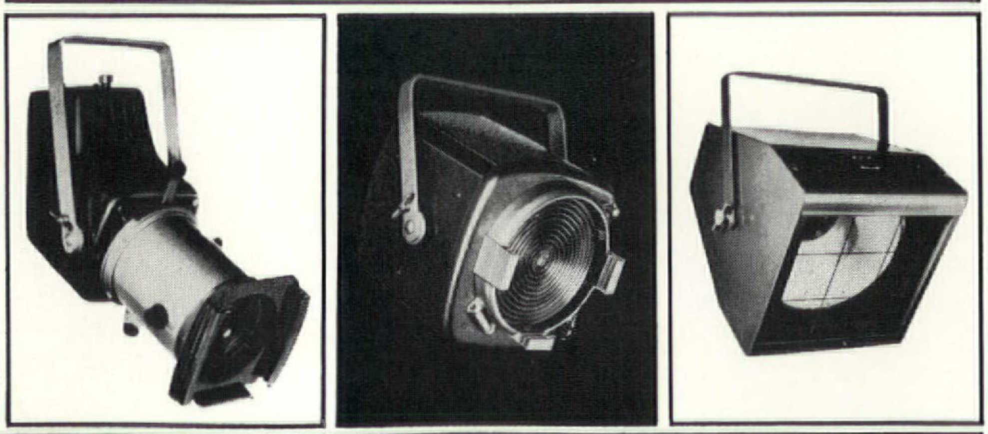
Wide Angle Cyclorama Flood
500 watt.



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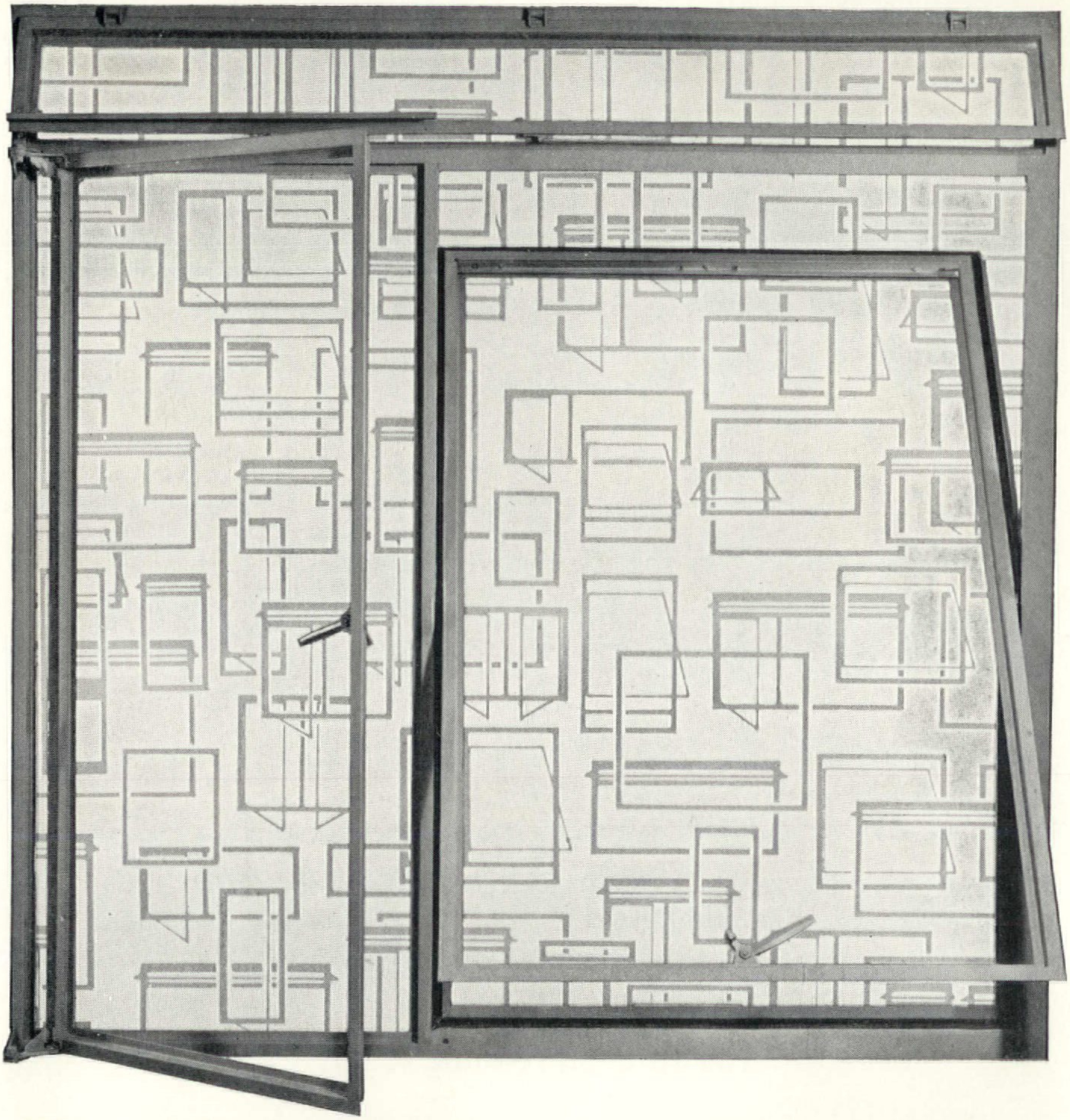

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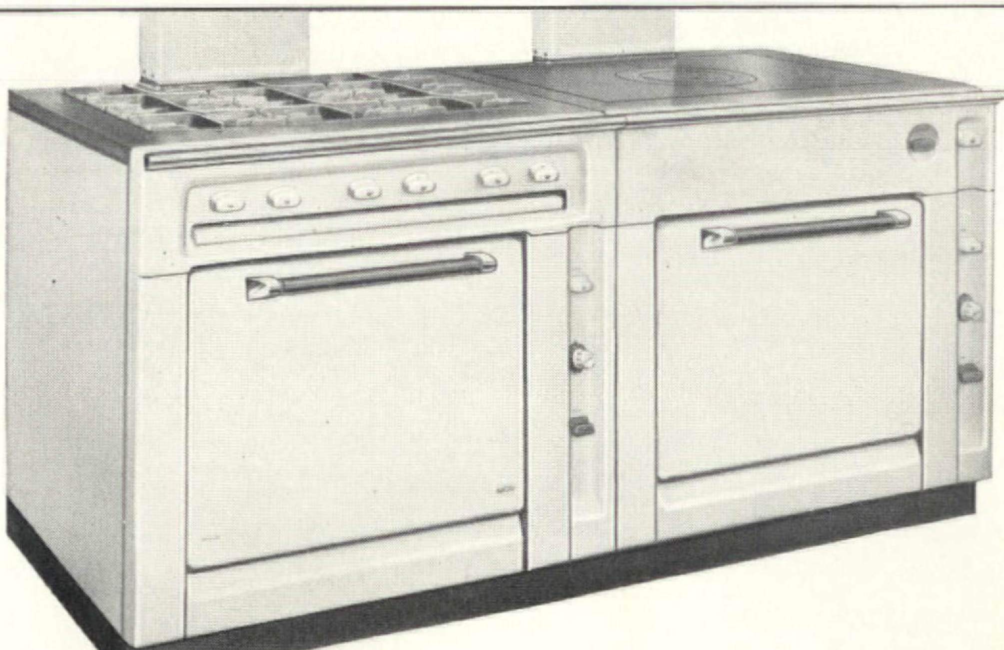

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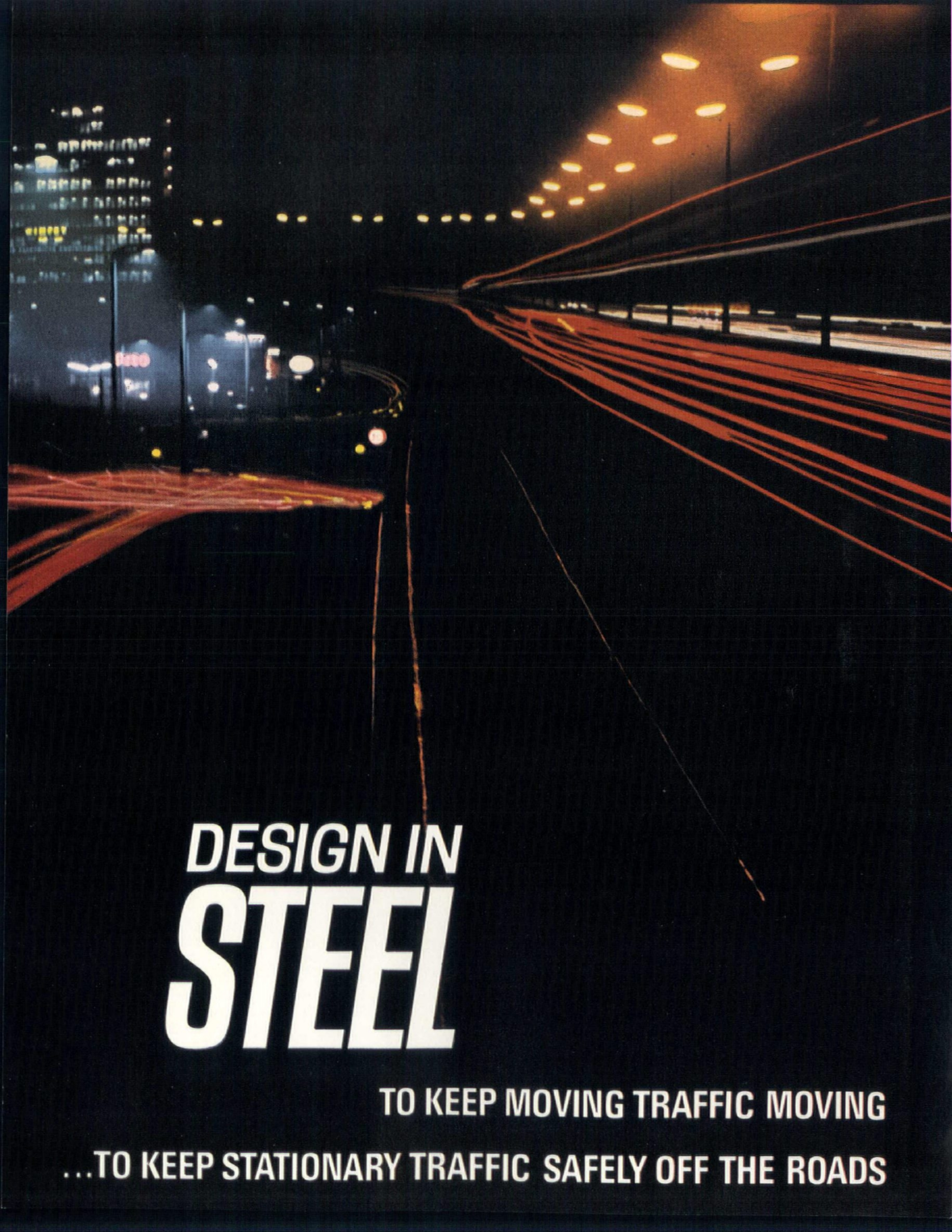
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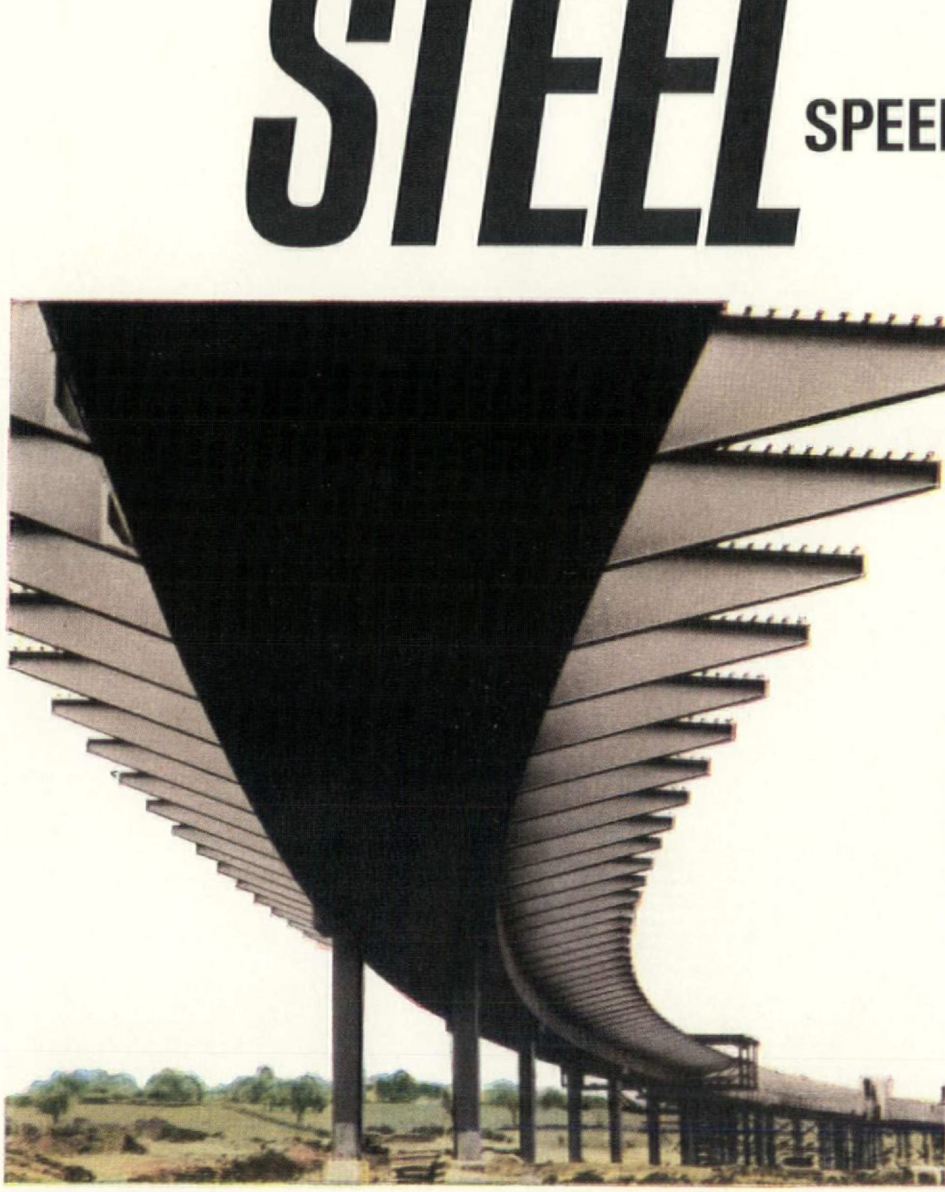
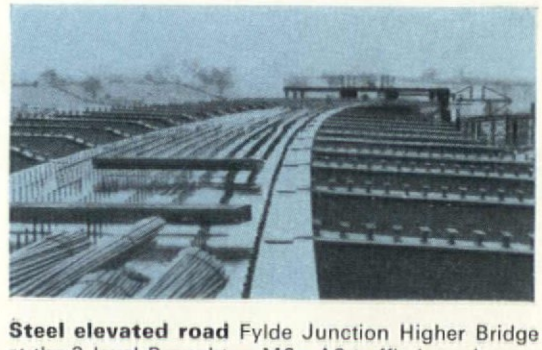


Steel—for the road ahead The speed of steel construction is just one of its vital contributions to Britain's expanding road programme. Rapid progress is essential if traffic flow is to be maintained satisfactorily in view of the fast-growing volume of traffic. Even now steel is showing how this can be done—with economy and efficiency—in swiftly-erected bridges, flyovers, elevated highways, off-street car parks, multi-level interchanges and other road structures. Advanced design in steel, new developments and new techniques in its use, are together providing efficient solutions to modern-day traffic problems that Britain's economic progress demands.



Steel elevated road Fylde Junction Higher Bridge at the 3-level Broughton M6—A6 traffic interchange. This attractively designed welded steel box girder viaduct, supported on steel piers, has a curved length of 1,300 ft. *The Structural Deck* (above) comprises a 14 ft. wide, 8 ft. deep, three-cell welded spine beam with 14 ft. long cantilevers on each side.

SOLVING THE PARKING PROBLEM

Quick solutions—in steel Many multi-storey steel car parks are easily dismantled and re-erected, and can thus meet temporary demands for central area parking on vacant sites during urban renewal schemes. 'Wheelright' 3-arch ramp-type car park, Birmingham, holds 400 cars on a site due for future redevelopment. This system is quick to erect and available in many forms.

Urgently needed: More off-street parking, to give the motorist a clear road ahead. Choose your car park in steel—for the simplest, *speediest* solution to your parking problem. Park *up*, with the help of steel and vehicle capacity of an existing car park or new site can be quickly multiplied as many times over as planning demands. Standard steel units keep down costs in all types of multi-storey parking systems and fire-encasement of steelwork is often unnecessary. Open-deck one-level, split-level or sloping-ramp 'drive-in' parks employ high-strength lightweight steel frameworks with the cost-saving advantages of fast, dry, all-weather construction.

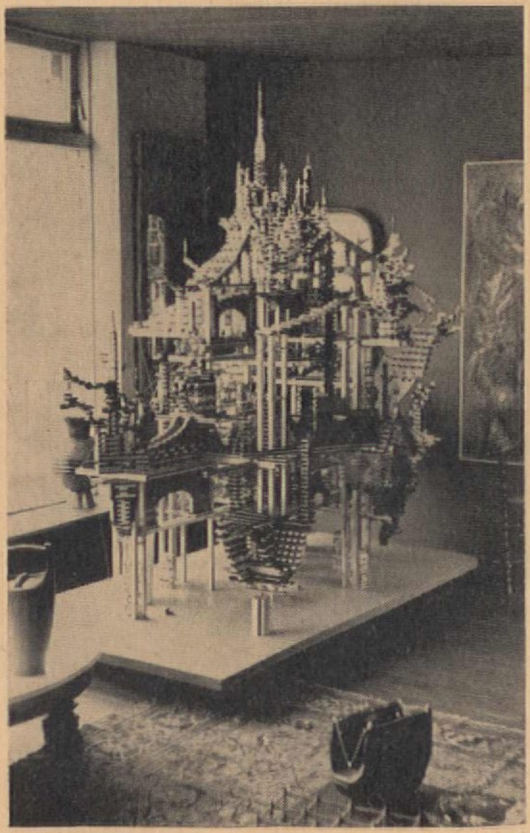
Cosmorama

This month the separate UK and World News features cease. Instead we introduce Cosmorama, a commentary on buildings or on events throughout the world that impinge upon architecture.

Mailer rides again

Safe in his brownstone house in Brooklyn Heights Norman Mailer has taken up the challenge proferred by Vincent Scully Jn. (*Architectural Forum*, April 1964), and has set about fabricating the image of his ideal architecture. Not one for 'Kleenex box architecture', he is equally not, it now seems, one for Sir Albert Richardsons' sort of liveliness in architecture (*AD*, June 1964). Strips of aluminium, string, building block and other odds and ends have been piled high in an exuberantly fairytale structure that represents a living environment for about 60,000 people (there will thus be ample room outside cities for the few who like to get away from it all to live in the wide open spaces). The spires and pinnacles rise about half a mile high, a modest bow this in the direction of Frank Lloyd Wright; but already this figure could be increased; what matters is the aspiration and the confident assumption that anyone can do it and everybody's doing it now. Certainly Mailer's fantasy is no less practical from the architectural point of view than those of Taut or Sant 'Elia, though the dogged attempt to show the individual living units and the ways and means of getting to them has set critics off on the line of practicability when castigating the design. The real drawback is the lacklustre nature of Mailer's imaginings. He should have another try.

Photo: Fred W. McDarrah



The cost of money

Ever since Lewis Womersley published those startling figures based on an analysis of housing in Sheffield, and demonstrated that building costs only accounted for 17 per cent of council rents and that over half represented repayment of interest and borrowed capital, it has become painfully clear that there is only one really expensive commodity in building—money.

The cost of money, as opposed to the cost of building, is now so high that a vast amount of reconstruction programming will have to be rephased (i.e. held up) to combat rising costs. Great Britain on the never-never? Never—ever.

In two articles in *The Economist* on building, the first outlines ten major factors affecting the present situation: (1) Demand exceeds productivity, there is a growing shortage of building craftsmen and the beginning of bottlenecks in the supply of some key materials. (2) The construction industry is used as a tool of economic restriction that inhibits investment and training schemes required for the future. (3) Credit policy is the most popular weapon of economic restraint and in spite of government promises of low mortgage rates has thrown the building societies into their familiar vicious circle. (4) The discriminate squeeze on house building presupposes that it is an import-sensitive industry, socially undesirable and that last year's rise in demand was a flash in the pan. Each of these is untrue. (5) Propping up the pound as an international banking currency rates as an indirect tax on a necessity of life, and rent control that makes private development for rent unprofitable, are three factors that together help to explain why the shortage, inadequacy, squalor and misuse of existing housing resources is the biggest cause of abject misery remaining in Britain today. (6) The advent of the Labour government has made all three of these distortions even worse than before. (7) *The Economist* argues the strongest social and economic case for house building to be protected against the present economic squeeze. (Quite apart from the paralysing effect of high interest rates, we only spend 3 per cent of our national income on housing.) (8) Any policy to make mortgages cheaper should also make it easier for more houses to be built. (9) Increase the rate of council house building where there is an exciting prospect of increasing productivity. The last paragraph is quoted in full:

(10) By every social, economic and market test, house building should be due to take over from the consumer durables as a front-running growth industry for Britain in the late 1960s and early 1970s. It will be a major tragedy if this prospect is now delayed by accidental distortions in the direction of the Government's general deflationary policy, or land policy (which has not been discussed here, partly because nobody —apparently including the Government—has got the foggiest idea of what it is to be), or credit policy, or non-planning policy, or inter-ministerial in-fighting with the Bank of England, or political muddle, or economic ineptitude, or anything else. But there are strong grounds for fearing that this is what may happen now.

The Economist scores telling points against the Government through sound criticism but is less convincing with proposing alternatives. Surely it is time for some creative re-thinking of the whole structure of economic policy in an attempt to narrow the gap between the real value of men and materials and the artificial value of money.

The second article surveys the world of systems 'Houses, fast'. 'We are in the crazy situation of being in a country that has more industrialized systems on offer than any other in the world (outside America) and yet has as few to show in operation as, say, there are bridges left in North Vietnam'. Although the article makes an admirable survey of industrialized systems and associated arguments, it fails to make any conclusive value judgments and completely omits to mention that most of the 400 available systems are produced by manufacturers in the interest of flogging a proprietary material rather than of solving the problem of a human environment.

John Donat

Change to metric

The change to the metric system would mean an increase in efficiency and clarity in a thousand detailed operations. Since we count in decimals it would seem obvious to measure in decimals also.

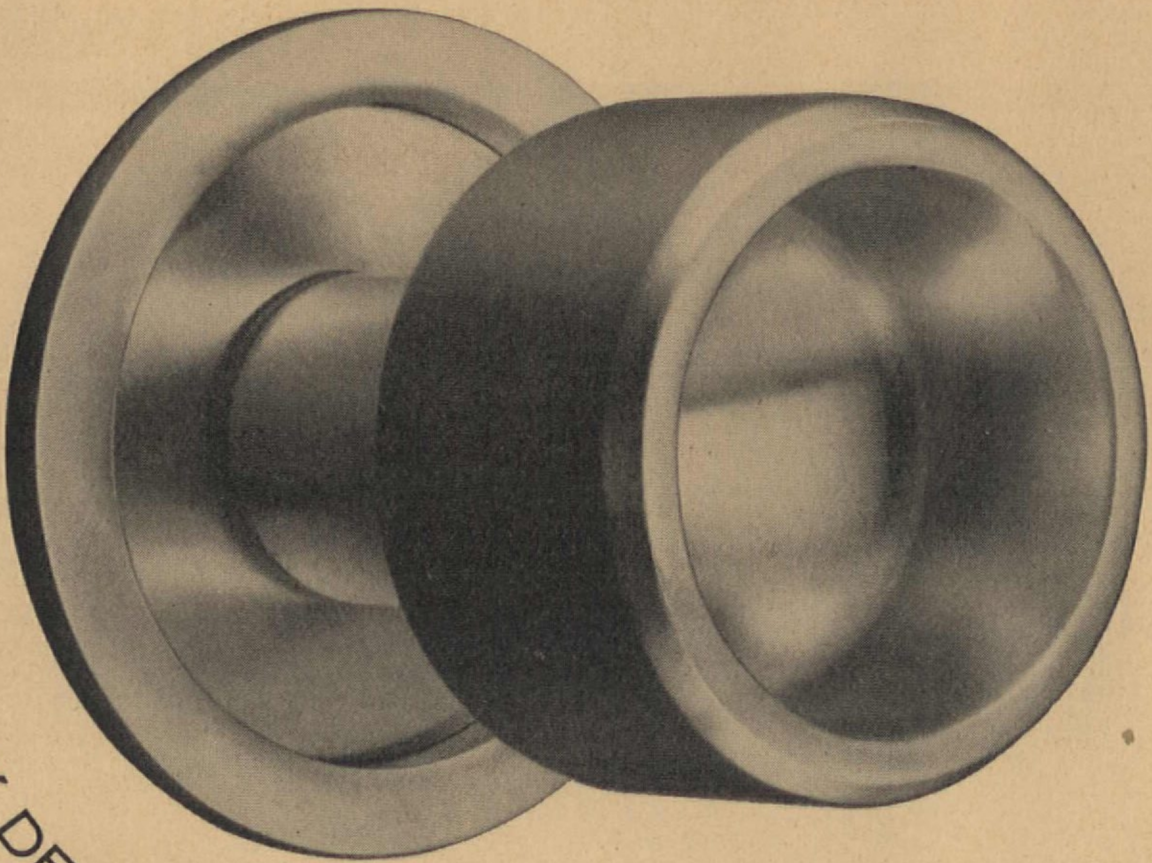
At a Building Centre forum in 1963, a resolution in favour of going metric was passed nearly unanimously. Early this year at a Modular Society meeting, the majority of speakers favoured the change-over. In April the BSI made recommendations for dimensional co-ordination, and published them in metric terms. In May, the Architectural Association set up a Committee to discuss the possible change to metric with the Minister of Technology, and subsequently asked the RIBA to set up a metric committee.

It was the Ministry of Technology which proved to be the official catalyst, and having made their recommendation they asked the BSI and the MOPBW to coordinate the change-over.

In the building industry difficulties will vary from branch to branch: many builders and manufacturers will be able to change over without much re-tooling; others will have to spend considerable sums on new tools and will have to carry stocks of both dimensions for a period, and are therefore not enthusiastic about the Government's announcement. However, such isolated objections should be an added spur to the thorough coordination of all aspects of the change-over in the building industry. It is to be hoped that the RIBA will play its part in this, together with the BSI, the MOPBW and the industries.

For those who still wonder whether we will really make our daily work any simpler we publish the following two tables:

1 mile	= 1760 yds	1 km	= 1000 m
1 yard	= 3ft	1 m	= 100 cm
1 foot	= 12in	1 cm	= 10 mm
1 acre	= 43,560ft²	1 hectare	= 10,000m²
1 ton	= 2240 lb.	1 kg	= 1000 gm



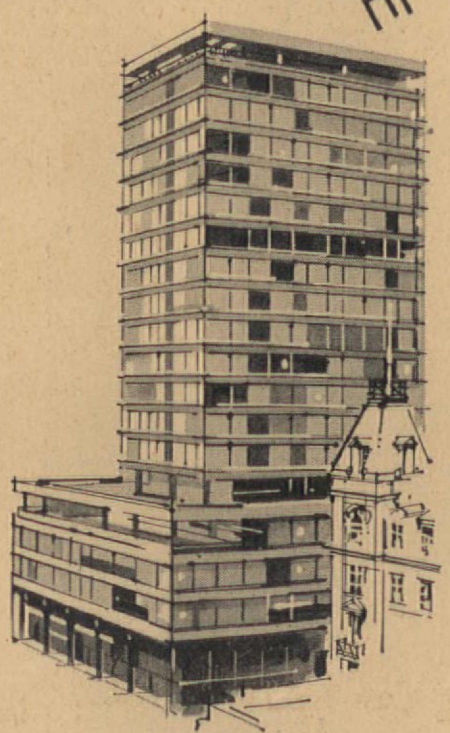
SPECIALLY DESIGNED FOR NEW ZEALAND HOUSE

Door Furniture, Floor Springs and Overhead Closers.

New Zealand House which is the administrative and social headquarters for the High Commissioner and his staff as well as serving as a centre for New Zealanders in London was designed down to the last detail by the architects, Robert Matthew, Johnson-Marshall and Partners.

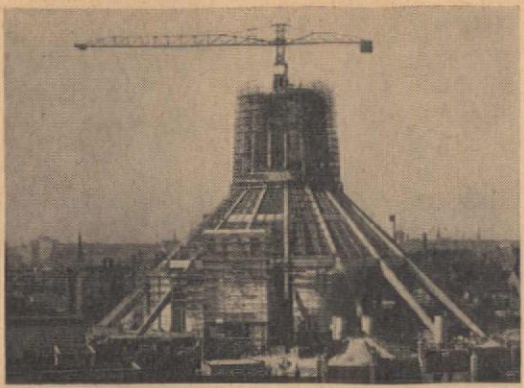
Even the door furniture is architecturally designed and because quality in materials and workmanship were of paramount importance the task of manufacturing these items was entrusted to Newmans.

Newmans also supplied, through Dennis Waring & Co. Ltd., all the Floor Springs and Overhead Door Closers from their range of architectural Ironmongery which is world renowned for its efficiency and reliability.



See our exhibits at the Building Centres, London, Birmingham, Manchester and Glasgow. All details can be found in the Barbour Index, File No. 53 and the Gorco Bureau File, No. 44/3.

NEWMANS WILLIAM NEWMAN & SONS LTD., HOSPITAL STREET, BIRMINGHAM 19



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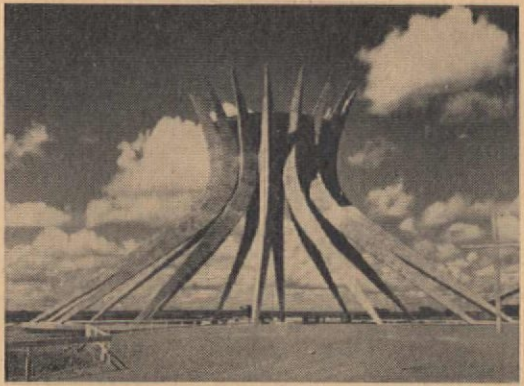


2

RC Cathedral, Liverpool

Apart from the fact that both their concrete structures rise over circular plans, it is clear that Frederick Gibberd's Metropolitan Cathedral of Christ the King **1** does not really resemble its so-called counterpart at Brasilia **2**.

It is still too early to judge the eventual appearance of the angular Liverpool structure. Surmounting an elevated site less than a mile from Scott's Anglican Gothickiana, and hemmed in by poly-style University buildings, from no point can you see it as a whole. At present the structure is of chief interest. Gibberd, who won the competition in 1960, conceived a central altar and a series of perimeter chapels. The circular plan was adjusted to a polygon delineated by 16 boomerang-shaped reinforced concrete trusses which form the drum, the conical roof and the cylindrical tower above. The sloping cone members extend to the ground as flying buttresses, and the horizontal and diagonal thrusts are restrained by two concrete rings at top and bottom of the cone.

The chapels (free standing and stone clad) are slotted-in between the trusses (externally clad in white mosaic) below the level of the lower ring beam.

The cone roof to the main space is of precast concrete slabs covered with sheet aluminium. The lantern above is virtually a cylinder closed at the top by a dome roof. Its 16 facets, the main source of light for the altar, are made up of reinforced concrete frames containing concrete ribs and infilling of 1in thick 'Dalle de Verre' stained glass segments jointed in epoxy mortar—designed by John Piper and Patrick Reyntiens, and due for completion in March 1966.

The slender pinnacles surmounting and visually extending the lantern ribs will be of prestressed concrete wound with three concurrent resin-coated PVC helixes and enclosed in polyester resin tubular permanent formwork.

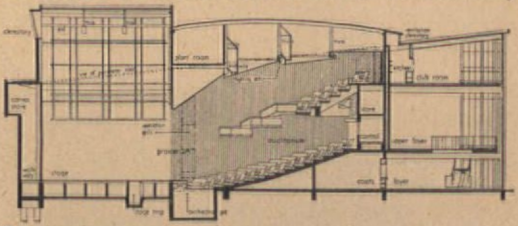
The cathedral, due to be formally opened in May 1967, had an original target figure of £1 million. The engineers are Lowe & Rodin and the contractors are Taylor Woodrow Construction Ltd.

Photos: 1 John Mills, 2 Lehmann

Yvonne Arnaud Theatre, Guildford

This new theatre **3, 4** designed by John Brownrigg of Scott Brownrigg & Turner is a major civic achievement and occupies a magnificent town centre, riverside site. It is slightly less of an architectural achievement because the quality of design and detail is inconsistent.

Externally the raw concrete fly tower and scene dock are confident and bold. But the auditorium and foyer section of the building suffers from a weak roof line and an indefensibly



3

4

false façade pattern of vertical louvres, behind which can be seen the truth, in the form of an irregular pattern of standard metal windows.

Structurally the building is of in-situ reinforced concrete, excepting for the auditorium's steel and timber domed roof covered in copper.

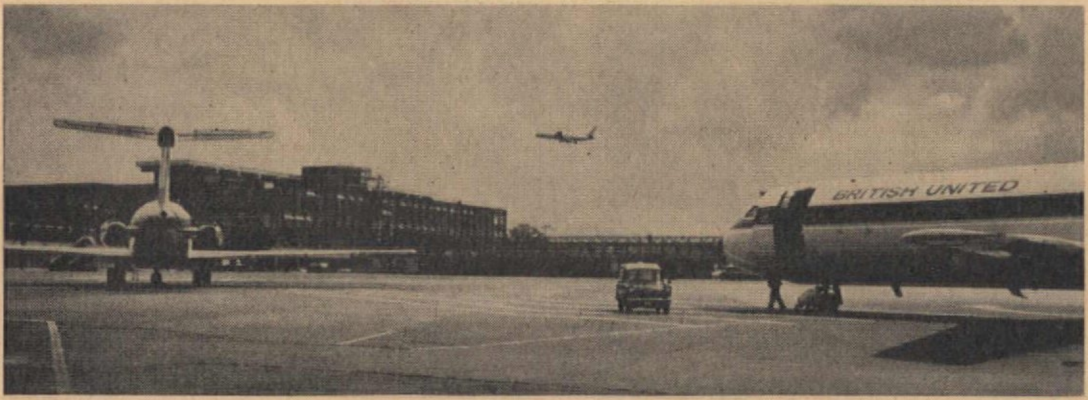
Internally the 574-seat auditorium has verve and precision and is resolutely detailed with concrete walls, timber roof and black metal work. A realistically adaptable stage 85ft×33ft plus apron stage, has enormous wing areas and full flying facilities, and for the size of the theatre the foyers and restaurant are spacious and have a measure of excitement.

Back stage, planning sags and complications caused at the junction of a circular auditorium and rectangular stage are not resolved.

A nearby fine old disused mill has been transformed into scenery workshops, wardrobe and store.

The theatre was resoundingly inaugurated with a month's festival under Michael Redgrave's direction. *MM*

Photo: S. W. Newberry



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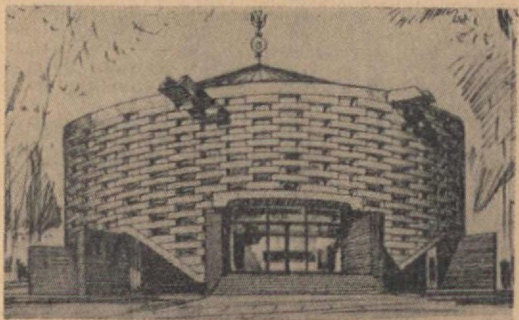
Gatwick expands

The expansion of Gatwick Airport, by Yorke, Rosenberg and Mardall **5** is nearly complete. The terminal building has been more than doubled in size, the runways have been increased, additional aprons provided, and two additional fingers feeding passengers to aircraft, built like enclosing arms on either side of the first finger completed seven years ago. To celebrate the completion of the new work, an open day was held on June 22nd, attended by the Minister of Aviation. *JD*

Photo: J. Donat

The mysteries of Sir Basil

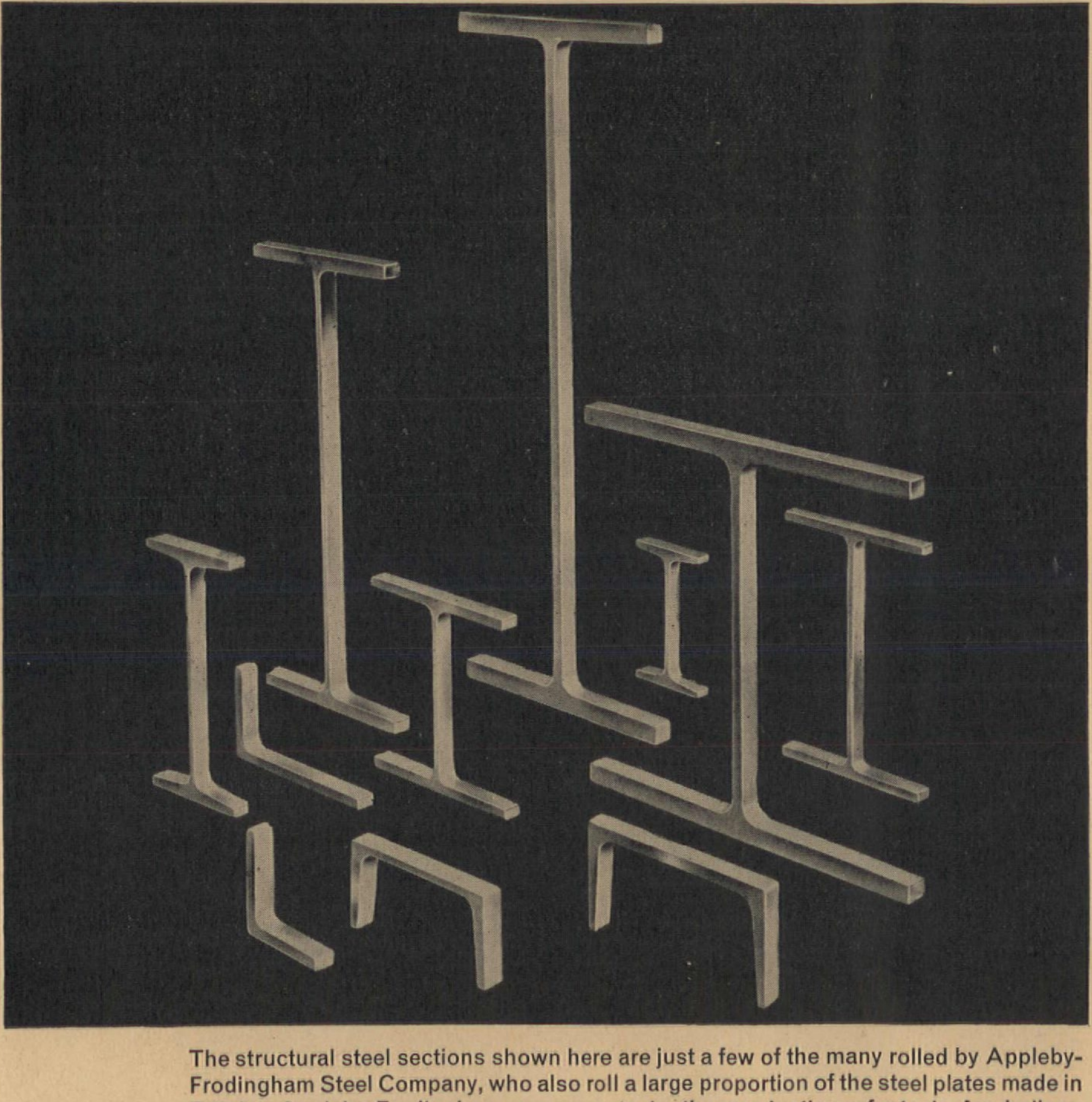
Sir Basil Spence's architecture, one would have thought, was not of the type to divide Sussex critics. His university buildings have long been accepted by both students and Brighton connoisseurs as something slightly domesticated yet competent and with an air that is boldly modern. Certainly they know what to expect of Sir Basil. It is odd, therefore, that the Brighton Planning Committee recently rejected his design for a non-denominational chapel for the University, only to rescind their decision after a visit from Sir Basil. Nor is this the first time that the design has been disputed. The Students' Union protested so vigorously about the first scheme for a chapel, on the edge of the Great Court, that a new site had to be found and the new design prepared **6**. This seemingly uncontroversial design was declared 'completely out of keeping with the rest of the fine buildings designed by Sir Basil.'



6

APPLEBY-FRODINGHAM

STRUCTURAL STEEL SECTIONS



The structural steel sections shown here are just a few of the many rolled by Appleby-Frodingham Steel Company, who also roll a large proportion of the steel plates made in Britain. Appleby-Frodingham are experts in the production of steels for boilers, pressure vessels and highly-stressed structural components.

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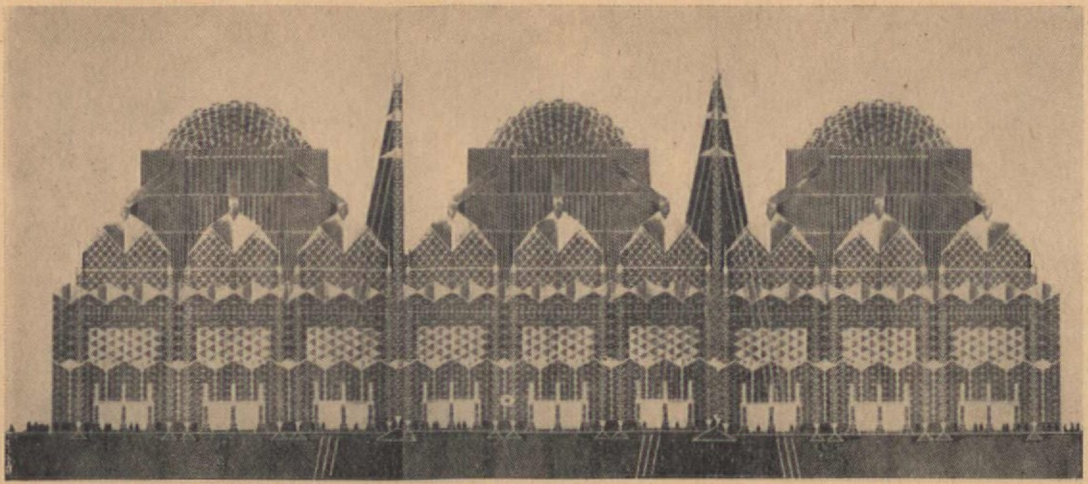
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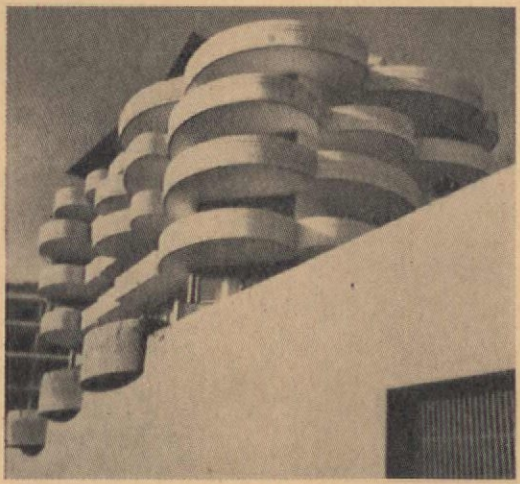
Evolution or resolution

This is the umbrella title of another sumptuously thick issue of *l'Architecture d'Aujourd'hui* in which a series of searching questions about urbanism and the way ahead are answered by 35 of the world's leading architects. (Example: Gordon Bunshaft: 'The ugly environment that is being built throughout the US is due primarily to two factors: (1) 90 per cent of the practising architects in our country are incompetent as far as any creative constructive design is concerned; (2) 75 per cent at least of the sponsors, promoters and owners of single buildings as well as large urban developments, are nothing more or less than investors in three-dimensional securities.')
A galaxy of examples of architecture, urbanism and projects world-wide includes Polish students' nuclear power station **1**, Luigi Moretti's Mendelsohnesque apartments **2**, and glass towers of flats with magnificent sea views over an exceptionally beautiful garden; a town by Austrian students reminiscent of Soleri bowellism **3**; and high-density environment-artifacts by Anger, Puccinelli, Loyer and Heymann **4** and Stifter **5**. The future of the man-made world? *JD*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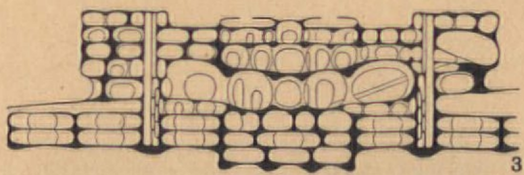
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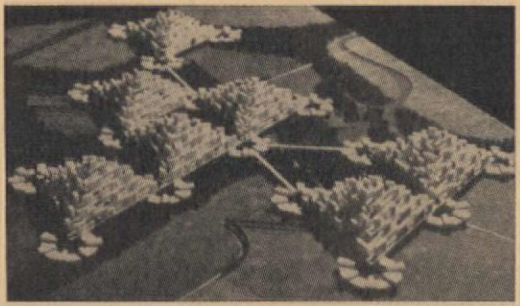
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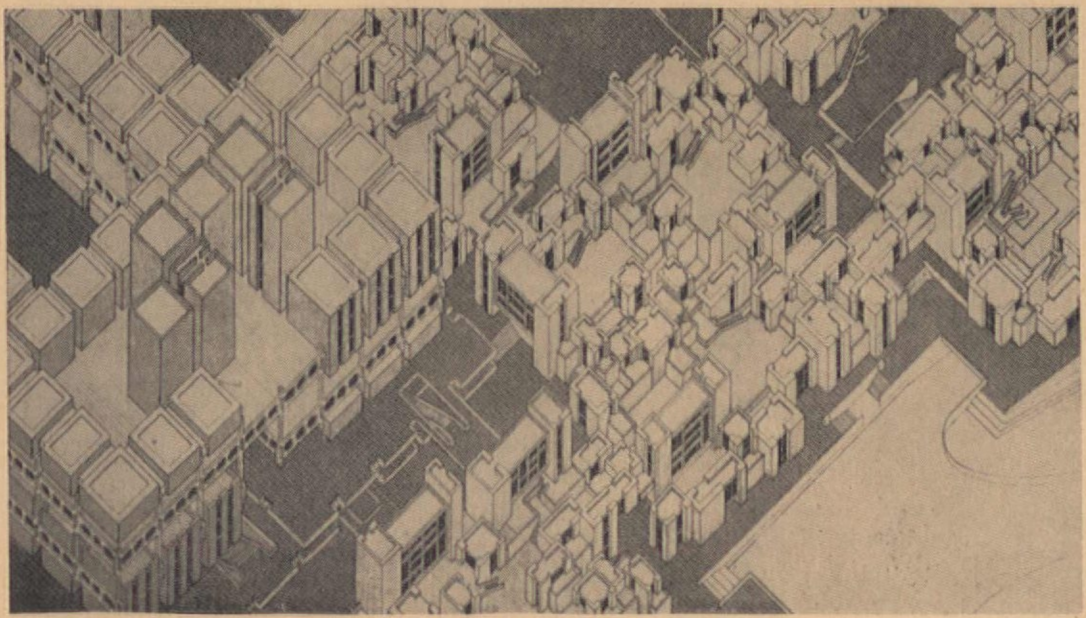
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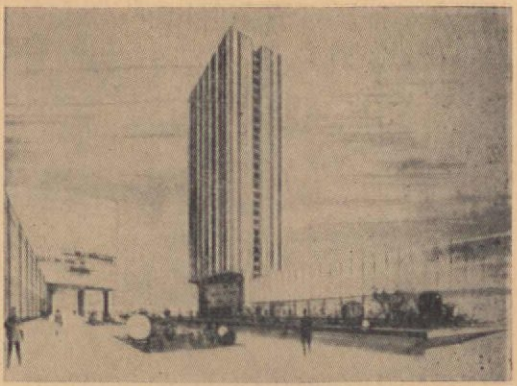
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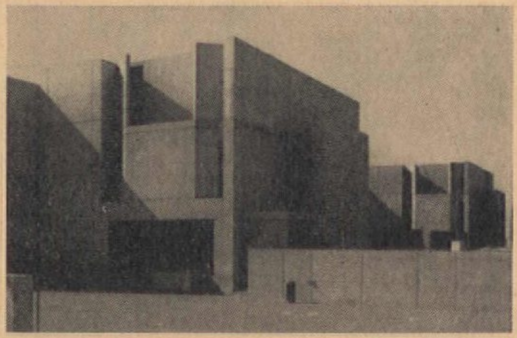
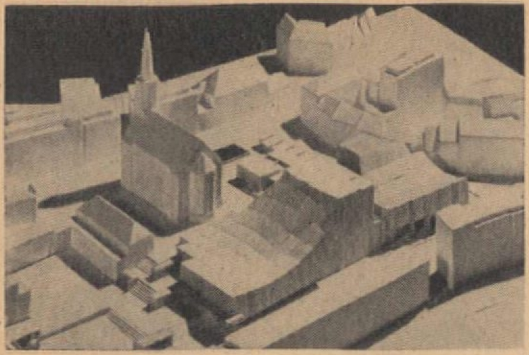
Twenty towers on the Seine

Paris can take one Eiffel Tower without disruption, indeed with enhancement, but can she take many towers such as this **6**, the first of twenty scheduled to be put up along the Seine? This problem in urbanism really goes back to the eighteenth century theorist, Abbé Laugier, who recommended that we strive for uniformity in the detail but for variety and even tumult in the general effect. Twenty towers will so dominate the sky-line that for better or for worse they will produce uniformity in the general effect, even if they vary in detail. Thus, the problem of locating oneself enjoyably in a cityscape is made insoluble, as in Corb's Voisin plan. Moreover, like so many French solutions put out by DPLGS from the Beaux Arts, the solution proposed, though doubtless very boldly conceived technically, is formally naïve and inadmissible. A city like Paris, indeed any city, cannot afford too many such buildings. One can only pray that the cult of rapid obsolescence will rapidly make these buildings obsolete before ever they leave the drawing board of the architects, Raymond Lopez and Henry Pottier. *T. G. Stevens*
Techniques et Architecture 3, 1965


7

Lou Kahn in California

The Salk Institute for Biological Research **7**, a subsidiary of the institute founded by Dr Jonas Salk, of anti-polio vaccine fame, whose governing board also includes Lord Snow, gave Louis Kahn another opportunity to build, close to the Pacific Ocean in California. There is no essential departure in this plan from previous work of Kahn—it is monaxially symmetrical and precise in conception and in the execution of its fine-shuttered concrete. Kahn has used his method of designing to build in flexibility for a time to come: interfloor trusses of large span, and vertical duct spaces which also function structurally and formally provide for changing equipment for a time ahead. This way of solving one twentieth-century dilemma is more expensive in initial outlay, but may prove cheaper in the long run; and it does enable the architect to devote himself radically to the fixed functions and structures and expression of the building, where a more temporary construction might receive less devotion. *TGS*
Architectural Forum May, 1965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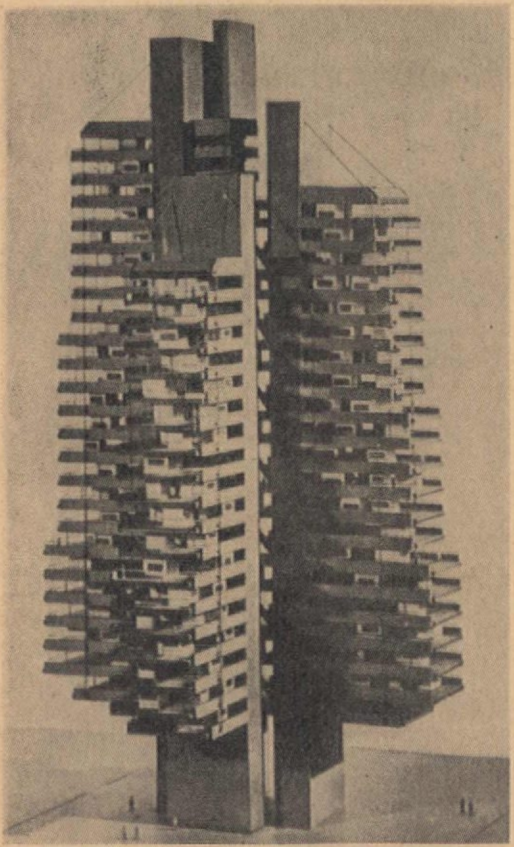
Basel Theatre competition

The first prize in the Basel Theatre competition was awarded to Schwarz, Gutmann and Gloor **1** for a design that triumphs over an extremely congested urban site and brilliantly scales down the great bulk of the building to provide a sympathetic setting for the Elizabethan-Kirche and to reduce the abrupt contrast between the theatre and the narrow frontages of old terraced buildings that line the site.

JD

Deutsche Bauzeitung June, 1965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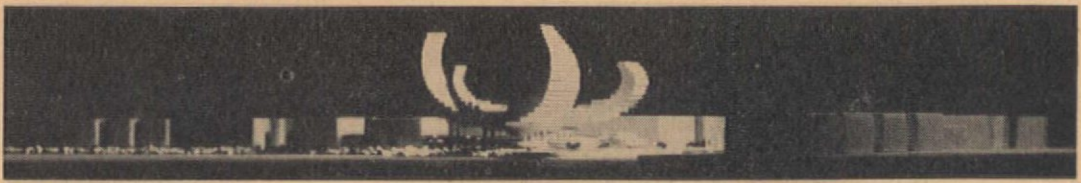
Inter-Scandinavian competition for urban housing

Gehrt Bornebusch has won third prize with a project for high density housing **2** in which 'living-trays' are suspended from a core of service and circulation elements. Each tray becomes a personal plot on which prefabricated room units can be arranged to provide a variety of living-space plans with generous private open space surrounding each dwelling.

JD

Bonytt April, 1965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San Sebastian competition

Out of 500 applications and 122 eventual entries, the international competition for the redevelopment of the Kursaal site at San Sebastian, Spain, has been won by a British architect, Jan Lubicz-Nycz, with a team from Virginia University, USA. They have conceived their solution **3** as 'a container—a distinct structure related to the city of San Sebastian and the geographical location of the site'. The container has 105 apartments, a 300-bed hotel, 300,000ft² of shopping arcades, a 1000-seat auditorium, a covered skating rink, indoor swimming pool and public gardens, terraces and restaurants.

It is a dramatically fresh and exciting conception but if its form symbolizing twin bull horns is more than a coincidence it may be that the current revulsion from the form-follows-function dictum is leading to dangerous ground.

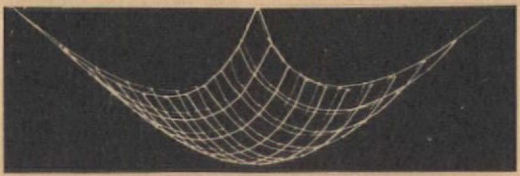
MM


4

Expo' 67 Montreal

Fairfield and Dubois' recently released design for the Ontario Government Pavilion **4** for the Montreal exhibition 1967 has all the difficulties of Frei Otto's architecture but with added, ill-assorted complexities. The roof structure is made up of triangulated steel tubes and a translucent covering of fibreglass coated with vinyl—a technique first developed for radomes. But this technological expertize is transfigured, perhaps with intentional irony, into a playful roofscape that is set hovering over platforms of natural timber and stepped terraces of unfinished blocks of Ontario stone. Enterprising and educated though the design is, there is something uncomfortable in this particular juxtaposition of natural and synthetic images. Technology should not be transformed into the picturesque. The original radomes are far more satisfying as artifacts. As for the monorail threading its way through the conifers, one must hope that it will not be grotesquely domesticated into a surrey with fringe as at Lausanne.

Photo: Panda Associates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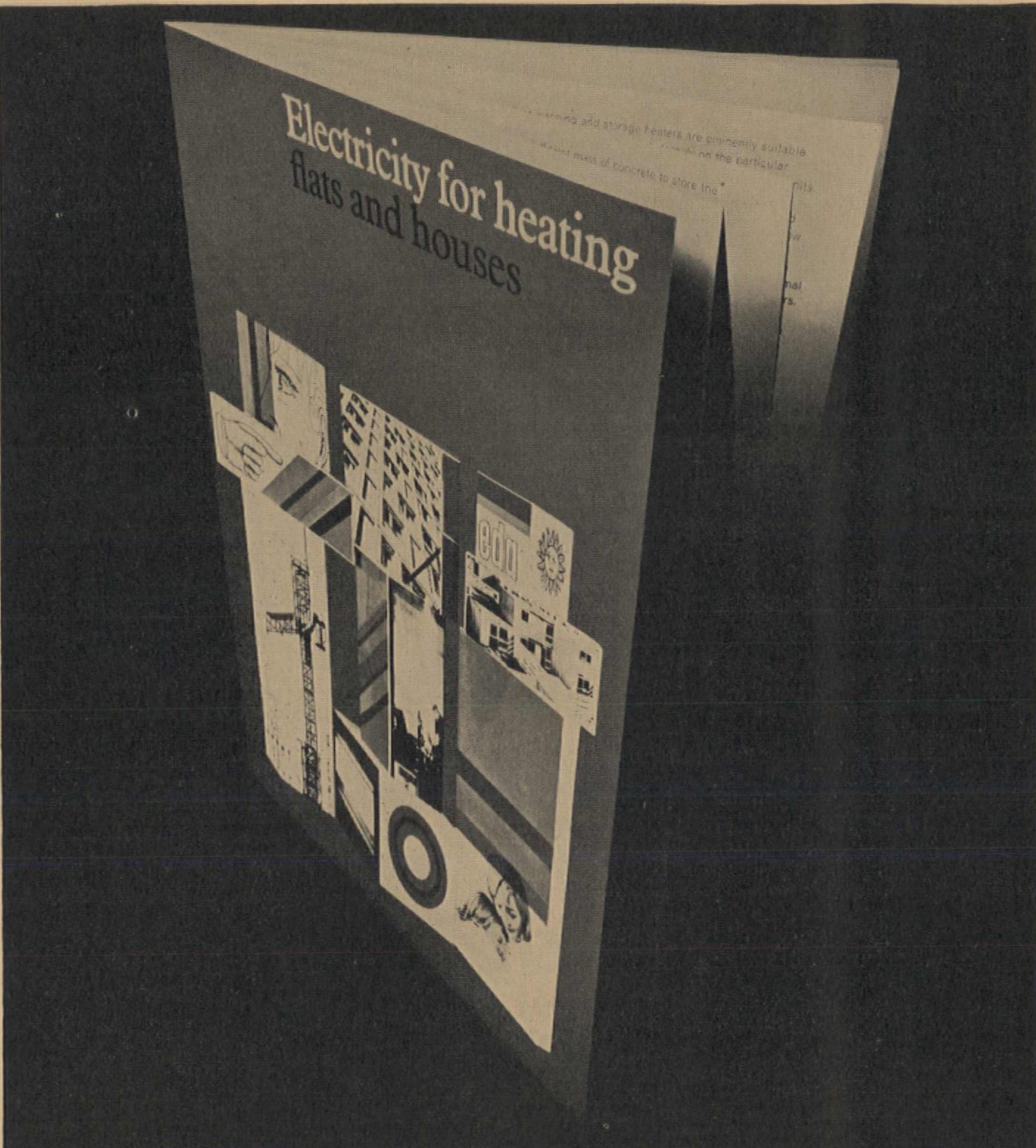
Frei Otto

Professor Frei Otto is one of the problem children of architecture, and he knows it. He plays with structures in an idiosyncratic and topsy-turvy way—grain silos are transformed from heavy-weight monoliths to suspended balloons in his hands, giant vaults become a filigree of nets and slung ropes and even when their construction is rigid the forms and shapes are arrived at first, upside down, by suspending a series of chains **5**. The dead weight of structure is inevitably banished. The logic and consistency of the thought is flawless and all engineers should be stirred to re-think our conventional and utterly wasteful methods of construction. Yet, as the photographs on exhibition last month at the RIBA showed, the problem arises when these designs are made real (and it is not a structural problem). How are they to be related to the architectural forms and shapes that we need and know? For the projects that have been built have become, without exception, over-elaborate and distinctly artistic. This is in part due to the fact that they have been for exhibition buildings on a fairly small scale. The point about Professor Frei Otto's talent is that it is for elegant structure on a large scale. When reduced to minimal dimensions and tampered with for fanciful and exhibitionist reasons, his designs become embarrassing, the passionate logic is upset by the strain of whimsy. But, equally, one has the impression that the structures are ends in themselves and cannot be related to the human condition; there is no place for doors, partitions and those divisions we need for privacy; even vast tiers of seats fit uneasily against the suspended roofs. The structure is not yet part of a building. But this must in no way diminish one's thrill at the structures themselves. They can give us a shaking sense of our limited view of the art of building.



Electricity for heating flats and houses

JUST PUBLISHED – the book gives a full description of the unique advantages of off-peak, low capital cost electric heating. Three such systems are described, each a major breakthrough in home heating. First – Floor Warming. Then – Unit-plan.

And now – ELECTRICAIRE (warm air throughout the house at very low capital cost).

The book has been sent to architects, local authorities, consulting engineers, heating and ventilating engineers, surveyors, electrical contractors, builders and others. If you have not yet received a copy, or would like additional copies (free), please contact your Electricity Board. Or write direct to the Electrical Development Association (M/AD/4), Trafalgar Buildings, 1 Charing Cross, London, S.W.1.

The tomorrow things are electric

1

Jawaharlal Nehru

London enjoyed for two brief June weeks the Nehru Memorial Exhibition designed by Charles Eames and made by the National Design Institute at Ahmedabad. It had previously been shown for a longer period in New York and has now returned to the USA for extended spells in Washington, California, and some 20 American universities.

Eames, steering clear of a tedious chronicle of events, tried to find out what it was that made Nehru turn out the way he did, what influences, what little things; and to convey to us something of how the great man must have felt during the various situations of his life—particularly in prison, his '40 days in the wilderness'. The exhibits include, in addition to over 1200 photos, both published and personal, Nehru's papers, diaries, books and MSS; objects from current everyday and cultural Indian life; historical objects; imaginatively ordered chronologically against colourful backgrounds of Indian weaves chosen by Alexander Girard. But it is the text of the exhibition which focuses the attention—Nehru's memorable words (extracts from his writings) round which Eames has developed each section.

Nehru's daughter, Mrs Indira Gandhi, is seen here **1** at the exhibition.

(Further details in a future issue of *AD*.)

Graphic art in London

Both the Design and Art Direction '65 exhibition (Reed House, Piccadilly) and the Graphic Design Britain '65 exhibition (Festival Hall), confirmed certain opinions about designers' concepts and methods, or lack of them, the sort of demands made upon them, the bias in favour of advertising, and the kind of work which can only be accomplished with a large budget. Both therefore are aimed at industry and commerce and other designers, and there seems to be a persistent 'in' language running through everything. At D&AD the gold medal went to Robert Brownjohn for his titles for *Goldfinger*. A justifiable award considering the money the film will make, and as Brownjohn commented in the catalogue that he needs a client before he can operate, he should have added that the client must be a wealthy one.

Both exhibitions seemed to attempt a standard, although both were equally, if in different aspects, unrepresentative. That is to say certain sections they defined were lacking in content, and as the organizers of D&AD appeared to cover almost everything in their directives, the work has obviously not materialized.

The packaging sections at each exhibition were depleted and there could have been more evidence of the activities designers indulge in without a client. When one considers the fantastic avalanche of publications produced by poets, writers, artists, etc., from independent sources, and the output in the specialized book field, one cannot be too appreciative of covers and spreads removed from their consumer magazine context which we know to be generally pretty awful. The pressures on designers are increasing; this may be welcome to some, but it would be interesting in exhibitions of this kind to give stimulation to the duller aspects of design instead of revering what is often just done to stuff unpalatable subjects down the consumer's throat. Would it also not be possible, despite the nomadic tendencies of designers, to attempt an award for a year's consistent work on a magazine or project?

There was a consistency of a kind at D&AD. The use of photographs in the same form is overwhelming, all are effective, all pretty, mostly of girls. The catalogue was useful as a guide and keepsake. The opposite could unfortunately be said of Graphic Design '65 which lacked the information D&AD gave and their catalogue made the identification of exhibits difficult. Their intention to present "a vast portfolio of work", as it happened, turned out to be somewhat optimistic. *G. Reeve*

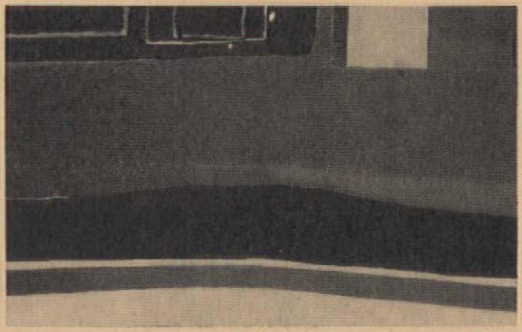
Harold Cohen

One could describe Harold Cohen's paintings of the past five years (Whitechapel Art Gallery, May–June) as complex, expansive abstractions, based in one sense or another on notions associated with topography and the landscape. On one level one could discuss them in terms of their formal aspects and the gradual development from strong horizontal emphasis and tonal use of colour characteristic of his work of 1960. Later, Harold Cohen explored the relationships of pyramidal forms, which gradually became fragmented, split up into bands of colour, arabesques and outlined knots. What was once the structure of a landscape, in the sense that one sees hills and fields in the distance, became within two years the sum of topographical elements taken out of context of their environment, comparable to imaginary charts. Like the moebius strip and the Kline bottle, his forms became inverted, twisted, disappearing and surprisingly emerging from the flat pale background. These paintings, no longer concerned with the flow of a single form or space had to be read—followed throughout the canvas until the entire composition clicked into an involved syncopated rhythm. In the latest paintings of 1965, the feeling of immensity and force characteristic in his work five years ago, has been combined with delicate linear themes reminiscent of personal monograms. In punctuating the loose expansive areas of colour with tight and complex linear motifs, Harold Cohen has again evoked the mood of the landscape. So different, however, that one could talk about it in terms of a landscape of sound that echoes and reverberates with an unexpected intensity.

One of the most striking aspects of the exhibition is that variety and sense of continuity go hand in hand. Only now it is possible to realize that the paintings which consisted of multiple fragmented forms, were not a departure from the previously consistent imagery, but acted as a bridge between one development of a theme and another.

To Harold Cohen the process of painting is parallel to the process of life. It becomes the sort of transformation which does not allow one to forget that what one is looking at is a painting. A painting, which contains the entire complexity of the process of painting itself as a symbolic activity, as well as the transposition of any emotion, subject, or theme, into its own equivalent within the terms of the images employed. *Jasia Reichardt*

2 Landfall, 108in × 164in. **3** Knight's Gambit, 51in × 102in. **4** Field Day, 102in × 144in. **5** Conclave, 98in × 116in



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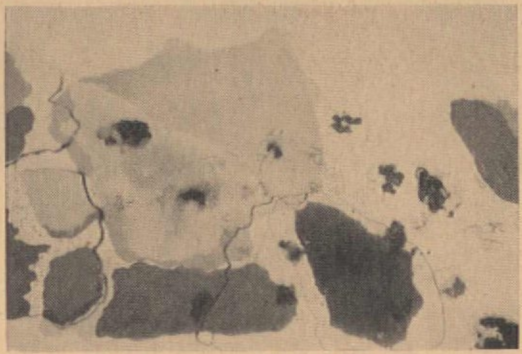

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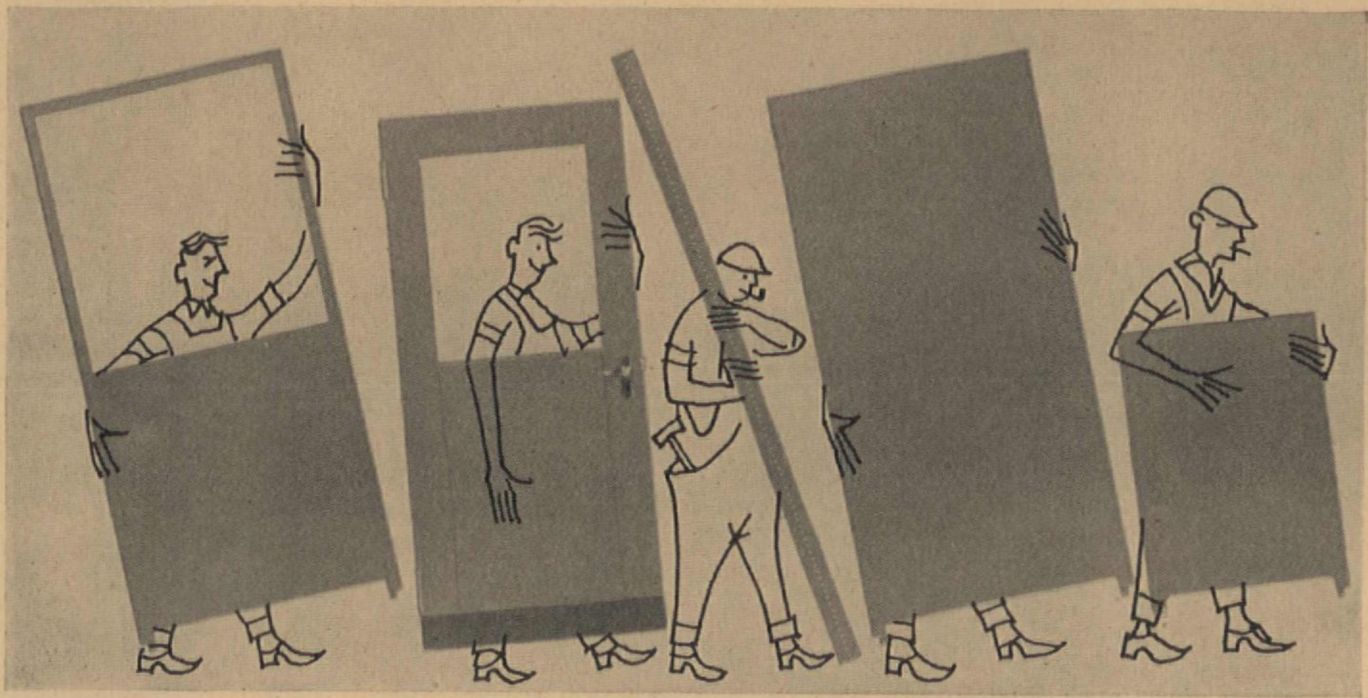

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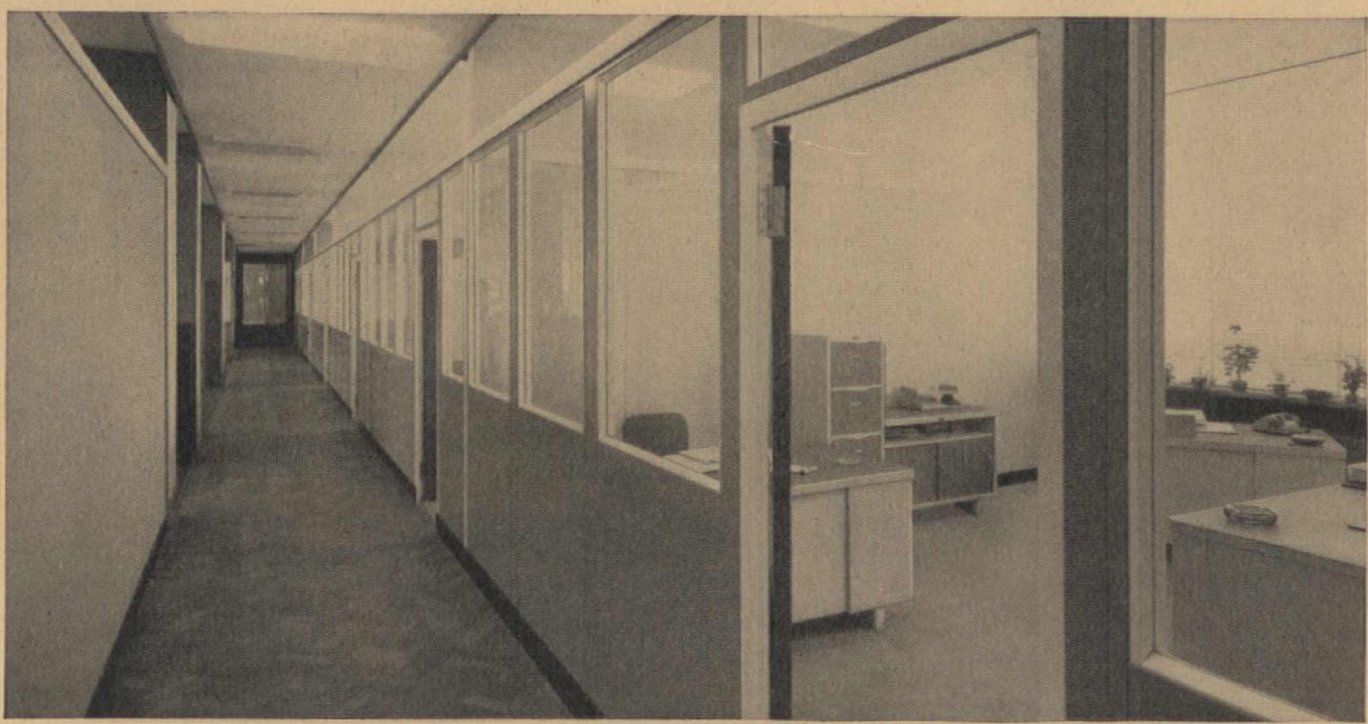

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Dans ce numéro

Le projet SCSD, USA

Page 324

Le projet 'School Construction Systems Development' (SCSD) est issu en droite ligne des systèmes de construction d'éléments industrialisés anglais de l'Aprèsguerre. Cependant tandis que les systèmes du Comté de Hertford et Clasp prenaient naissance apres la guerre en pleine période de manque de matériaux et de main-d'oeuvre et où le retard de construction était désespéré, SCSD s'introduit dans l'industrie du bâtiment américaine en pleine activité et hautement concurrentielle.
L'idée de SCSD a été de créer un marché suffisamment étendu et d'accorder aux principaux fabricants suffisamment de temps pour projeter et s'équiper à produire en série des éléments composites industralisés orientés tout spécialement vers le marché des constructions scolaires.
SCSD entreprit de grouper 13 districts scolaires dont les travaux échelonnés sur deux ans représentaient la valeur d'environ 25 à 30 million $US et définit à l'intention des fabricants les problèmes de constructions tels qu'ils étaient envisagés par les autorités scolaires.
Les étapes parcourues par SCSD peuvent être très simplement décrites dans leur ordre chronologique:

1. le groupement d'un nombre de districts scolaires.
2. l'étude des exigences des autorités scolaires.
3. la définition en termes techniques de ces exigences et l'élaboration du cahier des charges des éléments de construction de différente catégorie.
4. la stimulation simultanée de l'intérêt des industriels à ce marché et la recherche de soumissionnaires possibles.
5. l'offre en soumission compétitive des éléments composites et la sélection d'un système approprié à l'ensemble du projet dans chaque catégorie fonctionnelle.
6. l'étude coordonnée des différents systèmes.
7. la remise de l'ensemble des études et informations concernant les systèmes, y compris leur coût aux architectes chargés par les autorités scolaires des districts intéressés d'établir un project d'école.

Il est encore trop tôt pour juger sur le plan pratique du succès du projet SCSD mais les membres du bureau d'étude sont très satisfaits des résultats obtenus à l'heure actuelle. Il semble que l'objectif principal ait été atteint, à savoir de réaliser une nouvelle série d'éléments de construction coordonnés à l'intention de constructions scolaires répondant mieux aux exigences et meilleur marché que les systèmes existants. C'est à l'usage que sera vérifiée la vraie valeur de ces éléments. L'équipe de SCSD considère cette étude essentiellement comme une expérience architecturale et c'est la valeur des constructions issues de ce système qui permettra d'en estimer la réussite. Dans cet ordre d'idées, l'apport de cette expérience se situe certainement dans l'élaboration minutieuse du cahier des charges. Cette attitude reconnaît qu'en architecture construire est un événement dynamique. Le degré de transformation de nos institutions augmente rapidement; l'industrie du bâtiment, enfin, prouve que dans une certaine mesure elle peut répondre aux exigences et réalités de la vie moderne.

Logements par éléments de béton, Japon

Page 346

Le projet déjà fameux de logements bas à haute densité composés d'éléments standardisés de béton et comprenant des éléments sanitaires en plastique de Noriaki Kurokawa est, parmi les projets proposés par les Métabolistes Japonais, certainement le mieux étudié et le plus clair. Dans une analyse du concepte—'A la poursuite de l'espace métabolique'—Kurokawa indique qu'il s'est fortement inspiré des notions développées par Yona Friedman et Jean Prouvé, il cite également l'influence d'Aldo van Eyck. Il reconnaît le fait que le problème le plus pressant de l'architecture aujourd'hui est l'abaissement du coût et la rationalisation du bâtiment pour la construction rapide et à grande échelle de logements de haute qualité pour la masse. Mais il va bien plus loin; il a repensé fondamentalement le problème propre à la production en masse de logements. L'hypothèse facile, insiste-t-il, que des unités de logements peuvent être produites comme des automobiles est trompeuse sinon fausse. Car le degré de transformation nécessaire aux unités de logement est beaucoup plus lent que celui des automobiles; rien que le nombre immense de logements qu'il faut construire dans le monde actuel indique que les nations ne peuvent se payer le luxe de les remplacer trop vite.

L'Association de Dessin Industriel GK au Japon

Page 353

Six dessinateurs industriels de l'Université des Arts de Tokyo formèrent en 1953 le group GK. Après quatre années d'incertitudes le groupe fut réorganisé par trois d'entre eux, Kenji Ekuan, Shinji Iwasaki et Kenichi Shibata et ils lui donnèrent le nom de 'Association de Dessin Industriel GK'. Les industriels n'étaient certainement pas inattentifs à l'activité de ces jeunes gens (ils étaient vraiment jeunes, car le plus agé n'a aujourd'hui que trente-six ans). En quelques années ceux-ci étaient à la tête d'environ cinquante employés administrant une organisation divisée en sections et sous-sections avec une précision et une minutie dignes des éloges de Mr. Krupp. Ils obtinrent l'année dernière le Prix International Kaufmann.
Sans nul doute, ils apparaissent être les créateurs et dessinateurs les plus prolifiques, réussissant visiblement le mieux au Japon, aux ressources toujours nouvelles, prêts à s'intéresser à toute nouveauté, jamais pris de cours lorsque sommés d'expliquer le pourquoi et le comment de leurs créations. Certains de leurs produits sont surchargés des manifestations gauches d'une intention philosophique. Malgré leur succès, malgré leur prétention, leurs ambitions n'ont jamais dépassé leur talent. Sans nul doute, leurs créations témoignent de leur compétence, que ce soit des emballages de carton pour le lait ou des cycles à moteur. Leur vigueur et solidité les situent à part parmi leurs contemporains japonais—américains ou même européens.

In dieser Nummer

Das Projekt SCSD, USA

Seite 324

Das Projekt zur Entwicklung von Schulbau-Systemen (SCSD) stammt in gerader Linie vom englischen Nachkriegssystem des Bauens mit vorgefertigten Teilen. Allerdings mit dem Unterschied daß, wo das Hertfordshire-System und CLASP inmitten der durch den Krieg verursachten Material- und Arbeiterknappheit und zur Behebung eines enormen Wohnungsmangels entstanden, SCSD in die schon sehr aktive und konkurrenzfähige amerikanische Bauindustrie eindringen mußte.
Der Grundgedanke der SCSD war, einen so großen Markt und soviel Zeit zu schaffen, daß größere Firmen imstande sein würden, eine Reihe von Bau-Kleinsystemen, besonders für Schulbedarf, zu entwerfen, auszurüsten und herzustellen.
Der Arbeitsvorgang bei SCSD war, 13 Schulbezirke zusammenzufassen, die etwa 25 bis 30 Millionen in Arbeitswert für einen Zeitraum von zwei Jahren darstellten, und das Schulbauproblem, mit den Augen der Bezirke gesehen, so auszudrücken, daß es für Hersteller verständlich wurde. Das ganze SCSD Verfahren kann ganz einfach in einer rein zeitlichen Folge ausgedrückt werden:
1 Zusammenstellung einer Zahl von Schulbezirken.
2 Prüfung der Bedürfnisse in diesen Bezirken.
3 Darstellung dieser Bedürfnisse in technischen Ausdrücken und Herstellungsspezifikationen für die in den einzelnen Abschnitten benötigten Komponenten.
4 Gleichzeitig muß man die Industrie an diesem Plan interessieren und mögliche Bieter finden.
5 Die erforderlichen Systeme müssen dann im Wettbewerb ausgeboten werden, und aus diesen Wettbewerben muß in jeder Hauptkategorie das erfolgreichste System für den Hauptplan ausgewählt werden.
6 Die einzelnen Systeme müssen in Verbindung miteinander weiterentwickelt werden.
7 Die gesamte Information über diese Systeme wird dann, zusammen mit Angaben über Preisbildung, den Distriktarchitekten zugeleitet, um sie für den Schulbau auszuwerten.
SCSD sieht sich hauptsächlich als Versuch in Architektur an und sollte als solches nach den Verdiensten der dabei entstandenen Gebäude beurteilt werden. Der bedeutungsvolle Schritt dabei liegt in dem Zweck der Herstellungsspezifikationen. Dieser Zweck nämlich bedeutet die Anerkennung eines architektonischen Bauwerkes als ein dynamisches Ereignis. Der Wechsel in den Anstelten vollzieht sich schneller, und die Bauindustrie ist in der Lage, so zu bauen, daß die Wirklichkeit des modernen Lebens dadurch widergespiegelt wird.
Es ist, vom jetzigen Standpunkt gesehen, noch zu früh, um den Erfolg des SCSD Projekts zu beurteilen. Bis jetzt sind jedenfalls die Angehörigen der Arbeitsgruppe mit den Ergebnissen zufrieden. Das Nahziel eine neue Serie von zusammengehörigen Komponenten für den Schulbau aufzustellen, besser und billiger als bisher erhältlich, scheint erreicht zu sein. Die vollen Verdienste dieser Komponenten müssen allerdings erst in ihrer Anwendung erprobt werden.

Hausbau mit Betonkomponenten, Japan

Seite 346

Noriaki Kurokawas jetzt schon berühmter Plan für flache, dicht belegte Hauseinheiten aus Beton-Standardteilen mit eingefügten Versorgungsteilen aus Plastik ist der bestausgearbeitete und genaueste Entwurf, den die japanischen Metabolisten bisher hervorgebracht haben. In einer Analyse dieses Planes—'Auf der Suche nach dem metabolischen Raum'—zeigt Kurokawa, daß er sich stark an die von Yona Friedman und Jean Prouve vertretenen Wahrheiten angelehnt hat, er nennt sogar Aldo van Eyck als Einfluß. Er erkennt an, daß das drückendste Problem in der heutigen Architektur das folgende ist: Niedrighaltung der Kosten und Rationalisierung des Bauens für schnelle und großräumige Herstellung von Massenbehausung in hoher Qualität. Er geht aber noch einen großen Schritt weiter; er hat das Problem von Häusern in Massenherstellung für sich selber überlegt. Die einfache Annahme, daß Hauseinheiten wie Autos am Fließband hergestellt werden sollten und könnten, ist nach seiner Ansicht irreführend, wenn nicht sogar falsch. Denn das Veränderungsverhältnis für Hauseinheiten ist viel langsamer als das für Autos; die bloße Anzahl der heutzutage in der Welt erforderlichen Häuser bedeutet schon, daß keine Nation es sich erlauben kann, diese in kurzen Zeitabständen auszuwechseln.

GK Industrie-Entwurfs-Gruppe, Japan

Seite 353

Im Jahre 1953 bildeten sechs Industrieplaner von der Tokyoter Kunstakademie die GK Gruppe. Nach vier unsicheren Jahren wurde sie von dreien von ihnen neugegründet und umgeformt. Diese drei waren Kenji Ekuan, Shinji Iwasaki und Kenichi Shibata und die Gruppe wurde umbenannt in GK Industrie-Entwurfs-Gruppe. Auch die Industrie beachtete schon die Tätigkeit dieser jungen Männer (und sie waren wirklich jung, denn der Älteste von ihnen ist jetzt erst sechsunddreißig). Innerhalb von wenigen Jahren hatten sie fünfzig Angestellte und hatten sich eine Organisation aufgebaut, so gut unterteilt und gruppiert, daß selbst Herr Krupp daran seine Freude haben würde. Im letzten Jahr erhielten sie den Kaufmann International Design Award.
Sie scheinen sicherlich die offenkundig erfolgreichsten und fruchtbarsten Zeichner und Entwerfer in Japan zu sein, nie um eine Lösung verlegen, immer bereit, sich an etwas Neues zu wagen, und nie ohne eine Erklärung, warum sie etwas gerade so machen, wie sie es tun. Manche ihrer Erzeugnisse sind allerdings mit unschönem philosophisch sein sollendem Beiwerk überladen. Und trotz aller Erfolge, trotz aller Anmaßung, hat ihr Talent mit ihrem Ehrgeiz Schritt gehalten. Ihre Entwürfe sind immer richtig und treffend, ob es sich um Milchkartons handelt oder um Motorräder, und sie zeigen eine Lebhaftigkeit und eine Kraft, die sie ihren Zeitgenossen in Japan, ja sogar in U.S.A. und Europa deutlich entgegenstellen.

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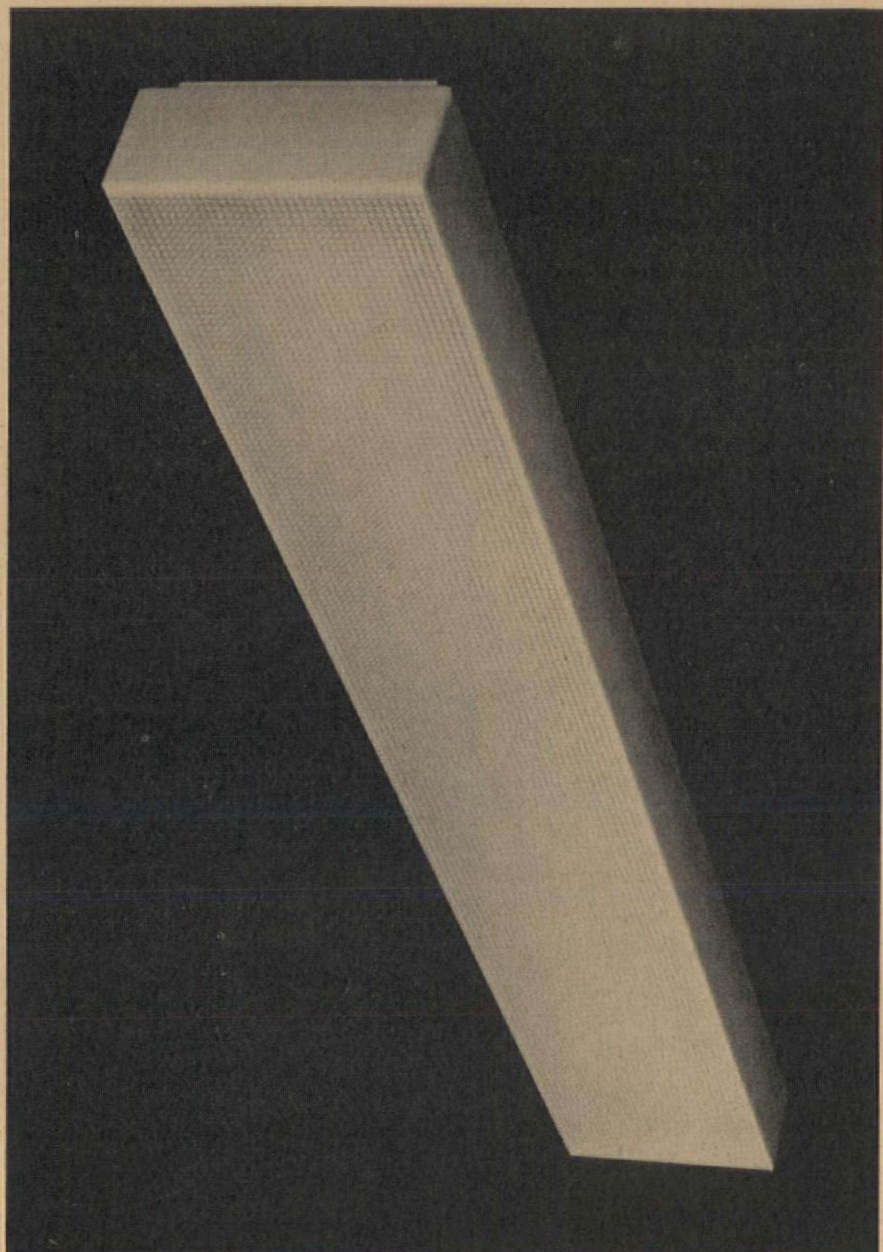

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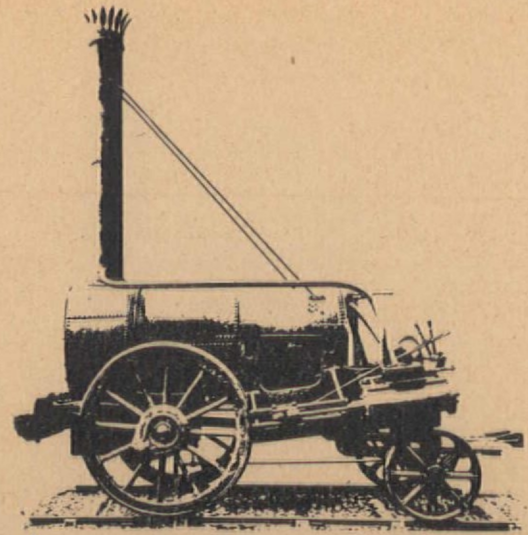
The Rocket

Peter Smithson

A statement on the present state of architecture giving a certain rationality to our instinctive judgements on it



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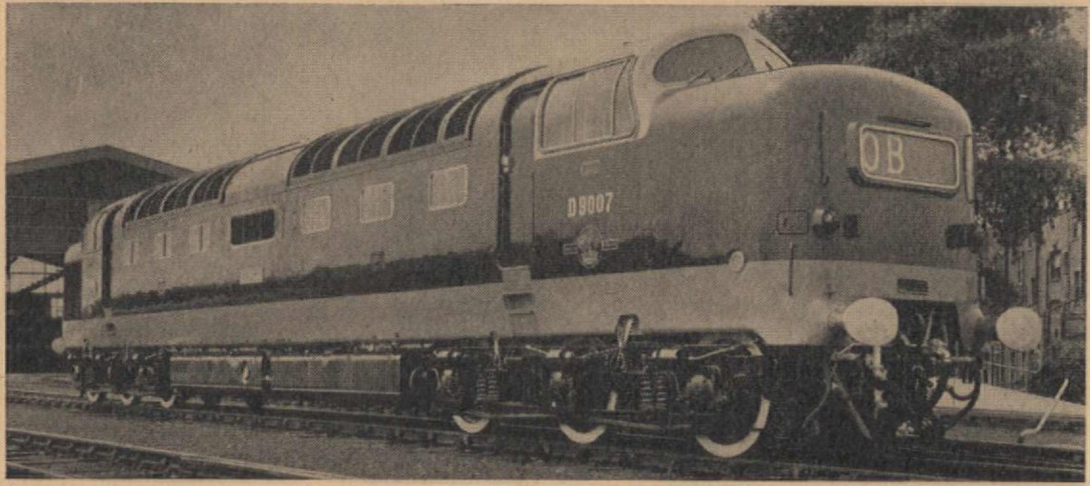

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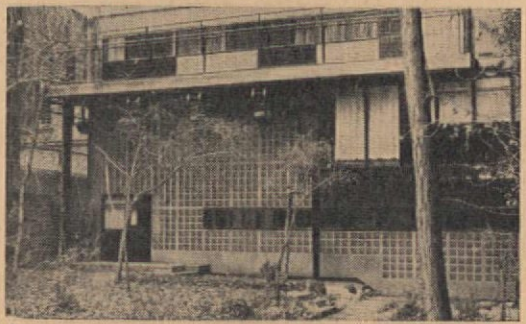

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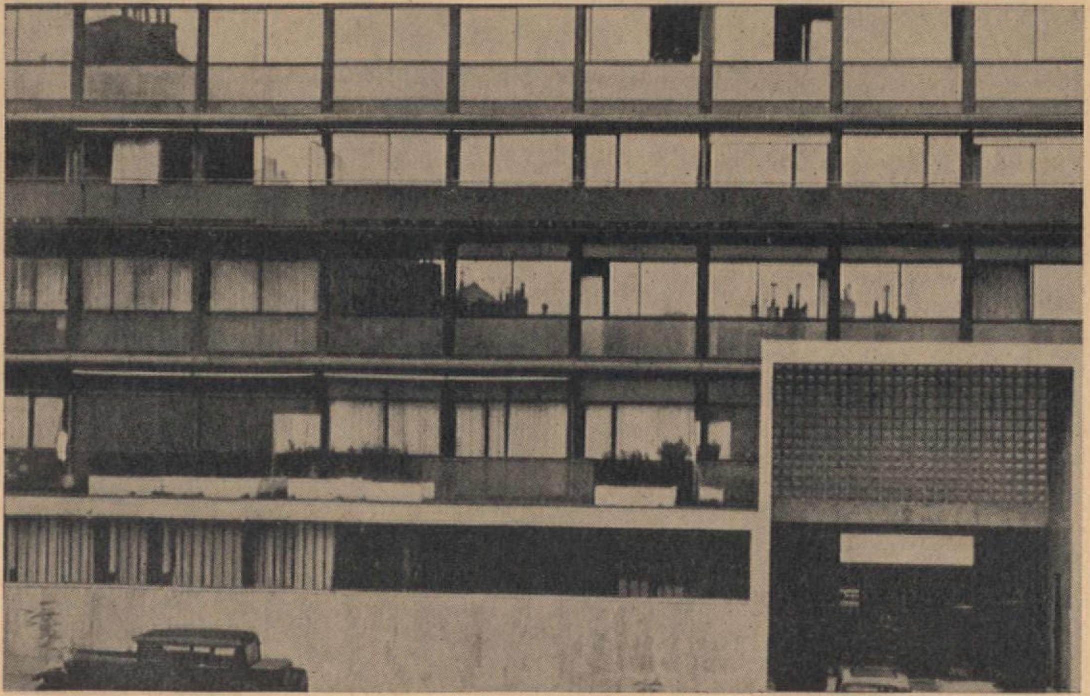

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The 'Rocket' was recognizably 'made'. With pieces of things which also remained themselves. We recognize their source, they are untransformed even re-usable, primitive: entraining us into the romance of boats and carts, of plate-wagonways and horses.

The modern locomotive is 'designed'. All special parts useless for anything else coming together to make a complete 'object'. An 'object' which in no way reminds us of the steamers it displaces, and if we like it, it is for what it is, not for what emotions it entrains by reminding us of previous technologies.

It is tempting to use the difference between 'assembled' and 'designed' as the simplest of criteria to decide what is architecture at the present time. For architecture in this century has always stood pretty close both to the actual state of technology and to the currently fashionable view of the machine.

In the heroic period of modern architecture the Constructivist/Sachlichkeit faction took what machine products were available from industrial construction—steel beams, industrial glazing, ships handrails, stairs and chequerplate floors, pavement lights, tiles and bricks—and it displayed its machines (lifts, dynamos and so on) very much in the way the Bentley of the same period was manifestly made of riveted sheets and had its supercharger 'displayed' on its front.

The Purist/Bauhaus faction took what had been developed for building proper—standard metal windows, flush doors, domestic lighting fittings—was more discreet about its machines and developed a unifying aesthetic which absorbed them.

At the present time the admired machines of the

1
The 'Rocket'

2
English Electric diesel locomotive

3
'Circuit de Dieppe'

4
'Maison de Verre', Paris, 1929. Chareau and Bijvoet

5
Immeuble 'Clarté', Geneva, 1930–32. Le Corbusier

Photos: British Railways 2. Werk 4. Le Corbusier: Oeuvre Complet, 1929–34, 5.

few are highly integrated and rather smooth. For example, the 'E-type' Jaguar appears to be modelled in some universal material—certainly the actual materials and the machinery are not overtly displayed. Such buildings which have been carried to an equivalent level of the logic of their own development, for exanple 900 Lake Shore Drive (on the outside), Union Carbide (on the inside), are 'designed' to a point of refinement entirely missed by a popular taste which assumes them to be routine catalogue stuff, when they are in fact unique and one-off.

Now throughout the development of modern architecture has run an economic and social argument in favour of the acceptance by architecture of mass-production. Mass-production would give houses to those who previously had none; it would raise the standard of living; it would create, it was said, a society of artisan heroes. There was, for example, a 'supplementary theme' to the CIAM Conference at Brussels (CIAM 3) on the 'Sliding Horizontal Window'; and Tange's choice of steel windows for Tokyo Municipal Offices was buttressed with the argument that the use of metal parts would help the development of the Japanese building industry and wean it away from wood.

But today we are in a period where in many cases there is no longer an economic argument in favour of using mass-produced building components—we can machine-produce exactly what we want even for small runs—and we may soon be in a period when there will no longer be a social argument.

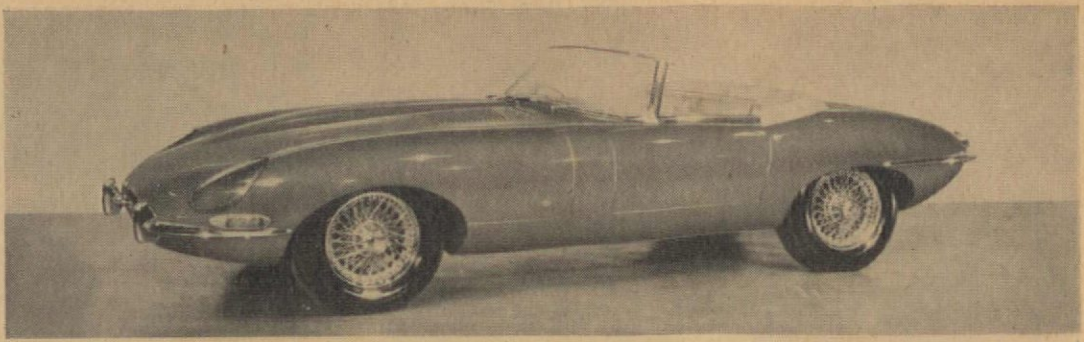
This suggests that there is a logic in many of our current judgments; that we are right when we worry about buildings in which plumbing vents are made to look like ships air-intakes, and towns like oil refineries, in which our emotions are entrained by reminders of previous technologies. We are right to worry about buildings which are too obviously 'assembled' out of pre-existing components developed for different situations to our own.

That the reason we worry about prefabricated houses (especially about the windows) is because they have no-longer-necessary formally unabsorbed components. That the reason why the LCC pre-fab is the only one which gives pleasure is simply because it has no 'windows' as such. It is a single clearly designed each-part-specially-developed object. (It also reminds us of Mies!)

As to the social necessity for everything to be mass-produced or even automated one-off machine-produced, there may soon be sufficient slack in our economy for the hand-made to revive.

For if there is to be a four-day week, could not some people choose to be highly paid hand-craft workers? Will it not soon be socially acceptable for some to opt out of machine society norms? In a way it has already happened, in that people who can be relied upon to produce unique hand-crafted objects get extremely well paid. A 'Flag' or 'Target' by Jasper Johns is worth 30,000 dollars in its young artist's lifetime. Current hand-production (admittedly highly specialized and promoted) for the first time and is well paid, even too well paid.

As far as architecture is concerned this new situation will knock the linch-pin out of the 'only acceptable components are the mass-produced components' argument. This removed, the responsibility for exact form decisions is back with the architect. All hindrances to completeness, uniqueness, precision of response to place, and satisfaction of need, are removed.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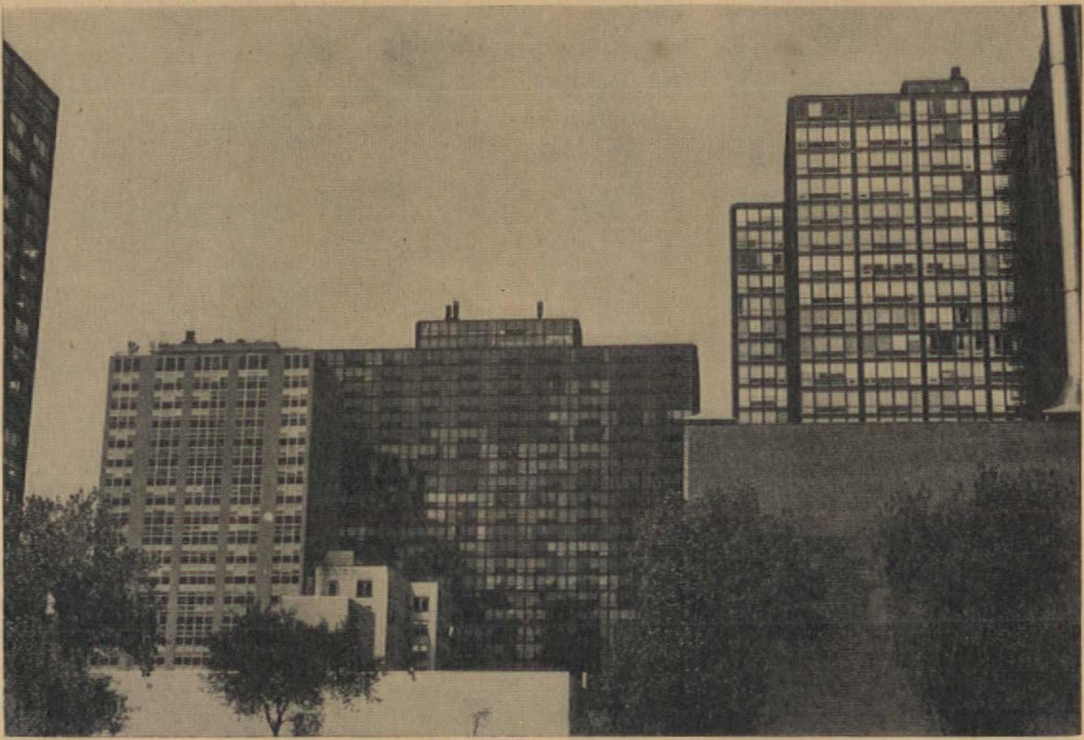
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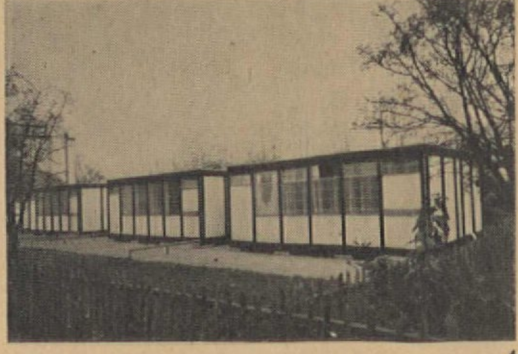
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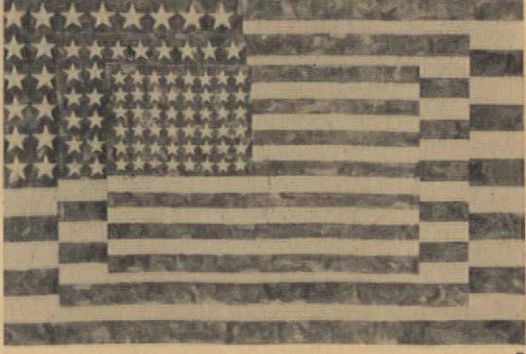
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1
E-type Jaguar

2
900 Lake Shore Drive, Chicago. Apartment house by Mies van der Rohe

3
Union Carbide office building, New York. Skidmore, Owings & Merrill

4
LCC pre-fab

5
'Flag' by Jasper Johns, 1955

Photos: P. Smithson 2. Architectural Forum 3.

SCSD project, USA
School Construction Systems Development

The project has been carried on as a joint activity of the School Planning Laboratory of Stanford University School of Education and the Department of Architecture of the University of California at Berkeley under a grant from Educational Facilities Laboratories, Inc., a non-profit corporation established by the Ford Foundation.

Project coordinators: J. Laurits, J. Boice
Project architect: Ezra Ehrenkrantz
Architects: C. Arnold, V. C. Bryant, Jr., B. E. Ray, V. Boyd

Acoustical consultant: D. Fitzroy. Mechanical consultant: G. L. Gendler. Electrical consultant: F. Sampson. Structural consultants: A. G. Tarics, C. Rinne. Liaison officer: C. M. Herd.

The School Construction Systems Development (SCSD) project is a lineal descendant of the English post-war industrialized component building systems. However, where the Hertfordshire systems, and CLASP came to life amid post-war material and labour shortages, and a desperate backlog of building, SCSD has inserted itself into the already highly active and competitive American building industry.
Although the building market for schools in America is huge ($12,619 million in 1962), the practice of competitively bidding one school at a time makes development of new products for schools difficult and slow. There is not enough incentive for architects and manufacturers to explore approaches to building schools which depart significantly from traditional, generally accepted methods. Thus, most development has not gone into school products and the school architect relies on catalogued hand-me-downs. But in California rapid increases in population have forced both users and manufacturers to consider seriously the possibility of new prefabricated buildings. In the Los Angeles area, the school district builds the equivalent of one elementary school a week; the yearly building budget is around $50 million.

School building in California

The state is divided into 58 counties and 1585 school districts. Each district is administered by a local Board of Trustees, an elected body of volunteer citizens who administer the policy of the State Department of Education. Districts have remarkable freedom in their control. The differences between a school district in a right wing suburb of Los Angeles, a wealthy liberal district of suburban San Francisco, or a rural district in the farmlands of the Imperial Valley will be at once apparent in all phases of the district's operation.

The policy of the school board is executed by the professional superintendent of the district and his staff of educators, administrators and teachers. The programme for a school will be written by the superintendent and his staff and the architect will be employed by the board.

All school designs are subject to approval by the Bureau of School Planning in the State Department of Education whose comments and recommendations are advisory, though powerful.

The Structural Engineering Section of the State Department of General Service must approve all structural drawings and specifications before a job may be bid, and also employs a field staff to check details as the job proceeds. The primary concern of this group is safety in the case of earthquake.

School buildings are exempt from local Building Codes but are subject to State Building Codes. By State law, as defined in the State Education Act, schools must be bid competitively by open invitation to general contractors. In all contract matters the County Council acts as legal advisor to the school district. For SCSD, this meant that all its procedures and bidding documents had to be approved by the six separate County Councils involved in the project.

The SCSD concept

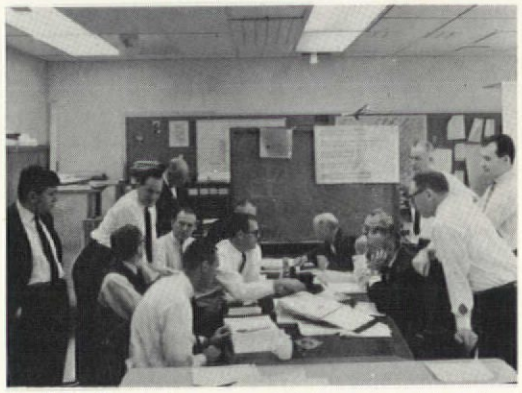
The SCSD idea was to provide a big enough market and enough time to enable major manufacturers to design, tool up for, and produce a series of building sub-systems specifically oriented to the school market.

The SCSD procedure was to group together 13 school districts whose work represented around $25 to $30 million in value in a two-year period, and to define the school building problem as seen by these school districts in terms which would be helpful to manufacturers. The whole SCSD procedure can be expressed quite simply in chronological sequence:

1. Group together a number of school districts.
2. Study the school district needs.
3. Define these needs in technical terms and write performance specifications for the components in the categories required.
4. At the same time, interest industry in this market and find potential bidders.
5. Bid the required systems competitively and from the bidding procedure, select one system in each functional category as successful for the entire project.
6. Develop the various systems in conjunction with each other.
7. Hand over complete information on the systems, including pricing, to the district architects for them to design their schools.

The SCSD project had its origin in a conference sponsored by *Architectural Forum* in September 1961, held to discuss ways of getting better value for money spent on school building and to study alternatives to the stock plan approach then under way in New York State. Much interest was aroused at this conference by details of some of the British systems described by Antony Part of the British Ministry of Education.

Of all the methods studied, this approach seemed most likely to be of value in this country. Accordingly EFL* set up a project to evaluate the approach and Ezra Ehrenkrantz, an architect who had previously worked for two years at the Building Research Station, went to England for a period to study systems there. Upon his return, he developed, in association with James Laurits, an experienced educator, a feasibility study which resulted in the determination by EFL to set up a large-scale project in California to develop a component system for building high schools. In September 1962 the SCSD project began full time operation. At this time, around seven school districts had already committed themselves to the programme.



By this time also, an advisory committee had been appointed, to give general guidance to the project. The committee, which meets irregularly and infrequently, is composed of experienced architects, educators, and State of California officials.

Investigation of school district needs culminated in the General Educational Specifications published October 1962 by the SCSD office. These specifications represented in outline the user requirements of the SCSD school districts. The document was not a simple record of the districts' opinions, but rather a fairly strong leading statement by SCSD, amalgamating its ideas with the expressed problems of the districts, resulting in an approved statement of design aim for the project schools.

The format of the Educational Specifications was that of a master statement embracing all district needs for a hypothetical school of 1800 students, known colloquially as 'Hypo-High'. Later a school was designed by the SCSD staff around these specifications for purposes of defining space relationships and estimating quantities.

Through the analysis of each space type in 'Hypo-High' ran the theme of flexibility. Some district personnel and architects believe that large-group instruction is proving to be effective and will be used more and more as teachers learn the methods. In most cases, a maximum group size of 150 students will be required.

Many educators in the member districts believe that small-group instruction will also come to the fore as new methods for scheduling students are developed. They see the need to alter the building in many places to create minimum spaces of approximately 450 square feet, requiring their separate controlled sources of light and ventilation. Work-groups or discussion-groups of 10 to 15 students will use these spaces, and partial partitions might further subdivide the 450 square feet in various ways.

A flexible school can accommodate a conventional programme; the converse is not true. The foreseen need for flexibility in these buildings dominates the technical requirements of the categories themselves.

Allied to the structural requirements of long-span are three additional factors which govern flexibility of use: the system for the interior partitions; the thermal environmental control of teaching areas; and the lighting system.

Within the fixed structural 'umbrella' three types of partitions are necessary to achieve the educational purposes. *Fixed partitions* will be required around spaces such as toilets or mechanical rooms, and to conceal plumbing or act as a shear wall. Demountable partitions, easily moved by school custodial help, provide the basis for plan rearrangements. Recently developed criteria result in the necessity for light sources over at least 50 per cent of the ceiling, ruling out many conventional lighting systems.

The educational programme, then, yields four component criteria which at present are difficult to meet within the school budget.

1. Long-span structures.
2. Varied movability of partitions.
3. Full thermal environmental control with the ability to adapt to changing plan configurations.
4. An efficient and attractive low-brightness lighting system, which adapts to changing plan configurations.

The performance specifications

'The structural systems shall allow the various District Architects freedom to plan the structure of the individual schools in a 5ft × 5ft module or multiples of this module. The structural systems in all areas of the school except physical education shall be designed to meet the requirements of an integrated structural, mechanical, and lighting-ceiling sandwich (hereafter referred to as the integrated sandwich). Bids will be evaluated on the basis of consistency, compatibility, and a composite total price of the integrated structural, mechanical and lighting-ceiling solutions.

'Mechanical equipment, or components, which are exposed on building interiors and exteriors shall be well organized and detailed. Component contractors are encouraged to think of the final appearance of their equipment as contributing to the character and interest of the general architecture of the building. Controlled expression of function is suggested as a guide to the desired design approach in exposed equipment (a ship's ventilator is suggested as a good example of this approach).'

(The SCSD Performance Specifications, Category 7, H.V. & C.)

There were two important reasons for setting up the specifications on a performance basis. One was to attempt to release talents in industry itself, which might not see the light of day if bids had been set up on materials and design basis. The other was that architects, other than the SCSD group, were eventually to use the system and they would probably not have accepted a system directly designed by a group of architects. However, they would accept systems designed and accepted as answers to performance standards which they themselves had helped to set out. It is in this area of performance bidding that perhaps one of the most radical departures has been made from normal practice and bidding building products in the United States.

Under the SCSD procedure, it was necessary to introduce these ideas to component manufacturers who were accustomed only to engineering their own products and then sending them out in the world for the architect and consulting engineer to coordinate. This problem led to a careful definition of the *integration concept in the specifications*.

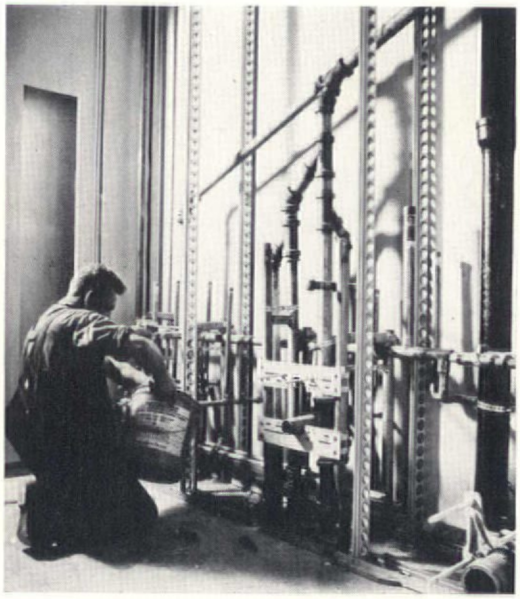
The earlier in the design process that the coordination of components begins the more effective the results. For the success of this project it was essential that coordination began as industry started to design the product rather than SCSD attempting to coordinate independently designed products.

*Educational Facilities Laboratories Inc.

To quote from the Specification *Blue Book:*
'The major area where coordination is necessary is in the ceiling 'service sandwich', the space between the ceiling and roof (or floor structure in multi-storied buildings), wherein are concentrated the main environmental services of the building. In the components that make up this 'service sandwich', three orders or degrees of coordination may be seen:
(*a*) Coordination by architects and engineers of components performing separate functions, which have been designed without reference to each other. This represents the typical situation with building design today, wherein architects coordinate a variety of catalogue building products and field erected materials.
(*b*) Coordination by architects and engineers of components performing separate functions, which have had some degree of coordination at their design phase. This represents the best situation in the building design process today, but applies only to the prestige or functionally organized buildings.
(*c*) Coordination of components at their design stage between architects and industry, wherein components perform other functions as well as their own. For example, structure may form or contain air ducts, and act as a light-reflector; light fixtures may perform heating functions.
Coordination of this third order results in component integration. It is this integration that is desired for the project. At this order, criteria which may be overacting for components acting in isolation become feasible. A long-span beam which is uneconomic when used solely as structure, may be economic when it is also designed to carry air.
To implement the conception of integration, the following criteria shall be met by the service sandwich. The sandwich shall provide long spans from 55ft to 75ft with 60ft designed as the most economical span. Maximum bay width shall be 30ft, with a maximum sandwich depth (from ceiling to top of roof structure or floor deck) of 36ft. The sandwich shall provide the capacity for carrying air to meet the needs of an efficient mechanical system. Provision shall be made for distribution of air to rooms, for removal or utilization of light fixture heat, and for return-air removal or reuse. The sandwich shall provide an acceptable minimum ceiling. While hung ceiling may be used, underside of sandwich would be capable of use as basic finished ceiling.
The sandwich shall act as a reflecting surface for the lighting elements. It shall be possible to accommodate lighting elements within the sandwich, providing an adequate distance between lamp and reflecting surfaces or diffusing elements. The low-brightness requirements indicate light sources over a large percentage of the ceiling plane, and tend to rule out conventional troffer type fixtures with high brightness characteristics. It is desirable that a variety of ways of meeting the lighting criteria be provided.
The sandwich shall meet requirements for one hour fire protection. Sprinkler systems as a method of achieving this, do not meet with the project requirements for flexibility.
The sandwich shall act as a roof deck.
The sandwich shall provide for attachment of fixed, demountable and operable partitions.
The sandwich shall provide for running utility services.'

To assist in explaining these ideas to manufacturers, several diagrams were prepared to give them an idea of how these requirements might be met. It had been repeatedly stressed to participants that these drawings were conceptual and did not represent solutions which SCSD wanted industry to provide. While industry was quick to accept the importance of integration, it was very slow to apply the idea to its actual design work. The concept of integration was brought down to earth by being made a mandatory part of the bidding procedure. Though this greatly increased the amount of work for manufacturers, no one could deny that this was a most necessary part of the whole system design problem.

It will be noted that the exterior wall was excluded from the systems to be developed. Study had shown that only about 6 per cent of the cost of a school was attributable to the exterior wall. At the same time, California architects were using about 14 different materials for exterior



walls. This meant that the economies of a volume approach could not be very effective for all these materials. Similarly, plumbing was eliminated from the systems worked on because of the foreseen impossibility of any technical advances which were produced through the system being acceptable to the labour interests involved.

Bid submission

At the opening of the bid period in July 1963, a conference was held at Stanford University to which all interested manufacturers were invited with the purpose of explaining the aims of the project and the details of the specifications. Some 200 people attended this conference representing nearly 100 different manufacturing concerns, and probably this conference represented the turning point in the SCSD project as a whole, for the sight of so many influential members of industry convinced everyone that here indeed was a serious and important project. Following this conference, SCSD worked continually with interested manufacturers, helping them with their compatibility problems and trying to insure that manufacturers did not waste their time pursuing solutions which would clearly not meet with approval.

To assist further in giving manufacturers a sense of the desired direction, the first submission asked for in September 1963 was the Evaluation Submission. This was asked for as a proposal from manufacturers to indicate new selected methods of solving the performance standards. No prices were asked, but enough information was required so that an analysis could be made of the manufacturer's system.

In addition to the performance specifications, the precise method of asking for bids had necessarily to be unusual. None of the schools had yet been designed though their sites and approximate sizes were known. Under these circumstances, bids were asked for an estimated quantity of material to build or equip 1,400,000ft² of floor space. This was a guaranteed minimum. In addition, a maximum of 2,400,000ft² was imposed. This 1,400,000ft² was broken down into estimated but precise quantities for bidding purposes, which of course varied according to the category being bid. The bidder was asked to come up with a lump sum for the treatment of this area of space. At a later date, July 1964, he was asked to come through with unit prices for each item bid, and the aggregate of the unit prices had to relate to this original lump sum bid.

The lump sum and the unit prices both applied to materials installed on the given sites. This action of calling for an installed bid represented another radical departure. The schools were due for completion between September 1966 and December 1967, or up to three years from the time when bids would be made.

In general, high schools were being built for an average cost of $16·74 per ft² at the same time the SCSD target was set up. This figure which includes extensive science equipment, but not external works, at 118*s*. compares with around 70*s*/ft² for a CLASP school. When it is realized that the California school is built with labour whose basic cost, exclusive of employers' contributions, ranges from 24*s* 9*d* an hour for a labourer to 38*s* 6*d* an hour for an electrician, it will be seen that the California school is good value for money (comparable labour rates in Britain are 7*s* 8*d* and 10*s* 6*d*).

Evaluation submissions were received in September 1963 from some 50 firms. Development work proceeded and final price bids were received in December from 26 firms. During this month a complex evaluation procedure of the final bids was undergone to ensure that if a bid was selected, it might not have some hidden flaws which might result in severe problems at a later date. On January 7th, 1964, six successful bidders were nominated:

Inland Steel Products Company of Milwaukee, Wisconsin with a *structural* bid of $2,390,000, equivalent to $1·81 a square foot. This compares with a target for conventional construction of $3·24 per ft², derived from estimates by SCSD staff.

Lennox Industries, Inc. of Marshalltown, Iowa, with a bid of $3,410,000 for *heating, ventilating and cooling,* equivalent to $2·24 per ft². This includes 56 per cent air conditioned space, and a five-year full maintenance contract. Target figure was $1·90 per ft² for minimal air conditioning and no maintenance.

Inland Steel Products Company of Milwaukee, Wisconsin, with a *light-ceiling* bid of $2,256,000, equivalent to $1·31 per ft². Target figure was $1·58 per ft².

The E. F. Hauserman Company of Cleveland, Ohio, with a bid of $2,330,000 for an *all demountable partition* system.

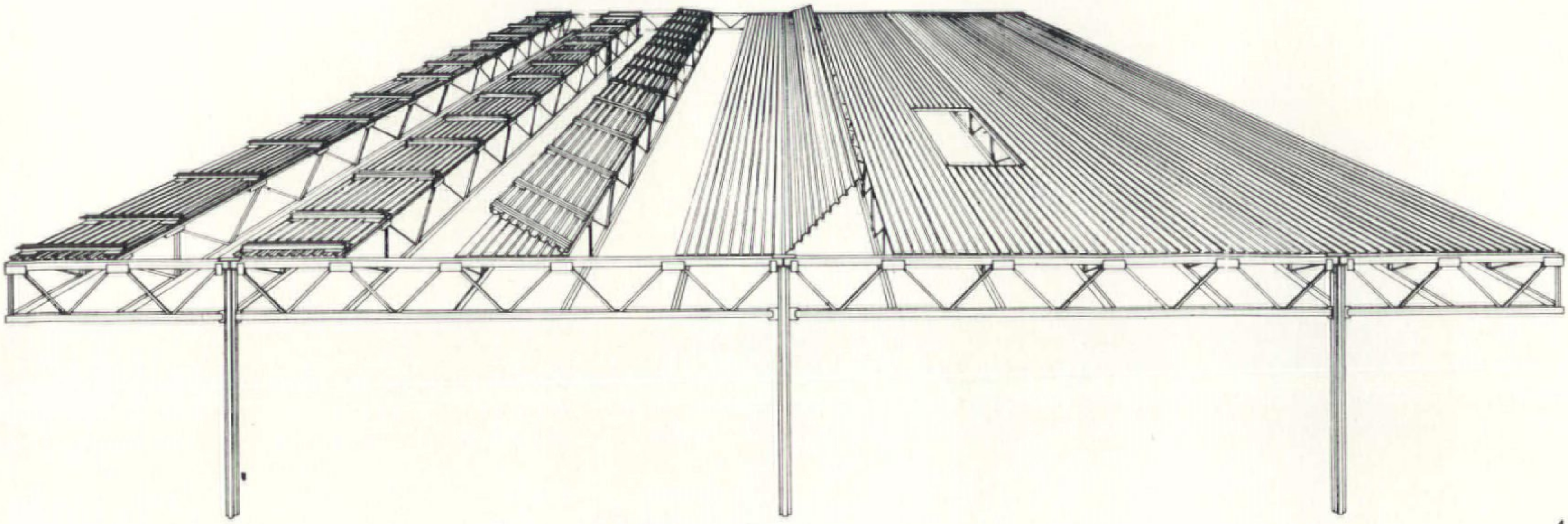
Hough Manufacturing Company of Janesville, Wisconsin, with a bid of $78,000 for *accordion type operable partitions.*

Western Sky Industries of Hayward, California, with a bid of $328,000 for *panel type operable partitions.*

The aggregate of partitions bid represents $1·52 per ft², compared with a target of $1·67 per ft².

The aggregate of components bid represents a total of $6·88 per ft². Analysis of current building experience in California indicates that the building components involved in the project cost approximately $8·39 by conventional methods. Accepted bids represent cost savings of approximately 18 per cent through project methods, according to figures developed by the project staff and checked by independent estimators.

The six selected manufacturers began working in January 1964, with SCSD acting as coordinator, to develop their systems in unison and to ensure that full information would be available by September 1964 for all the participating architects in the district.



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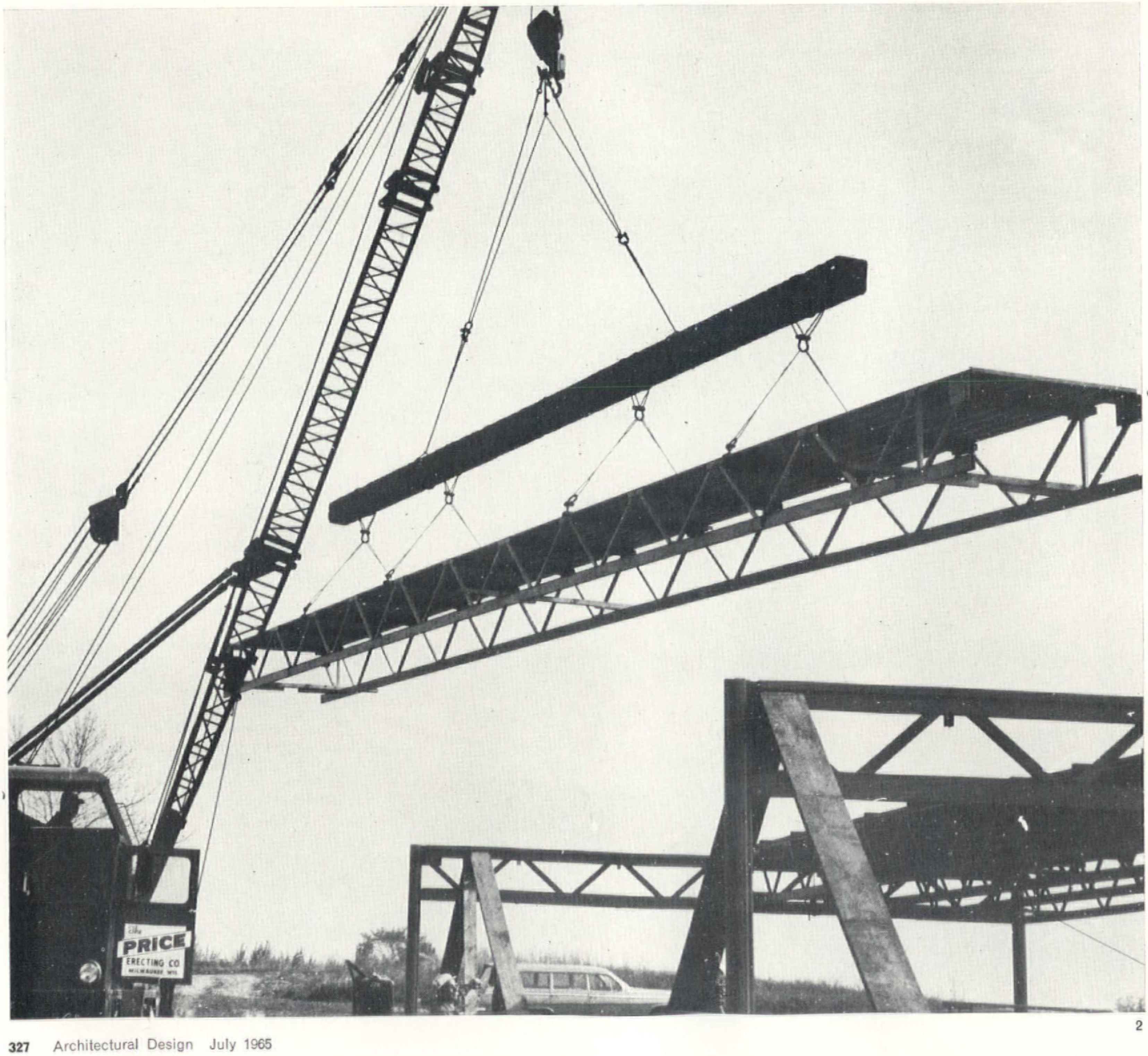

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Structural system

Inland Steel Products' selected bid proposal of \$2,390,000 provides a structural system and roofing for 1,400,000ft² of roof area. In brief, the system includes all columns and primary beams, allowing column spacing of 10ft, 15ft, 20ft, 25ft, and 30ft; all roof spanning members for spans of 30ft, 40ft, 45ft, 55ft, 60ft, 70ft and 75ft for academic areas; 90ft and 110ft for gymnasia; and floor spanning members of 30ft, 40ft and 45ft. Also included is all insulation, flashing and 20-year bonded type roof.

The system is designed to conform to state codes and to meet all the requirements thereof. It does not include a lateral load bracing system which will vary on each building and will be supplied by others.

The Inland system makes use of a new structural technique for school buildings in America by utilizing the inherent structural properties of steel roof deck. The basic roof spanning member or deck unit consists of a metal roof deck panel used as a compressive top chord, web members of tubular type sections and cold formed bottom chords in warren truss configuration. For floor construction a metal deck having proven composite behaviour with concrete fill is utilized to achieve composite action between the webs and bottom chord portions of the deck units and a concrete floor slab acting as the top chord. Cantilevers of 5ft and 10ft may be achieved with cantilever deck units connected to primary beams. These are designed as conventional warren trusses with welded connections. Cantilevers of 5ft and 10ft may be achieved with cantilever beams connected to columns.

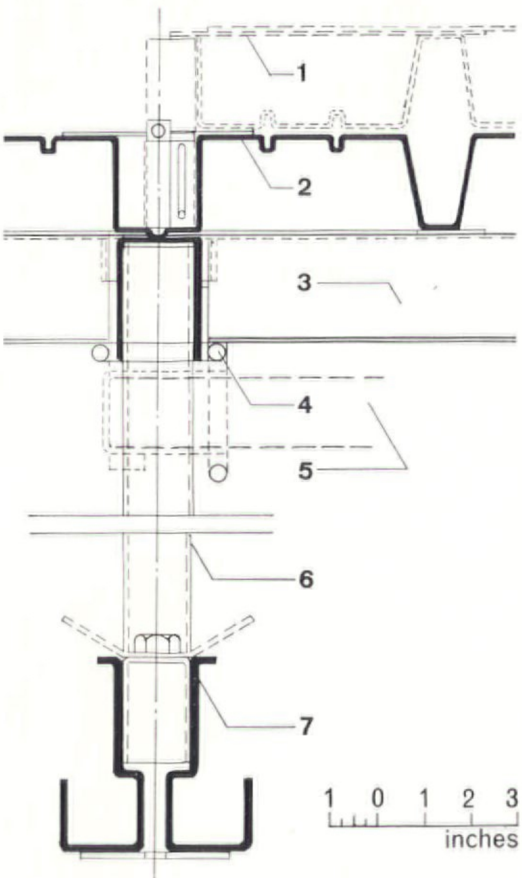
All truss deck units between 30ft and 75ft span have identical dimensions and geometry and a depth of 33in. Units between 90ft and 110ft span have identical dimensions and geometry and a depth of 57in. All primary beams have identical dimension and geometry and a depth of 33in.

The columns are cruciform metal tube of varying wall thickness with constant outer dimensions for all loading conditions. Where necessary to achieve a desired fire rating, the columns will be filled with concrete and have an intumescent coating on the outside.

For ease of handling and shipping, the webs and bottom chords of the deck unit fold into a compact package. Erection involves lifting the deck unit from its package allowing the webs to unfold to their normal vertical position. The unit is then hoisted into position and attached to primary beams or columns.

The structure provides lateral support points at 5ft centres in both directions for anchoring of interior partitions.

Pricing of the structural system is such that the most economical bay size is 60ft × 30ft.



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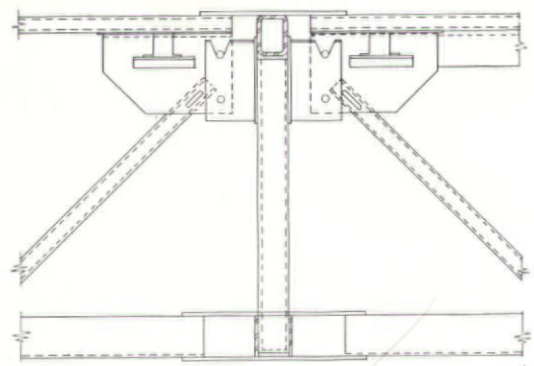

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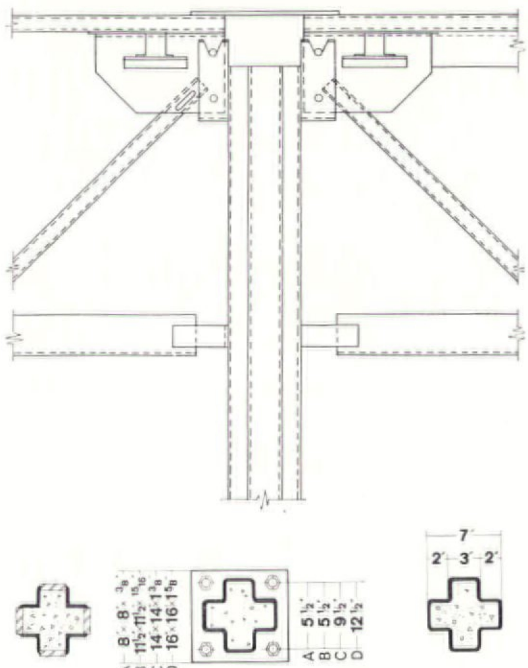

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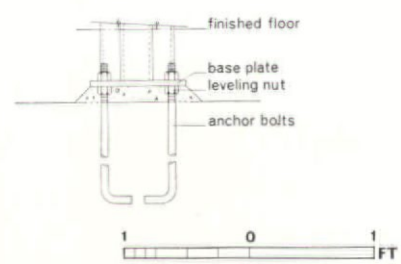
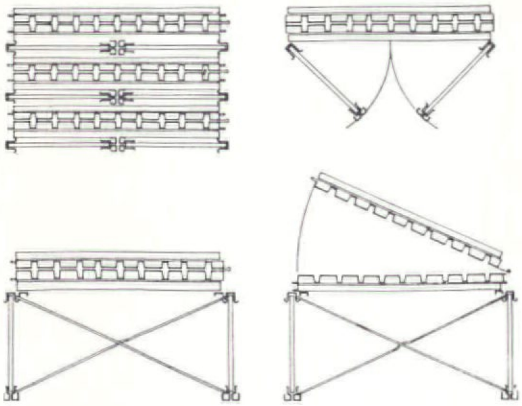


1
Structural system submitted by Inland Steel Products Co.
2
Truss and deck unit being hoisted into position
3
Roof detail
1 folded deck
2 deck
3 purlin
4 pivot
5 folded truss
6 tubular web
7 bottom chord
4
Detail showing the connection between cantilevered truss deck units and the primary truss spanning between columns
5
Detail showing the connection between the supporting column and cantilevered truss deck units. Shear plates are used to transfer the top chord forces across the primary truss or column in addition to any seismic shears. The column is a built-up or rolled section
6
Cross-section through a truss and deck unit showing how they are stacked and unfolded
7
Rejected space frame by the Butler Co., Kansas City
Photo: 7 Swetman and Grier



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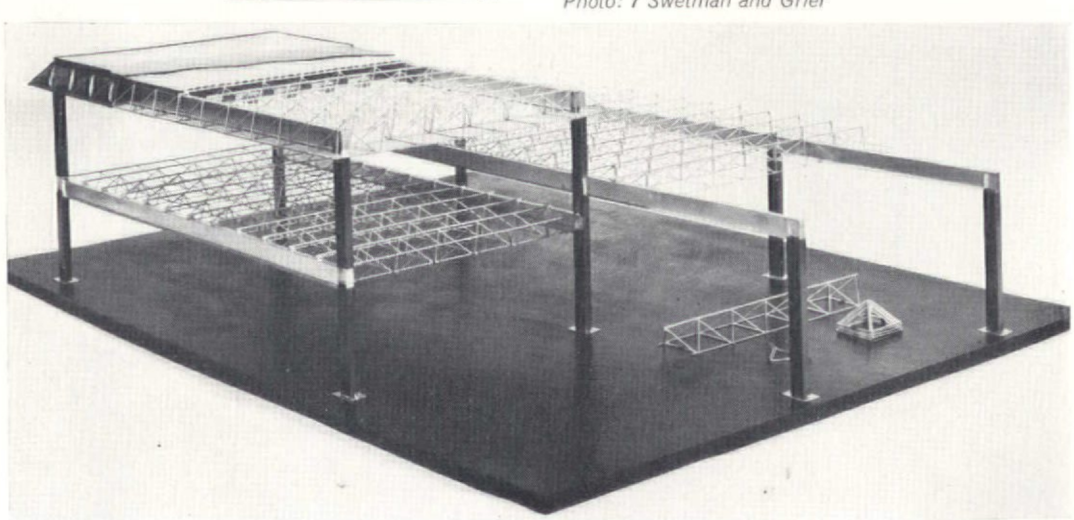

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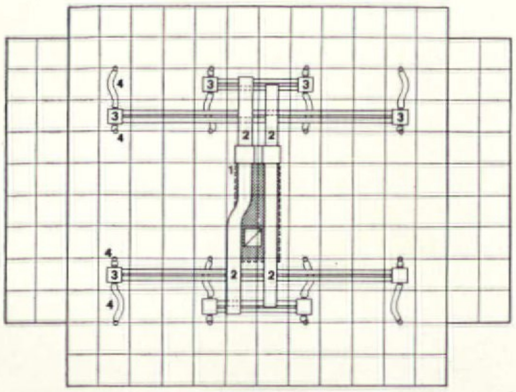

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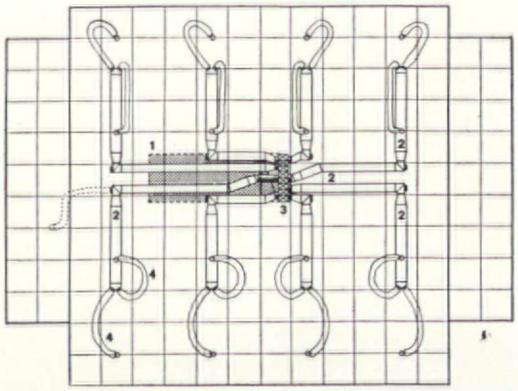


2

1 & 2
Duct layout as first proposed and as revised. Initially rigid ducts had to be altered for different room arrangements and mixing boxes moved.

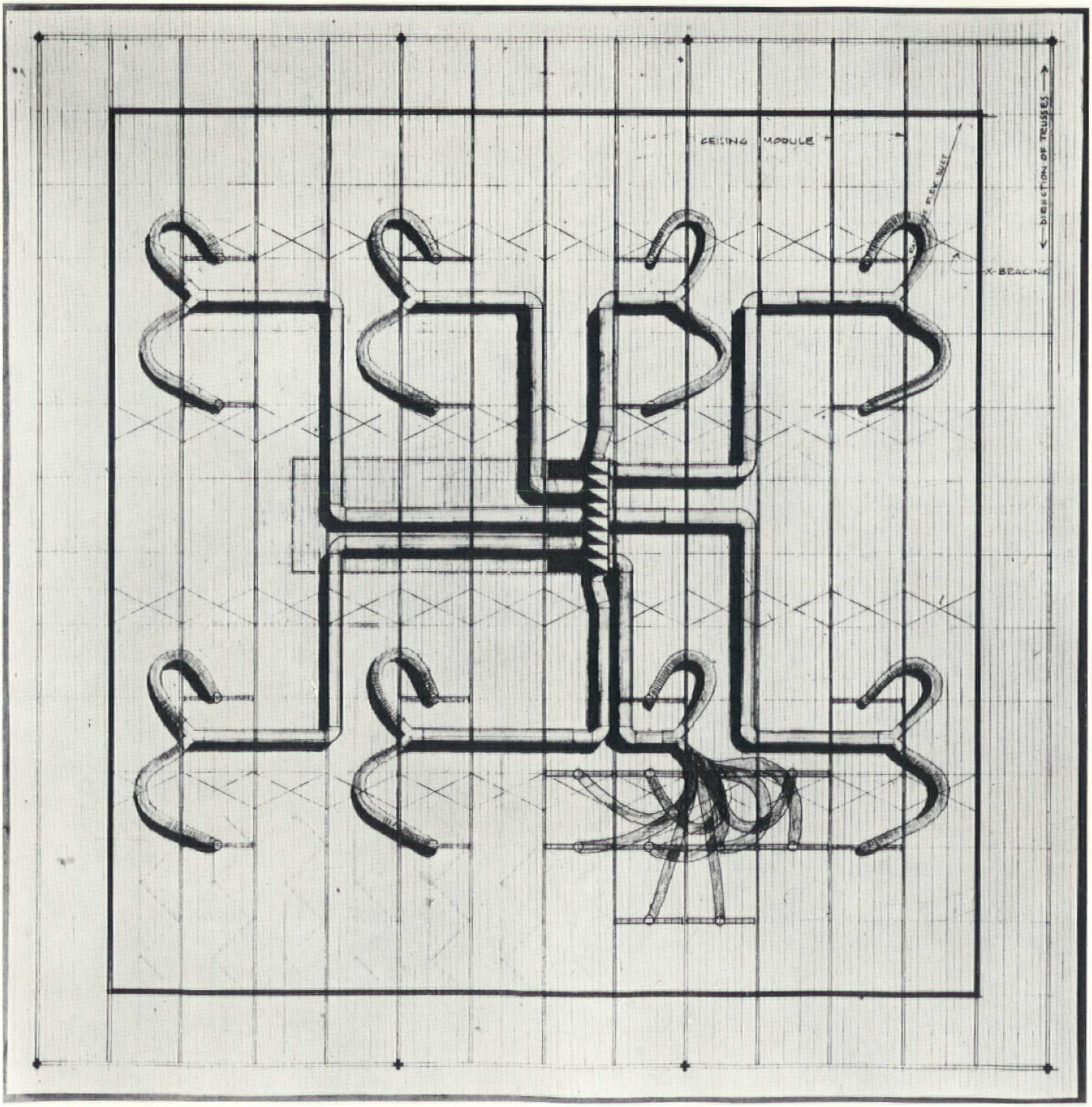
1 unit location
2 rigid duct
3 mixing plenum
4 flexible duct

3
Duct layout in the prototype building

4
Lennox air-control unit, 22ft long, weighing 2700lb

5
Lennox air-control unit

1 thermostat
2 condensing unit
3 outside air intake
4 return air intake
5 exhaust air
6 air dampers
7 air filter
8 centrifugal blower
9 heater
10 cooling coil
11 hot air
12 cold air
13 mixing boxes



Heating, ventilating and cooling systems

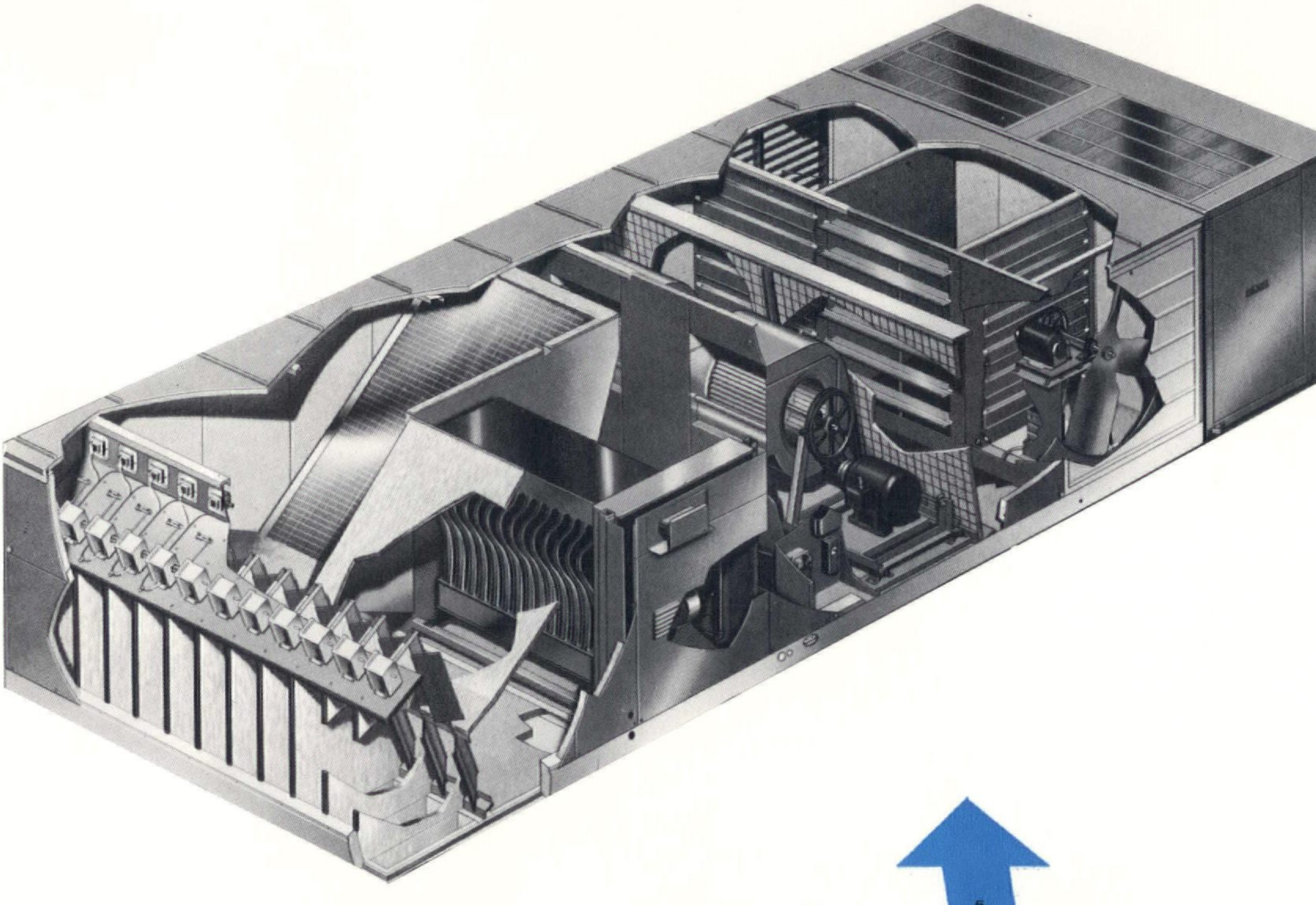
The basis of the Lennox Industries system is a roof mounted self-contained unitary system of air treating and handling equipment. Each unit serves one 3600ft² mechanical service module. Normal air handling capacity (with 3 h.p. drive) is 7200 cfm. With a 5 h.p. drive, approximately 10,500 cfm capacity is available. Cooling capacity is approximately 16 tons with units available up to 22 tons for special conditions. Heating is by direct fired gas heater; 250,000 to 350,000 Btu/h input.

The unit receives 100 per cent recirculated air, or 100 per cent outside air, or any mixtures thereof. A power exhaust fan is also incorporated in the basic unit.

Air distribution is through a multi-zone incorporating eight mixing boxes, each serving 450ft² of floor space via fixed and flexible ductwork and strip ceiling diffusers. Air velocities do not exceed 1200 fpm. Strip diffusers and fire dampers are part of the ceiling assembly, by Inland Steel Products. Return is via strip diffusers into a common plenum space and back into the units.

Control system is all-electric by Lennox. Automatic dehumidification is provided. It is possible to have any number of mixing dampers controlled by one zone thermostat, and it is possible to have a zone thermostat controlling mixing dampers which are supplied hot and cold air by different units.

The evaporator and condensing unit form a separate package which can be added to the basic unit as desired, initially or at a later date. The unit, including refrigeration section is approximately 48in high, 8ft wide and 25ft long.



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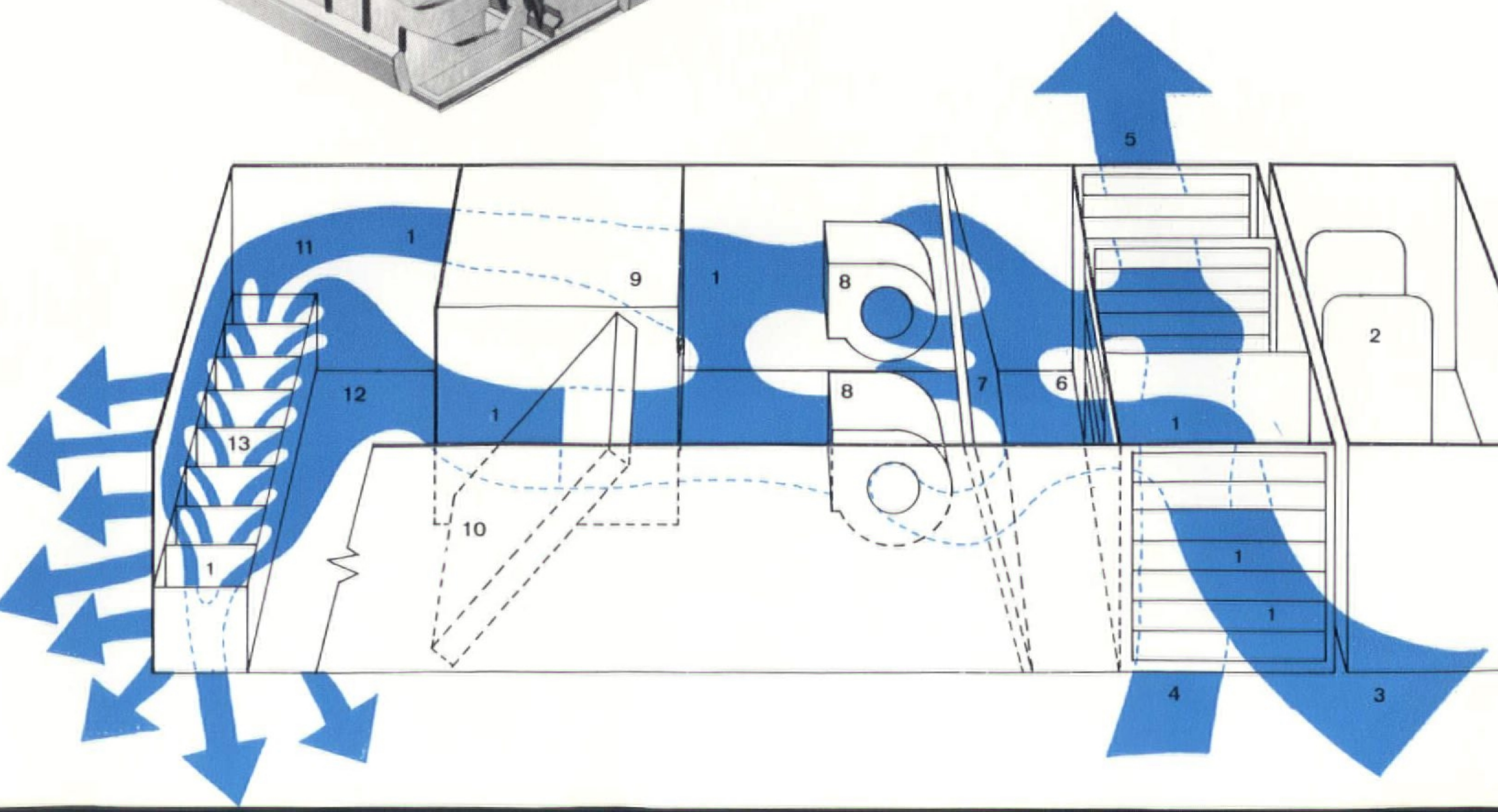

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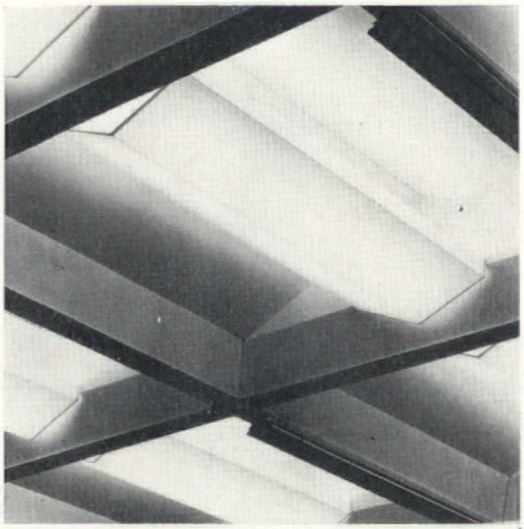

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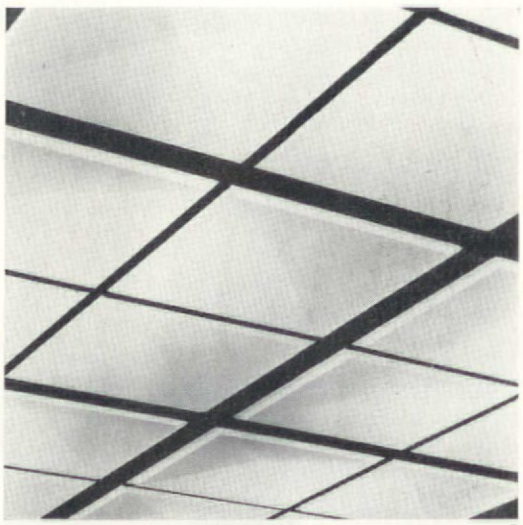

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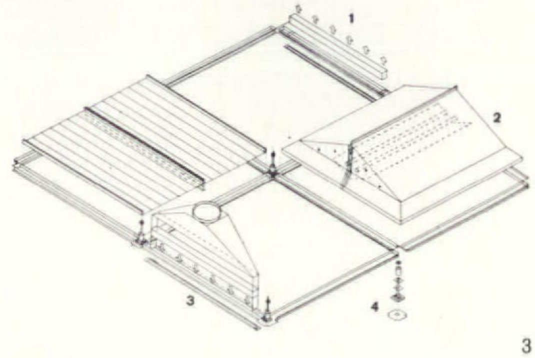
7

Lighting-ceiling components

In response to the SCSD Performance Specifications, the Inland Steel Products Co. lighting-ceiling system performs multiple functions by providing:

1. Source of illumination.
2. Finished ceiling or soffit.
3. Ceiling sound absorption.
4. Sound attenuation between rooms.
5. Fire protection for the steel structure.
6. Support for demountable partitions.
7. Supply and return air devices.



3

The ceiling system is based on a 5ft × 5ft metal grid suspended from the panel points of the structural elements. All structural members occur on the same 5ft module and are the same depth, allowing all ceiling attachment devices to be identical.

Grid members are nominally 5ft long × 4in wide and meet at intersections trimmed by a cover plate. Columns occur only at grid intersections.

Two lay-in elements are available to in-fill the basic ceiling grid; a 5ft² flat panel and a 5ft² coffer. Both are 26 gauge steel with a high-reflectance matt white finish.

The coffer serves as a reflector for standard lighting elements. Various combinations of these elements and variations in their location are possible within the coffer. The flat panel, for use in areas where a flat ceiling effect is desired, is composed of three one-third module elements and T-bar supports. Both the flat panel and coffer can be positioned in either direction within the square grid and both are available with perforated surfaces for increased sound absorption.

Where a fire rated ceiling is required, the backs of the panels and coffers are covered with mineral wool batts to provide heat insulation. The batts also increase the absorption and attenuation properties of the ceiling system.

The basic lighting element is a two-lamp strip fixture which can be mounted in various positions and quantities within the ceiling coffers. The fixture contains two 40-watt rapid start lamps and one ballast. Several diffusers are available.

1
Semi-indirect lighting system, providing a maintained level of 70 f.c. with low brightness. An adjustable slot air diffuser appears also in the picture

2
Luminous ceiling panels

3
Diagram illustrating the lighting ceiling system
1 air exhaust to plenum 3 air supply
2 light coffer 4 suspension system

4
A lighting coffer being installed

5, 6 & 7
Diagrams showing possible arrangement of fluorescent tubes to achieve indirect and direct lighting and luminous ceilings

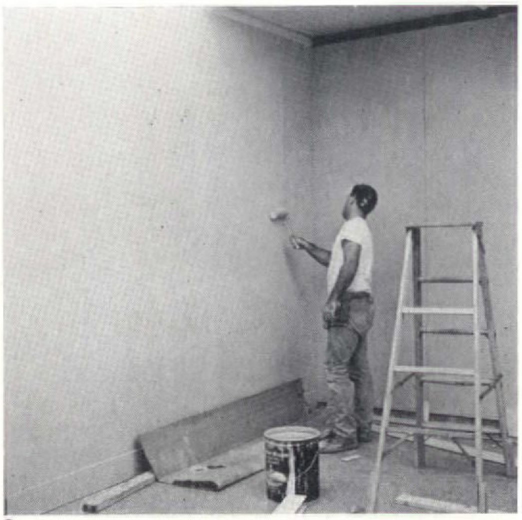
Fixed and demountable partitions

The demountable partition system submitted by the E. F. Hauserman Co. consists of metal studs at 40in centres to each side of which are snapped panels consisting of ⅜in gypsum board faced on each side with sheet steel. The total wall assembly is 3in wide, with two gypsum panels and four sheets of steel. Panel faces are independently removable from either side of the wall and are interchangeable. The basic panels are factory primed and field finished. The metallic faces serve as general tack surfaces by use of magnets. Other faces include a general chalk finish, glazed panels, acoustical and back-up panels. Accessory porcelain enamel chalk and half-inch thick vinyl surfaced tack panels for concentrated use are also included. Panels are available in 28 colours. Panels are 40in in width with filler panels cut to 12in, 16in, 20in, 24in, 28in and 36in for use at the ends of runs or columns.

The partition system is Hauserman's catalogued Coordinator Double Wall modified to conform to project specifications, particularly in terms of vertical tolerance and provisions for vertical deflection. The sound attenuation exceeds the 28 db average loss specified. Painted panel surfaces will be slightly textured so that field finish repair will be less noticeable.

A top set of vinyl base which is not removable can be substituted for the 6in high removable steel base. Other optional items include steel doors and vinyl panel finish which are available. Extra wide walls are formed by using double studs with a single panel face in each stud. On this basis walls can extend up to 25ft high.

8



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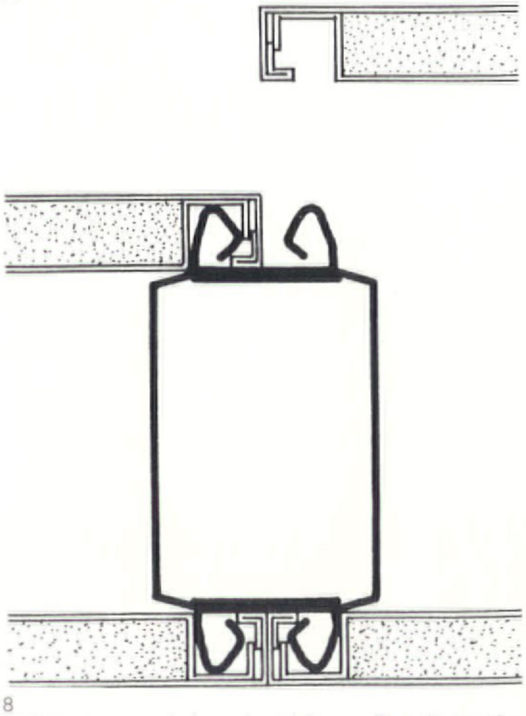

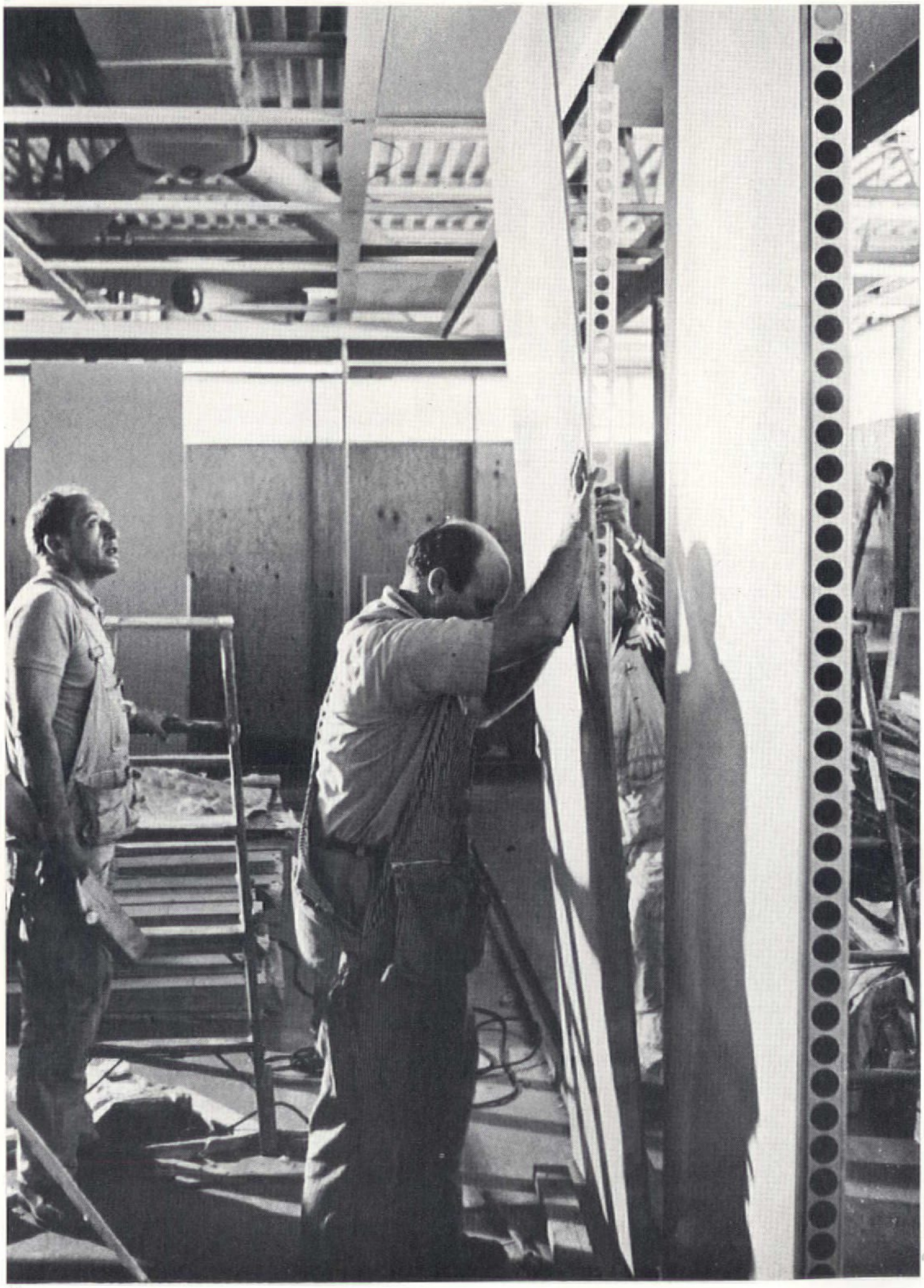

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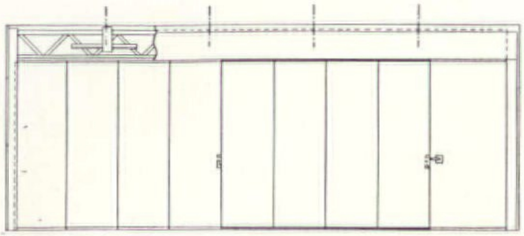
8
Ceiling runners being placed in position to receive partitions

9
Steel faced partitions being painted on site

10
Plan of the stud and panels showing how the panels are designed to snap on

11
A panel being installed. The ceiling runners and the metal studs, with telescopic top connections, are already in position. The baseboard is placed in position after assembly of the other components

Photos: 1, 2, 4, 8, 9 & 11 R. Partridge



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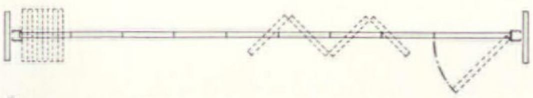

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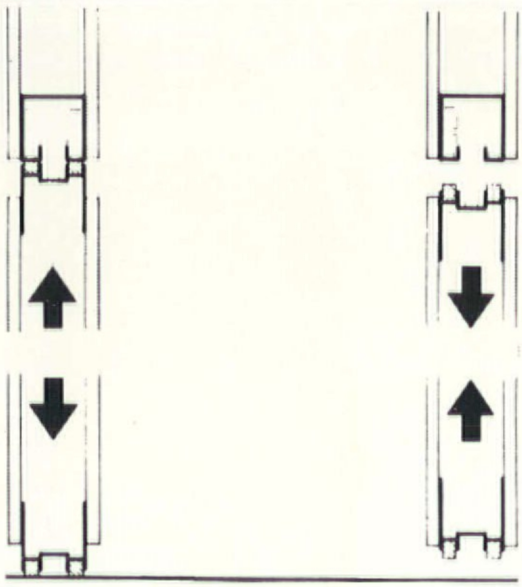

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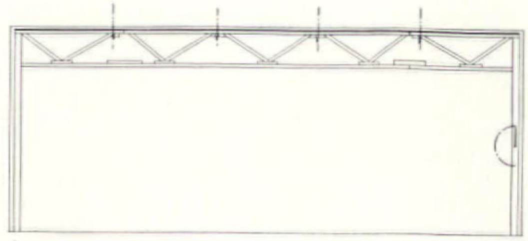

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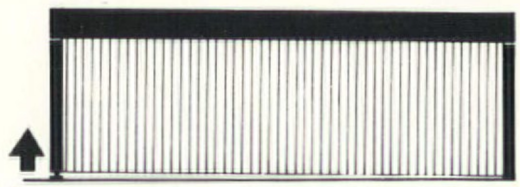

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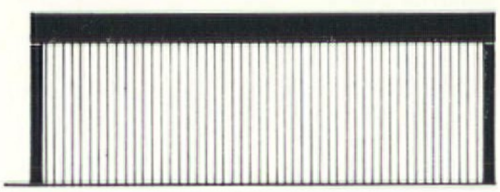

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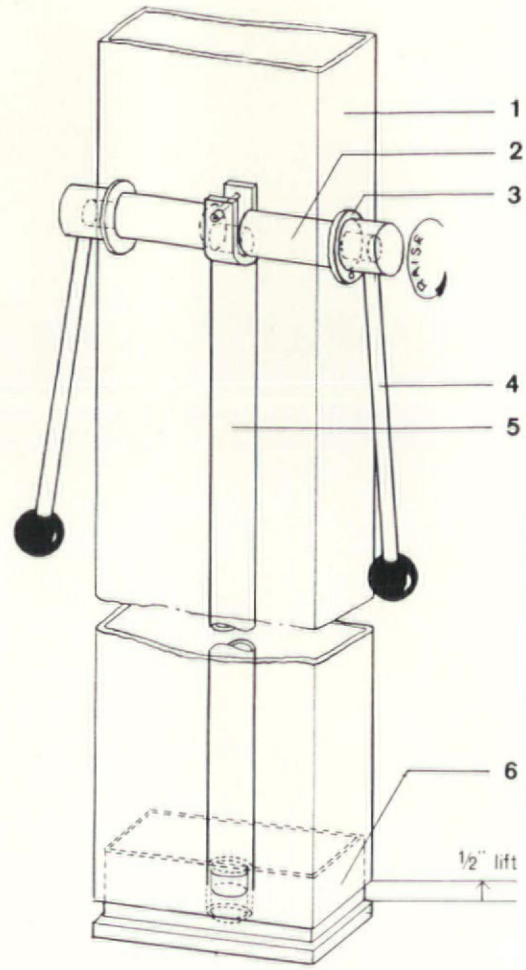


7

Panel type operative partitions

These partitions by Western Sky Industries, will be available in two heights; 10ft and 12ft, including frames. Widths will be in sizes, including frames, of 20ft, 25ft, 35ft and 40ft.

Standard panel widths are 30in and all panels are 3in thick.

Panels move singly or in groups of up to four panels. A group of these panels may be positioned at any point along their line of movement and locked in place without opening the total partitions. This permits their use as partial room dividers or to add additional wall work surface. Each panel contains a mechanical expansion device for acoustical seal at the head and floor, activated by a fixed flush mounted handle or by a removable key, at the district's option. There are no sweep seals.

Each partition contains a swing type pass door approximately 3ft in width. This door is independently hinged to the column supporting the truss. An easy passageway is thus provided between the spaces divided by the operable partition. The pass door is equipped with a latch set.

The basic panel finish is baked-on synthetic modified melamine resin in solid colours. Panels are also available in optional chalk, tack, vinyl and unfinished hardboard surfaces. One such option is a magnetically attractive chalkboard paint.

Panels are available without hangers or hinges in heights up to 10ft for use as room dividers. Weight of panels is approximately 3lb per square foot. Acoustical properties will meet the SCSD specifications, exceeding 28 db loss.

Accordion type operable partitions

The accordion operable wall is basically a Hough Manufacturing Co. model 3500-C modified to fit into a specially designed supporting frame system. It is supplied for two ceiling heights 10ft and 12ft and five room widths: 20ft, 25ft, 30ft, 35ft and 40ft.

The Unispan supporting frame is attached to the structure every 5ft at the points where the frame crosses the grids or grid intersections. The building structure provides lateral support for shear load only and the partition is completely supported by the frame. Sufficient tolerance is allowed between frame and structure to accommodate ceiling deflection up to 2in and to permit demounting and re-erection of the partition system. Attachment at the sides is for acoustic and light opacity purposes only.

The accordion partition operates in a top track which is an integral part of the supporting frame. There are no floor guides or thresholds required. The partitions are furnished as a single unit, stacking to one side of the frame or as a bi-parting pair, one-half stacking at each side of the frame.

The supporting frames on which single partitions are installed are equipped with a cam operated lifting device at the 'latching' column of the partition frame. This device enables the latching end of the complete unit to be raised ½in, thereby reducing the friction drag of the bottom sweep strips of the partition for easier operation. Bi-parting units, because they will be one-half the size and weight, do not require the lifting device to meet the specification requirements of 25lb or less maximum force to move the accordion partition across the opening.

Additional SCSD systems

This category was bid in October 1964. The successful bidder was Educators Manufacturing Company of Tacoma, Washington. Their solution involved a range of casework of modular size, with internal interchangeability of drawers, cupboards, etc. The cases are plastic finished in a range of colours.

Metal storage lockers for general use were bid in October 1964. The successful bidder was Worley and Company of Whittier, California, with a range of lockers in modular sizes.

1
Elevation of sliding folding partition

2
Plan

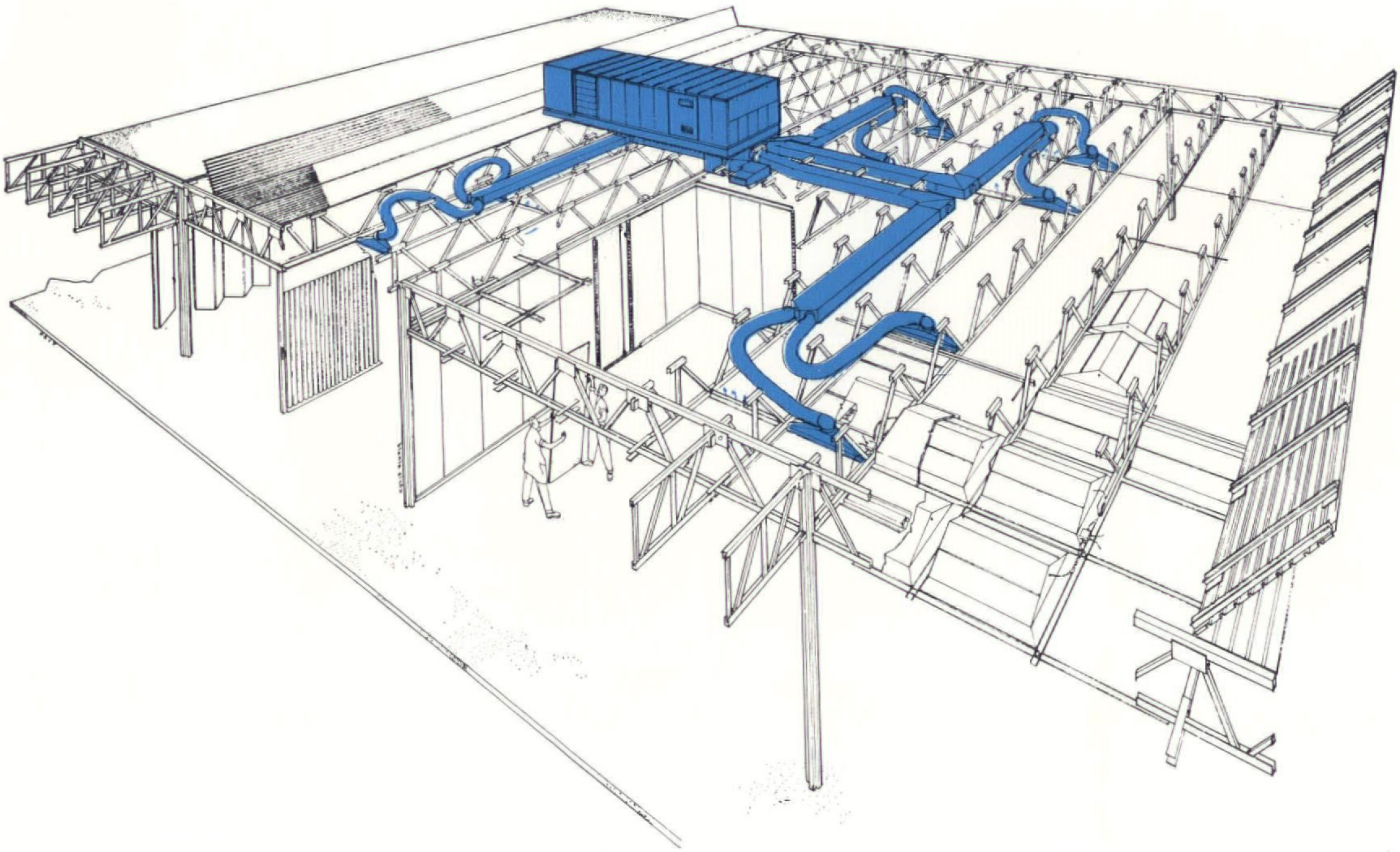
3
Section through sliding folding partition showing normal closed position and with acoustic seals retracted for easy movement

4
Elevation of frame for accordion type partition. It will support the partition with a minimum amount of deflection. The frame is shipped to the site in sections, the largest being not more than 20ft to facilitate handling and relocating

5
Accordion type partition raised by a lifting device for easy movement

6
Partition in normal position

7
Lift device detail
1 column
2 crank shaft
3 bearing collar
4 operating lever
5 lift shaft
6 base plate



1

Prototype

As part of the development programme, the manufacturers had committed themselves in their bid to supply equipment and a sum of money for a small mock-up or prototype building on the Stanford campus.

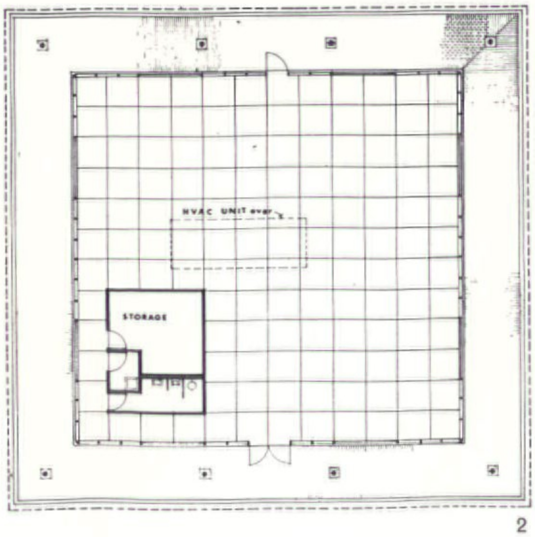
The mock-up building is intended as a check on the components before their details are finalized for production; a building wherein the environmental standards can be tested against those required by the performance specifications, and as a general demonstration of the SCSD system. The design attempts to show the systems in as pure a form as possible, and to minimize extraneous architectural expressionism. For this reason, the exterior wall is a complete curtain of very delicate design, though this will not be typical of the project schools. The curtain wall mullions are designed to receive the Hauserman panel face, and thus the glass wall can be made opaque as desired by a room arrangement, and the opaque portions of an exterior wall match the interior wall. This is a specially designed curtainwall for the mock-up building and is not part of the SCSD system.

The building has an enclosed area of 3600ft² (one Mechanical Service Module) and a roof area of 6400ft². The structure spans 70ft clear, and the interior is clear space except for a 15ft × 20ft storage and toilet area. Shear bracing is by exposed cross bracing which is chromium-plated. The curtainwall is aluminium with grey glass glazed into extruded neoprene gaskets.

The building is located on the Stanford University campus, in a grove of eucalyptus trees adjoining the corporation yard.

The testing procedures call for many different interior layouts to test out partitions, lighting-ceiling characteristics, air conditioning and acoustics. The building is available for test and demonstration purposes for two years, after which it reverts to the University for use as an office building. The test layouts involve extensive partition and ceiling re-arrangements, and zoning changes in the air conditioning system. The building was built by a general contractor, under procedures exactly simulating those under which the project schools will be built in 1965–67.

The mock-up building was designed by the SCSD staff, using their consultants.



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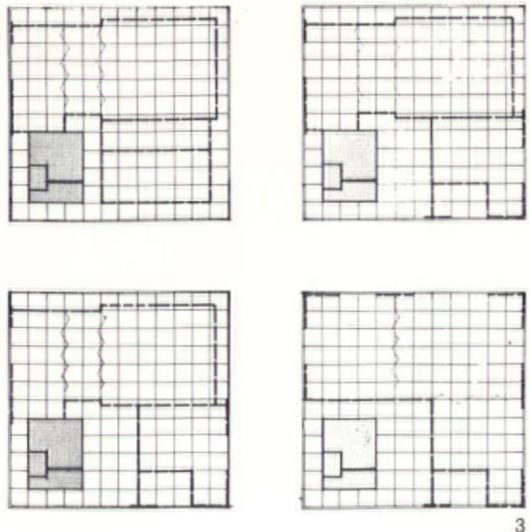
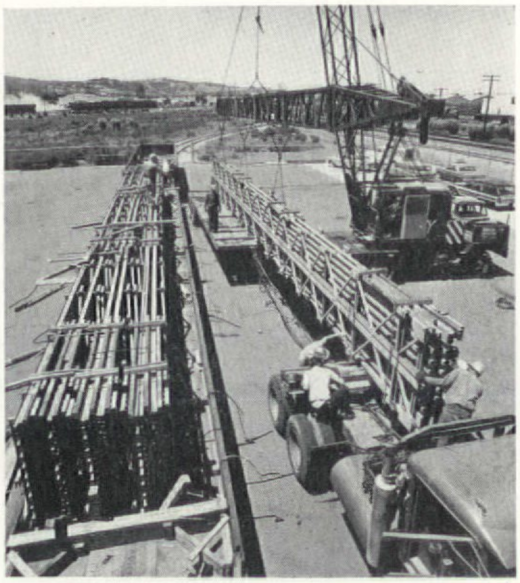


3

1
Diagram showing the integration of all the subsidiary elements of the SCSD system in a prototype building. The cabinets, furniture and lockers which are also part of the system are not shown

2
Floor plan of the prototype with all demountable partition elements omitted

3
Alternative arrangements of demountable partitions, with varying lighting, air conditioning and acoustic conditions. Only the toilet and storage area has remained fixed



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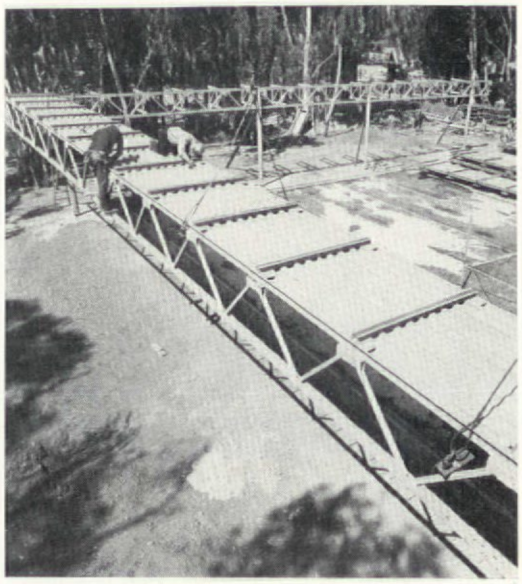


2

1
Folded truss deck sections arrive by railroad flatcar and are transferred to truck for transport to the site. Each unit is 70ft long and 5ft wide

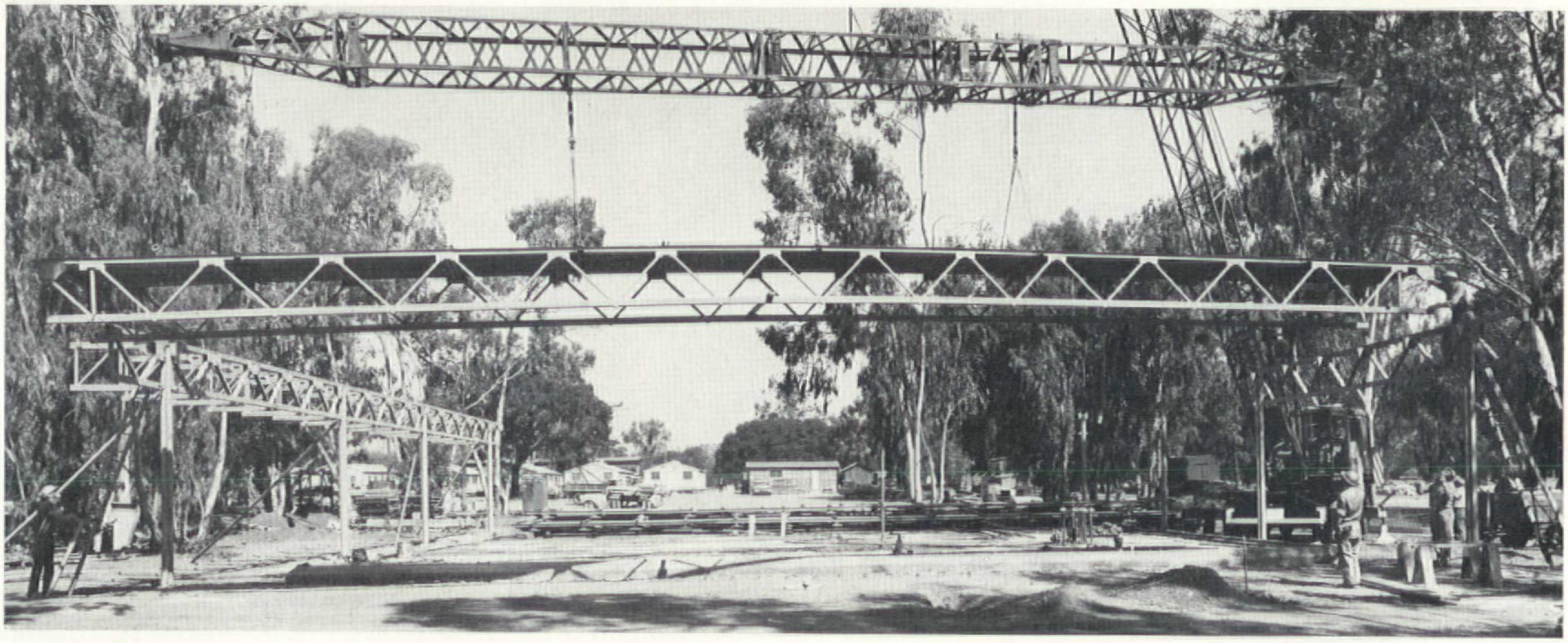
2
Deck units are unfolded manually to form trusses, which are then erected with one 5ft wide deck section still unfolded, by crane

3
A 70ft truss deck unit being placed in position. The cantilevers to the primary beam seen in position on the right have slot joints which are welded after assembly

4
The final truss deck sections being lowered into position. The hinged deck units are still folded back

5
Hinged deck sections being flipped into position to complete the roof deck, which is finally welded for stability

Photos: 1, 2, 3 & 4 R. Partridge; 5 P. Kastl



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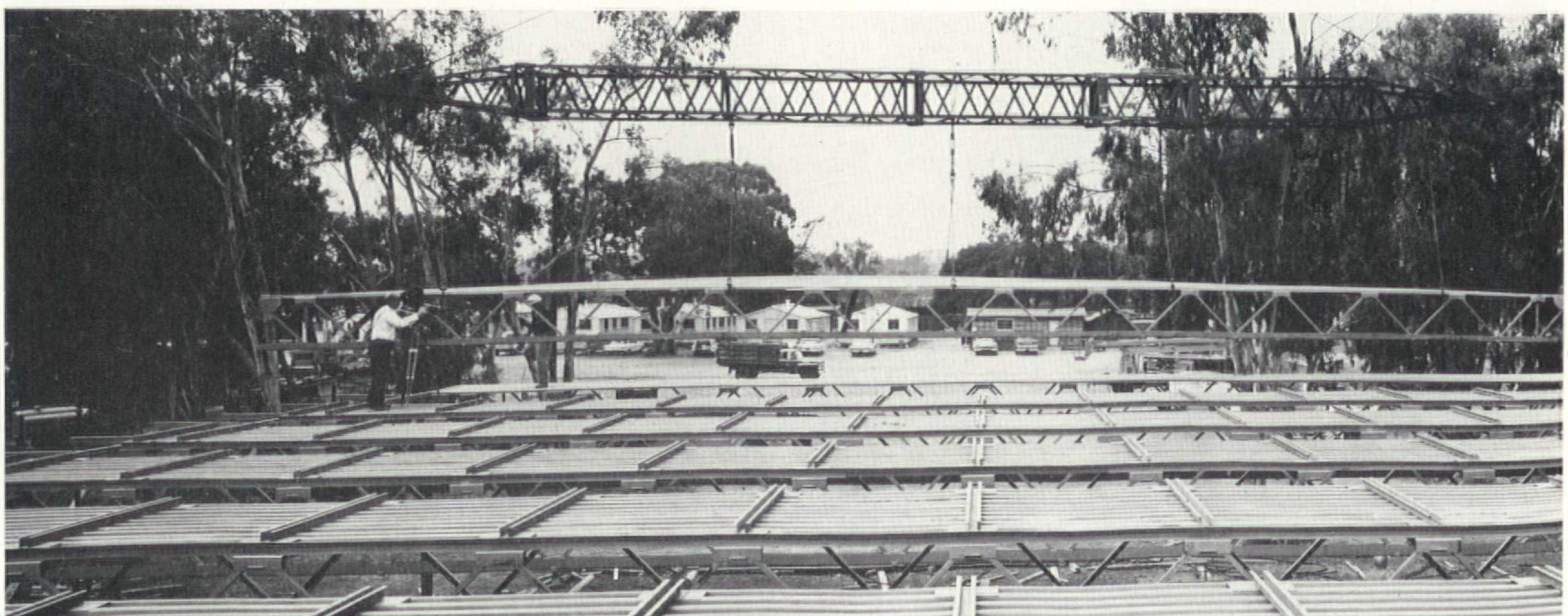

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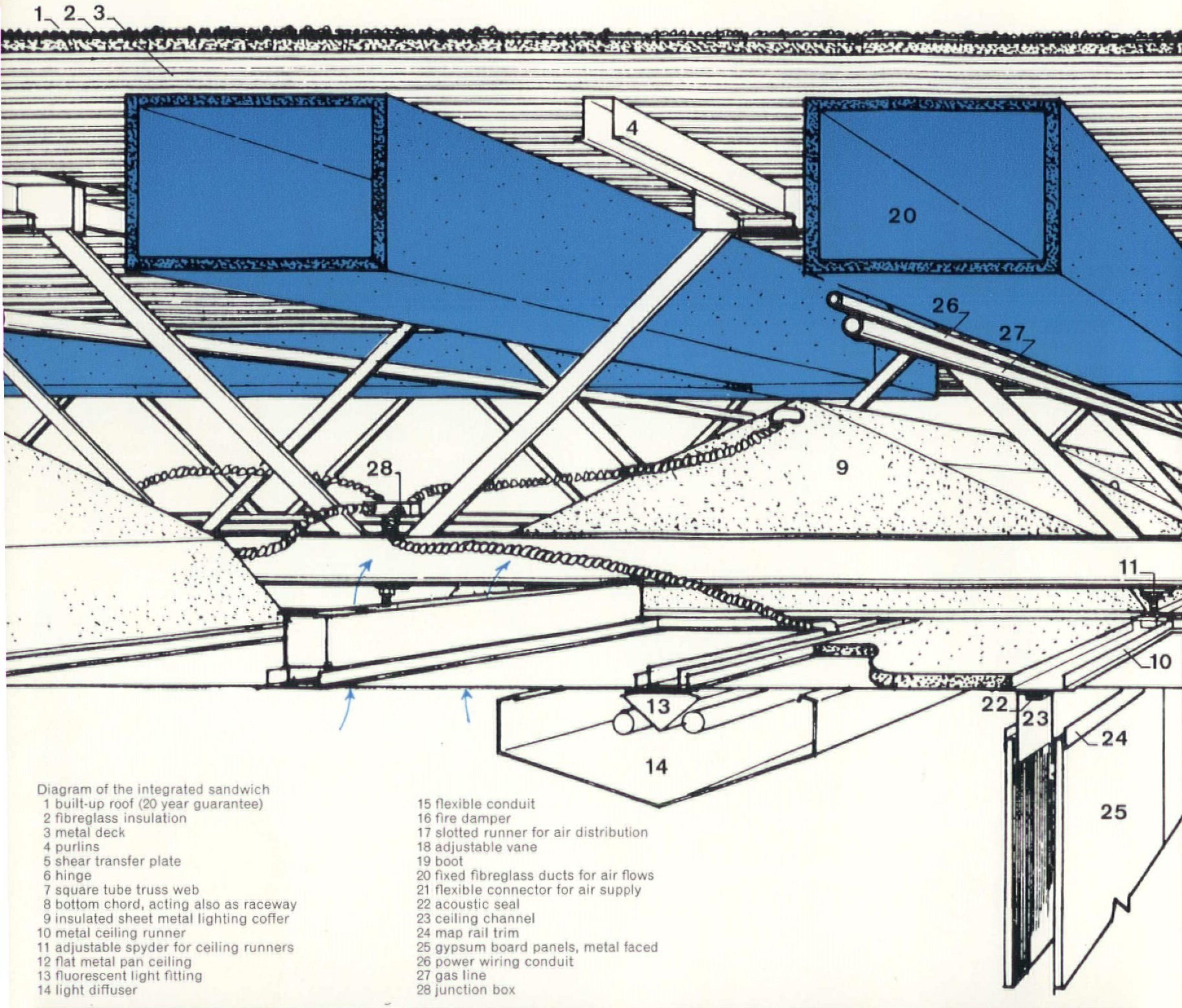
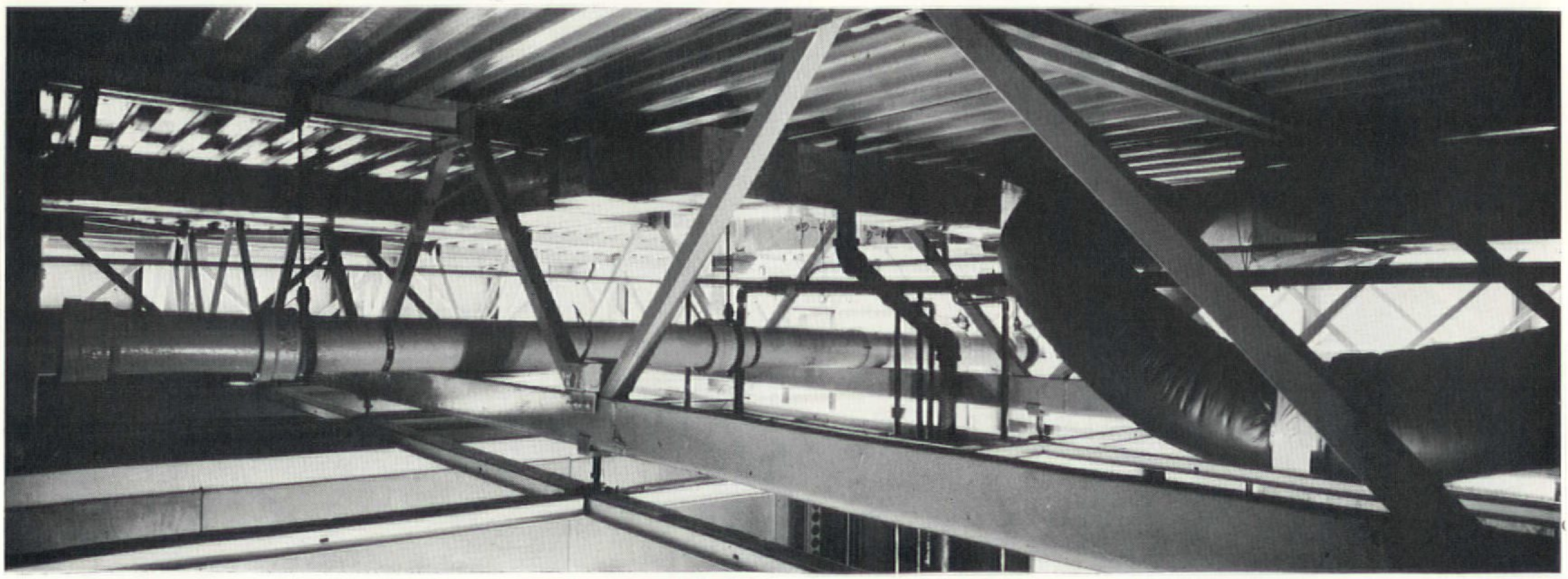


Diagram of the integrated sandwich
1 built-up roof (20 year guarantee)
2 fibreglass insulation
3 metal deck
4 purlins
5 shear transfer plate
6 hinge
7 square tube truss web
8 bottom chord, acting also as raceway
9 insulated sheet metal lighting coffer
10 metal ceiling runner
11 adjustable spyder for ceiling runners
12 flat metal pan ceiling
13 fluorescent light fitting
14 light diffuser
15 flexible conduit
16 fire damper
17 slotted runner for air distribution
18 adjustable vane
19 boot
20 fixed fibreglass ducts for air flows
21 flexible connector for air supply
22 acoustic seal
23 ceiling channel
24 map rail trim
25 gypsum board panels, metal faced
26 power wiring conduit
27 gas line
28 junction box



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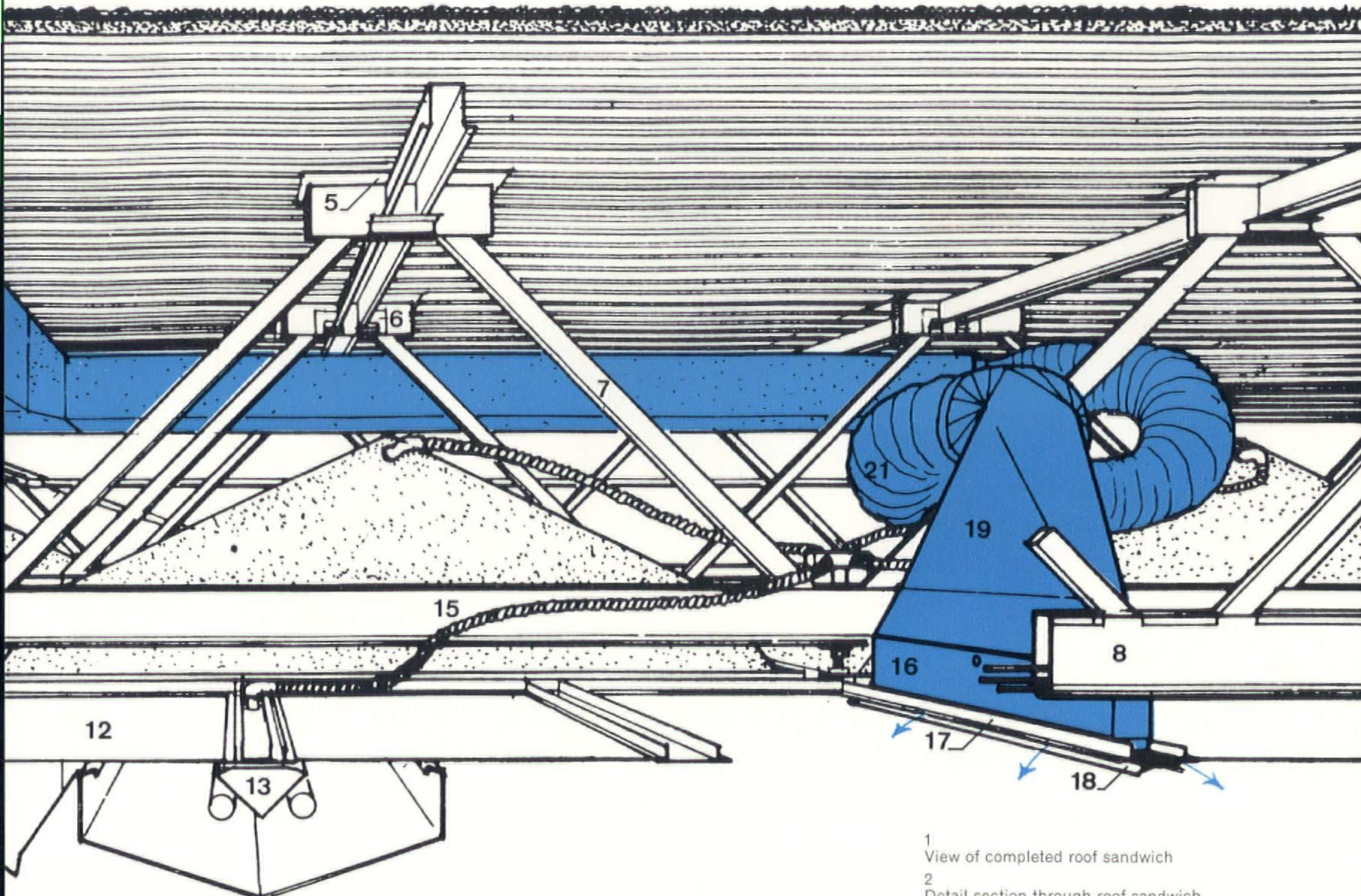
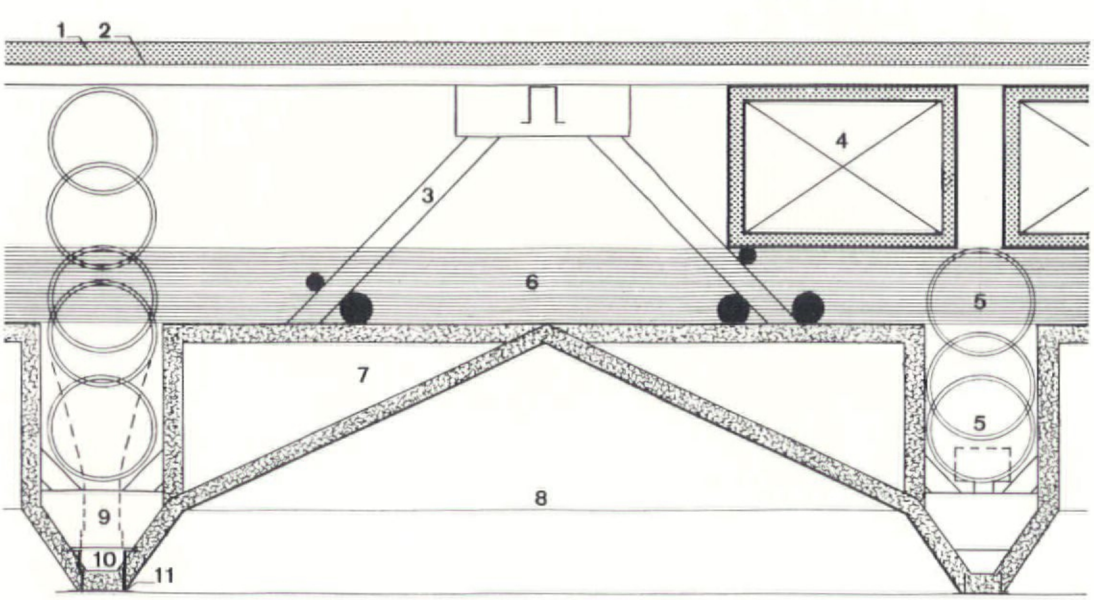


1
View of completed roof sandwich

2
Detail section through roof sandwich
1 insulation
2 steel deck
3 lattice girder
4 rigid duct, 9in × 13½in
5 flexible duct, 9in dia.
6 service freeway
7 fireproofing insulation
8 lighting coffer
9 connector
10 air diffuser
11 ceiling runner

3
Electrical conduits rising from the service core into the service 'freeway' in the roof sandwich

Photos: 1 & 3 R. Partridge



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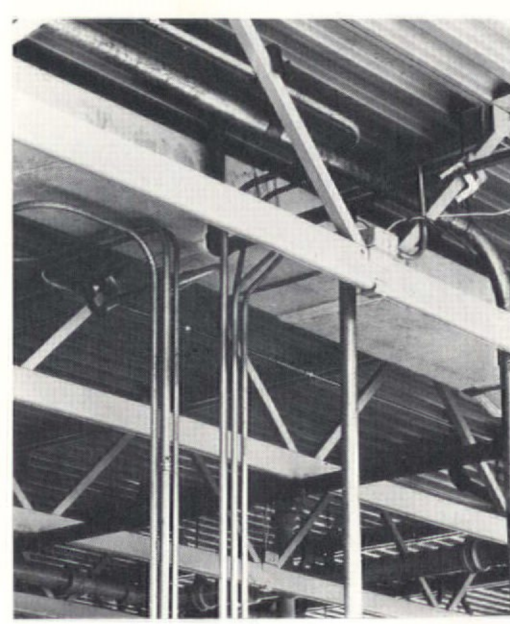


3

1

Conclusions

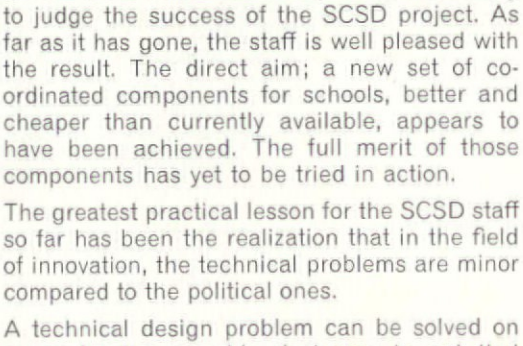
On the more immediate level, it is still too early to judge the success of the SCSD project. As far as it has gone, the staff is well pleased with the result. The direct aim; a new set of co-ordinated components for schools, better and cheaper than currently available, appears to have been achieved. The full merit of those components has yet to be tried in action.

The greatest practical lesson for the SCSD staff so far has been the realization that in the field of innovation, the technical problems are minor compared to the political ones.

A technical design problem can be solved on paper by one capable designer; to get that solution built on a job site may demand hours of negotiation with marketing managers, production engineers, lawyers, professional associations, trade associations, union officials, individual architects, engineers, contractors and job supervisors, and finally the understanding and cooperation of the mechanic on the job. Reluctance, lack of understanding, conservatism, or laziness on the part of any of these persons may consign a brilliant technical detail to oblivion. Such major difficulties as SCSD has encountered have all been in the political area. The most serious of these was a lawsuit following the award of the Interior Partition contract in January 1964 to E. F. Hauserman Company, the second low bidder, because in the judgment of SCSD and its consultants, the low bidder did not meet the specifications. The low bidder sued the First California Commission on the primary grounds that the specifications were inadequate and unfair. This represented an attack on the performance specification approach and a most serious threat to the whole project basis. After some months of litigation and a three-week court hearing, the case was decided in the project's favour.

SCSD is an experiment in architecture on a very broad scale involving people and procedures in a way in which the profession of architecture has not in the past had very much experience. It is our belief that if the profession of architecture is to survive as an active and productive contributor to society, rather than as a quaint anachronism, then some of the working directions indicated by SCSD must be developed by the profession. SCSD is involved at a managerial level with manufacturers in the building industry, it has influenced the thinking, acting and spending of these officers profoundly, and in so doing it has developed methods of communication of the greatest value. The communication systems between client and manufacturer, the technique of the pre-sold market combined with the performance specification, the mandatory integration of manufacturer's work at design time, the procedures which allow time for development work and which insist on it, the idea of a client-and-architect-controlled prototype structure, these are all ideas which came like a chill but welcome blast of air to the enterprising manufacturers who involved themselves in SCSD. Tentative attempts at some of these procedures in isolation cannot have the force of the deeply thought out and well financed programme which SCSD represents. Final cost of SCSD to the Ford Foundation will be about \$500,000; the probable cost savings to the districts will be about \$3 million. If the Foundation were a profit-making business, SCSD would have been a good investment.

But SCSD sees itself primarily as an architectural experiment and as such should be judged on the merits of the buildings which arise from it. On this score the significant step is contained in the intent of the performance specifications. This intent is the recognition in architecture of a building as a dynamic event. The rate of change of institutions has increased rapidly and the building industry is in a position to build in a way that reflects the realities of modern life.



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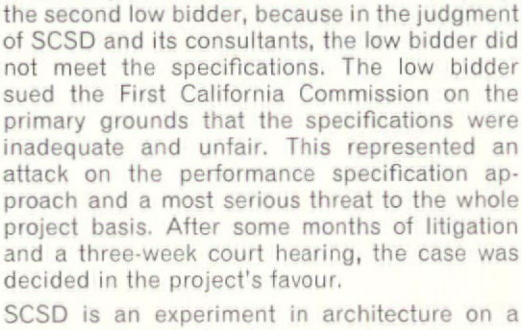


3

1
Completed prototype. The roof is entirely supported by eight columns and all walls other than the main plumbing walls are demountable. The black painted metal fascia masking the 3ft deep trusses and the aluminium curtain wall were specially designed and are not part of the SCSD system. The curtain wall incorporates a horizontal channel at the head which can slide vertically to allow a 2in structural deflection

2
Detail of the curtain wall cross-bracing with chromium plated rods and specially designed turn-buckles

3
Interior view showing direct and indirect lighting systems, slot diffusers, partitions and the accordion and sliding-folding doors. The supporting frames of these doors are independent of the building structure

Photos: R. Partridge

Industrialized building studies at the HfG, Ulm

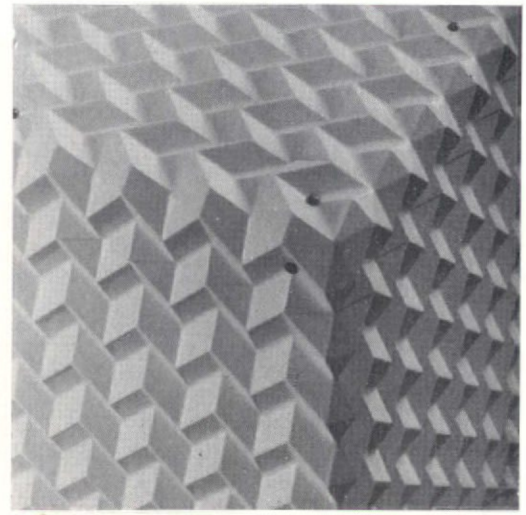
Plastic wall sheath

Hebert Ohl, Bernd Meurer, Günter Schmitz

All photos Hochschüle für Gestaltung, Ulm

1
Junction detail of Hostalit-Z panels
2
Development diagrams
3, 4 & 5
Variations in the appearance of the panel created simply by changing the angle of lighting

The task was to design a continuous, homogeneous, single-layer skin-surface for buildings of all kinds and all degrees of complexity using the thermoplastic material Hostalit-Z. A particular difficulty was the extreme expansion and contraction of this material and its low stability. In addition, the panels were to be capable of combination—in any direction—to make a static homogeneous skin structure. The folding principle, with its capacity for compression and multi-directional movement allows for great heat expansion. The folds contribute also to the stiffening of the surface of each panel, and of the connections between the panels (which are lapped) and thus to the stiffening of the whole surface. The folding ensures that the joints are secure in any direction and in any position. The construction-principle can be used for other materials such as metal or paper.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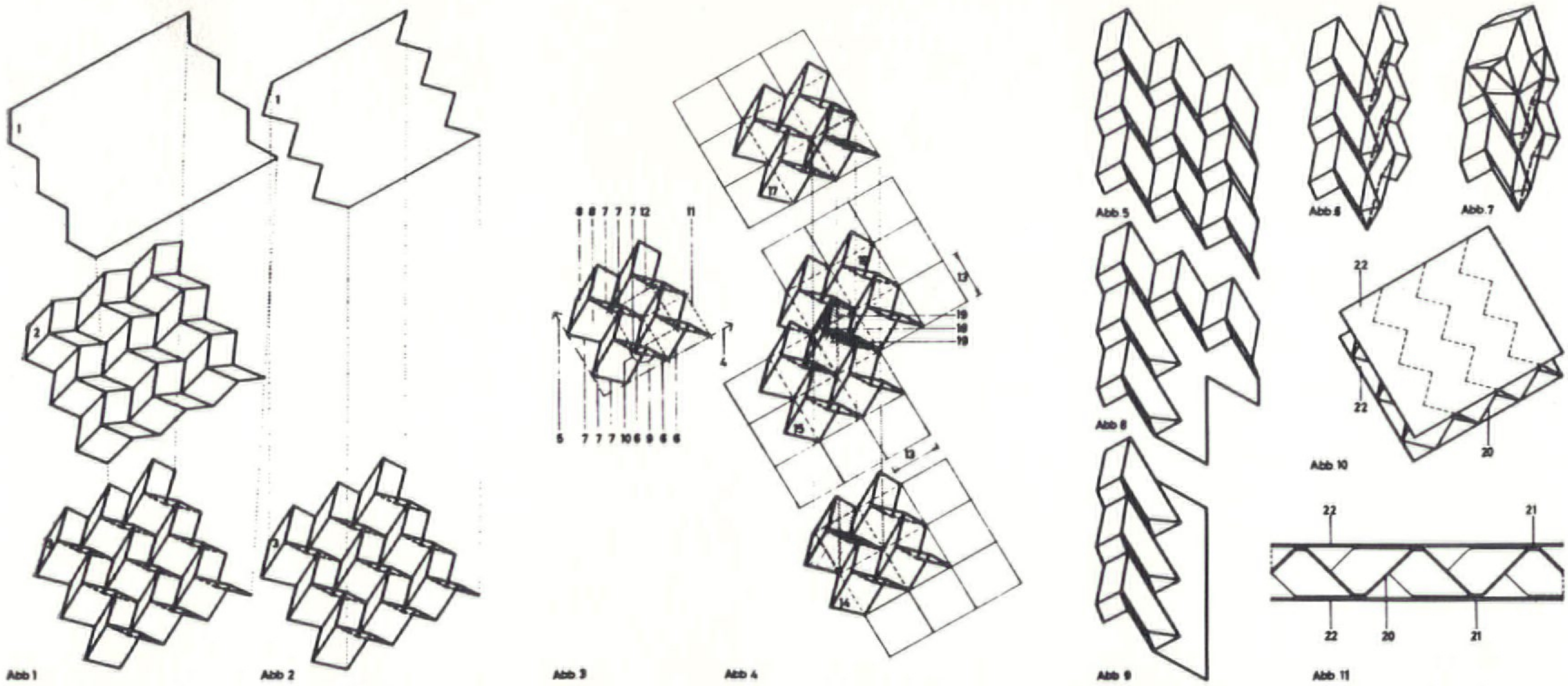

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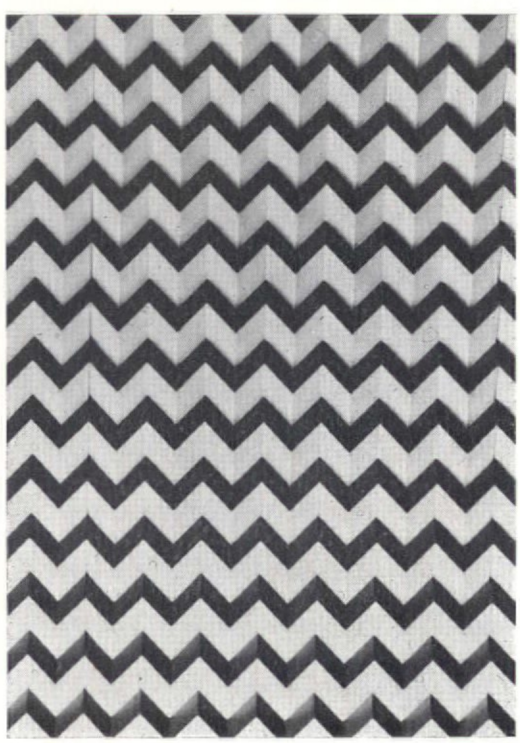
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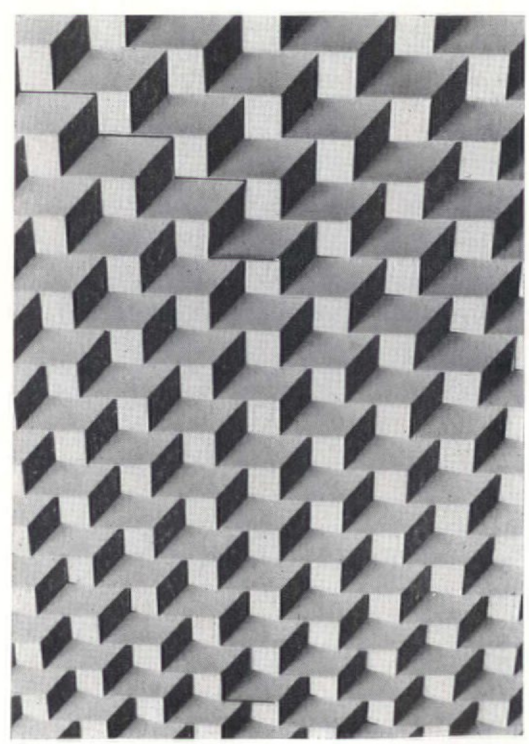
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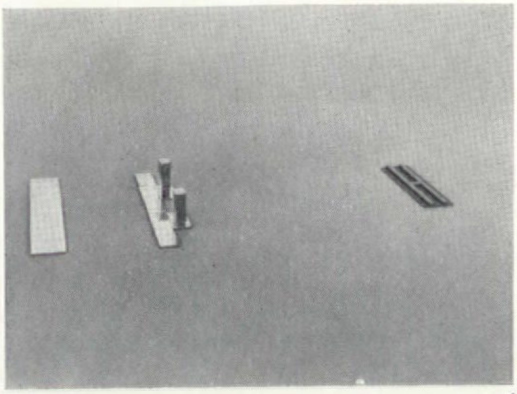
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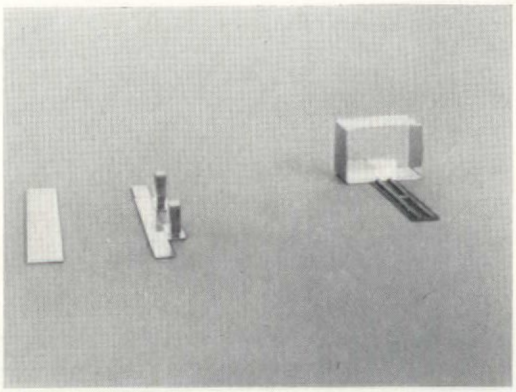
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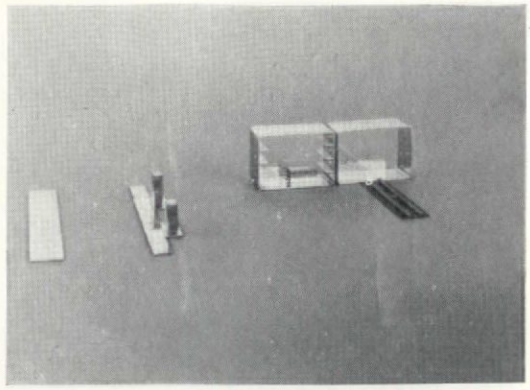
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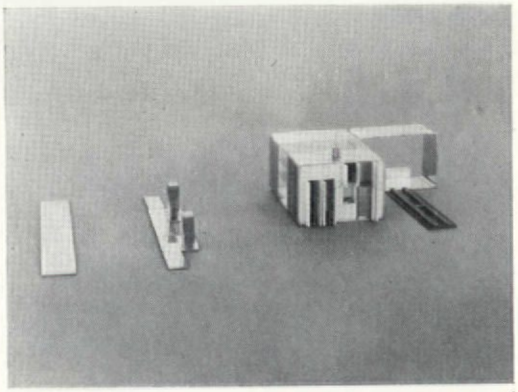
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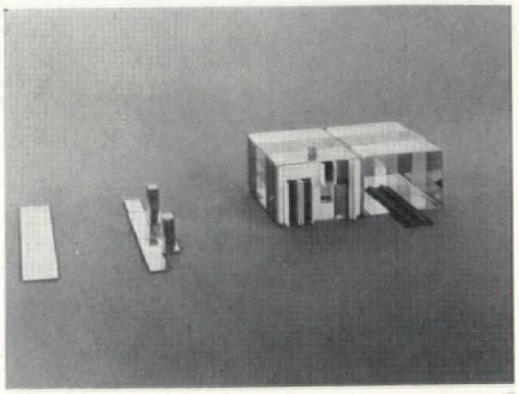
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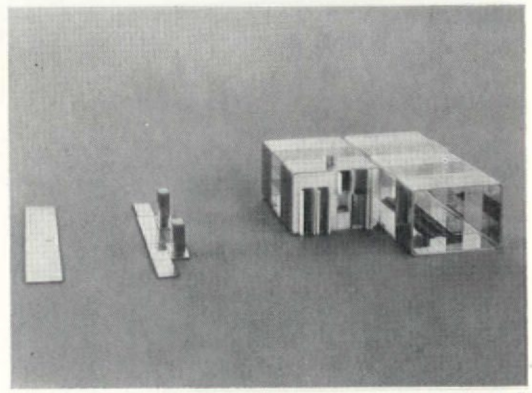
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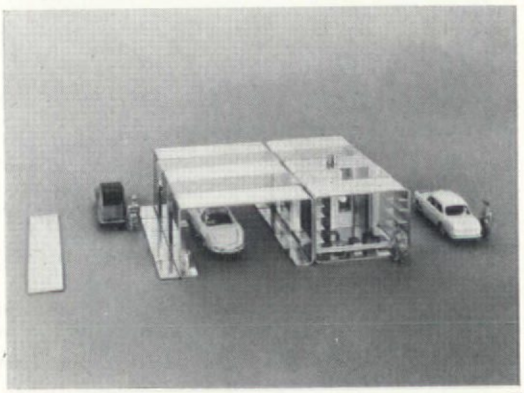
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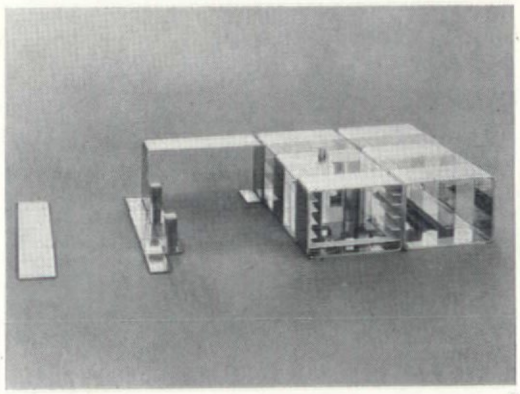
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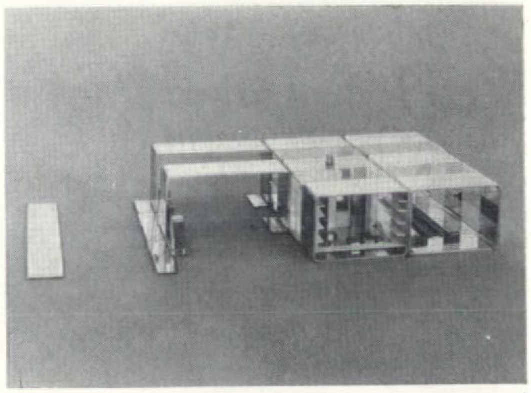
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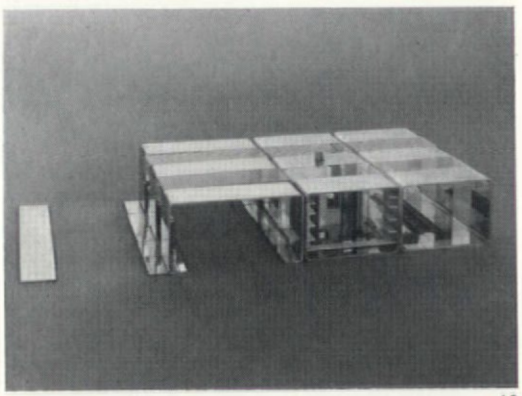
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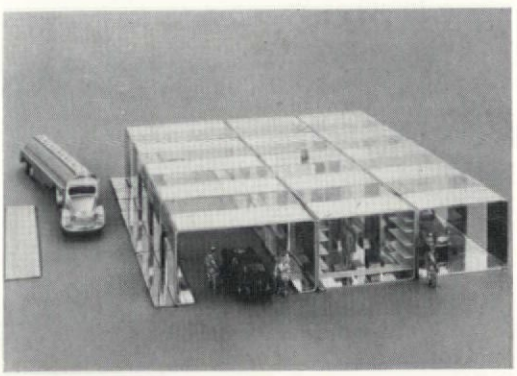
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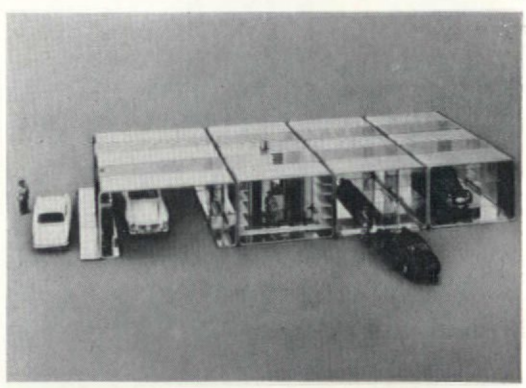
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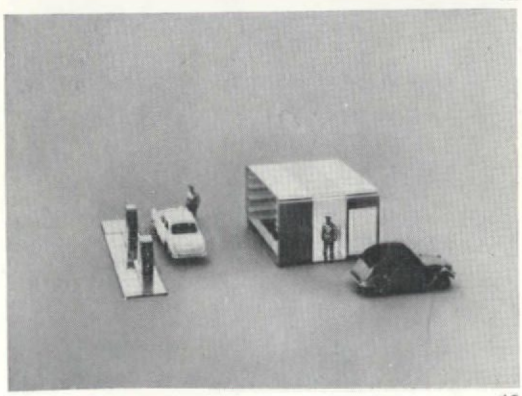
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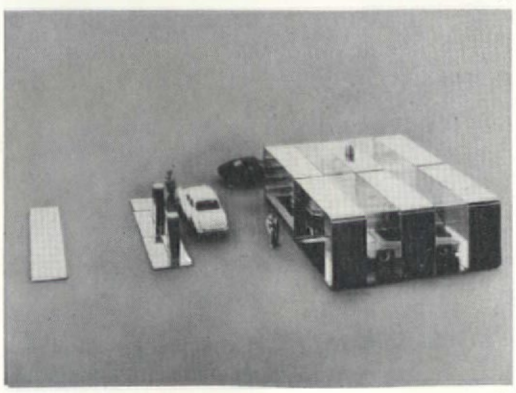
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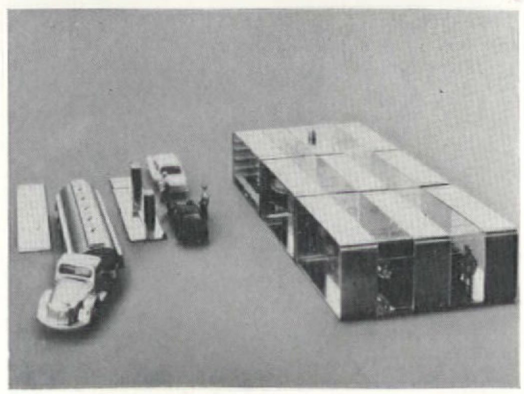
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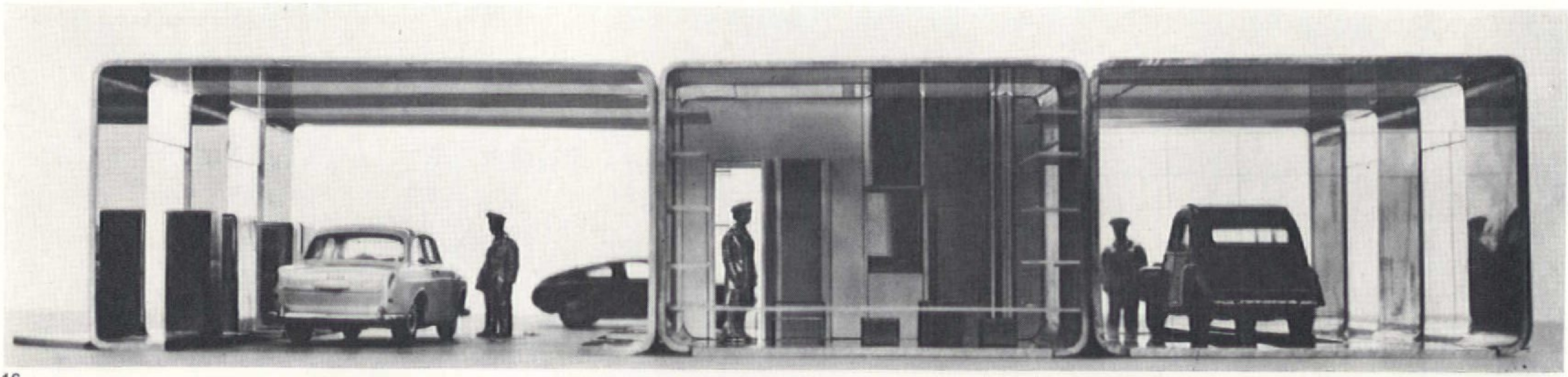

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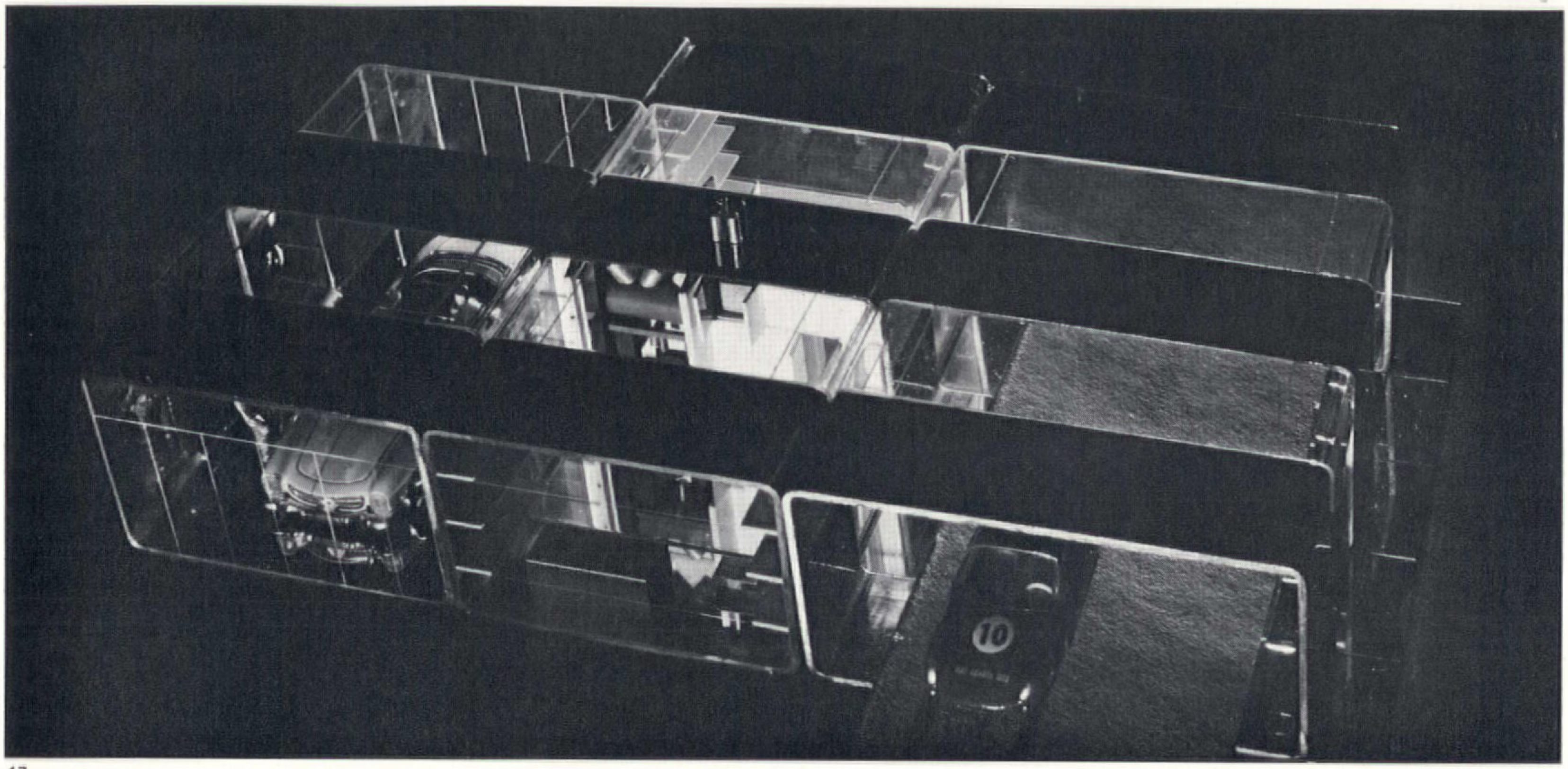

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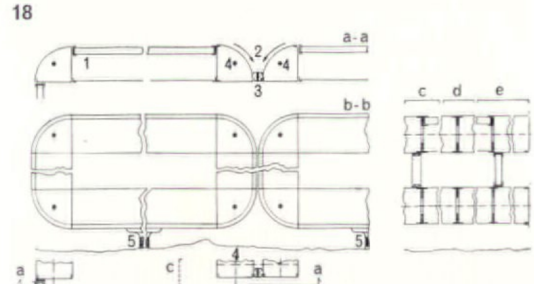


Filling and service station

Herbert Ohl, Bernd Meurer

The aim was to develop a system of standard units for petrol filling stations. Industrially manufactured, standardized elements were to be used. The design was worked out with the folowing criteria in view: optimum utilization of the ground area and of the possibilities of access to roads, rational staff organization, and the most favourable arrangement of the installations with respect to revenue, service and adaptability.

In order to keep the ground cost low, the side of the site adjacent to the road was to be as short as possible. The length of this side was determined by the length of the stopping places situated at the filling points parallel to the street, by the length of the entry and exit to these, and by the visibility of the installation with respect to attracting custom. The servicing rooms for washing, greasing, etc., had to be planned as drive-through rooms parallel to the filling installations. Undisturbed flow of the traffic within the area of the filling station was thereby attained. This arrangement is suitable for sites which adjoin the street on one or two sides or which lie diagonal or parallel to the street. The elements were so organized that with filling stations of all sizes the arrangement of the rooms could remain essentially the same. As the technical and sanitary installations are situated in the centre they are accessible from all other rooms. All installations can be combined in one unit. There is also unobstructed vision from the servicing room through the store room and customers' waiting room to the tank installations.

The buildings are made up of sections of light sandwich constructions, each one the width of a room. The individual room units are fitted out in the factory with all furnishings, installations, machines and necessary appliances. No further finishing work is required at the building site. For the assembly, only a prepared subsoil together with supply-line and sewage connections are required.

Transparent panels are fitted between solid units to admit daylight at all points, and light points are incorporated within the panels to make day and night conditions similar. All doors and openings occur in the transparent sections.

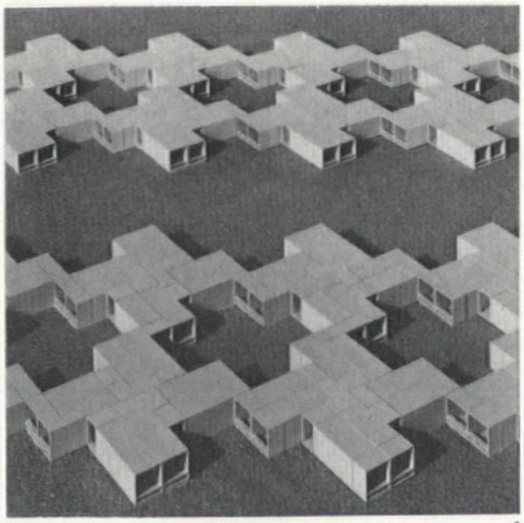
1–12
Sequence, showing how a filling and service station can be built up with basic prefabricated units

13–15
A similar growth sequence with the units set parallel to the traffic flow

16
View of the model of the service station

17
Night view of the proposed station showing glazed roofing panels between prefabricated sections

18
Junction details between units
1 glazing
2 rainwater channel
3 neoprene gasket
4 bracing rods
5 pipe foundations



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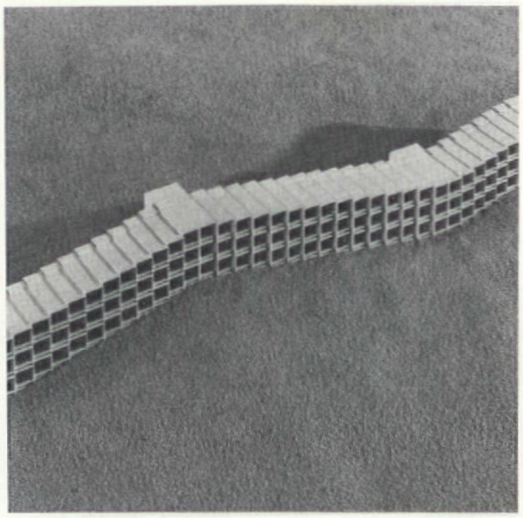

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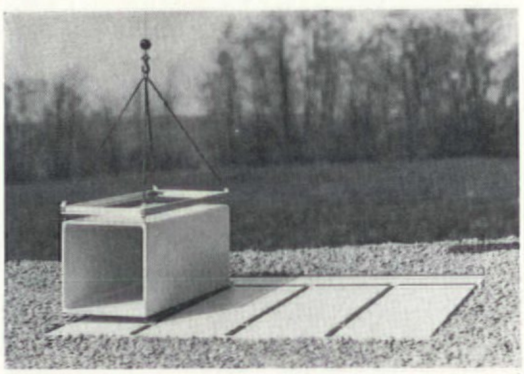
1 & 2
Suggested arrangement of the single housing units, showing patio type housing and a three-storey range. Buildings up to 10 floors can be erected by this method

3, 4, 5, 6, 7 & 8
Erection sequence with model units

9, 10 & 11
Model of an individual unit made of transparent plastic to show how it could be fitted up to provide a student's bedroom



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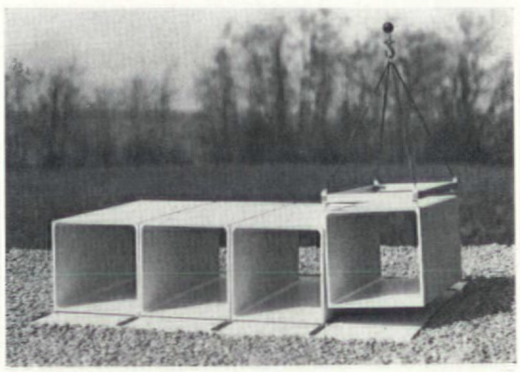

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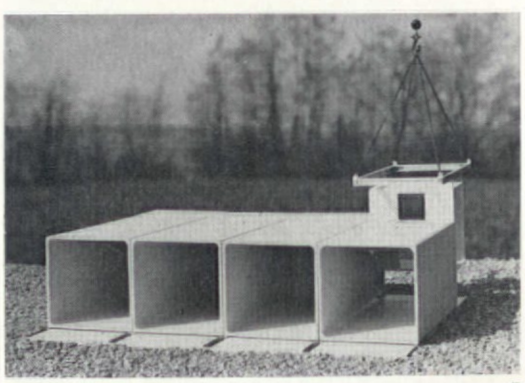

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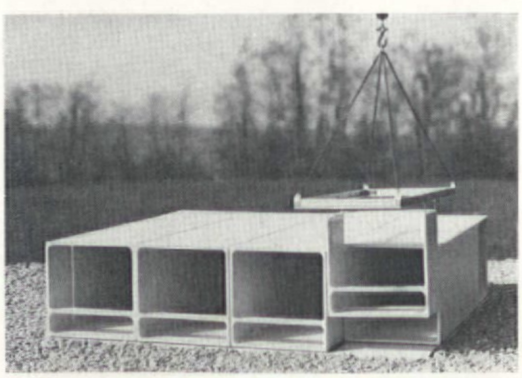

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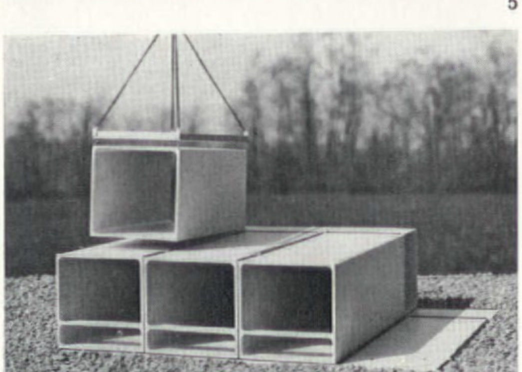

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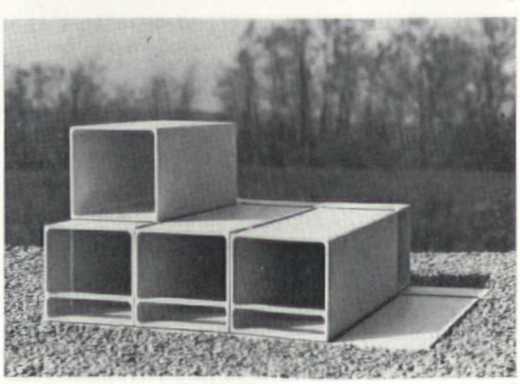

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Cellular structural unit

A study for industrialized building

Industrialized buildings have, for the most part, been designed as component posts, beams and panels. Reliance is usually placed on traditional means of reinforcement, when these are concrete structures, which has involved heavy concrete work that is difficult to transport and handle.

The problem, in the case of Ireland for which this study was first done, was to devise a system of industrialized building which, due to its ease of transportation and flexibility, could be adapted for production not only on the home market (with its limited demand), but for export.

The existence of a long-established cement industry in Ireland, as well as the existence of high-grade aggregates and sand, produced in abundant quantities and at economic prices has conditioned the use of concrete.

The structural unit devised is in the form of an extruded concrete tube, rectangular in section, capable of being lifted by a crane directly onto a truck, and delivered to the site complete with all built-in internal fittings. It is set on a cushion of hardened rubber strips placed freely on a concrete slab or strip foundations or even a sand bed. All openings for doors, windows and pipework are made during the initial casting and sitework, therefore, consists only in the joining up of pipes if the units are placed in series or above one another. No jointing is required as between one unit and the next, nor are they fixed together, the weight of the units being sufficient to stabilize them.

The outer surfaces may be covered by a suitable insulating and weathering material (rendering, plastic sheeting, asbestos or ceramic tiling, mosaic, etc.); this work would normally be carried out in the factory, only bonding between the units need be done on the site.

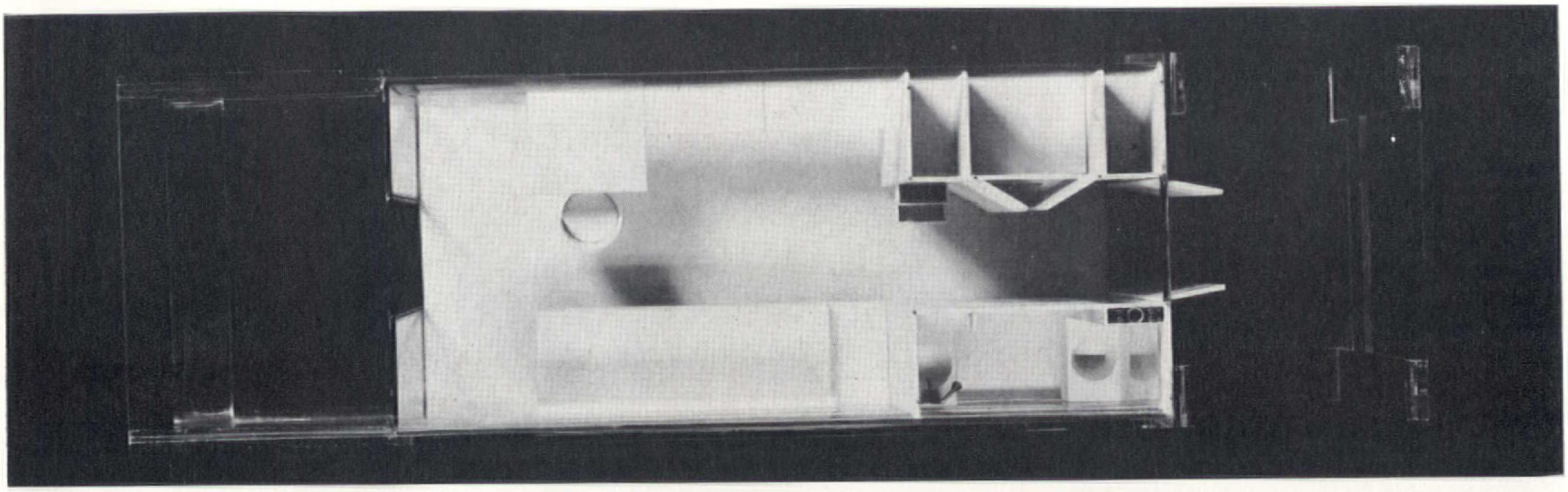
The system may be used to produce a wide variety of buildings, from uninsulated pig-styes, barns and stores to fully insulated and finished off dwelling units.

Dimensions of prototype: thickness of shell, $2\frac{1}{2}$in; external dimension of main unit, 16ft 3in, 8ft $1\frac{1}{2}$in, 8ft $1\frac{1}{2}$in; external dimension of balcony unit, 8ft $1\frac{1}{2}$in, 8ft $1\frac{1}{2}$in, 5ft 4in; external dimension of corridor unit, 8ft $1\frac{1}{2}$in, 8ft $1\frac{1}{2}$in, 5ft 4in; weight: main unit, 5 tons; balcony unit, 2 tons; corridor unit, 2 tons.

The shells of the three separate units, of which the total structural unit is made up, are cast in a vertical position. The formwork is of metal or timber. The amount of plant or equipment necessary for the operation is small. Most of the work, moreover, can be carried out in the open.

Conduits for wiring, pipe runs and ducts are cast into the shell during the initial stage of manufacture.

Thereafter the shells are moved to the assembly plant for internal fitting and external finishing. The shells are hoisted by cranes, the cables being threaded through hooks which are screwed into dowels that are cast into the concrete. Ultimately the hooks are unscrewed and the dowel holes filled in.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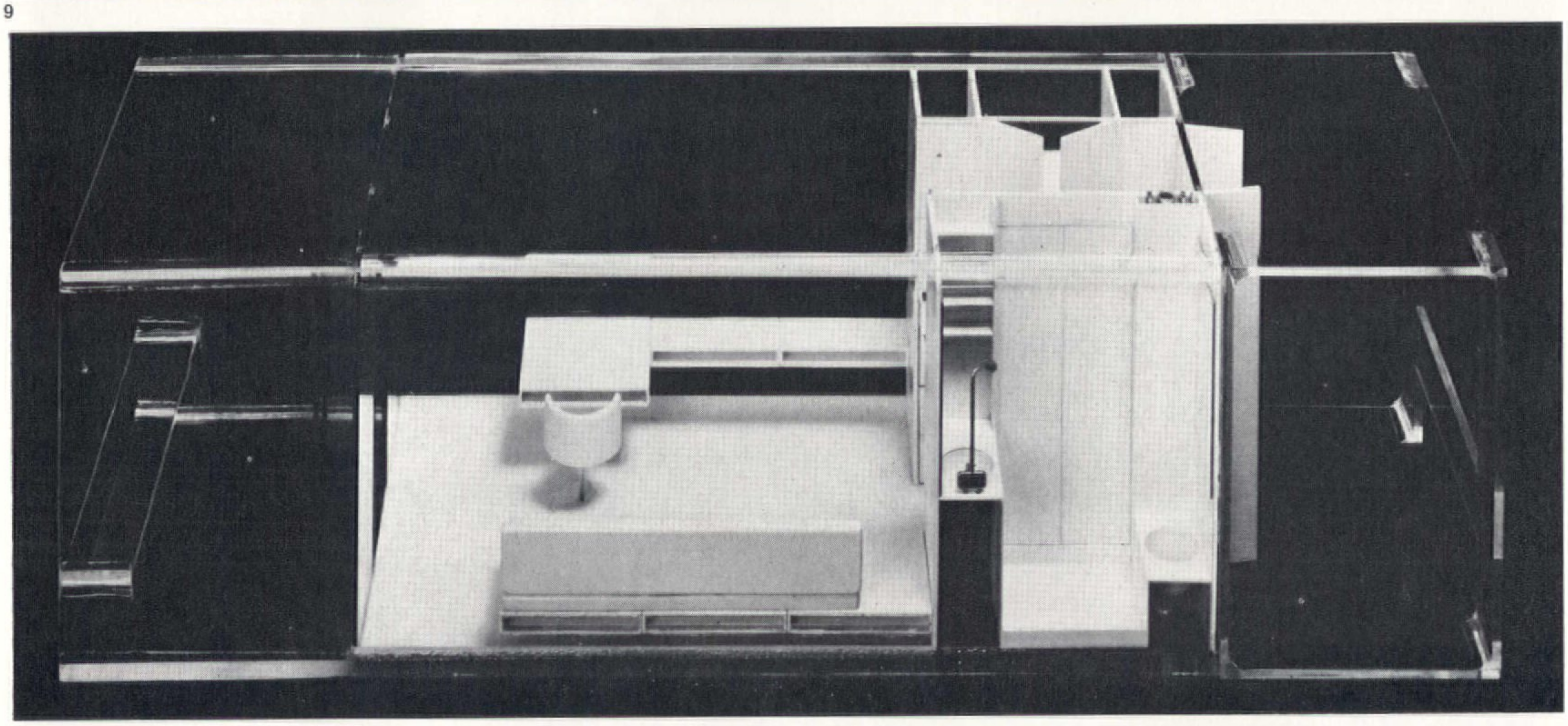
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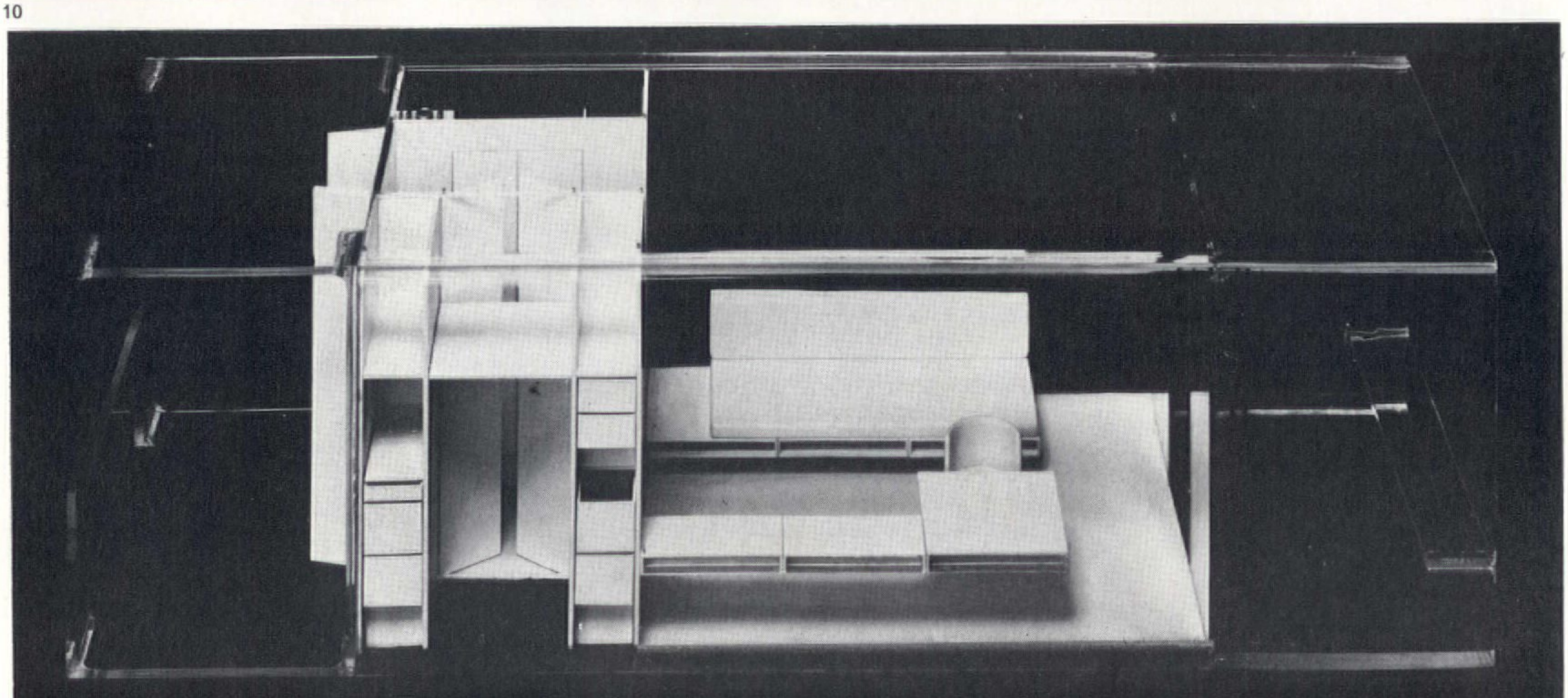
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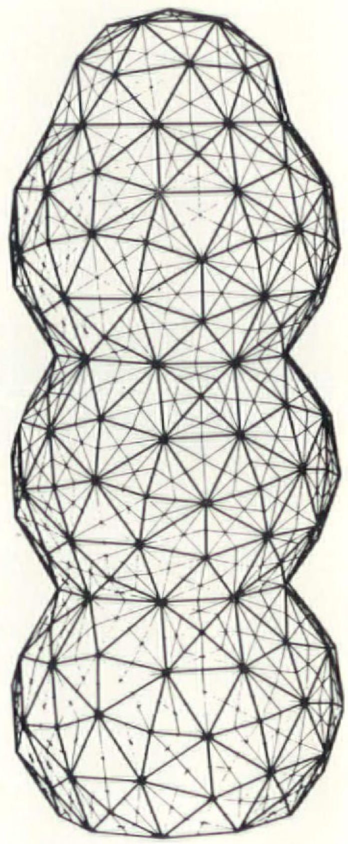
Geodesic variations

Günther Günschel

Pursuing themes adumbrated by Buckminster Fuller and Makowski, Günther Günschel has recently studied the possibility of setting geodetic systems of similar linear and surface dimensions across spaces of equal or dissimilar diameter.

He chose as the basis for his study such regular bodies as icosahedra, dodecahedra and hexahedra, that is, bodies that have a centre from which all angles and limiting surfaces are equidistant and can therefore be described by a sphere. By altering the number of planes and angles and removing panels from the outer edges various regular figures have been derived which are linked together to build up a seemingly endless variety of forms. Though all, of course, have the basic discipline and all the limitations of the well-known geodesic dome. Following on these studies Günther Günschel has given the idea of dome-formed buildings a new twist in suggesting how the dome might be treated not as a finite and complete object, but simply as a component in a multi-storey structure.



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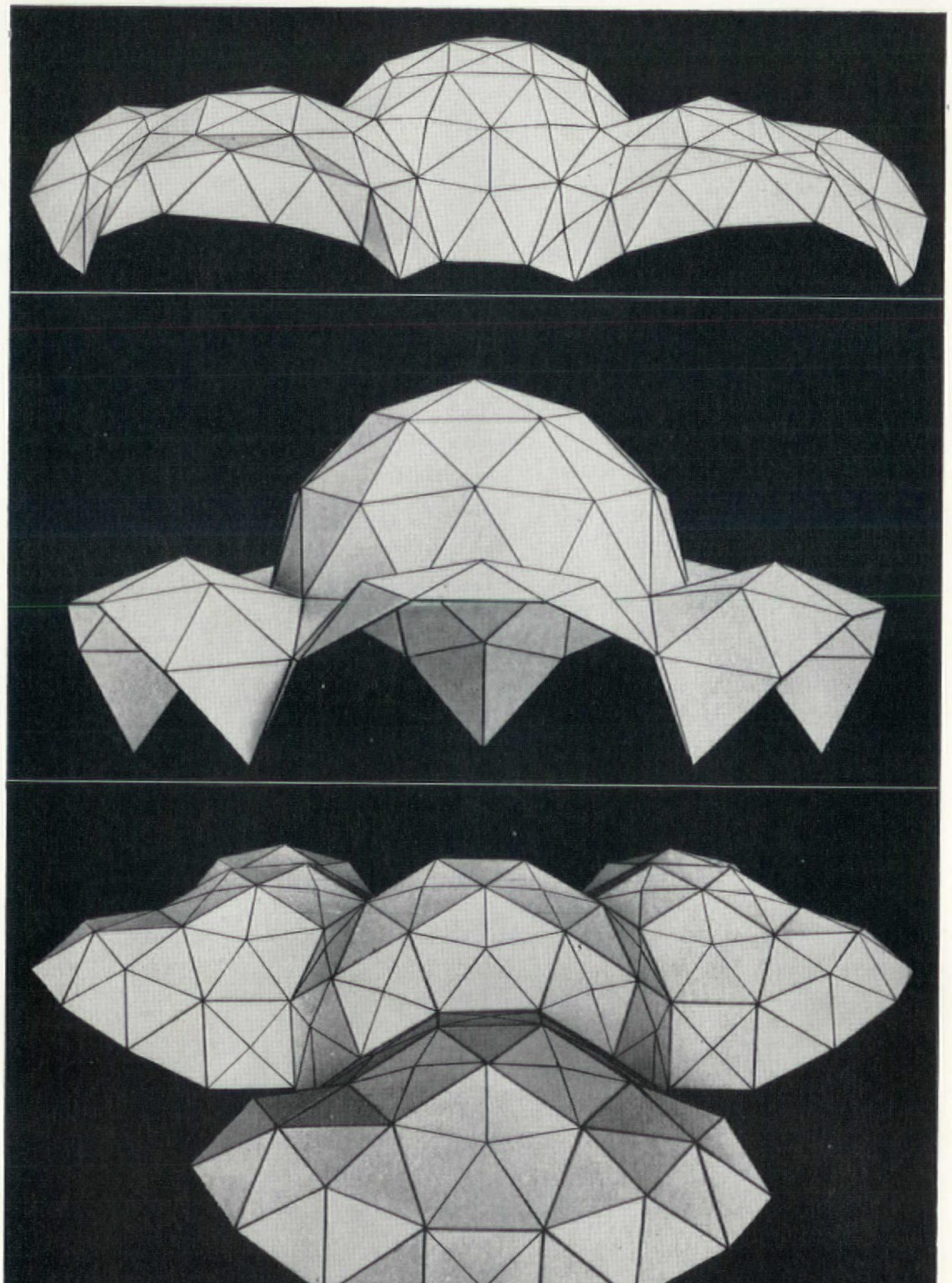

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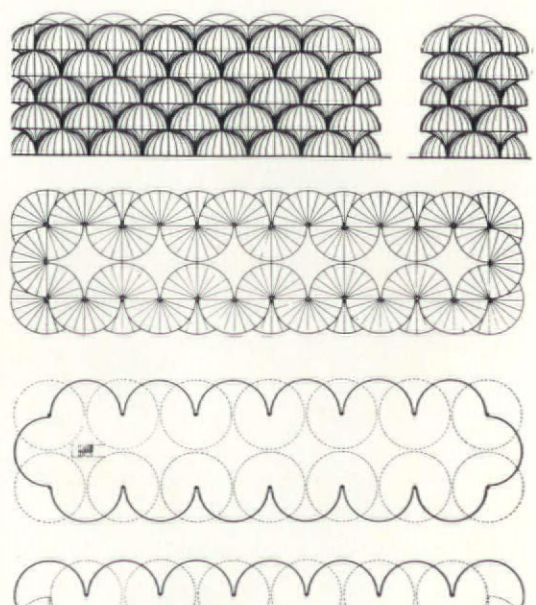
1
Study for a tower structure developed from icosahedra

2
Studies for structures derived from icosahedra, made up from triangular and square panels

3
Elevations, roof and ground plans of a five-storey building projected by Günther Günschel, in which walls and ceilings are made up with quarters of a sphere of four metres radius. Such buildings could be of prefabricated elements of plastic, steel or concrete or even of a framework of metal sheathed with plastic or glass



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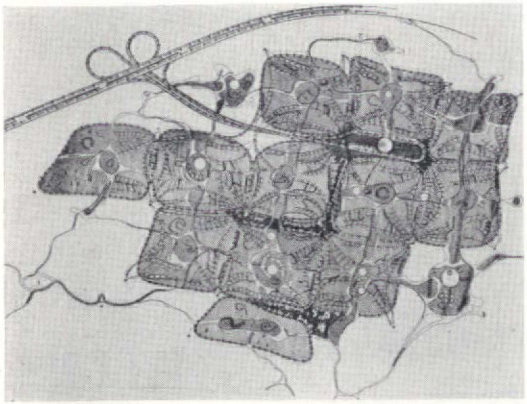

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1
Layout of the Isogo area, Yokohama, showing the disposition of housing units in a linear pattern, radiating from points or centres which are regarded as the foci of energy for each neighbourhood. Not only are the shops and community buildings grouped together at these centres, but all roads and services are designed to converge there and to emanate from there to the subsidiary units

2
Model of a low-rise housing unit made up with standard concrete components and moulded plastic service units

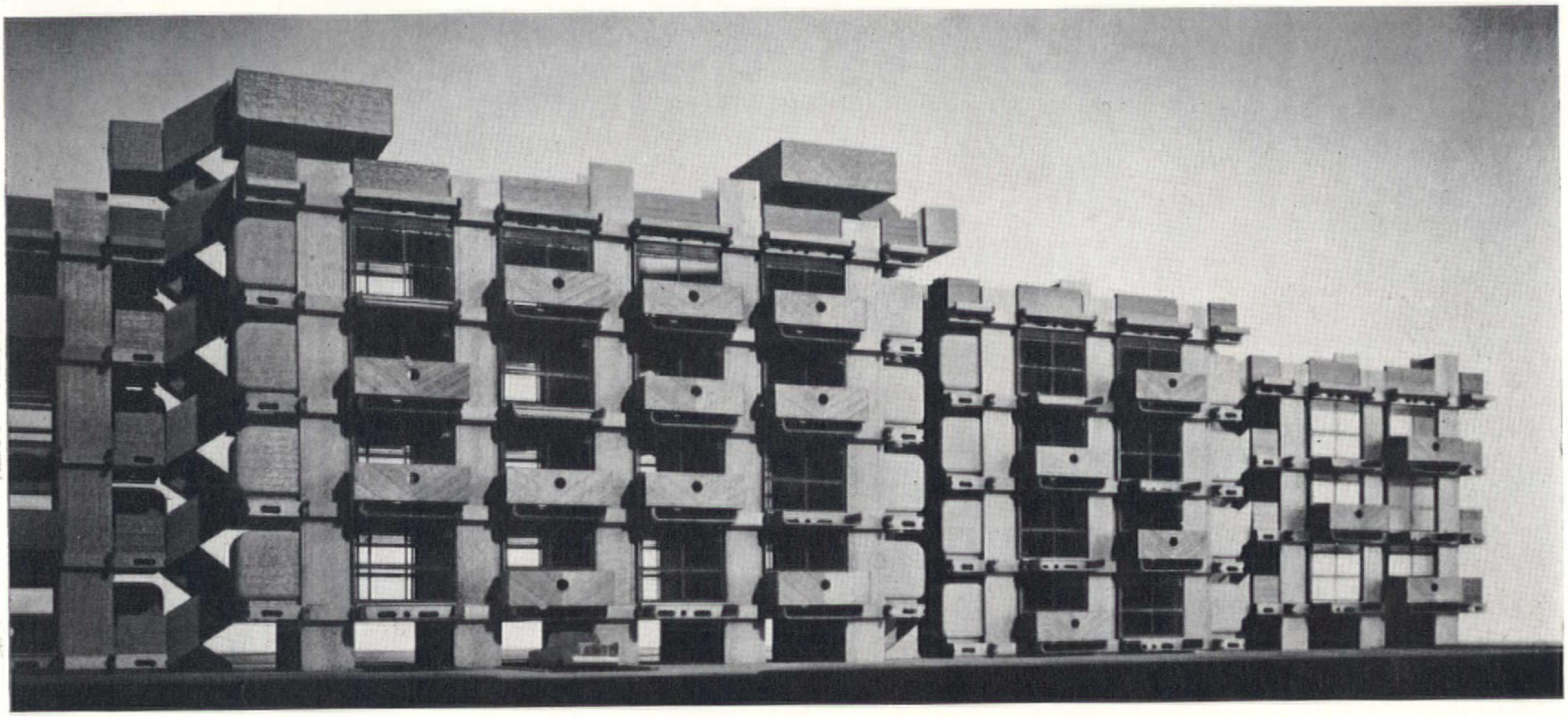
3
Elevation of a housing unit

4
Plan view of the model

Concrete component housing, Japan

Architect: N. Kurokawa
Engineer: S. Aoki

Noriaki Kurokawa's already famous project for low-rise, high-density housing units assembled from standard concrete components, with plastic service components inserted, is the most carefully worked out and explicit of the designs produced by the Japanese Metabolists. In an analysis of the concept—'The pursuit of Metabolic space'—Kurokawa indicates that he has leant heavily on theories propounded by Yona



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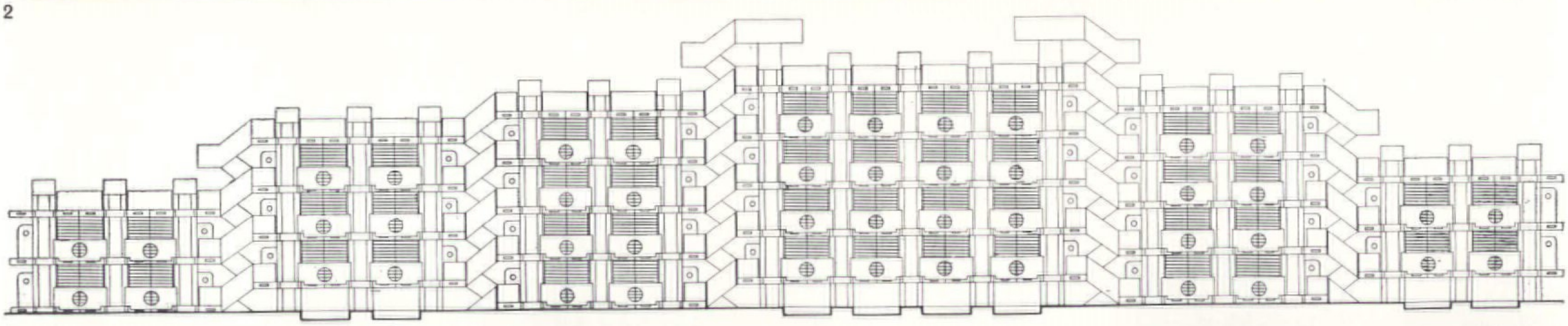

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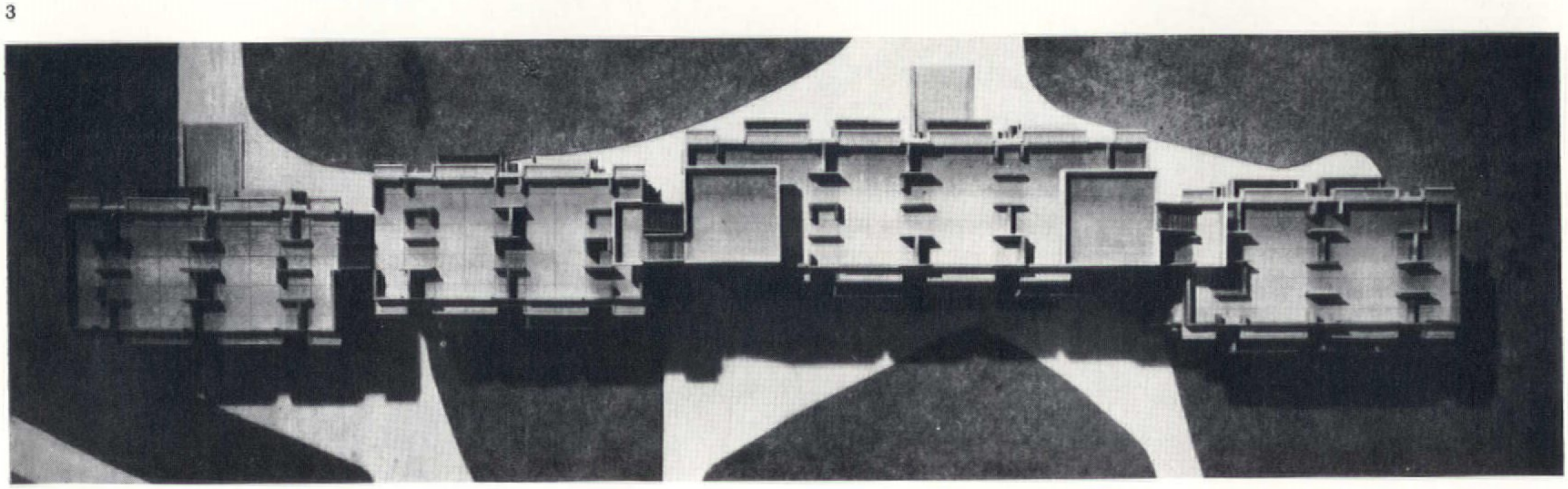

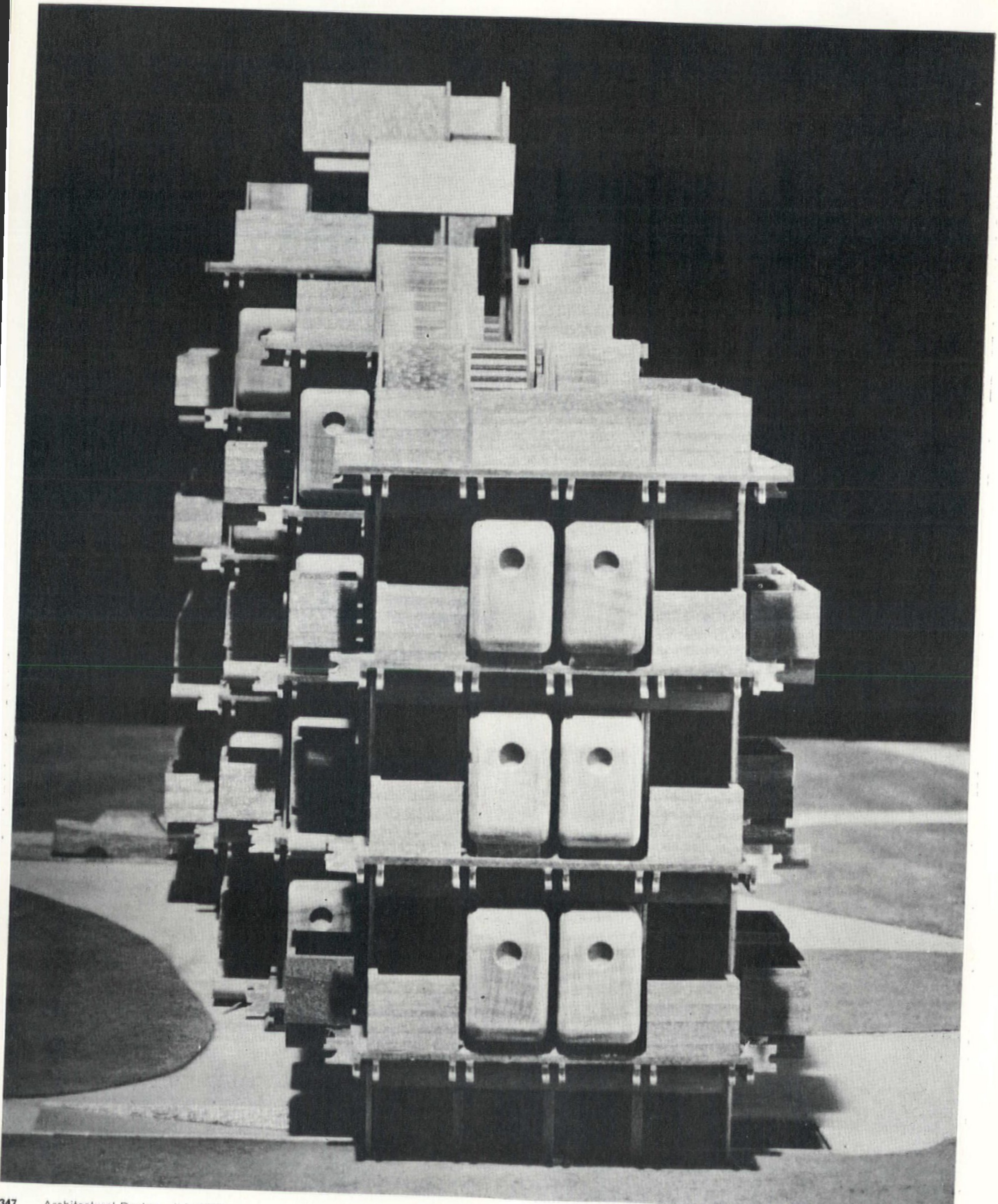

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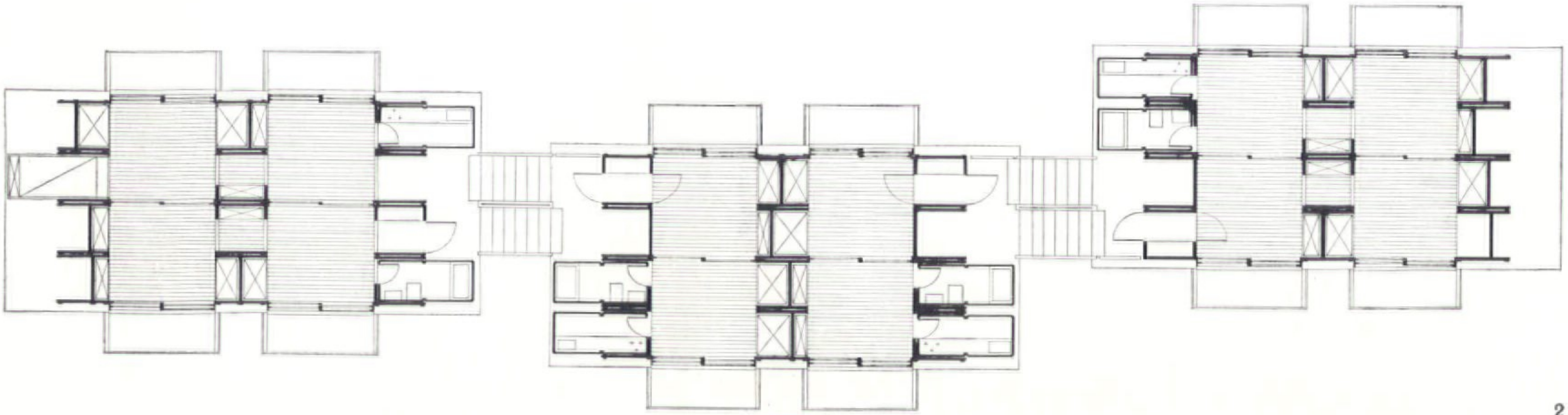

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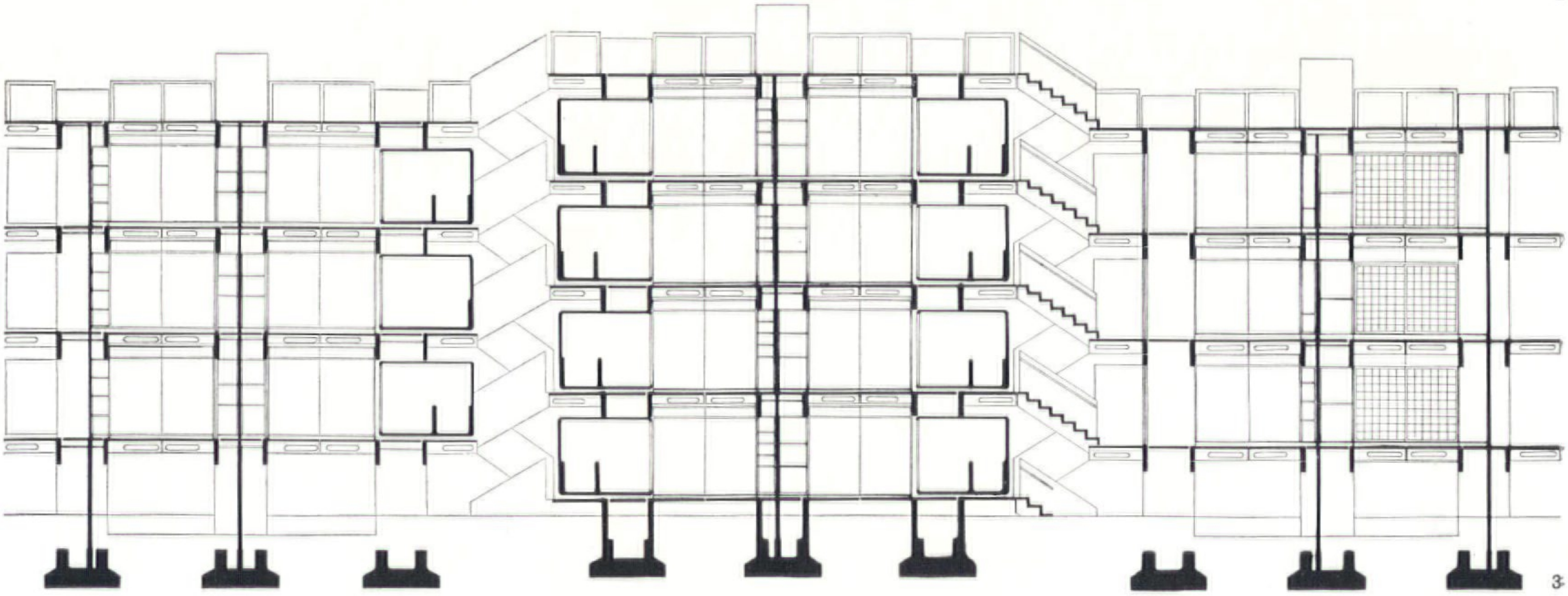

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1
End elevation of the model of a housing unit, showing the round ended plastic moulded service components that can be readily replaced as they become obsolete

2
Plan of three living units showing how they can be divided up to form small flats or enlarged. The structural spines, which are made up of interchangeable box units into which storage cabinets or service components are inserted, are designed to act both as a junction between adjoining living units or as a means of separation for privacy. The staircases which serve as links between the main units occur in different positions, allowing the units to be staggered in relation to one another

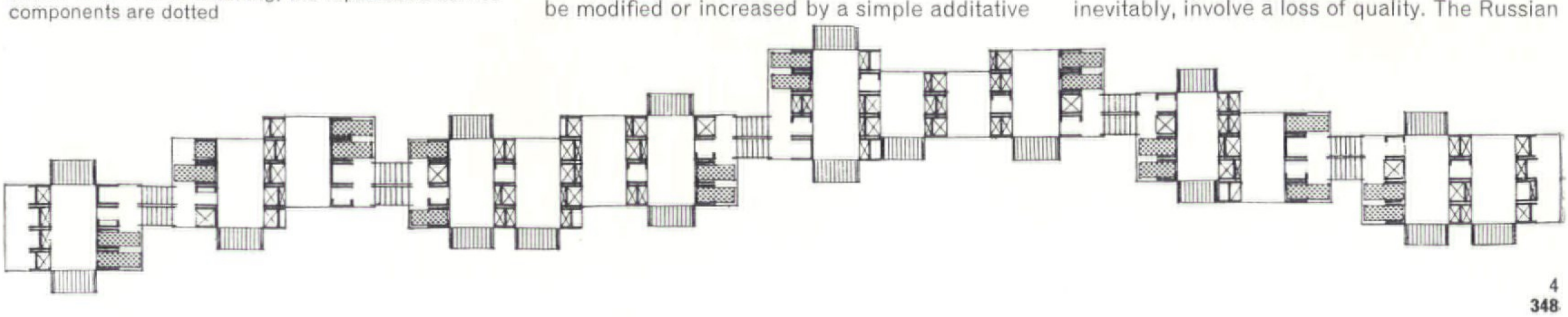
3
Section through three living units

4
Diagrammatic plan illustrating how the living units can be varied and linked together. The balconies are shown with vertical hatching, the replaceable service components are dotted

Friedman and Jean Prouvé, and cites even Aldo van Eyck as an influence. He accepts that the most pressing problem in architecture today is the reduction in cost and the rationalization of building for the rapid and large-scale construction of mass housing of high quality. But he goes a great deal further than this; he has clearly reconsidered the problem of mass-produced housing for himself. The easy assumption that housing units should and can be turned out like motor cars is, he insists, misleading if not false. For the rate of change required in housing units is much slower than that for cars; the sheer number of houses needed in the world today means that nations cannot afford to replace them at short intervals. The depreciation tables of the Japanese department of Inland Revenue, moreover, list the life of a concrete house as 75 years, a steel one 35 years, a wooden or plastic one 30 years, while a car is expected to last no more than 4 years. Whereas the car has a salvage value at the end of its life, a house has none.

Kurokawa has determined thus to break down the areas of a living unit into those that are static and those that are dynamic. The main living spaces, he assumes, do not require radical change during the lifetime of a house; they can be modified or increased by a simple additative process—a family taking over adjoining living spaces or relinquishing them as necessary—but no great change is needed to enhance them. The service and storage areas, on the other hand, need to be constantly and drastically altered as technological advances are made and as the mode of living of a family changes. Thus architectural quality can be maintained and even improved in time, unlike traditional housing which provides less and less satisfactory standards of living as the years go by. He has therefore chosen a cheap and durable material, concrete, for the structural components that make up the main, static elements, while plastic or timber is used for the storage fittings and the service components which can be readily renewed or replaced.

The size and form of the components is largely dictated by Kurokawa's belief that though the designer of prefabricated housing must allow for flexibility and variety, he must at all times condition and control the spaces and forms of the buildings for which he is responsible; in the normal post and panel type of prefabrication systems the initial designer inevitably relinquishes control of the final product to those men who assemble the pieces in accord with their own notions, which usually, though not inevitably, involve a loss of quality. The Russian



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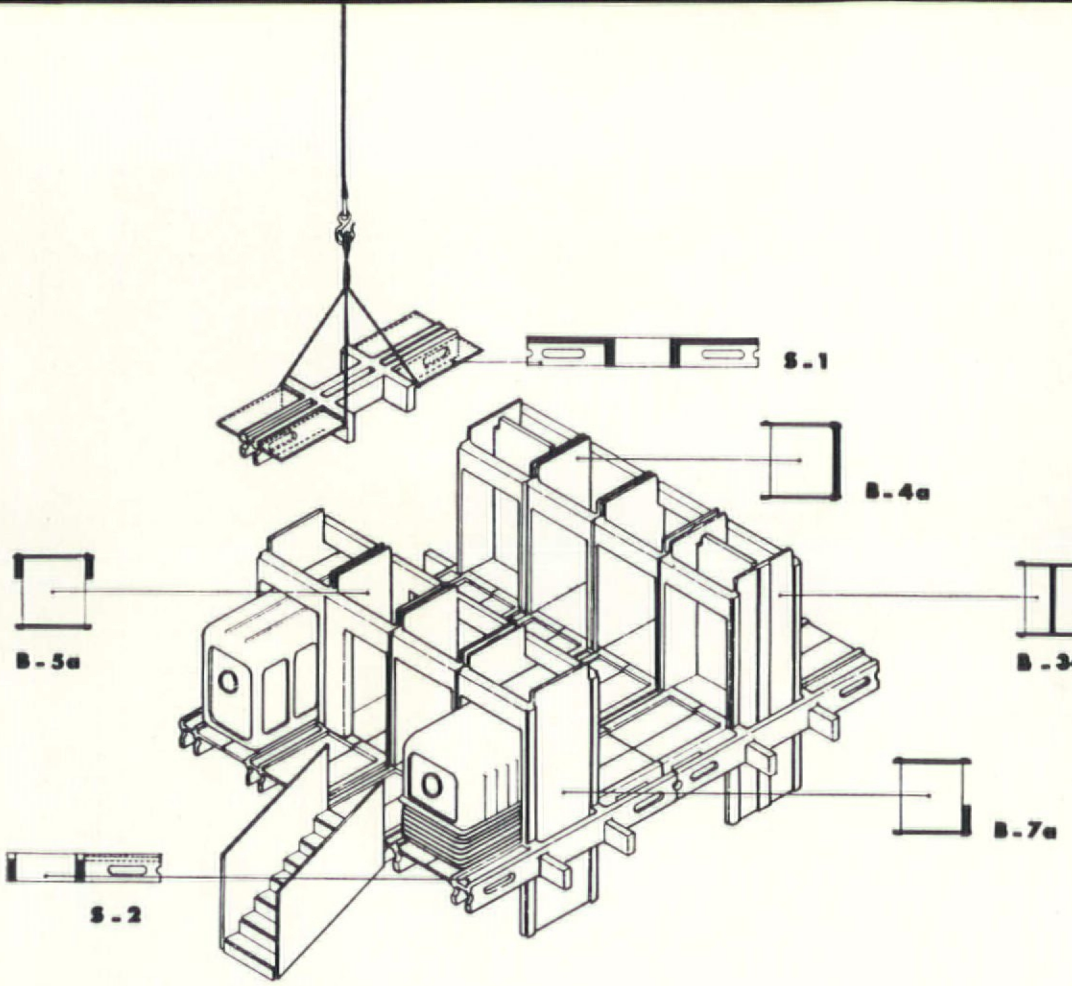
practice of making entire house units in a factory is, he believes, equally wrong headed, for it does not allow for sufficient flexibility and short-term and long-term elements are usually regarded as having the same durability. Kurokawa's components are therefore of medium size, with a range of interchangeable parts, which when assembled inevitably result in spaces and forms that relate to one another and, most important, to his initial spatial and formal concepts. His main living spaces, however, though of more or less constant dimensions, are given a margin for variety in that the structural spine that is normally the storage area, is conceived of both as a unit of separation for the living areas and as a point of contact between them.



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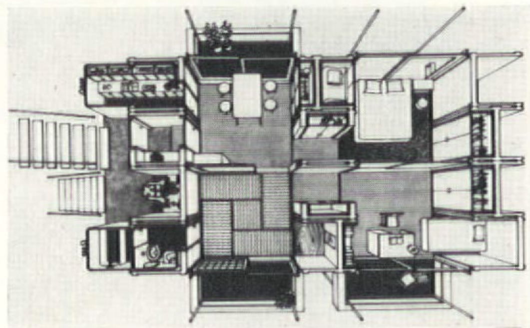

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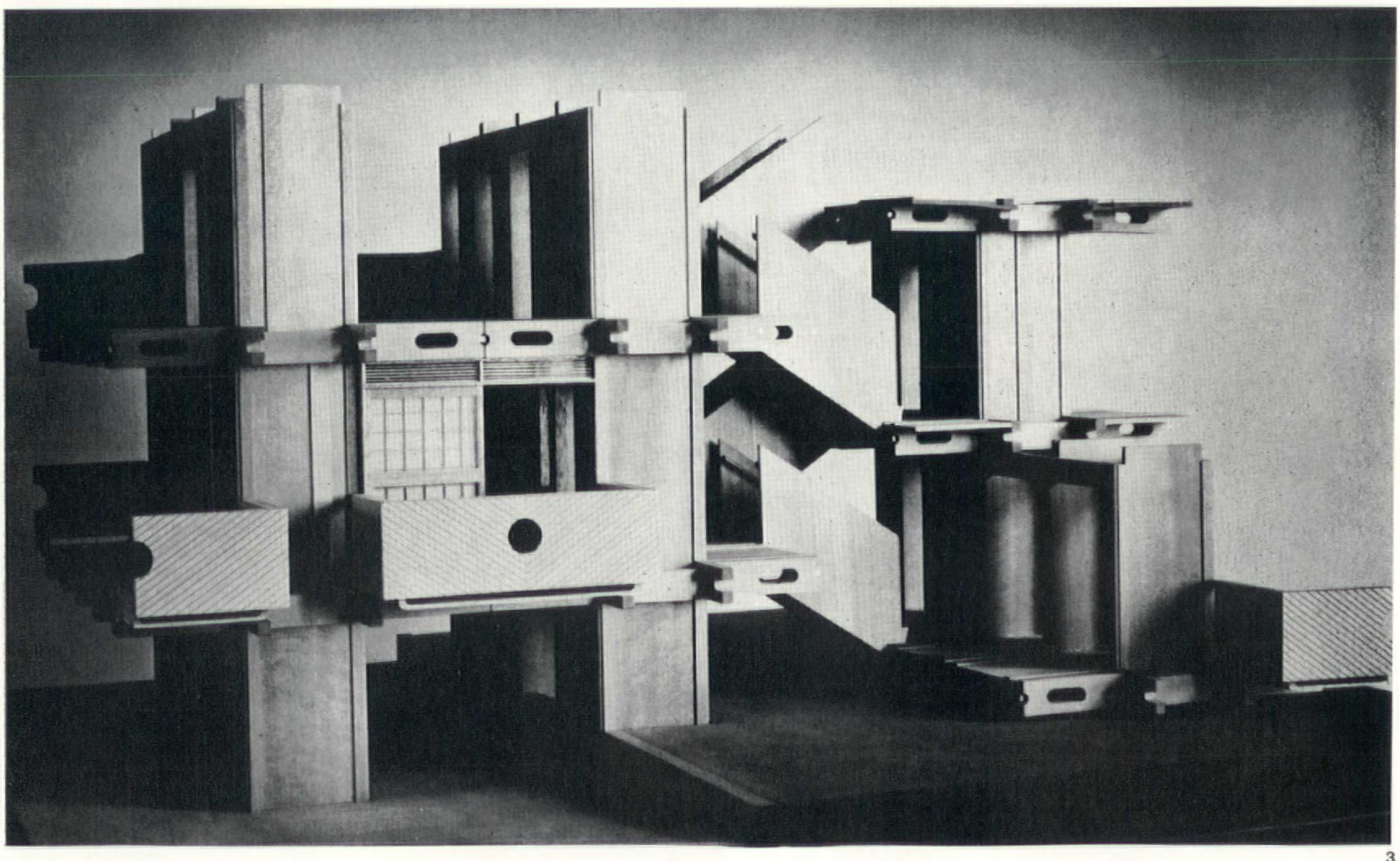
1
Isometric showing the assembly of components, each having a serial number

2
Bird's eye view of a living unit

3
Model of two living units and open access stair

4
Model of a living unit showing the round-ended plastic service components slid into position



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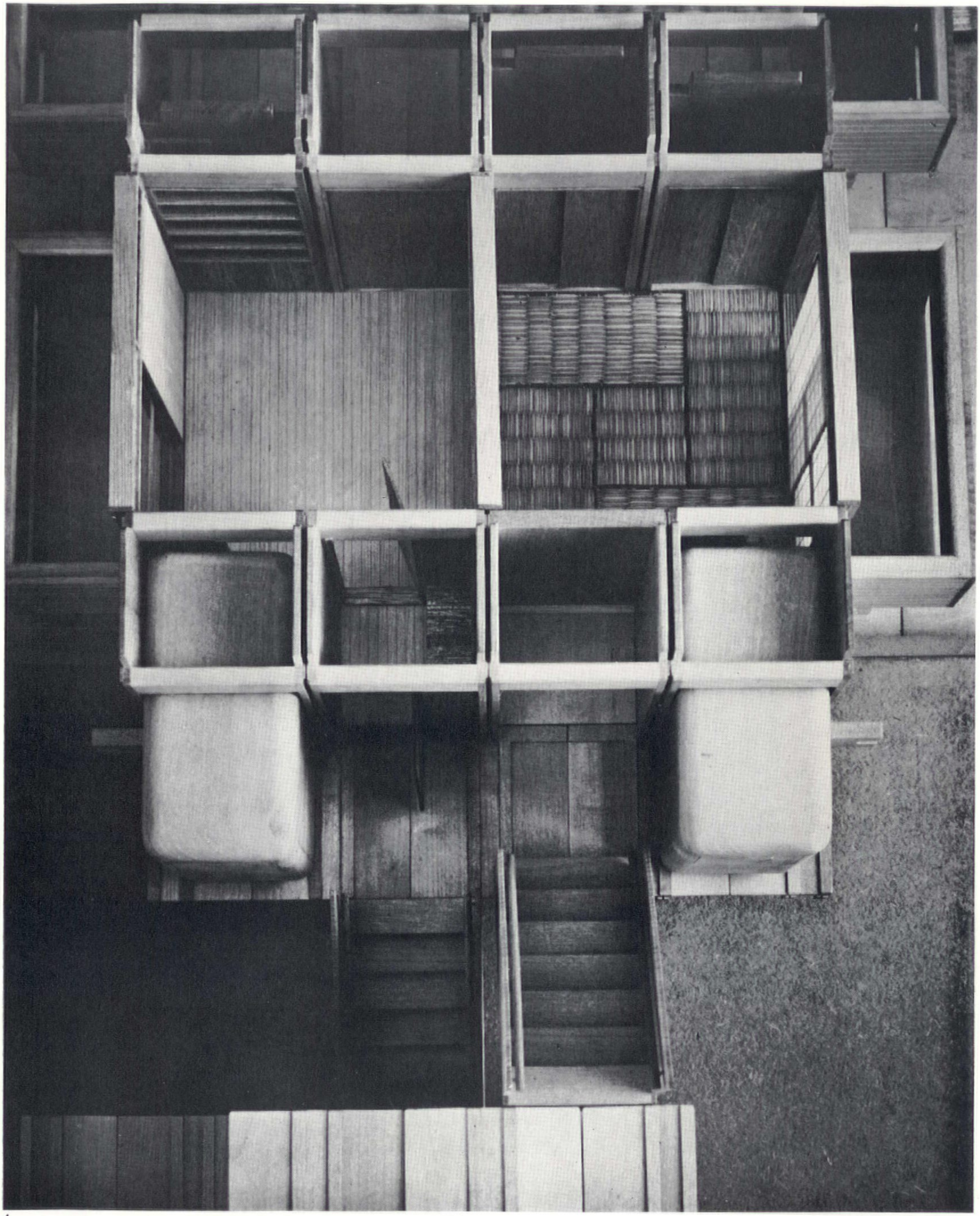

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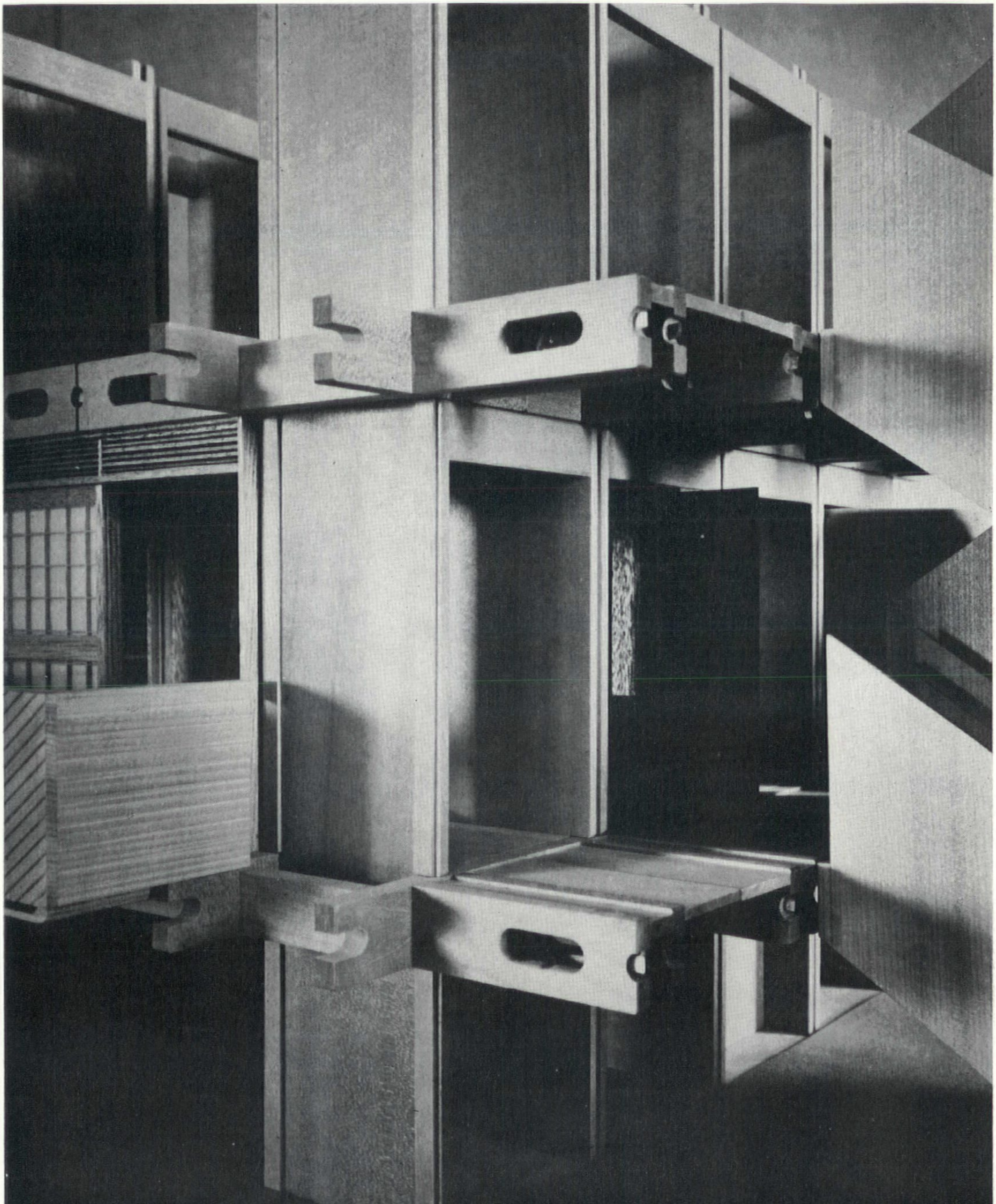

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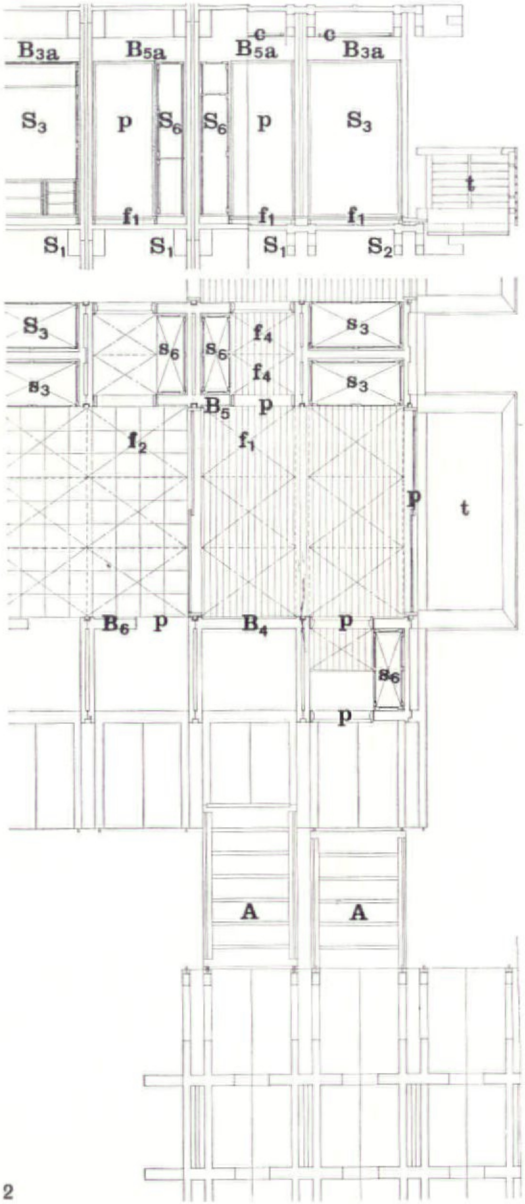

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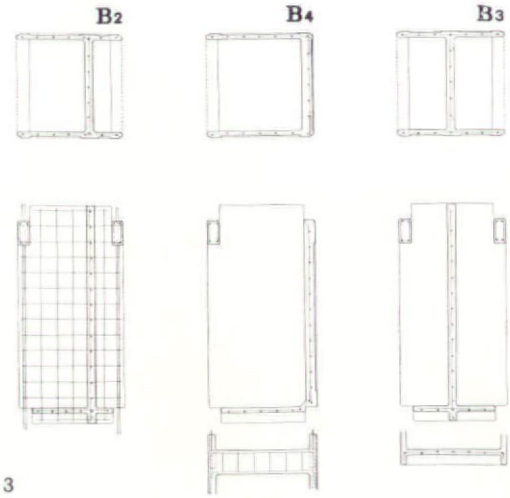

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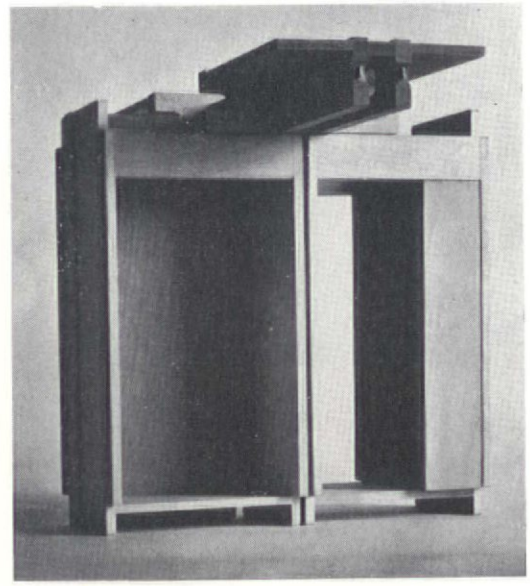

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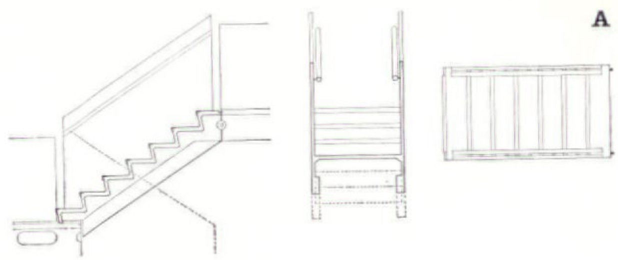

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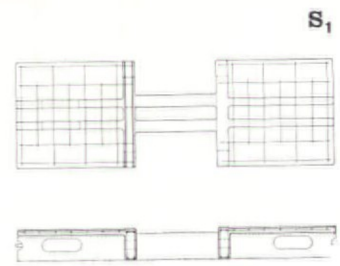

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1
Model showing the main structural components around the staircase and landing

2
Section through the structural and storage area and the plan of part of living unit and stair, indicating the serial numbers of the component parts

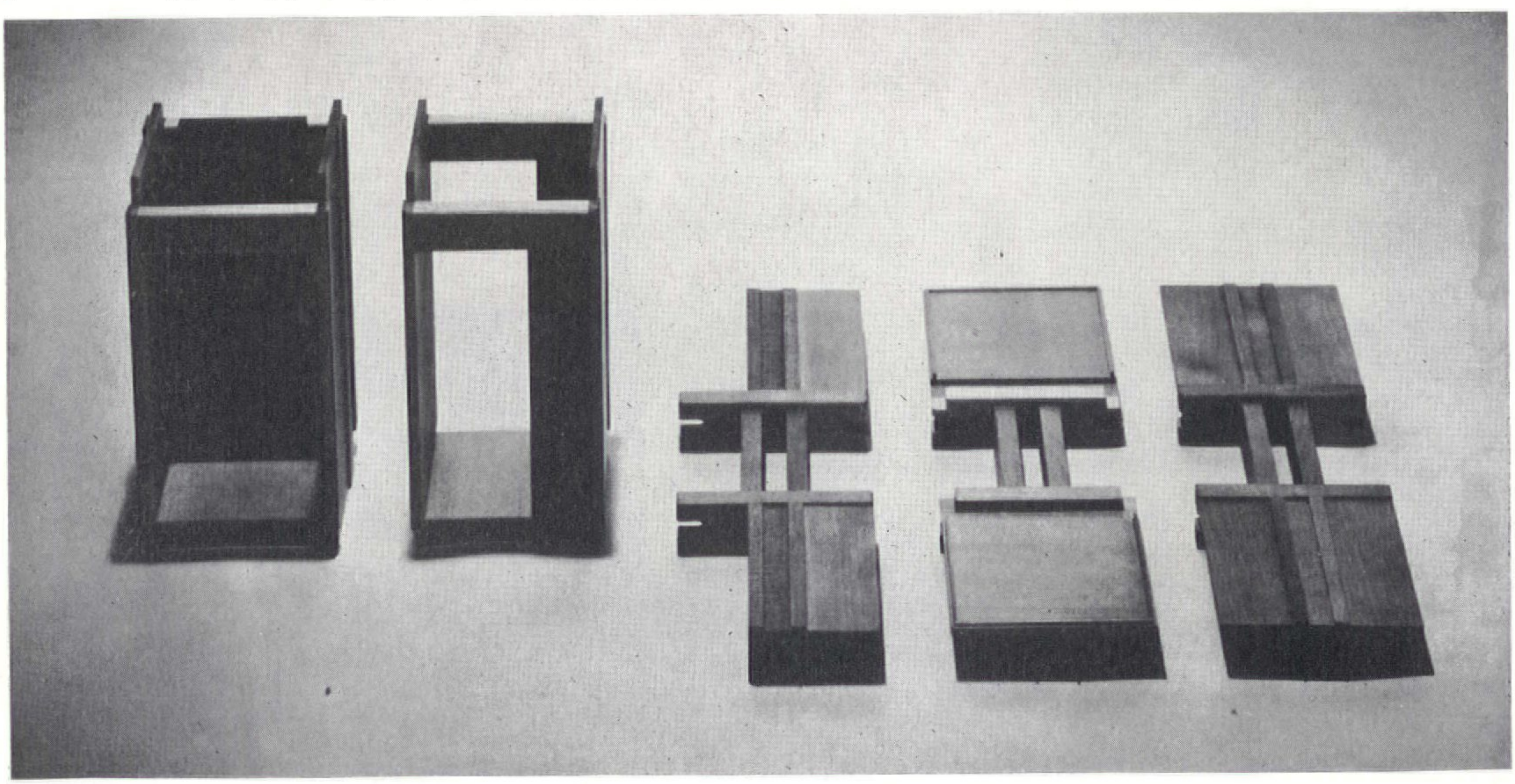
3
Box wall components, B_2, B_3 and B_4, all of which can be used to make up the structural spine

4
Model made up of components, S_1 B_{4A} and B_{5A}

5
Elevation, section and plan of the stair component A

6
Plan and sections of slab component S_1. The box wall components, types B, fit over the space in the centre

7
Models of box wall components B_{4A} and B_{3A} and slab components S_2, S_3 and S_1



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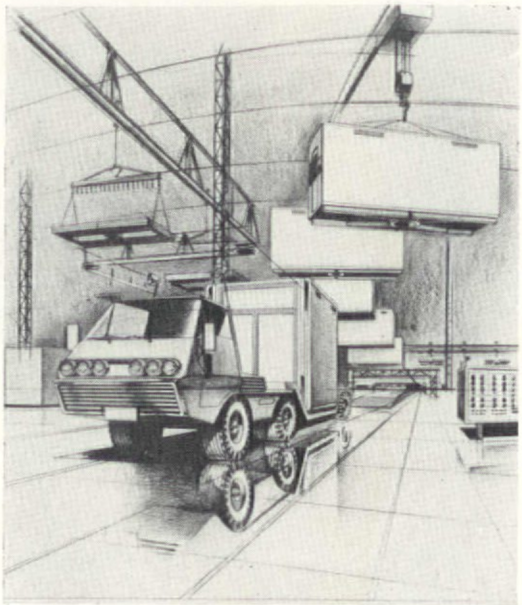
Industrial design in Japan

GK Industrial Design Association



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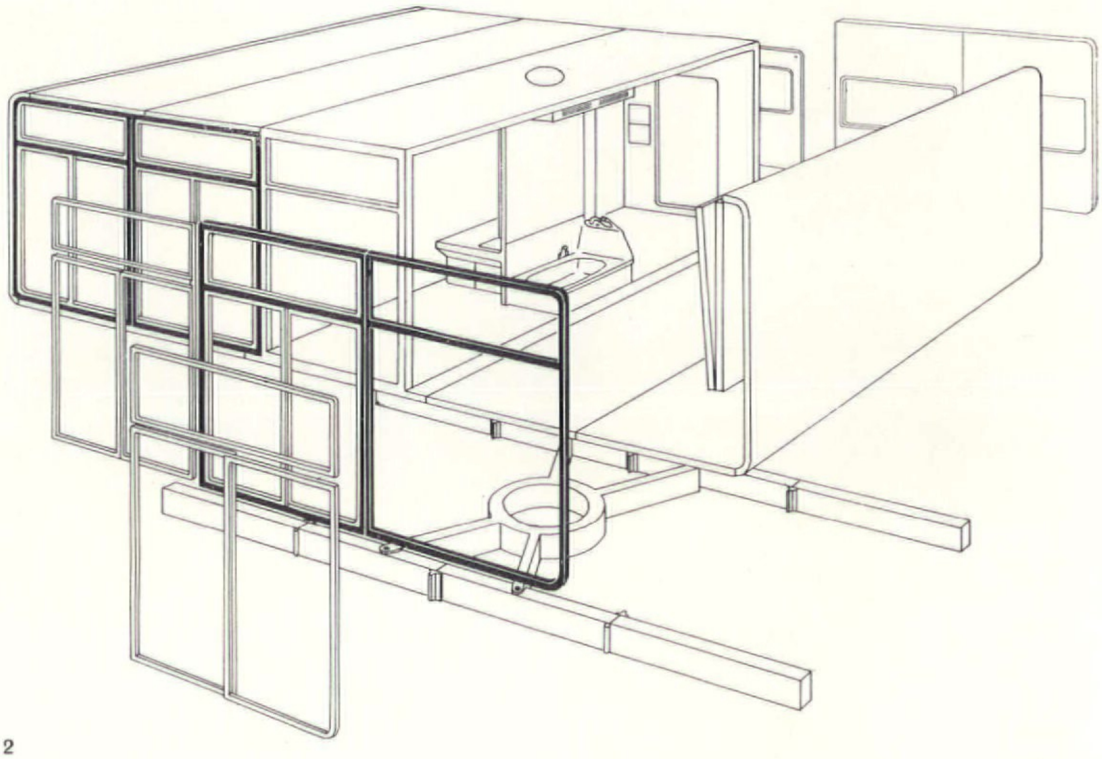

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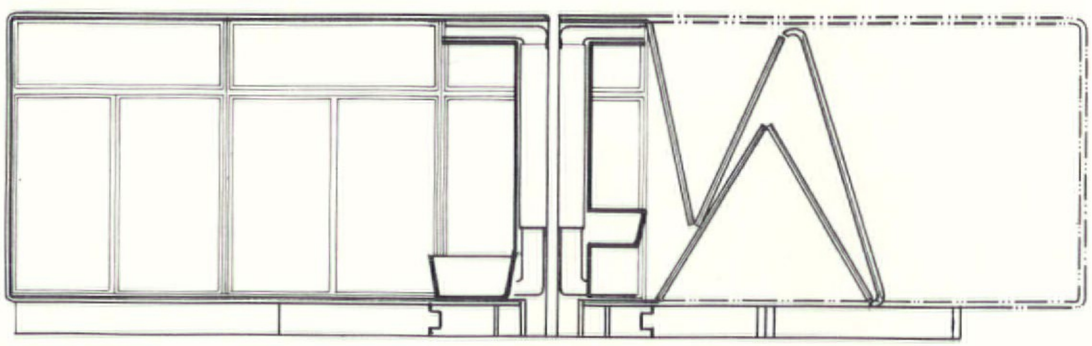
In 1953 six industrial designers from the Tokyo University of Arts formed the GK group. After four uncertain years it was reorganized and reformed by three of them, Kenji Ekuan, Shinji Iwasaki and Kenichi Shibata and its name changed to the GK Industrial Design Association. Industrialists were by no means unheeding of the activities of these young men (and they were young, the eldest is even now only thirty-six). Within a few years they were employing a staff of fifty and running an organization that is divided up, sectionalized and sub-sectionalized with a zest and precision that Herr Krupp might be asked to applaud. Last year they were given the Kaufmann International Design Award.

Certainly, they seem the most conspicuously successful and prolific doodlers and designers in Japan, ever-resourceful, ready to turn their attention to something new and never at a loss for an explanation of how and why they design in the way that they do. Some of their products are over-burdened by ungainly statements of philosophical intent. But despite all success, despite all pretension, their talents have in no way been overdriven by their ambitions. Their designs are unfailingly competent, whether they be for milk cartons or motor bicycles, and they are of a vigour and robustness that sets them apart from those of their contemporaries in Japan—and even in the USA and Europe.

On this and the following pages a range of their designs more specifically related to architecture is illustrated. They are not revolutionary nor highly idiosyncratic but they do represent a radical departure in that they will soon be available to consumers in Japan. For unlike so many exponents of the flexible, 'throw away' architecture of the future, the GK group is lost in no visionary dreamworld, its directors have the zest and resourcefulness and, above all perhaps, the power to persuade industrialists to make their designs take form.



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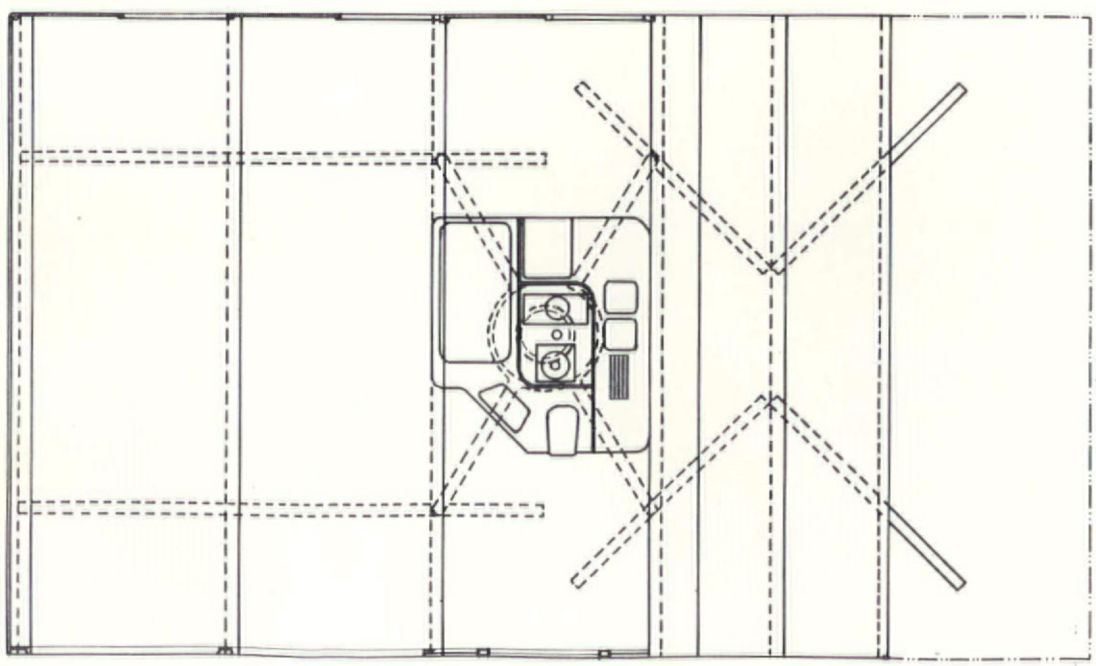

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1
Industrialized housing project which folds into a compact unit that can be loaded and carried on heavy-duty trucks

2
Isometric projection of the house showing how the main floor and roof elements fold out from the core unit. The end walls are filled in with panels or windows

3
Section through the house showing the unfolding of the side wall, floor and roof elements

4
Plan of house with the main supporting beams shown set in position and being unfolded

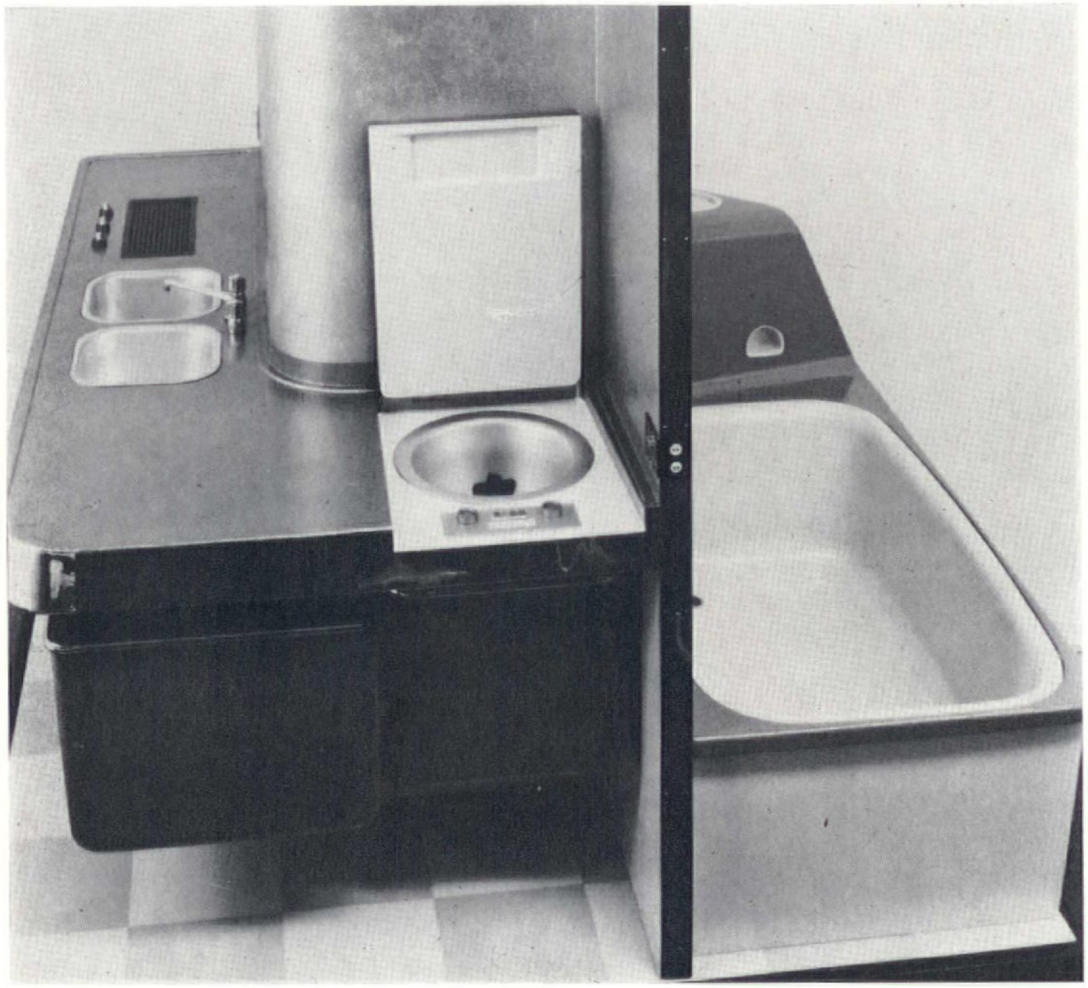
5
Photograph of the mock-up for the kitchen and bathroom core unit

6
Isometric illustrating the mechanical services in the kitchen and bathroom core unit

1 vent	7 heating unit (gas or elec.)
2 r.w.d.p.	8 water main
3 flue	9 waste pipe
4 air diffusers	10 supporting frame
5 junction box	11 fuse box
6 air conditioner	

7
Isometric of the core unit

1 lighting panels	7 sink
2 air diffuser	8 range
3 junction box	9 oven
4 bath	10 dish washer
5 washing machine	11 refrigerator
6 waste disposal unit	



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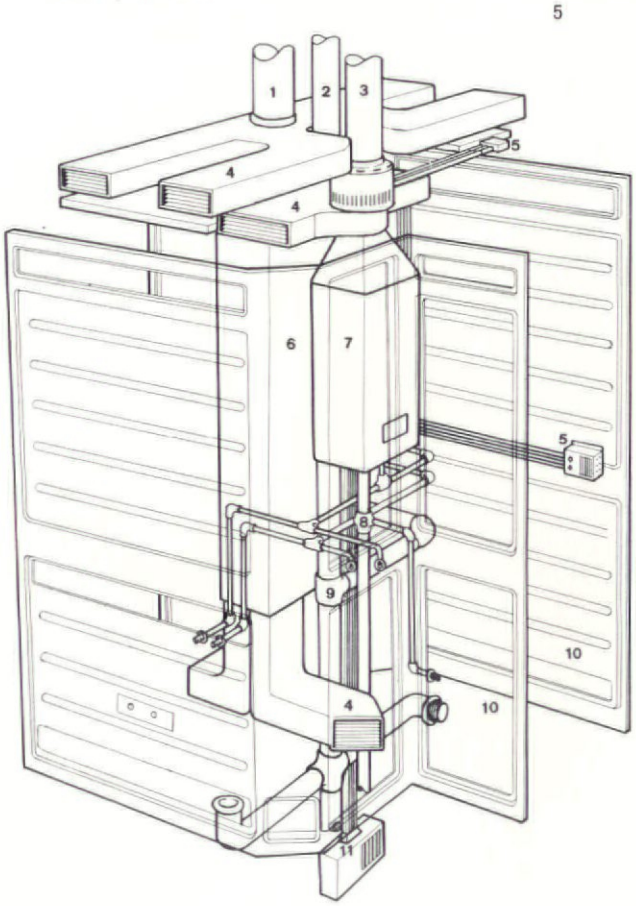

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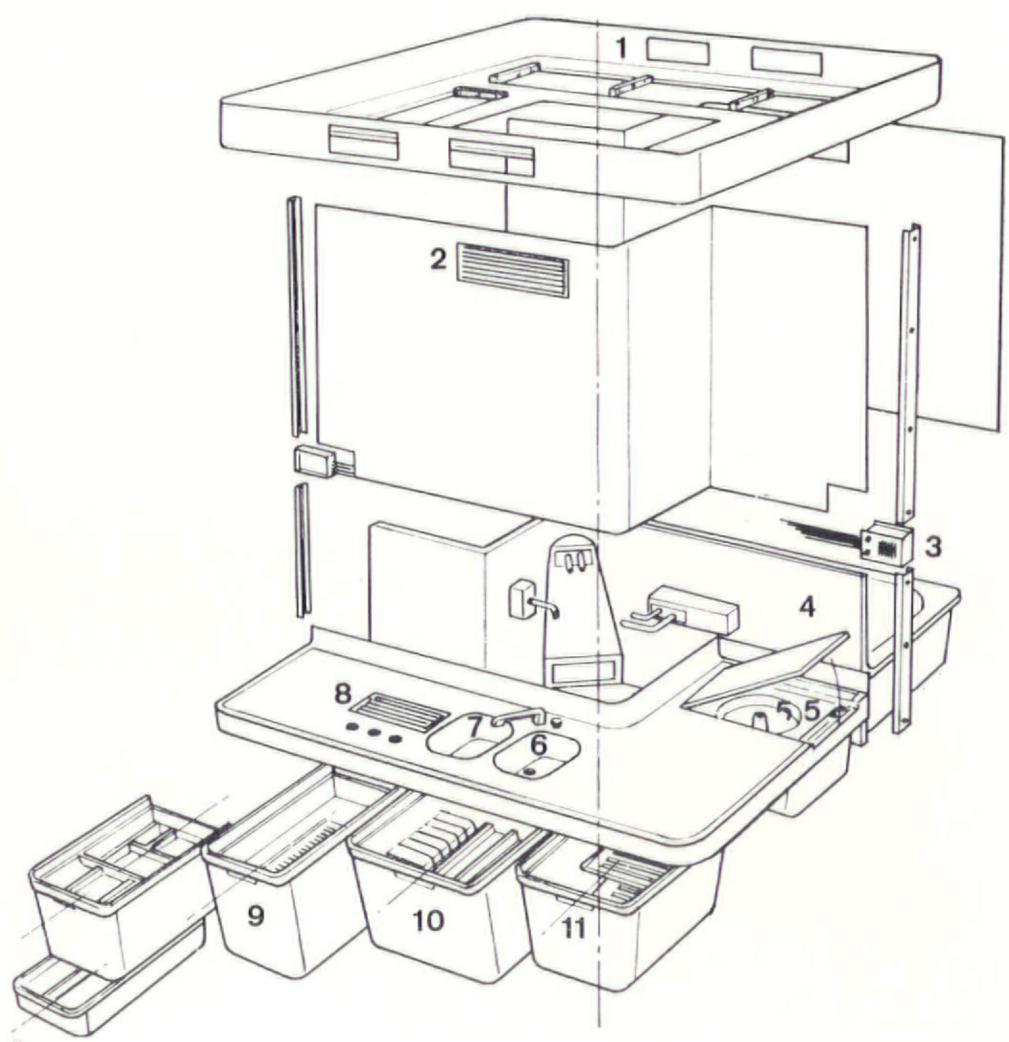

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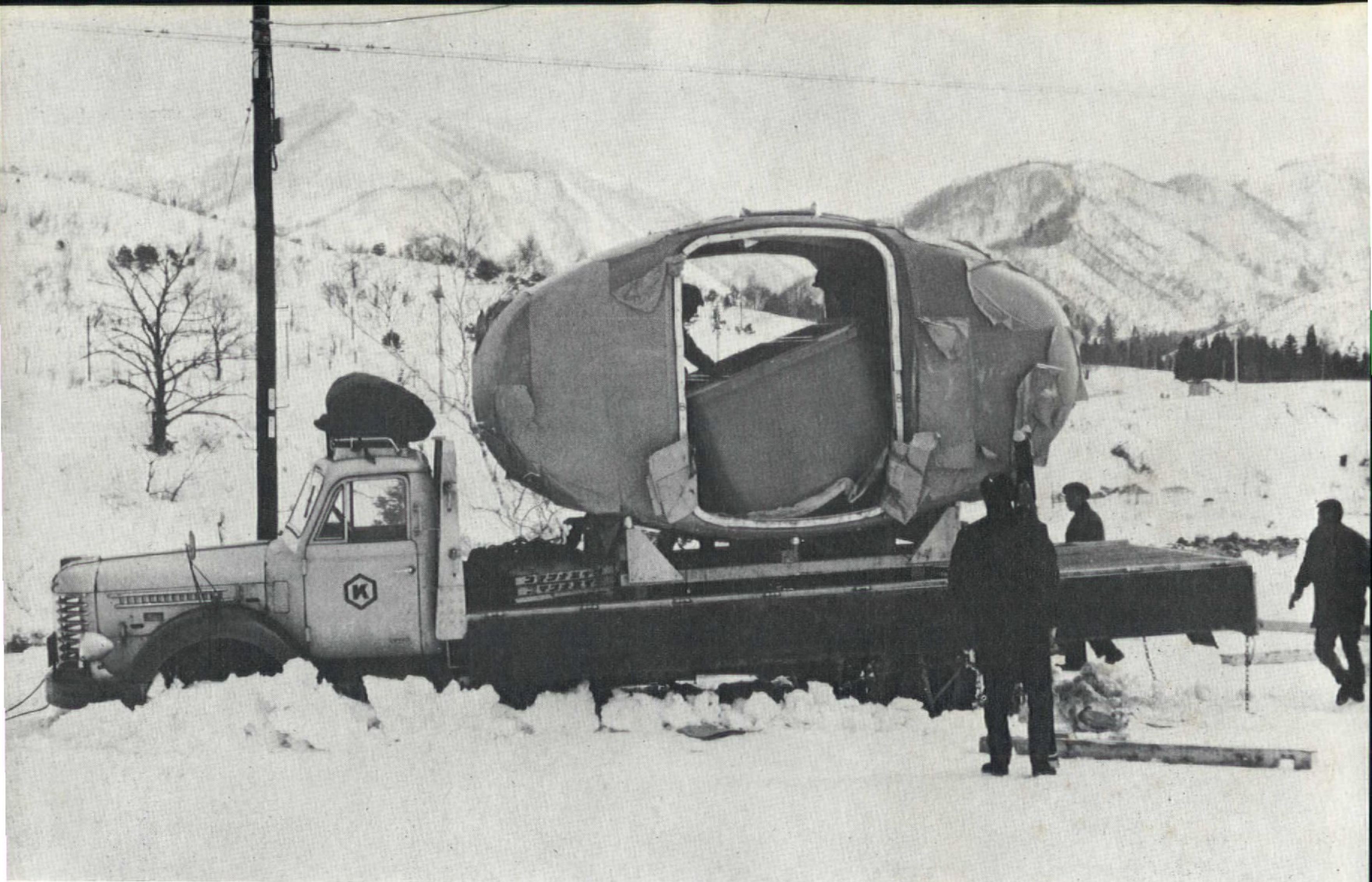
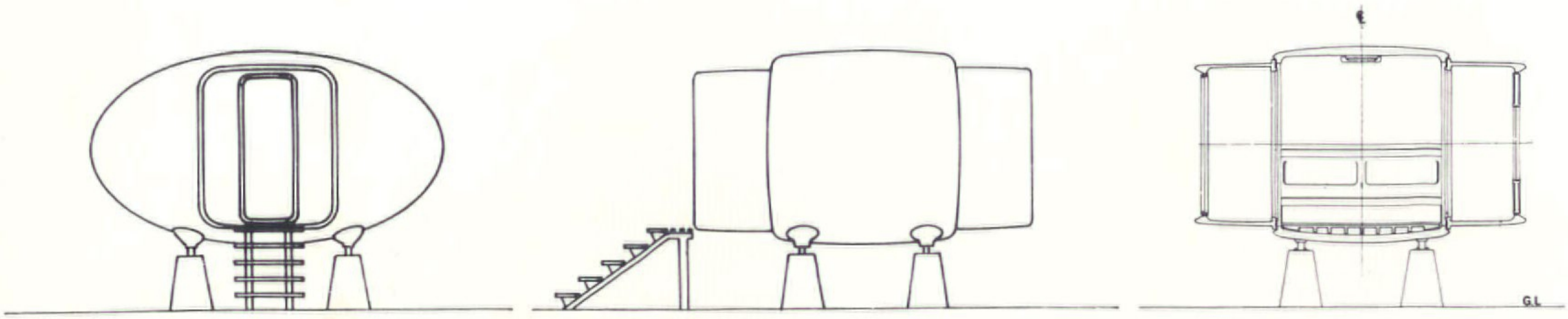
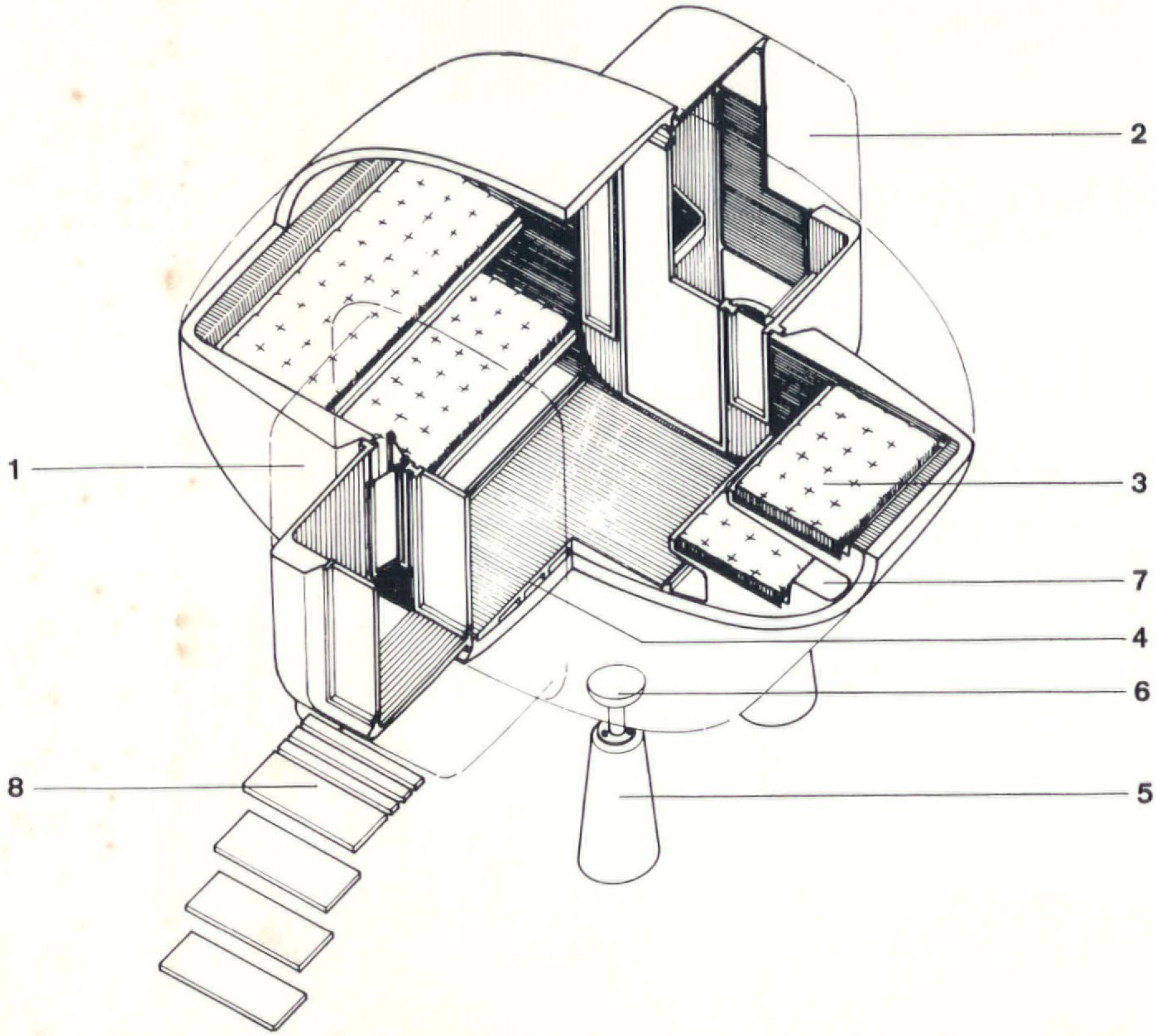




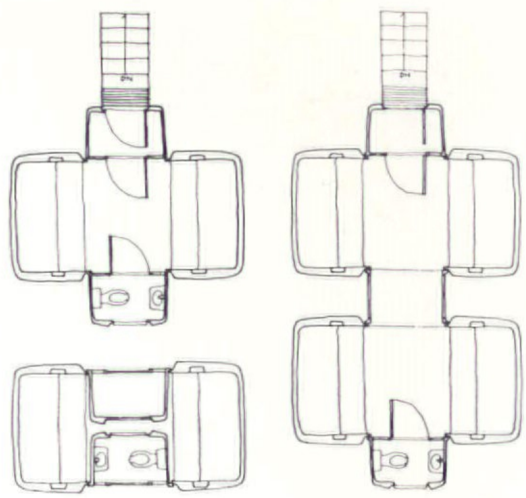


Komatsu ski-lodge

The fibreglass ski-lodge, made by the Komatsu Plastic Industry, consists of a large accommodation unit, fitted up with four bunks, and two subsidiary service units, all of which can be loaded on to a standard truck for transportation to the site. The decision to deliver the units in this way conditioned not only the use of materials, but also the size of the elements. Fibreglass 3mm thick, on a timber frame, with a plywood lining, proved to be far lighter than a capsule of steel or even aluminium. The accommodation unit weighs 1500lb, the service units approximately 300lb each. The Japanese highway code restricted the dimensions to a maximum width of 8ft, a height of 11ft, and a length of 39ft.

All wiring and internal finishing is completed at the works. The accommodation unit is unloaded at the site and set directly on the snow, much like an egg, or, as in the illustrations shown here, on four rubber cushions supported by metal legs and concrete blocks. The service units are then screwed on and the electrical supply cable connected to a main buried in the snow. Water and sewage connections are likewise made to flexible pipes buried in the snow.

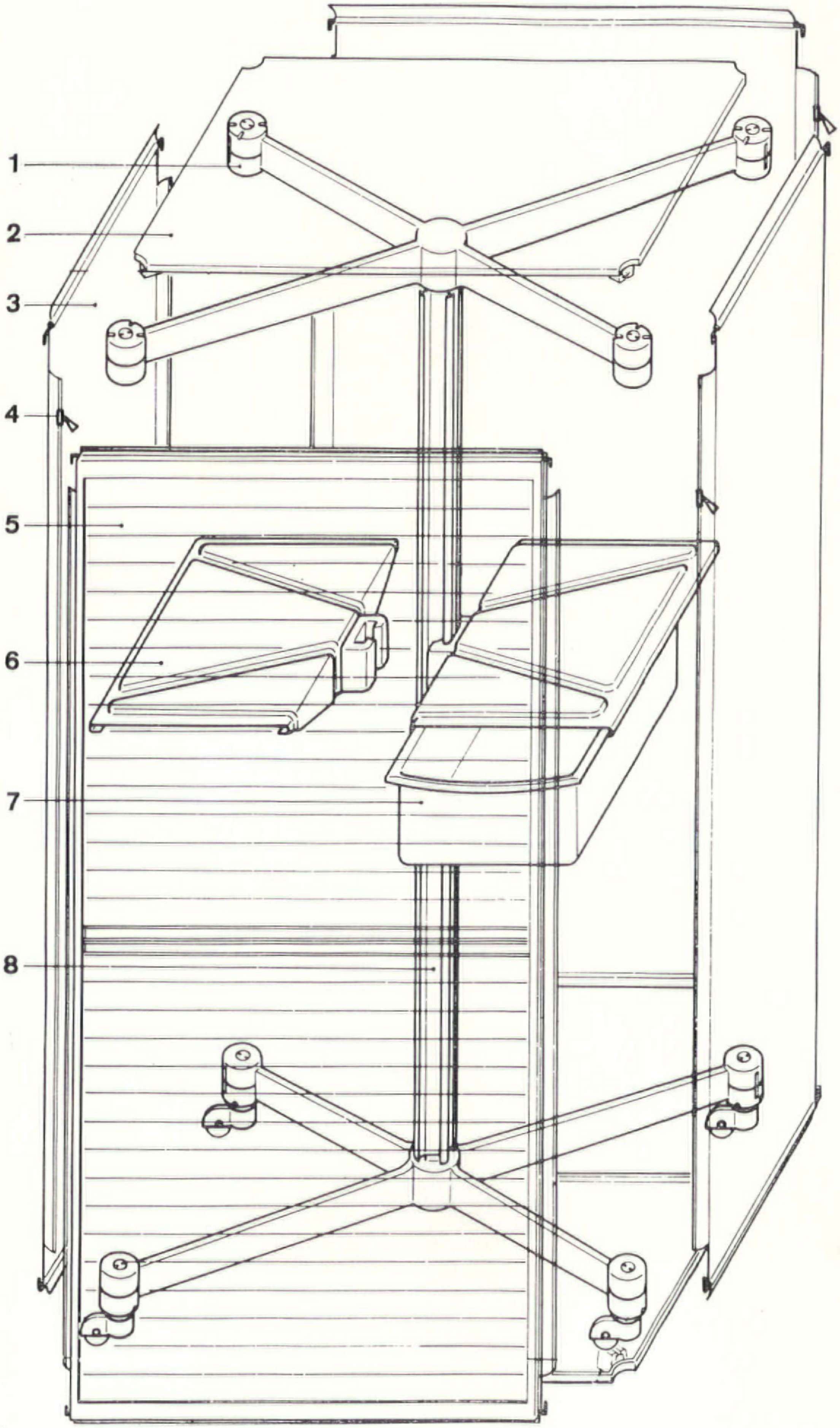
Key
1 porch unit
2 service unit
3 bunks
4 framework of timber, sheathed externally with 3mm fibreglass, internally with plywood. Insulation is fibreglass
5 concrete pad
6 rubber cushions
7 shelf
8 steps



Furniture of Metabolism*

The furniture of Metabolism is conceived of as an ever-changing, easily modified array of storage units, work tops and props for the human body that are made up from two basic sets of components—the stands, shelves, drawer units and casings that are used to form cupboards, chests and tables and the frames and webs that are used to make seats and beds. All the elements are standardized, but nothing need be standard and nothing, least of all in the way of dull monotony or sameness, need be imposed upon the individual user. He can put the pieces together as he wishes, he can leave them clearly displayed or he can encase them with plastic, paper, straw or coloured fabrics of his own choosing. The system is indeed open to great variations within its limits. Its limits are twofold; those imposed by mass-production and those inherited from the Japanese past. For not only do the elements conform strictly to the dictates of the production line but also to those of Japanese tradition. The module upon which the furniture is built up is that of the Tatami, the mat that is the basis of all traditional architecture in Japan. Likewise the covering of the storage units is modelled upon the shoji or akari-shoji, the movable screen of Japanese architectural convention, and like it is made up of a frame with a thin sheath that is intended to be replaced and renewed often—for the New Year ceremony, for weddings or for special guests. Indeed the storage unit is like nothing so much as the old tansu storage unit of tradition. The metabolic twist arises out of the way in which the elements have been thought of; the stand or support is the frame or skeleton, the drawers form the organs while the covering is the skin—a complete man, almost.

* See *AD* October and December 1964



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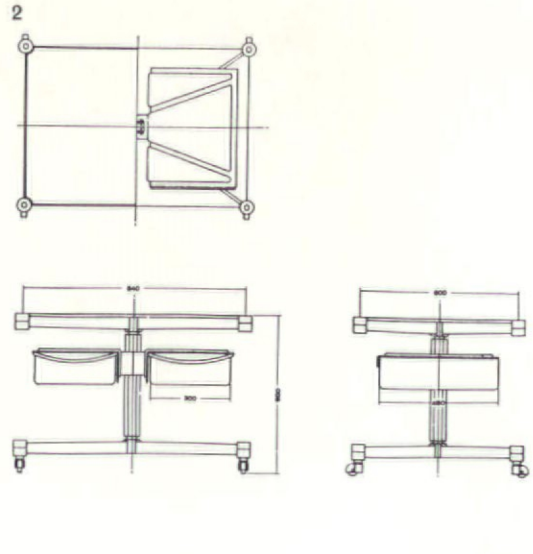

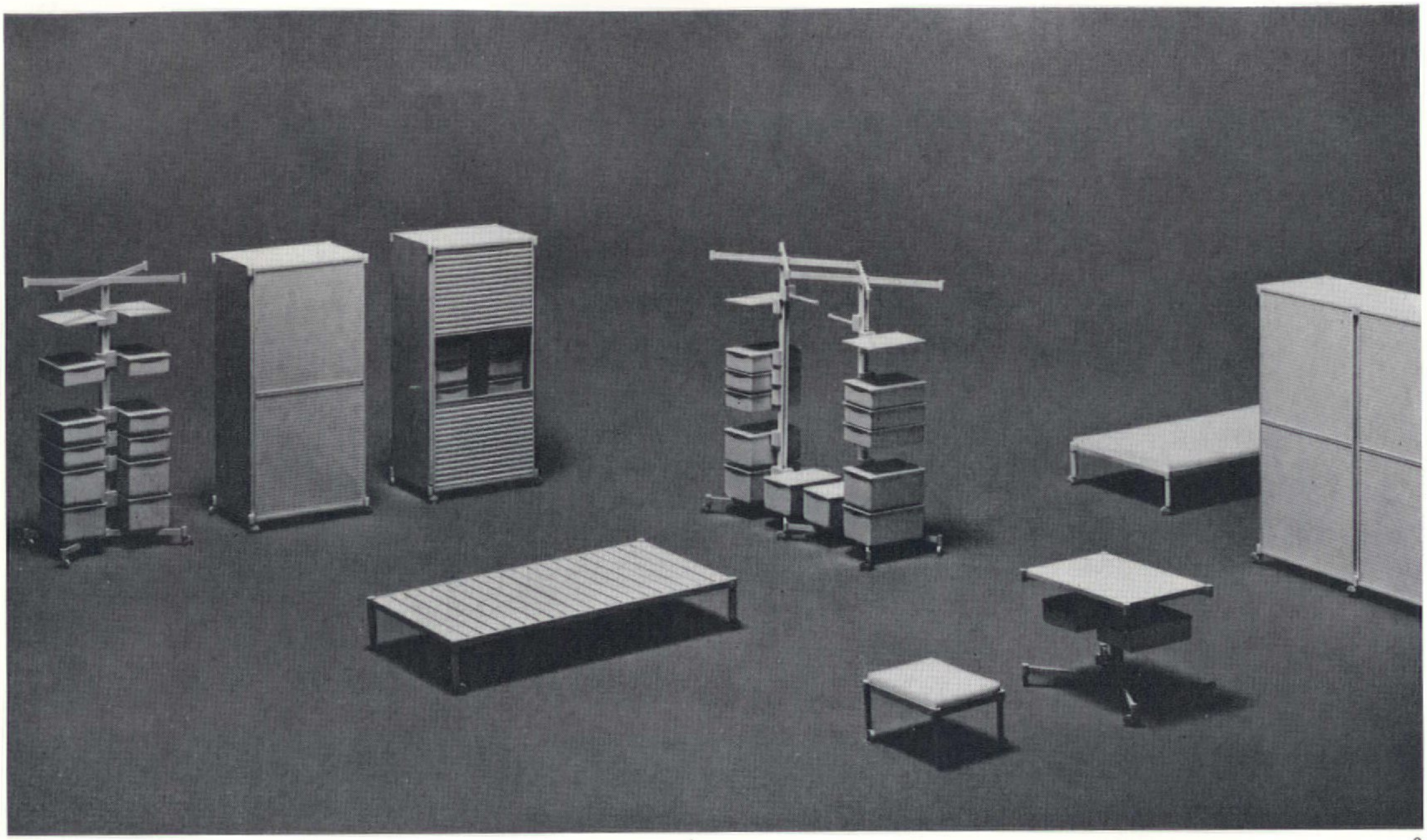

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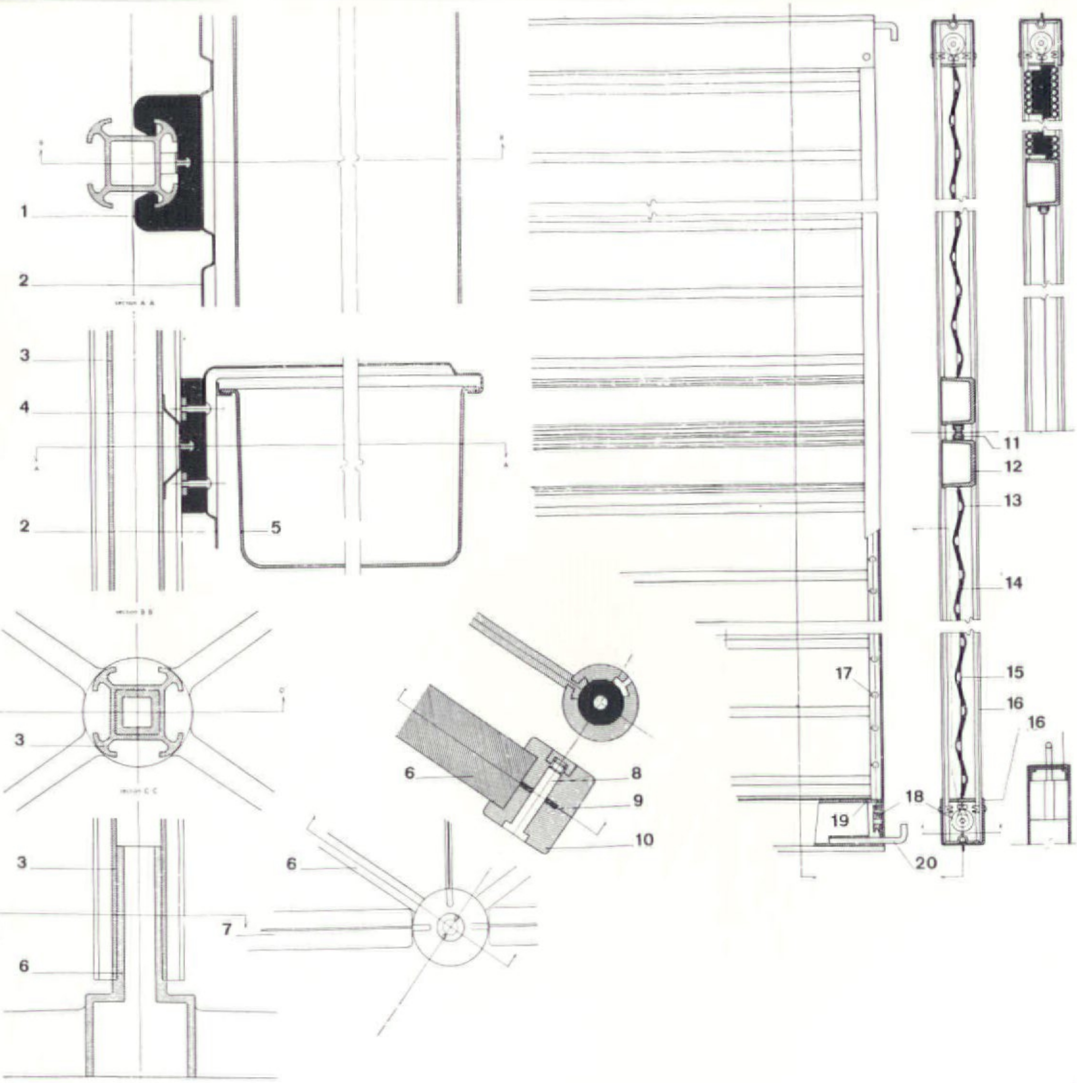


4

1
Diagram illustrating the composition of a storage unit using one range of elements

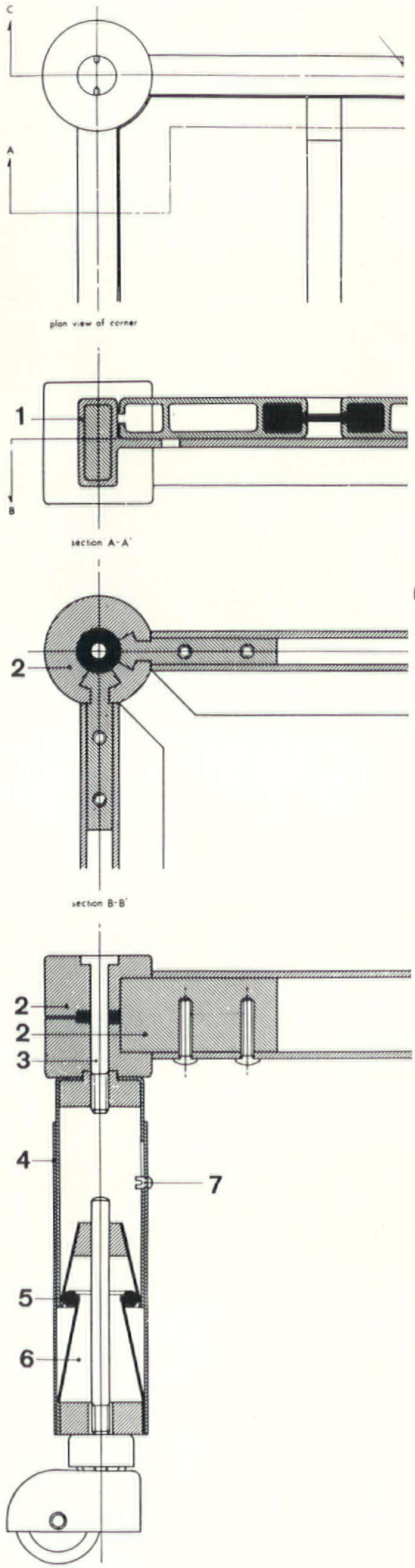
1 connector
2 top
3 cover
4 zip fastener
5 folding shutter
6 shelf unit
7 drawer unit
8 support

2
Plan and elevations of a table with drawers made up with standard elements

3
The furniture of Metabolism

4
Plan of sections through the main supporting unit and drawer, with subsidiary details of the connecting rods and folding shutters

1 rubber connector
2 pressed steel frame
3 aluminium frame
4 steel clip
5 plastic drawer unit
6 aluminium bracing
7 shutter
8 bolt
9 rubber gasket
10 aluminium connector
11 magnet catch
12 plastic handle
13 plastic or paper sheath
14 aluminium framing
15 controlling cable
16 plastic edging
17 cable holders
18 pulley
19 steel frame
20 connecting hook



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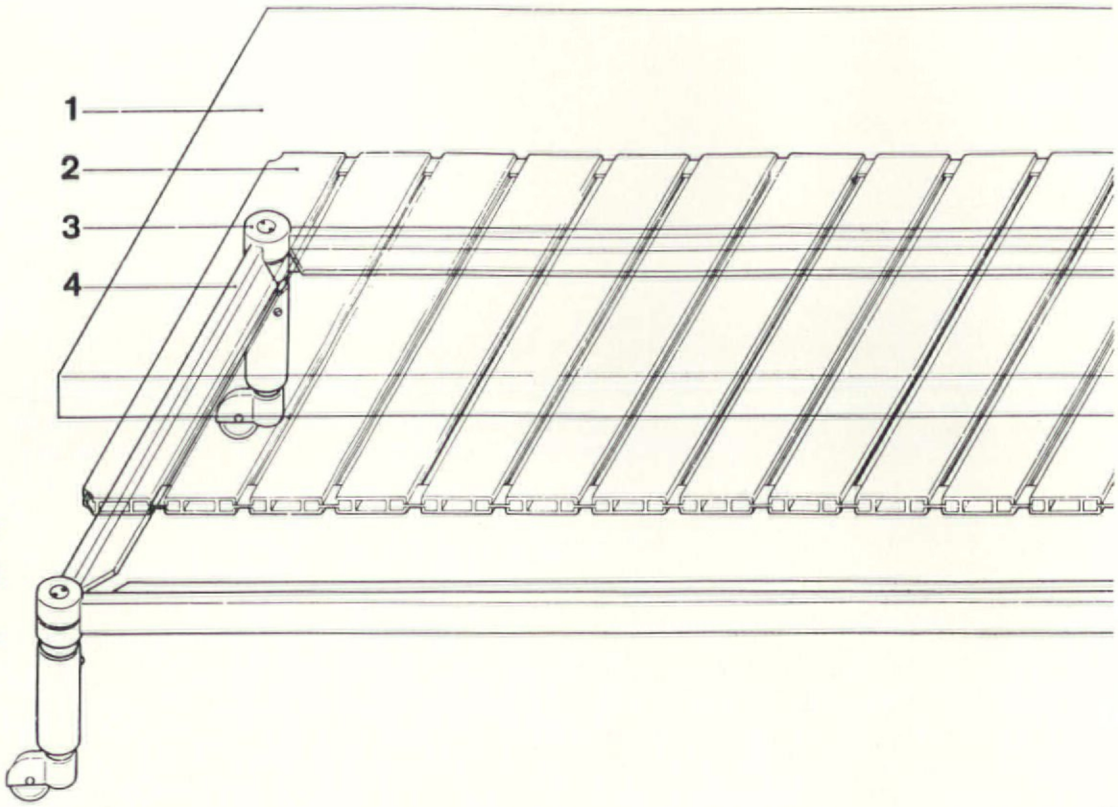
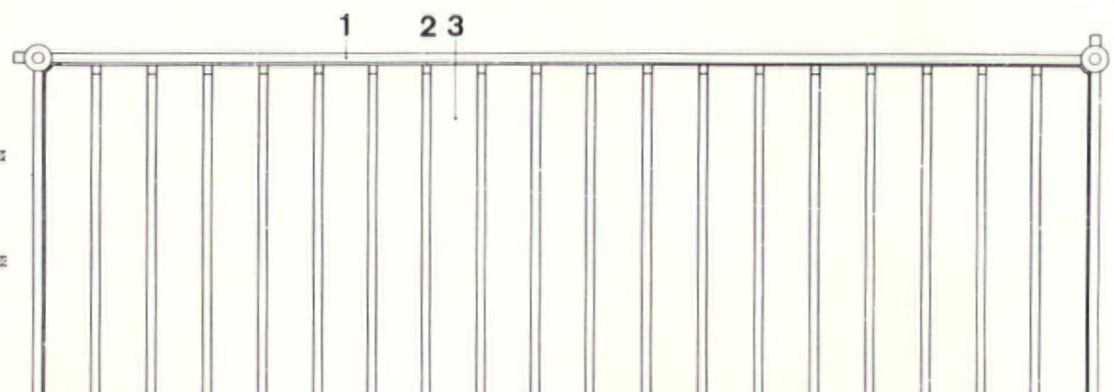


2

1
Details of the bed frame and leg
1 aluminium frame
2 aluminium connector
3 bolt
4 steel tube
5 rubber ring
6 shock absorber
7 plastic stopper

2
Diagram of the bed or stool components
1 cushion
2 timber or plastic laths
3 aluminium connector
4 aluminium frame

3
Plan of bed
1 aluminium frame
2 rubber connector
3 plastic or timber lath



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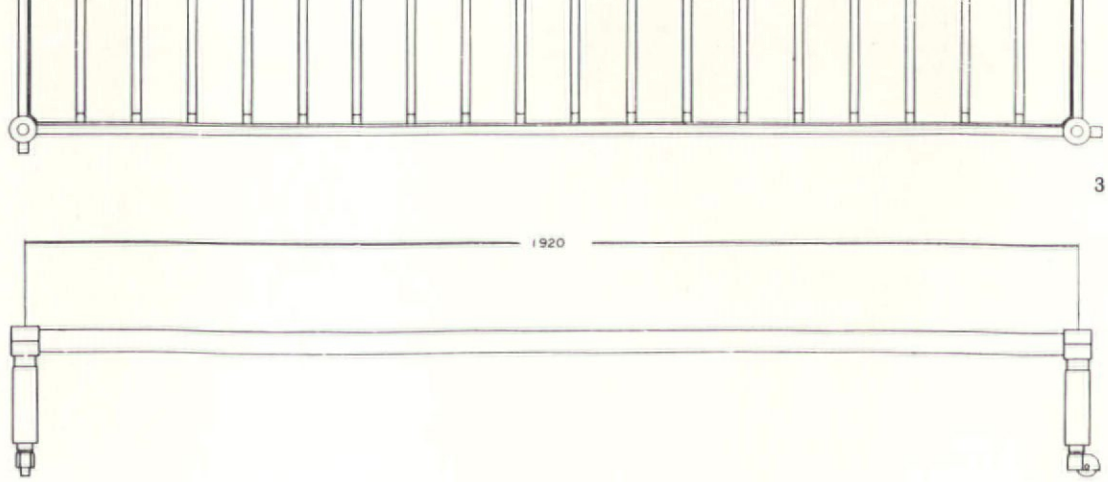

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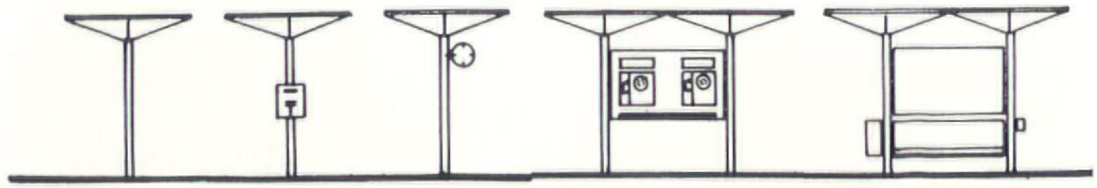

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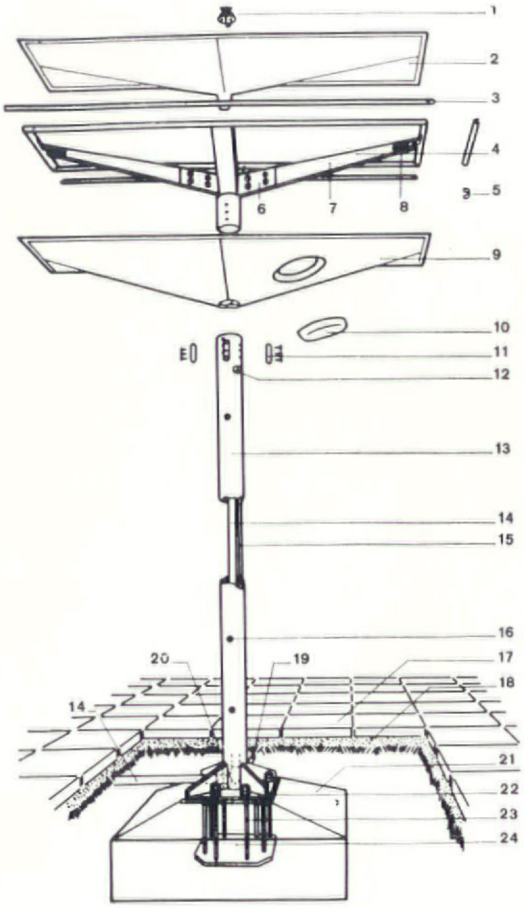


2

Street furniture

In an attempt to standardize street furniture the whole array of signposts, standards, telephone boxes and kiosks has been analysed and reduced to two distinct categories; those items that relate to vehicular traffic and its drivers and those that are used by pedestrians and idlers. The two are considered as distinct and separable and it is the latter group that GK has determined to study and resolve. What they have designed is an upright with a canopy that can be used alone, in twos or in groups to provide the framework for a surprising number of street fixtures—post and telephone boxes, hoardings, signs and clocks, shelters and kiosks and even public w.c.'s. This overall solution might seem to be unduly cumbersome when something as simple as a waste bin is required, but it does have the merits of consistency and in Japan where the street-scape is often chaotic and street names virtually non-existent, it does provide a readily recognizable object that ministers to all public services.

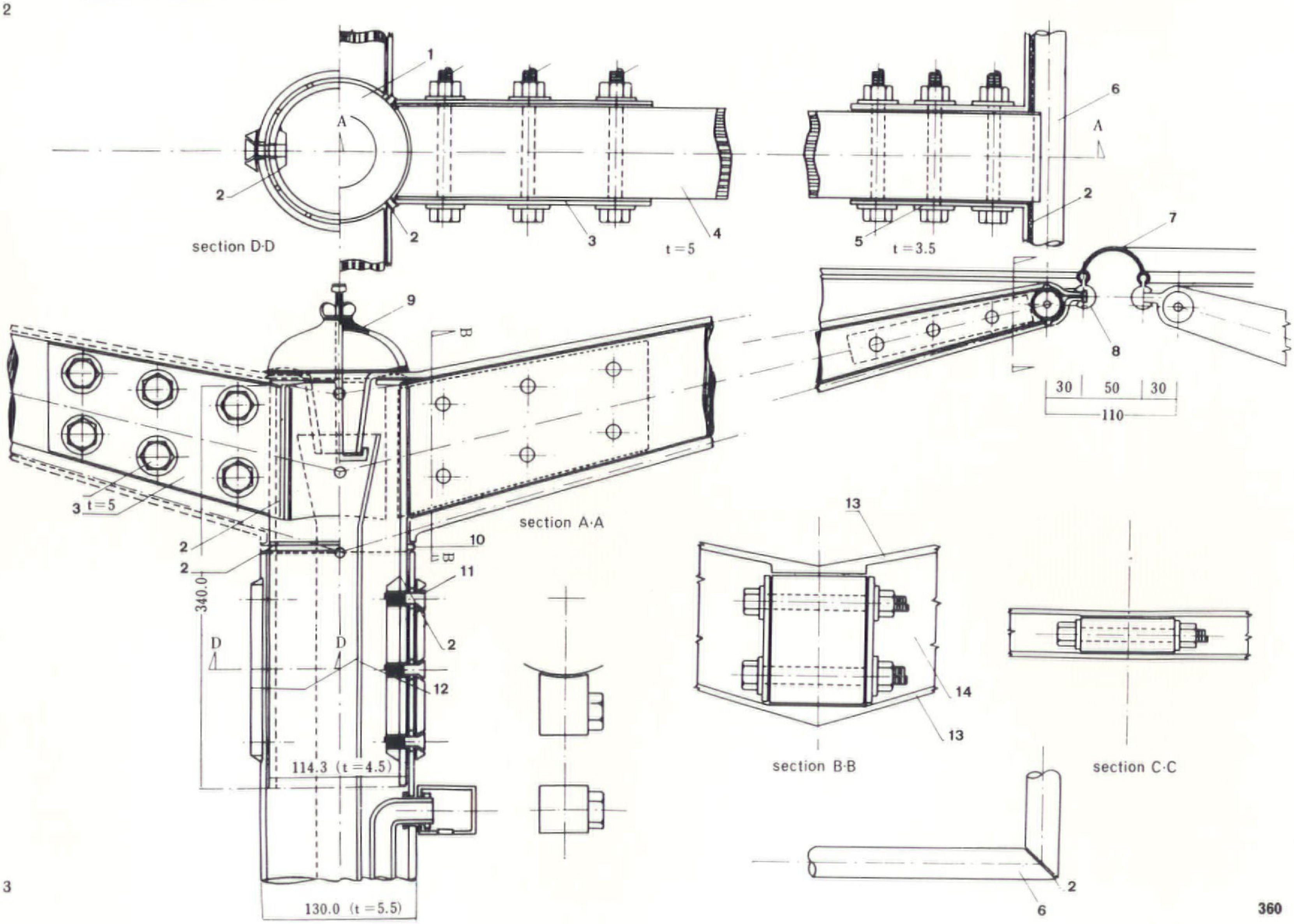
1
Various arrangements of the shelter units

2
Diagram illustrating the components

1 cap to downpipe
2 roof unit
3 PVC edging
4 supporting brackets
5 spading piece
6 steel plate
7 steel bracket
8 clip
9 ceiling unit
10 light diffuser
11 fixing
12 socket outlet
13 supporting pole
14 r.w.d.p.
15 electrical conduit
16 plastic sheath
17 precast concrete
18 sand bed
19 electrical cable
20 elbow joint
21 concreted base
22 base plate
23 anchor bolts
24 anchor plate

3
Plans and sections of structural details

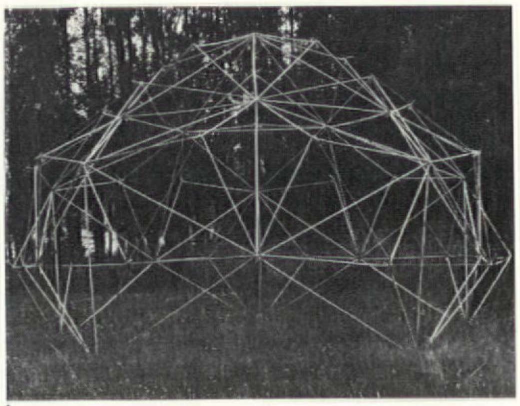
1 steel shaft
2 weld
3 steel plate
4 timber bracket
5 steel angle
6 tubular frame
7 PVC cover
8 aluminium trim
9 r.w.d.p. cap
10 washer
11 screw
12 PVC downpipe
13 PVC sheath
14 foam filling



3

Structures

D. G. Emmerich



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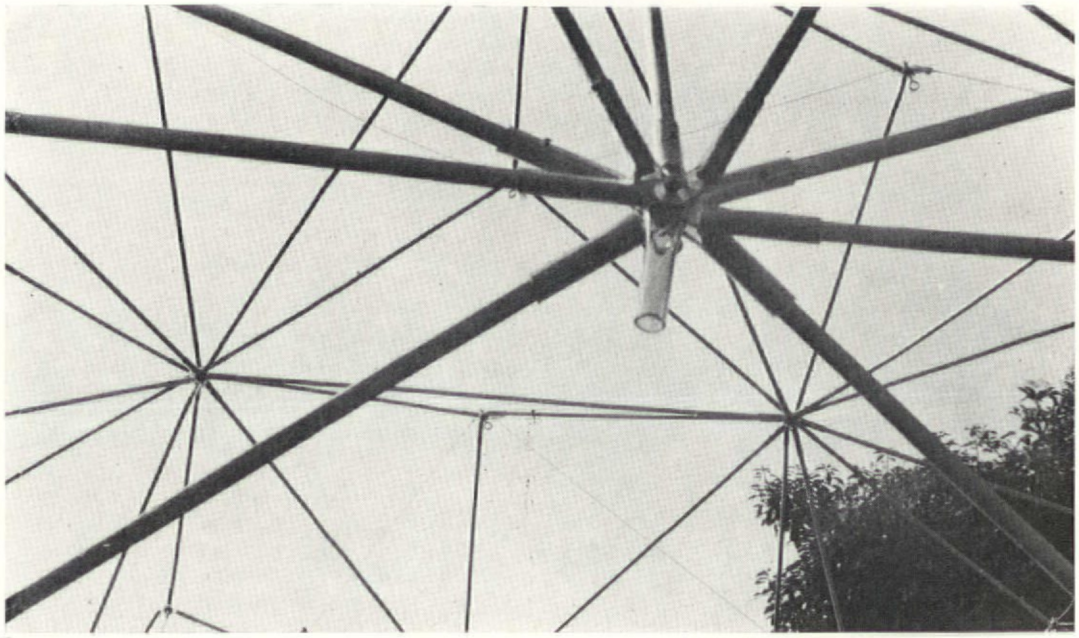


2

'Industrialization alone can increase the rate of production of houses . . . the mass-production of components is of the highest importance . . . the choice of new techniques devolves upon the architect'—technological cant.

But what sort of house are we to industrialize? An imitation of the hand-made product? The process of manufacture conditions the form, the form would thus be at odds with the process of manufacture. This failure in systems of production suggests that the cellular type of house as we know it is condemned: the machine for living in cannot, in fact, be made by machine.

The cellular type of house is usually a rectangle cut up into smaller rectangles. Materials account for 15 per cent of the cost, labour for 85 per cent. It takes 1000 man hours or 20 working weeks to build, but it takes twenty years of work to acquire. Yet, as it is made up of similar planes and partitions, it could be a functionalist machine.

In point of fact, an assembly of rectangular panels cannot be at the same time light and stable. Perfect symmetry would result in perfect equilibrium if external stresses were perfectly symmetrical, which, in practice, they are not. Consequently, the perfectly symmetrical system has no resistance to oblique forces. This disadvantage can be offset by increasing the weight so that outside influences become negligible. And vice versa: to offer resistance to external forces while at the same time economizing in weight, it is necessary to choose a geometrical system less confined than the cubic, which is fundamentally unstable.

Errors in conception arise from the confusion which exists between the concept of stability and that of resistance, which need bear no relation to one another, the one being geometrical in essence, the other physical. The stability of a structure does not depend on the resistance of the materials. It is true that as long as heavy materials are used, geometrical instability remains latent: the architect can draw any plan and the engineer will weight it. But these defects are incompatible with an industrial technique in respect of which the structural elements must be light, having regard to the cost of prime materials and transport.

For these reasons it is better to abandon our 'dwelling machine' and to turn rather to the 'building machine'—which, in fact, should have been the point of departure in the first place. . . . Machines require set and calculable norms: dimensions compatible with the working material, minimal series putting the tool at a discount, optimal number of components of investment, favourable weights from the point of view of maintenance, etc. These norms call for the manufacture of small parts in mass production of some light stackable patterns which when assembled give a stable structure. It is in terms of such norms that one must answer the questions: what parts? what form? what structure?

A stable structure must be built on the basis of a geometrical structural formula that is not susceptible to deformation. The deformability of a body depends upon the degree of freedom of its elements—of a given nature and in a given situation—in a combinative whole. The combination of various conditions of equilibrium are based on the concepts of topology, which is the exact science of structural composition, or at least it might become so in a figurative form.

At the same time, it is known that it is advantageous to construct a volume by means of a minimum envelope; in this way one arrives logically at dwellings having roughly the form of a surface of rotation, like the sphere, the ellipsoid, etc.

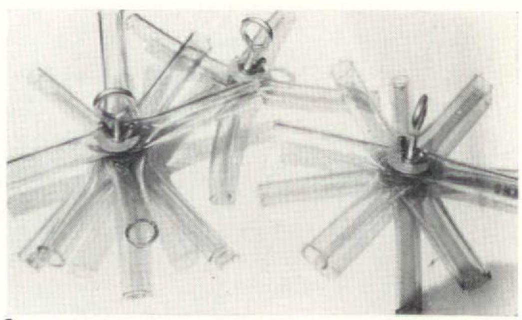
A surface incapable of development, thus incapable of deformation, has the advantage of being stable. But what is incapable of development implies the disadvantage that it is impossible to decompose such a surface directly into plane and simple elements in order to mass-produce it.

If a spherical envelope be decomposed into a number of polygonal elements it is transformed into a polyhedron, with as many faces as required; but it is difficult to effect this operation so as to obtain identical, regular facets and a limited number of standard designs. On the other hand, it is advantageous for a surface to offer variations of contour, such as ribs, folds, undulations . . . giving a structural height.

The present thesis represents an application of Cauchy's theorems, published in 1813, according to which a convex solid cannot be deformed if the polygons constituting its faces do not change. Thus, a solid with triangular faces cannot be deformed.

Thus if one cuts up polygonally based segments of a rigid polyhedron, and if one attaches them congruently on each polygonal face of a non-rigid convex polyhedron, one then gets a complex rigid polyhedron. To obtain a regular outline there must be a relationship or a series of relationships of regular solids either with regular faces and apices or with several types of regular faces and with identical apices. The operation can be repeated on the outline obtained until the desired profusion of apices, faces and arrises has been achieved. An outline thus serves as combinative structural formula for the following derivative, the first formula being the actual solid selected.

It is clear that by applying a group of polygons to each polygonal unit, a new unit is obtained, composed of all the polygons contained in the groups applied; if the polygons used are regular, the unit obtained will also be composed of regular polygons; finally, this operation can be continued on the new outline and so on. . . . This method of embellishment is comparable to the process of biological growth called gastrulation, where a more and more complex being develops by successive segmentation of the cells.



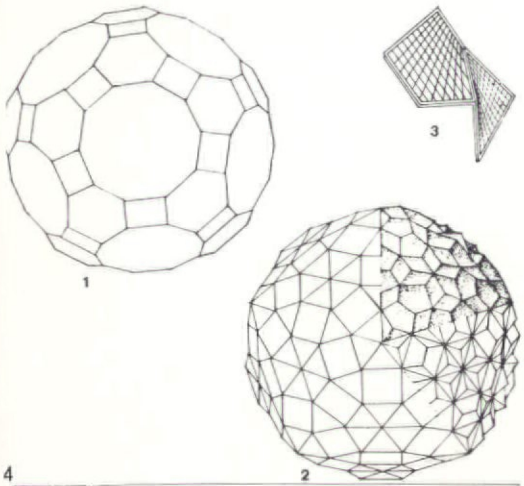
3

1
Experimental structure of standard rods and tension wires with flexible plastic joints

2
A detail view of the structure

3
The jointing system; plastic tubes and butterfly bolts with an eye through which to thread the tension cables

4
A dome made up of basic geometric planes 1, subdivided and enriched by the addition of supports to consist in its final phase of 360 rhomboids and 180 pentagons 2. The sketch 3 shows the individual unit of which the final dome might be built up and indicates how its surface might be further divided



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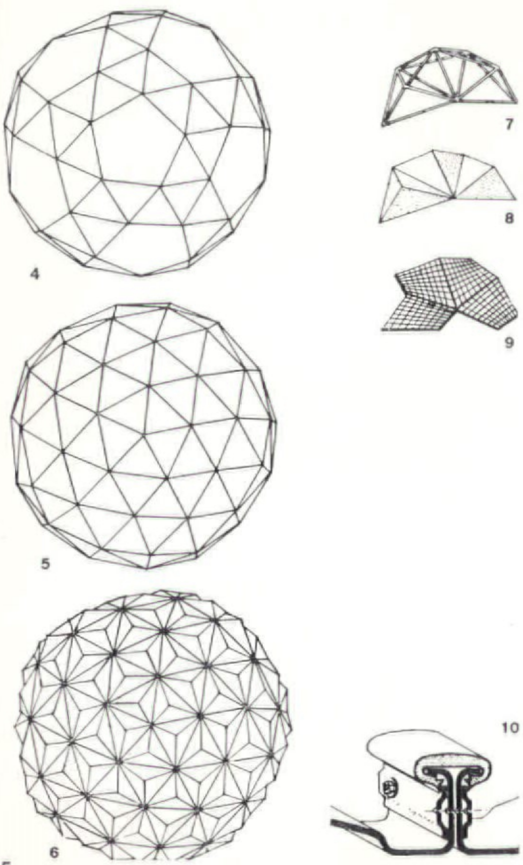

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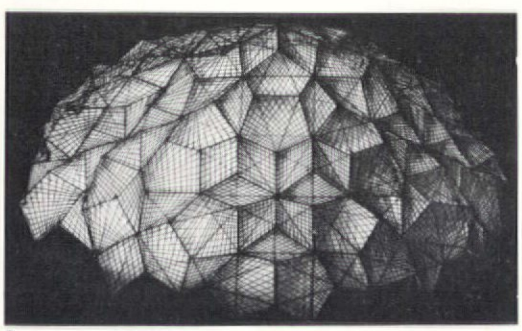

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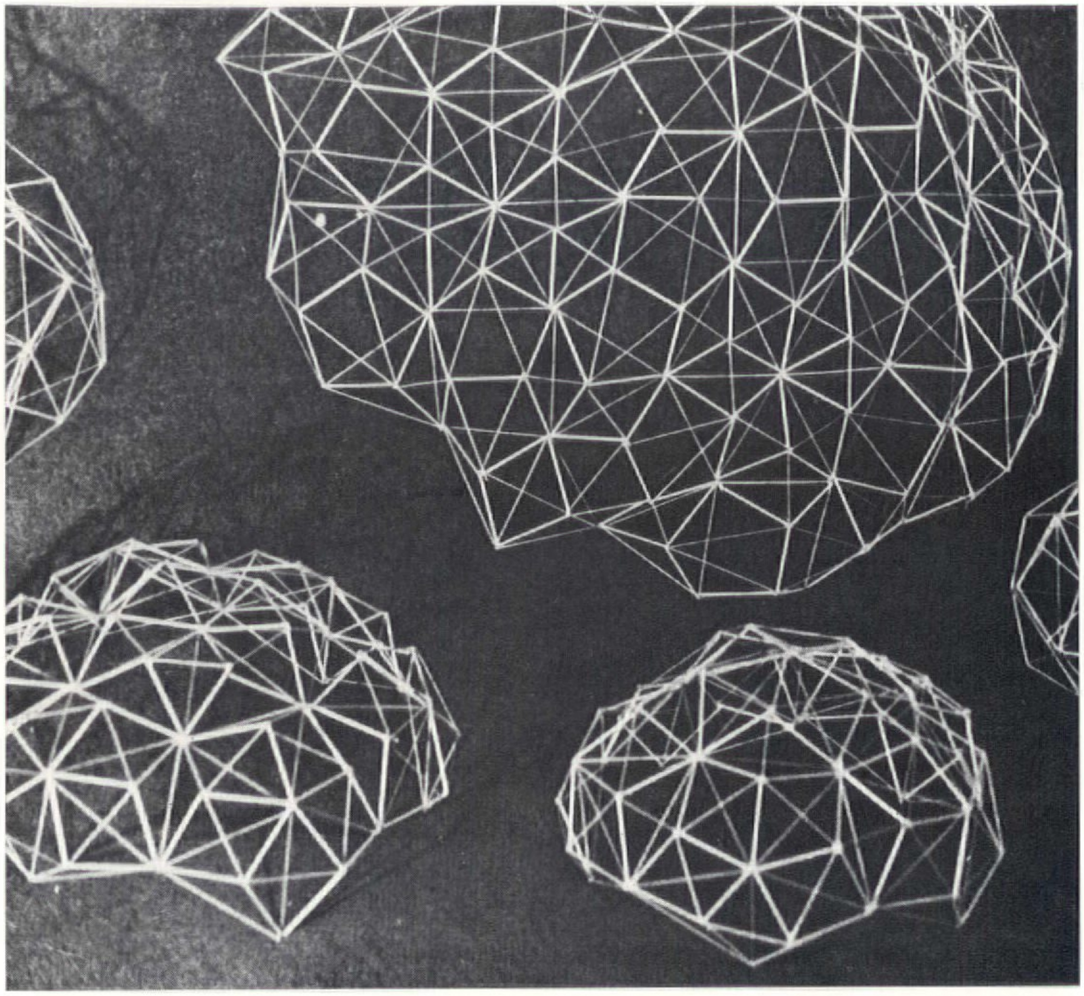

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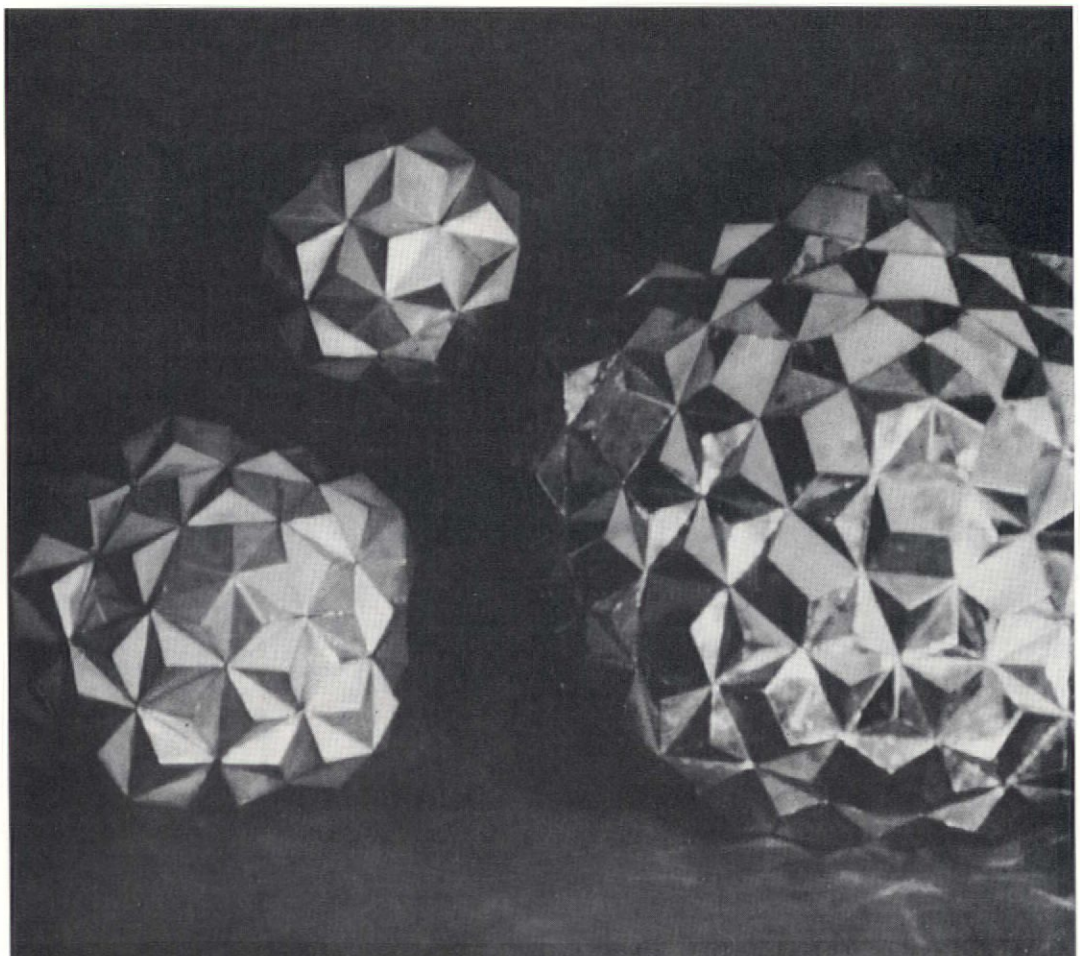

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5
A polyhedron of 92 faces transformed in phases by the addition of members, into a solid of 520 isosceles faces, 4, 5, 6. The sketches 7, 8, 9 illustrate various possibilities of manufacturing such as dome-units of welded tubular frames, sheet metal or plastic units or metal mesh units. The neoprene covered joint suggested is shown in 10

6
Model of a dome made up with metal mesh units as would appear internally lit

7
A series of domes of different size and varying form, all made from standard elements

8
Models of domes made with sheet metal units composed in accord with the system illustrated in 5

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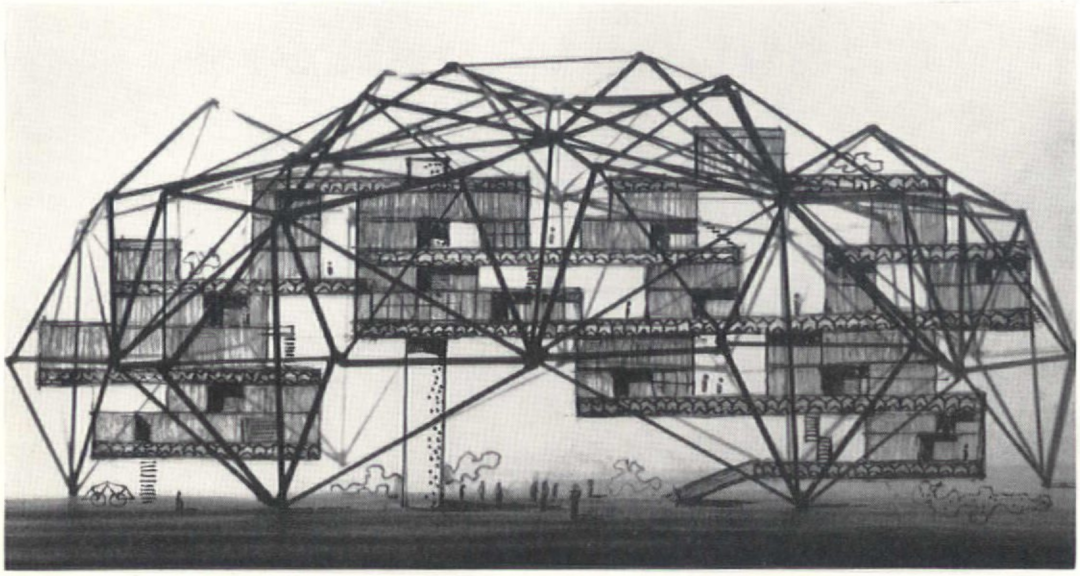

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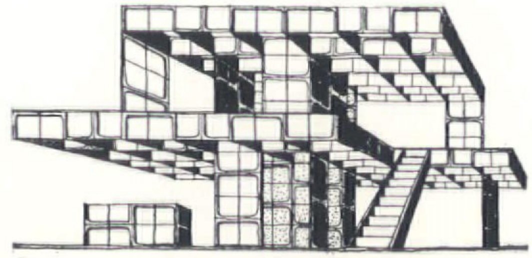

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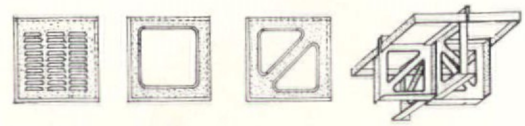

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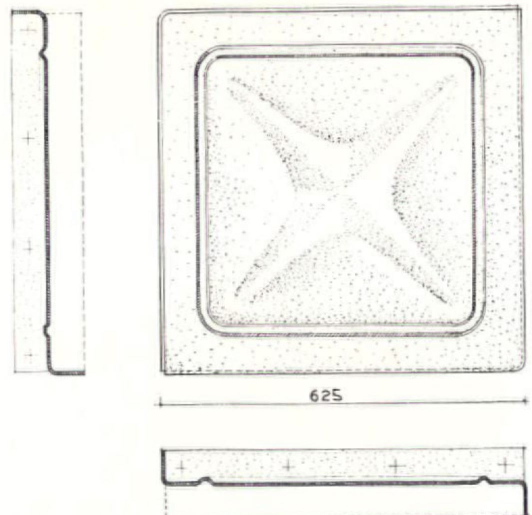


4

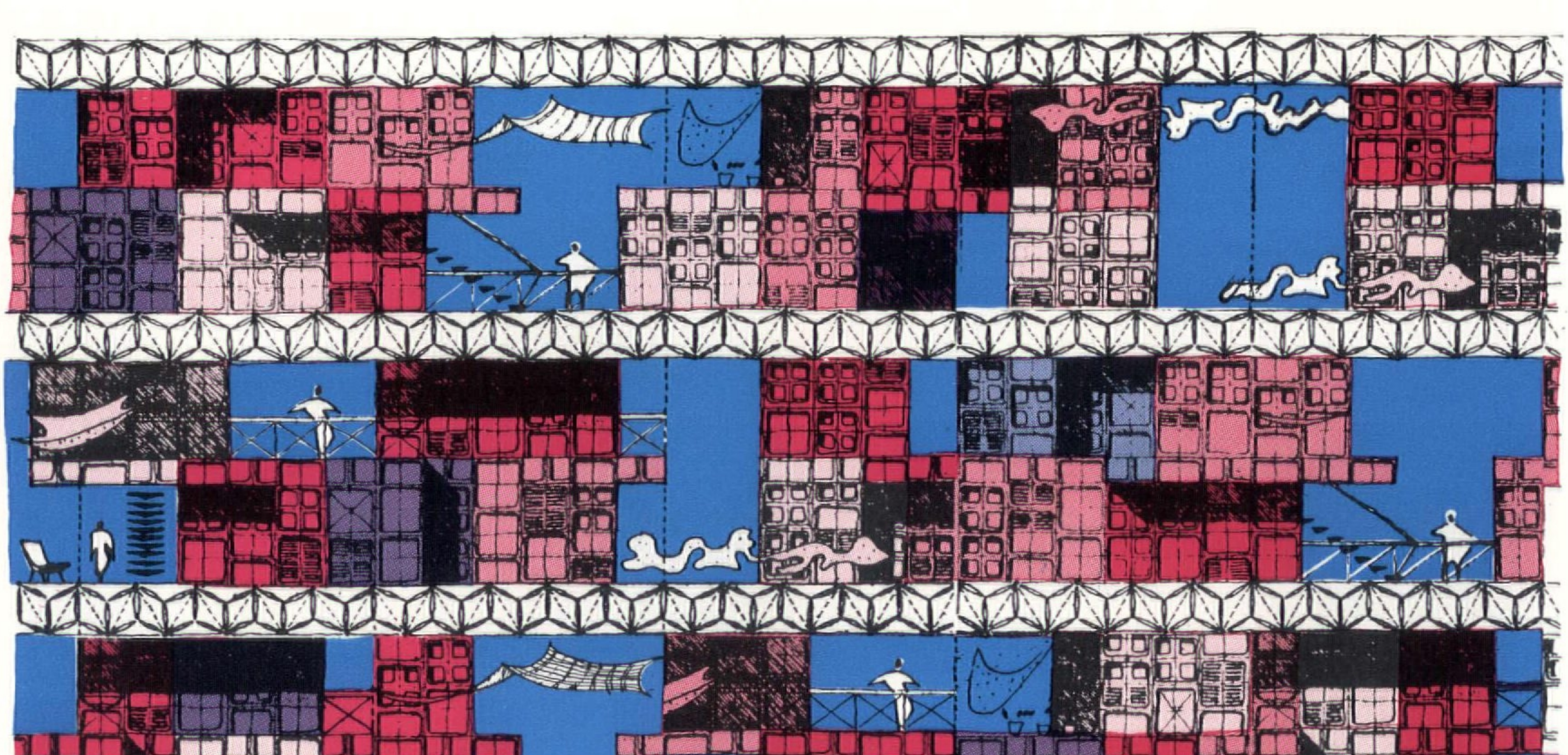
1
A controlled living environment incorporating several of D. G. Emmerich's projects—the envelope is a skeletal dome, the living units are made up from his 'Monoplaque' panels, while the platforms upon which they are set are the tension and compression structures with which he has been experimenting for several years.

2
A 'Monoplaque' structure dating from 1960. The building is entirely of square panels of a standard dimension, 625cm, but of different pattern and finish, bolted together to form beams, floors and walls.

3
Variants of the 'Monoplaque', with a sketch showing their assembly.

4
A 'Monoplaque' panel.

5
'Le bidonville de luxe'—a do-it-yourself housing unit of 'Monoplaque' elements on platforms of compression rods and tension cables. The standard elements are few but there is no need for monotony and the needs even of the most rebellious individualists can be satisfied.



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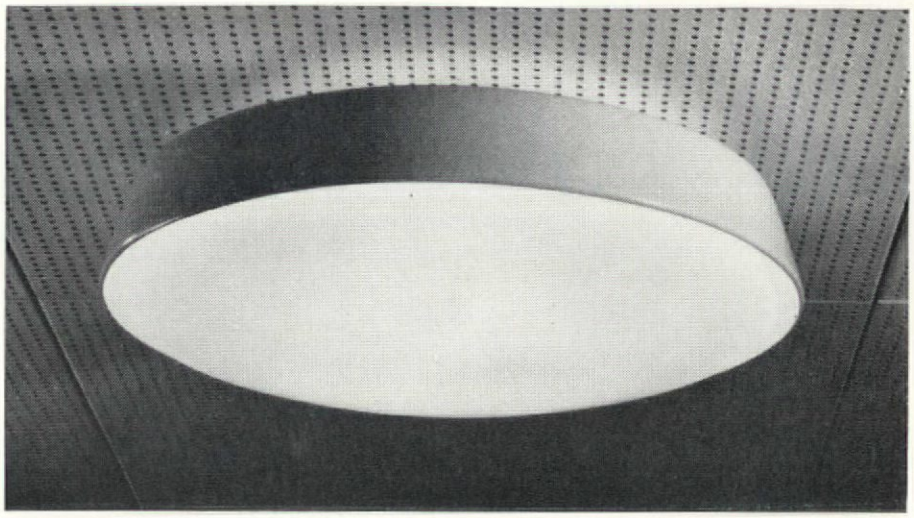
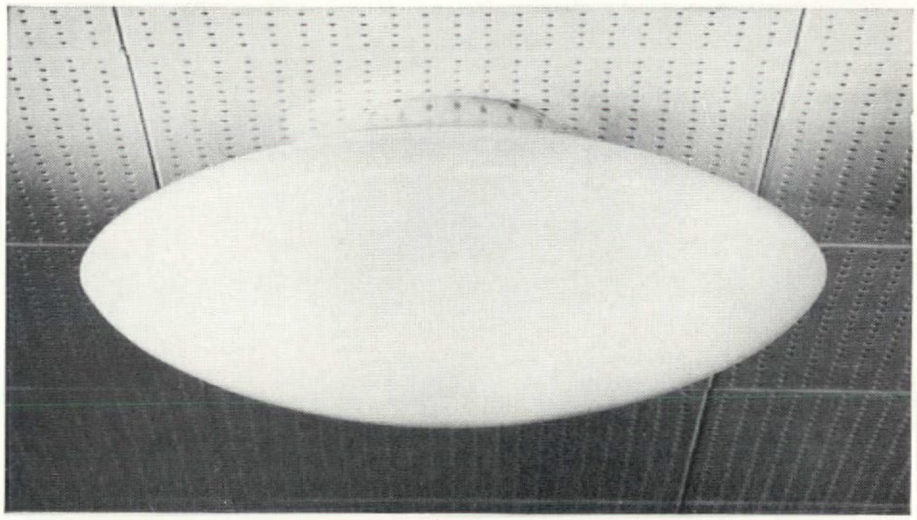
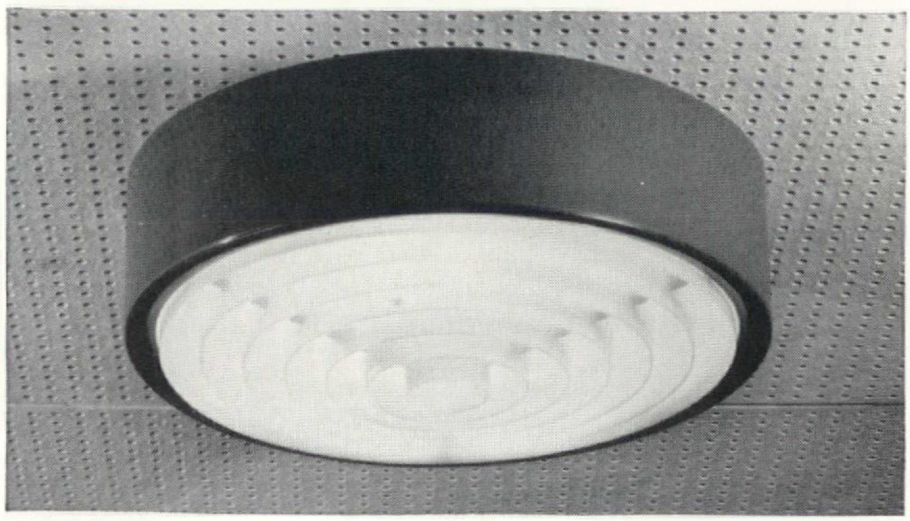
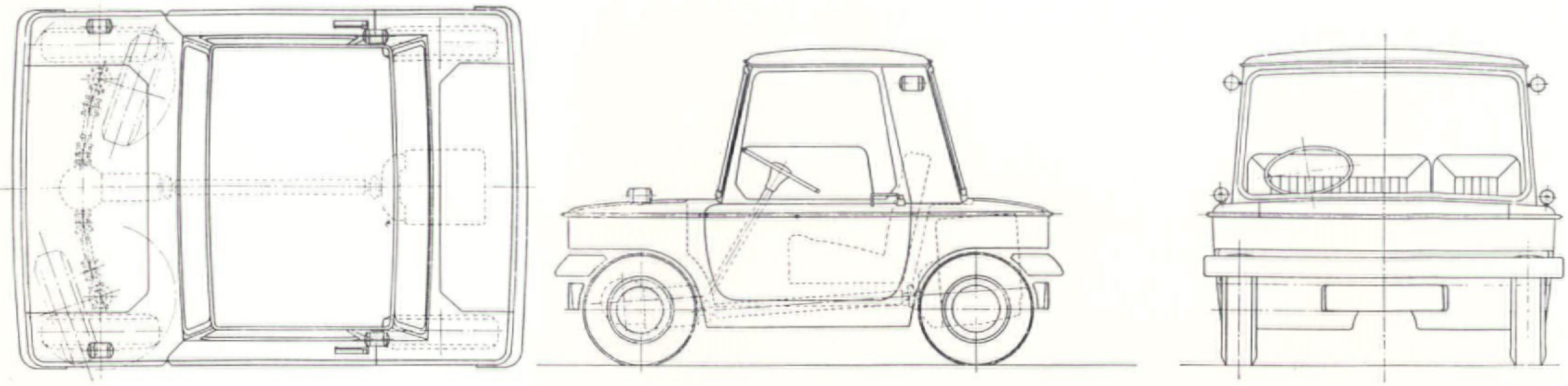








1

2

1
Plan and elevations

2
Mock-up of the town sedan

3
Plans showing mechanical arrangement
- x engine and drive layout plan
- y front wheels with full right-hand lock applied
- z front wheels with full left-hand lock applied
- 1 180° drive and steering boxes
- 2 10° universal couplings and sliding joints
- 3 differential and gearbox assembly
- 4 propeller shaft and flexible couplings
- 5 engine and clutch assembly
- 6 front end
- 7 in reverse gear
- 8 in forward gear

4
Plans showing parking and manoeuvrability
- A Diagram showing conventional street parking with indispensable manoeuvring allowances
- B Diagram showing 12 town sedans parked end on to kerb in four street parking spaces
- C Driving in 'in one', starting close in and abreast of space. The white arrow denotes the front end of the sedan

Town sedan

Eric J. Roberts & Associates have designed a town sedan or minimal motor-car that can park either in the conventional position or end on to the kerb. The front end steers sideways when full lock is applied, and the car then pivots on its rear axle. Its vital statistics are: overall length, 89in; overall width, 63½in; overall height, 56in; turning circle, 156in; steering, 180in; wheelbase, 58½in; track, 51in.

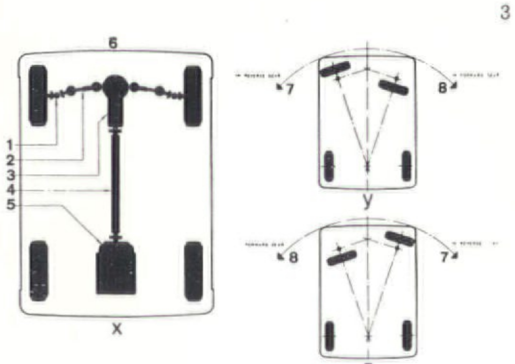
Thus three town sedans fit side by side within one 20ft × 7ft 6in street parking space.

The gearbox, differential, and drive assembly at the front evens up weight distribution, and the sound-insulated rear engine cell ensures quiet running. Front wheel traction enables a 180° steering capability to be achieved, with a conventional steering option if required.

The design provides good vision and safety. Winding windows give draught-free ventilation with easy hand-signal facility.
The wheel arches are open at the front and rear ends, the shape being defined by the bumper and valance returns. This solution to front and rear end design means easy manufacture, upkeep and cleaning. The bumpers can thus absorb impact without damage to coachwork. There is a locker under the bonnet.

The design study has been submitted to the Ministry of Transport's 'Cars for Cities' committee, which is due to report its conclusions later this year on future traffic requirements.

3



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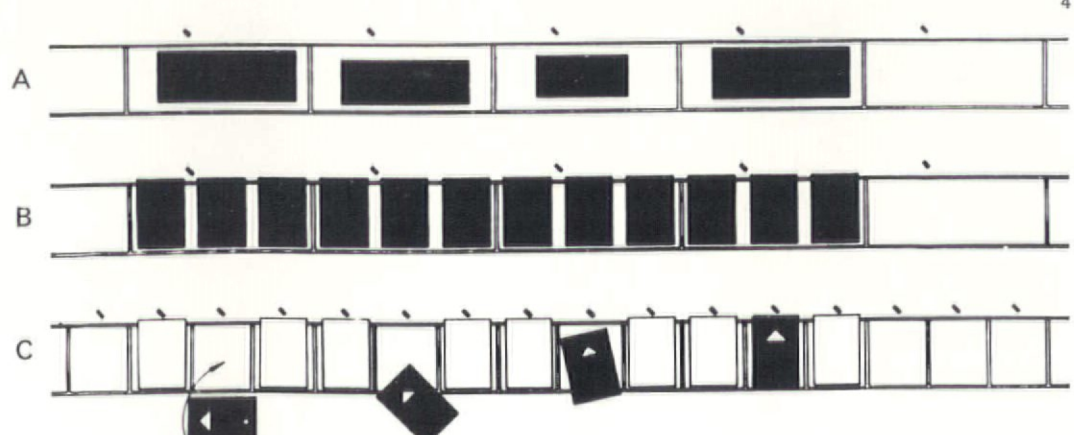
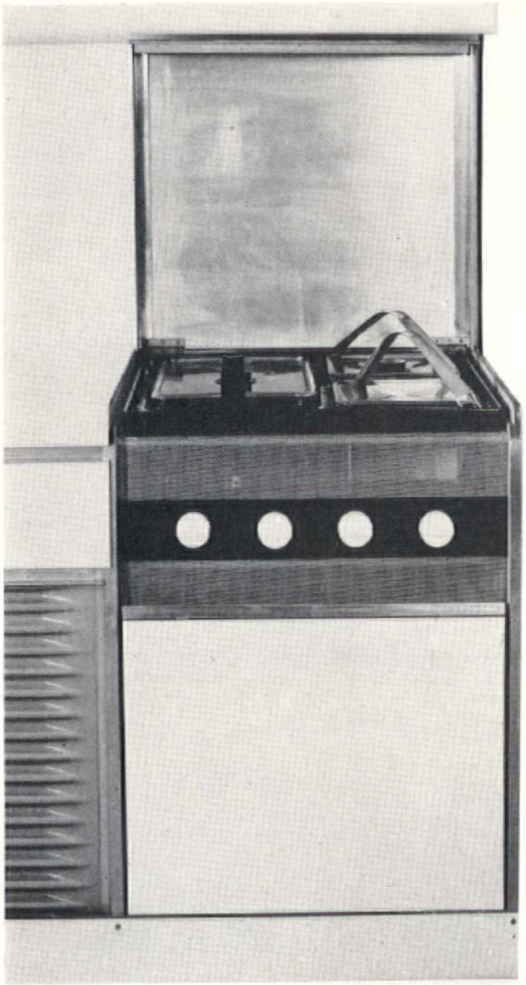


Design

Calor gas cooker 1–5

Hornsey College of Art's 'mobile shelter'* included a specially designed kitchen storage unit comprising cabinet, Calor gas cooker and cooking utensils. The whole thing swivels out into one of the extension areas. The unit **2, 5** is of 6mm plywood faced with Formica, with corrugated vacuum-formed ABS plastic, cheap, flexible, yet rigid crosswise. The sink and taps are integrally designed.
In the case of the cooker, **1,** a standard Flavel oven interior was used, located under the hob.

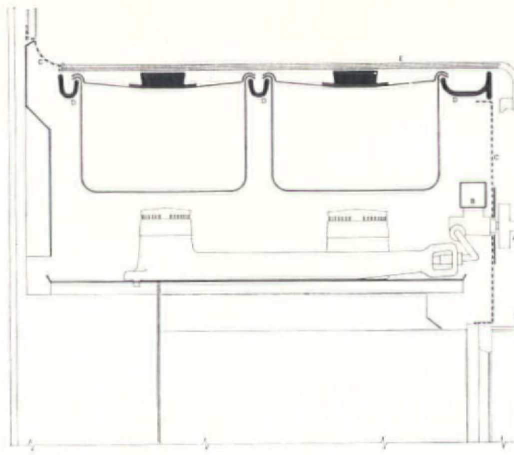


1

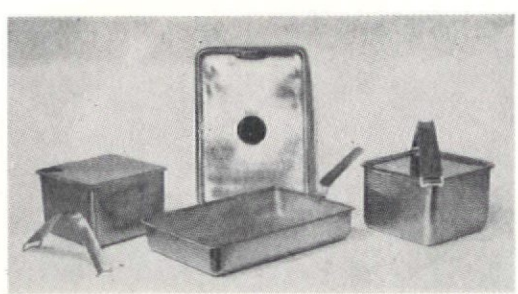
2

The design was conceived because in a restricted mobile holiday home, saucepans of hot liquid on open flames are a fire and accident hazard. So specially designed stainless steel saucepans **4** drop into the hobs right up to their rims **3,** and the gas heads under them are lit by automatic ignition. To ensure the exact location of pans over the Flavel burners, the pans are suspended by rims around their top edges, onto hob tops that also collect spillage. The hobs are rectangular to economize limited top area. The kettle is simply another pan shell with fixed top and corner pouring hole, and clip-on handle. To prevent the combustion products from smothering the burner flame, there is a large perforation area at the front of the hob and a vent in the upstand behind.
The automatic ignition can be either by gas or electric battery—not yet decided.
The hob top is in vitreous enamelled cast iron; the front is of perforated aluminium with a black Formica control panel; the oven door front is of white Formica with aluminium finger grip.
The cooker was designed and made by student Peter Thorn, the pans by student Roger Taylor; supervised by Victor Hyndley (Senior lecturer, Industrial Design) and Clive Latimer (Principal lecturer, Advanced Studies).

**AD* August 1964, page 411



Cross section of the hob (above)
A Control knob
B Gas drain
C Air grills
D Enamelled cast-iron top of cooker supporting pans
E Hood/working surface in closed position



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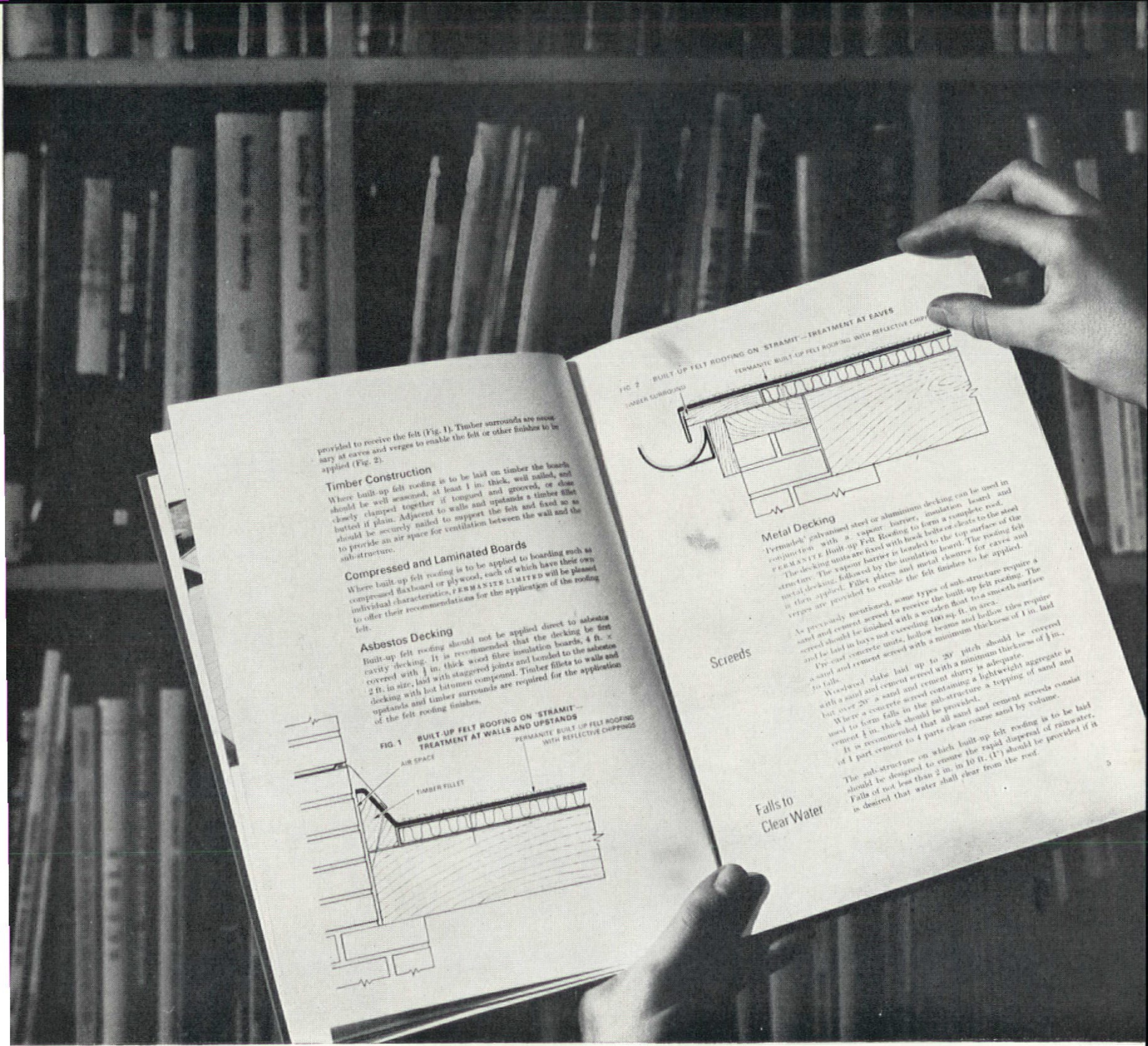
6

COID Design Awards 6–12

This year, the Duke of Edinburgh's prize for elegant design went to Peter Dickenson for his auditorium seating **6** made by Race Contracts. The judges were HRH the Duke, the Viscountess Eccles, David Hicks, Ernestine Carter, and Milner Gray.
There were 16 Design Awards. The judges, who as usual had to make their selection from products in Design Index or the Design Centre during 1964, were Anthony Heal, Helen Challen, Richard Stevens, Robert Gutmann and Shirley Conran.
AD has already applauded the Race seating (Oct. 1964, page 531) as well as Hille's polypropylene chair **7** by Robin Day (Oct. 1964, page 531) and wall storage system by Alan Turville (March 1965, page 153). All three are obvious winners, but surely David Mellor's ceremonial 'Embassy', made-to-order, sterling silver tableware should not qualify? Robert

7



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8

Welch, designed the other cutlery and flatware set (Old Hall Tableware) that was premiated.

Light fittings gained two awards, both Atlas: the very architectural 'Arrowslim' **10** range by P. Rodd and J. S. Barnes, and a hospital ward incandescent bed-head fitting **11** by R. Brockbank. Another electrical products winner was Carnscot Engineers' 2Kw convector heater **9** by B. Burns, a tidy job with integral polypropylene handles at either end of the chrome plated top, and costing under £9.

The Adamsez 'Meridian One' sanitary suite **8** by K. Holscher and A. Tye, with A. Adams, is sculpturally exquisite. It is in white glazed fireclay with acrylic WC seat, and all plumbing is concealed. It is designed to fit 6in tile sizes but can be adapted to the 4in/10cm module. The height of both bidet and WC has been reduced to 14in from the traditional 16in.

Interesting choices for award-winners are a slide rule (Thornton, designed by N. Stevenson); a yard-arm pick-up stick with magnet handle (Mabar Manufacturing, by D. A. Morton); a plastic-handled saw (Spear & Jackson, by B. Asquith); deceptively simple ceiling roses and switches (GEC, by Noel London); and a range of gay make-it-yourself rag dolls (Sari Fabrics, by J. & M. Wilcox).

As to the two textiles selected (Edinburgh Weavers' cotton satin, by Alan Reynolds, and West Cumberland Silk Mills' 'Kestna' range by Sii Nikolas Sekers), we feel we have seen dozens that we prefer.

Lastly, Primavera's excellent striped deep-toned bedspread-blankets by Henry Rothschild and design group—certainly the answer for the student bed-sitter. Though made of 100 per cent wool, they cost under £4 13s.

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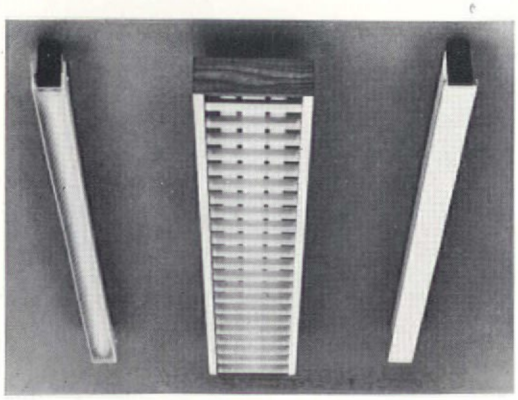

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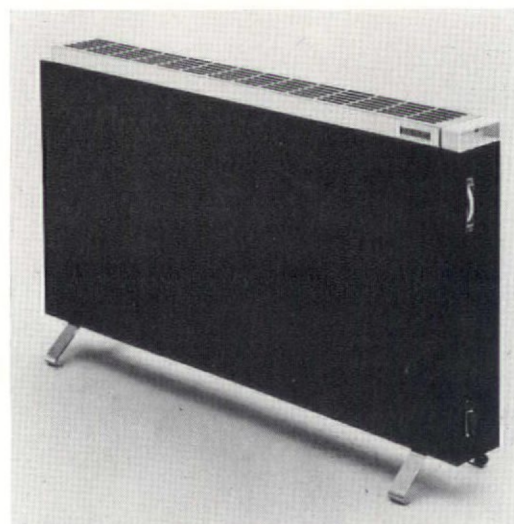

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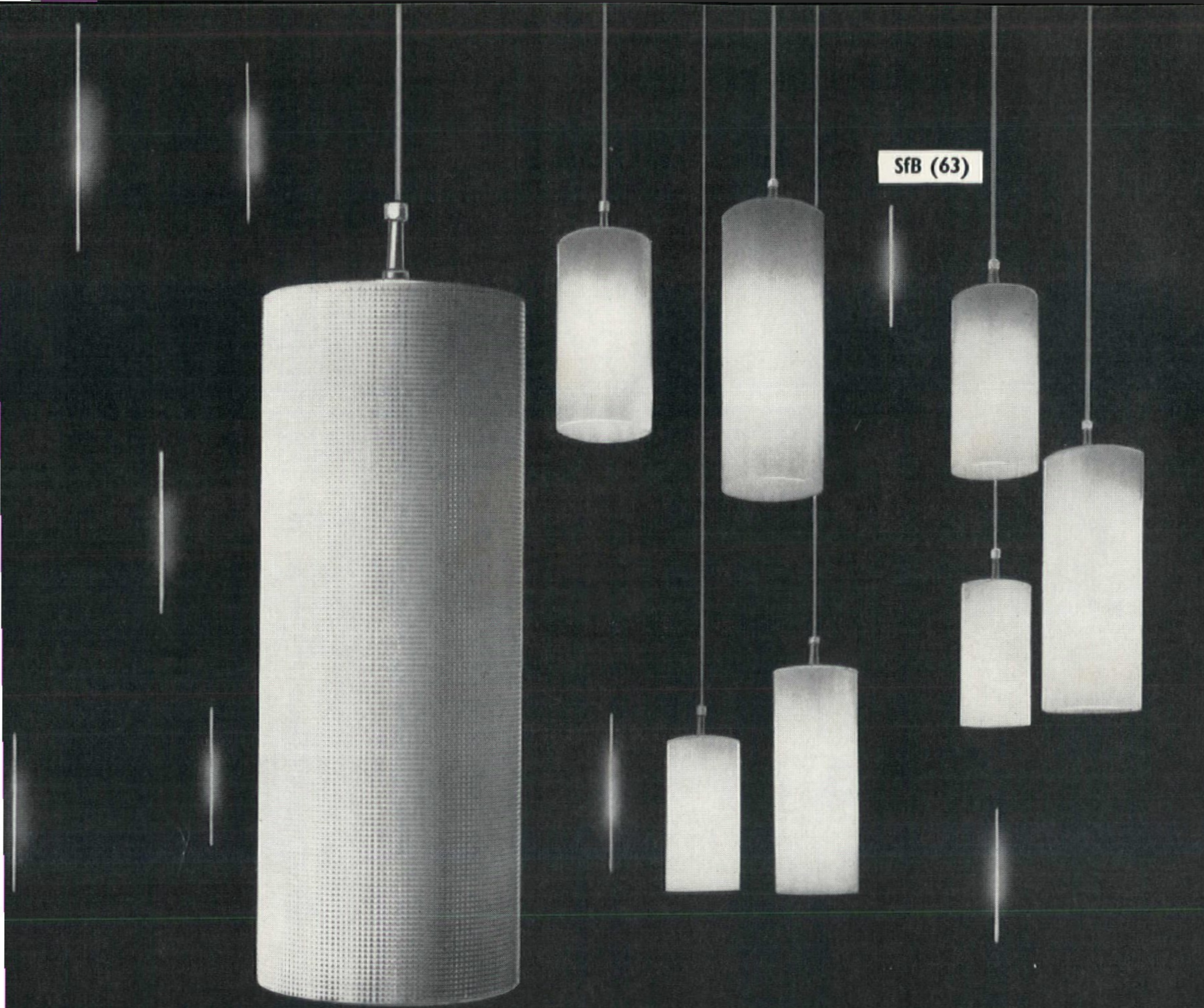

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Trade notes

Alexander Pike

To obtain additional information about any of the items described below, circle their code numbers (B1, B2 . . . etc.) on the Readers' Service Card inserted elsewhere in this magazine.

B1 Skirting cable ducting 1

Hartley Electromotives Ltd., Octopus Works, Monkmoor, Shrewsbury

A rigid PVC skirting 2¾in × ¾in secured by a simple clipping system provides two separate wiring channels. Available in black, white, grey or ivory at £3 10s per 100ft.

B2 Lettering machine

J. Halden & Co. Ltd., Rowsley Works, Reddish, Stockport, Lancs.

The Gritzner lettering device attaches to a horizontal bar fitting any drawing machine and has a keyboard with full alphabet, figures and a range of conventional symbols. Claimed to be 3·5 times faster than stencilling. Price £99 10*s*.

B3 Ceiling board

Treetex Acoustics Ltd., 8 Guilford Street, London, W.C.1

Treetex Slotac panels are now available with one 2ft edge rebated to simplify fixing and to improve end joints.

B4 Suspended ceiling

The Merchant Trading Company Ltd., Adrienne Avenue, Southall, Middlesex

The Metacoustic ceiling, hitherto available in aluminium strip, can now be obtained in PVC with a simplified clip-on method of assembly. Price expected to be about 45*s* per sq yd fixed.

B5 Press-button telephone 2

Interphone Ltd., 315 West End Lane, London, N.W.6

For desk or wall use the Sprint models provide full intercommunication and conference facilities. Instruments with 8 or 16 buttons at 14*gns* and 15*gns*.

B6 Rust remover

Surface Treatments Ltd., 133 Great Hampton Street, Birmingham, 18

A combined degreasing and acid-pickling solution for the removal of grease, oil, rust and scale from steel, Meta-kleen is claimed to give temporary protection against further corrosion and provides a phosphate film for future painting.

B7 Fan convectors

F. H. Biddle Ltd., 16 Upper Grosvenor Street, London, W.1

Four new models in the range of Forceflo Noiseless Fan Convectors have outputs from 27,000 B.Th.U. to 62,000 B.Th.U. Built-in or remote three-speed switches provide variable output, and clock controls are available to programme a number of heaters on an automatic basis.

B8 Thermal storage heaters

Falks Ltd., 91 Farringdon Road, London, E.C.1

Storawarm controlled output storage heaters are available in capacities of 56,000, 75,000 and 112,000 B.Th.Us, and have push-button controls for the two-speed fans or for automatic thermostatically controlled operation. Prices £49 15*s*, £62, £76 10*s*.

B9 Plastic coatings

Consett Iron Company, Consett, County Durham

A new brochure describes facilities offered for the PVC coating of steel or aluminium sections now applicable for sheets up to 40ft × 6ft.

B10 Thin film radiators

Aviation Products Division, Goodyear Tyre & Rubber Company, 1,144 E. Market Street, Akron 16, Ohio, U.S.A.

An electric radiator which can be applied to a wall like wallpaper consists of thin resistance wires in a filling of nylon net sandwiched between two outer layers of vinyl. Operating on 240v the surface temperature is 100°F.

B11 Ultrasonic cleaner

Elliott-Automation Ltd., Reading, Berks.

Intended for laboratory instruments and for the watchmaking and jewellery trades, the cleaner houses a 2-litre tank and 60W generator in a case 14in × 8in × 9½in.

B12 Portable shower cabinets

Marine and Industrial Plastics, Lower Quay, Fareham, Hants.

Originally designed by UK Atomic Energy Authority for decontamination purposes, but with obvious uses in other areas, the glass fibre cabinets have a built-in tank and a perforated floor, allowing the water to be re-circulated. For highly toxic conditions the unit can be sealed and used as an air lock.

B13 Bathroom fittings 3

Miraflo Ltd., Cheltenham, Gloucestershire

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B14 Extruded aluminium weatherboard

The British Aluminium Company Ltd., Norfolk House, St. James's Square, London, S.W.1

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B15 Automatic fire detector 4

Telephone Rentals Ltd., 197 Knightsbridge, London, S.W.7

Operating automatically at 135°F—or before this if there is an abnormally rapid rise in air temperature—this model is 2¾in long by 2½in diameter.

B16 Non-staining hospital castors

Homa Engineering Ltd., Homa Works, Cosby, Leicester

A new range of lightweight ball bearing castors claims to overcome the problems associated with the permanent staining of vinyl floors due to the reaction of certain agents in rubber components.

B17 Plastics consultancy

Polyplan Ltd., 58 London Road, Leicester

A brochure on sources of information on the use of plastics in building design and construction also lists the services offered by these specialist consultants.

B18 Built-up felt roofing

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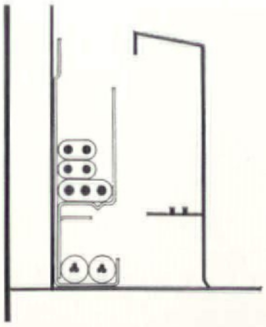

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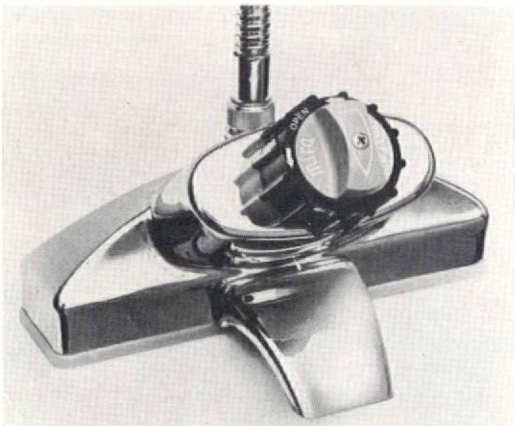

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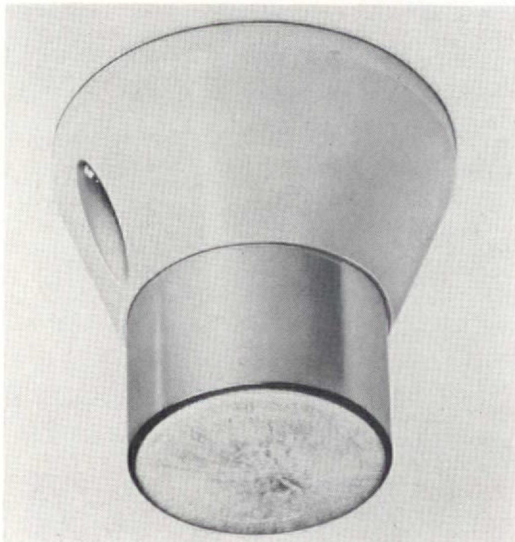

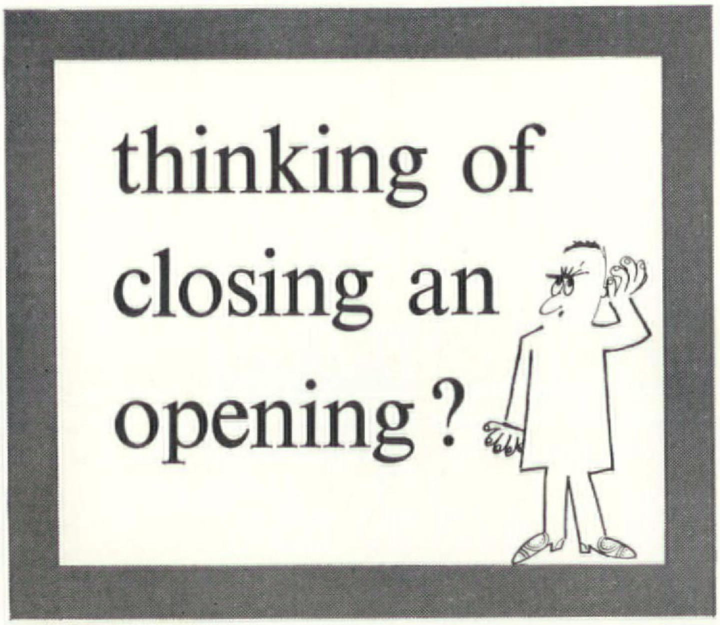

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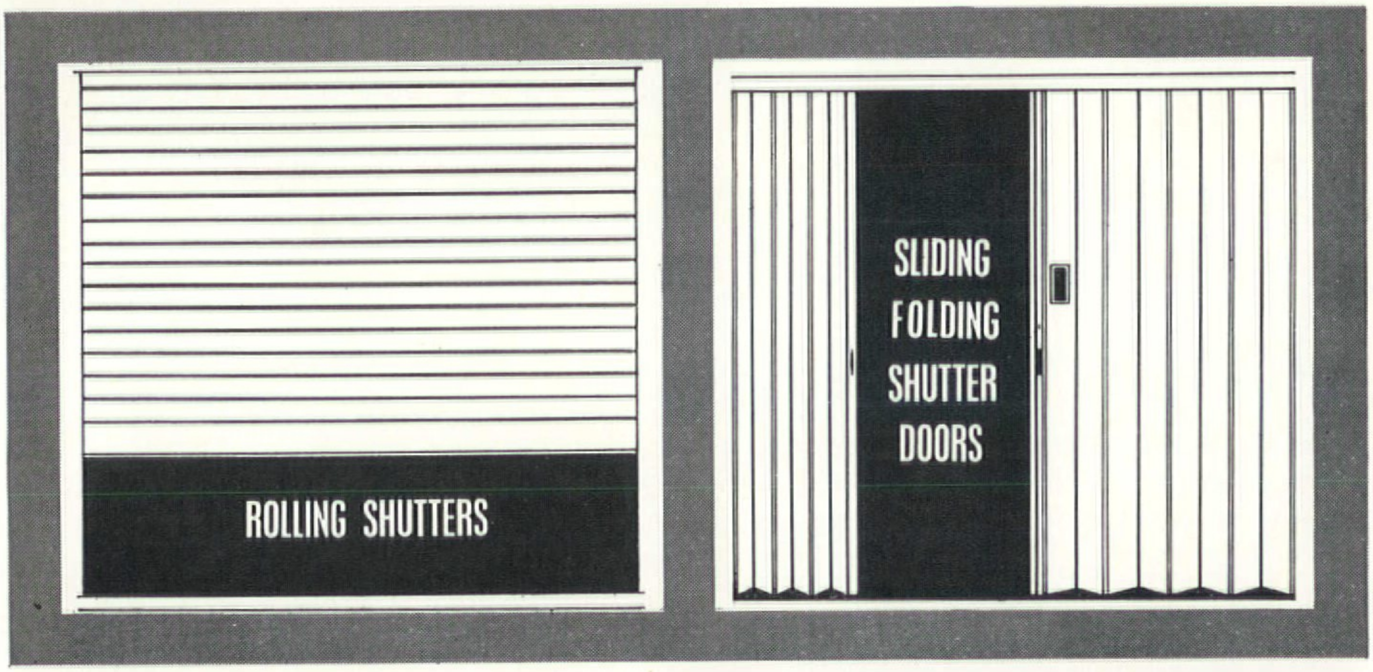

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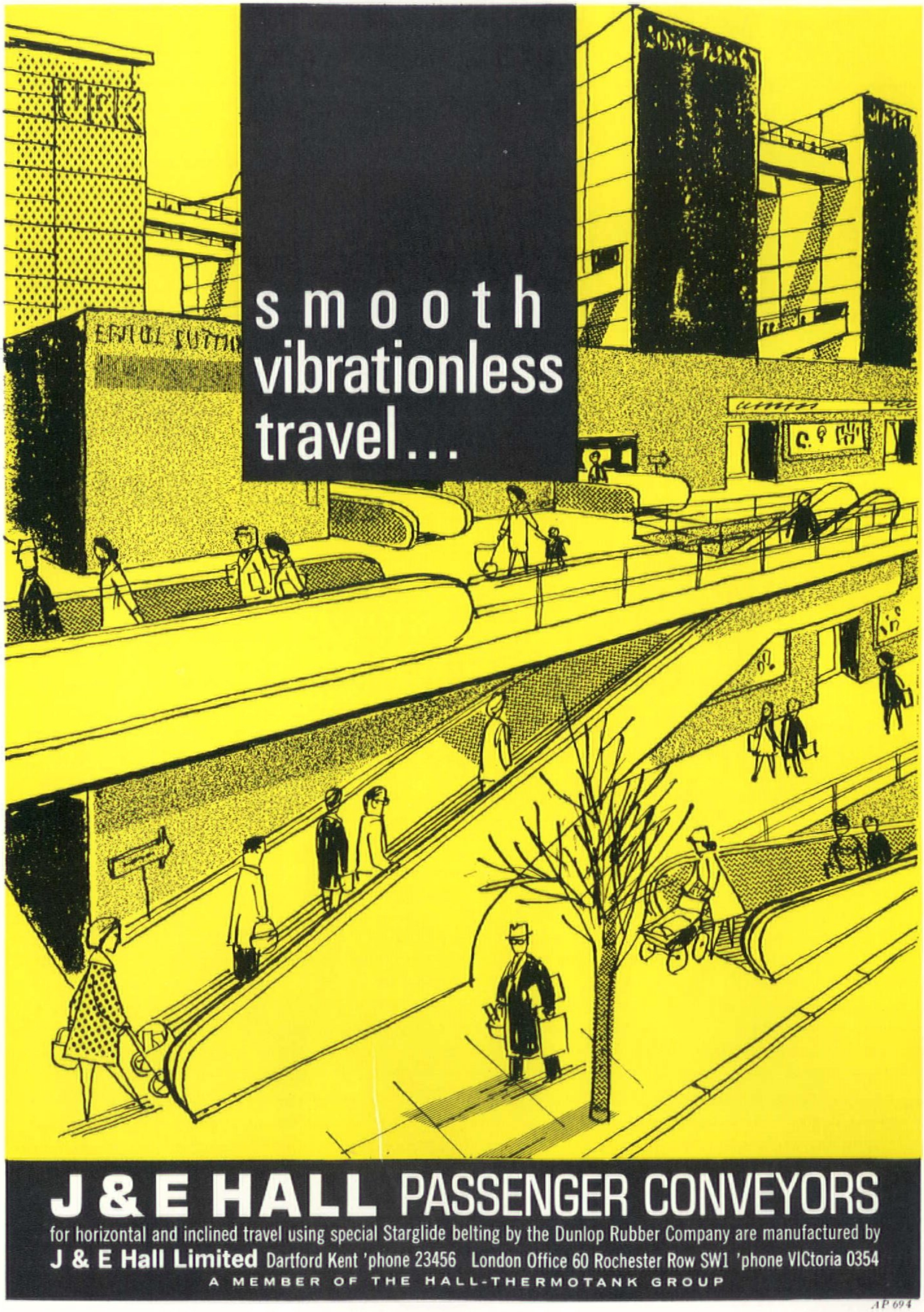
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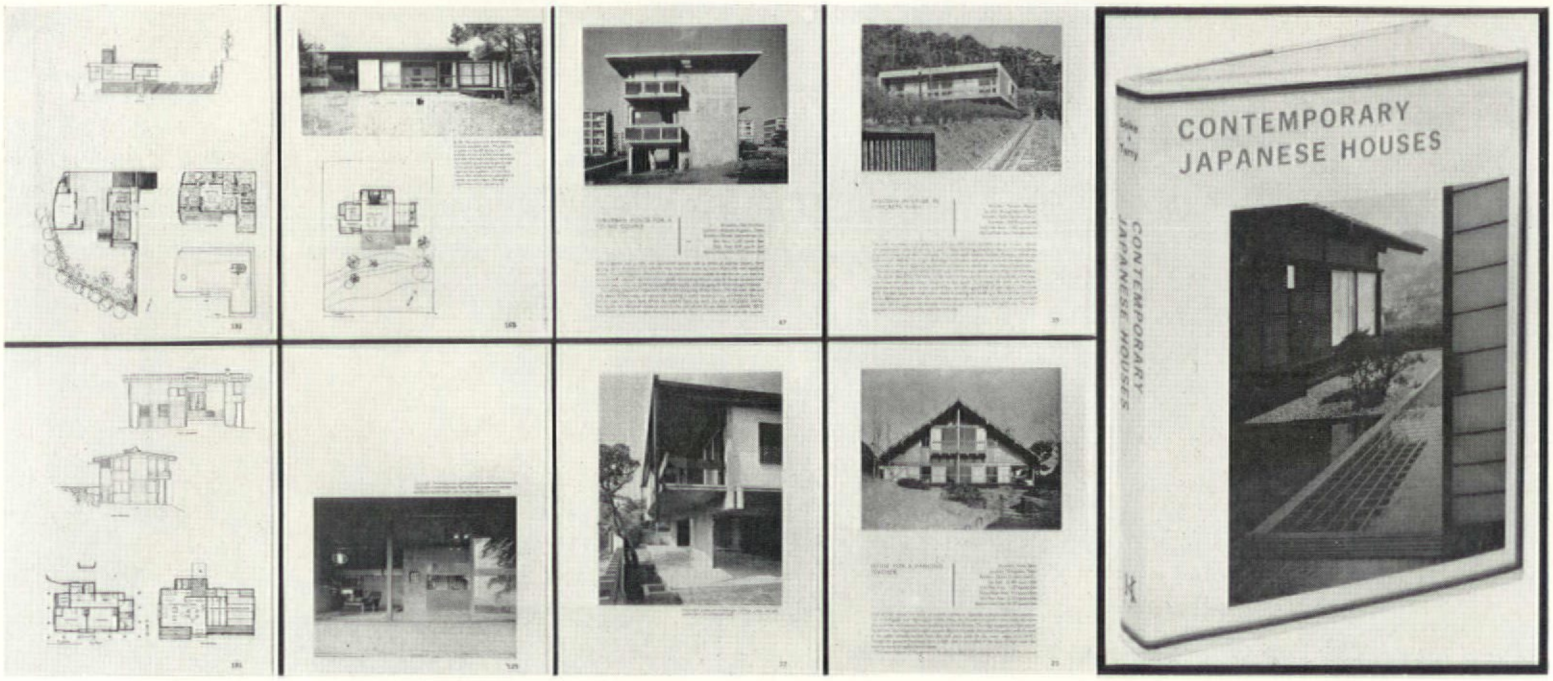

With the possible exception of woodblock prints, no phase of Japanese civilization has been so much admired or so frequently emulated as Japanese architecture, and particularly Japanese residential architecture. Though there have been periods in which Occidental writers and critics have been inclined to dismiss the traditional Japanese house as a flimsy creation of wood and paper, leading Western architects of the past six or seven decades have been almost unanimous in acclaiming its simplicity, its logical organization, its functionality, its openness, its flowing space, and its beautiful textures. The influence of the Japanese house has been especially strong in the United States, where it was a determining factor in the formation of such popular types as the bungalow and the ranch house, not to speak of the individual styles of such diverse architects as Frank Lloyd Wright, Philip Johnson, and Richard Neutra.

Over the past hundred years or so, the Japanese house, for its part, has been buffeted by Western influences. Though it was rather quick to adopt certain practical features of Western houses—glass window panes, electric lighting, modern sanitary facilities, and so on—until the Second World War it remained surprisingly conservative in over-all style. The reason suggested by the authors of this book is that despite the rapid Westernization of Japan in the latter nineteenth and early twentieth centuries, Japanese home life, centred about a well-entrenched family system, failed to change radically.

During the war and for several years afterward, Japanese architecture went into eclipse, and when, in the early 1950's, Japan began to recover from her wounds, Japanese architects found themselves faced with the task of building for a society that had already changed much and was still changing rapidly. The family system was breaking down; the status of women was rising; the country was undergoing a rapid urbanization; there was a new emphasis on individual liberty and privacy. In the succeeding years, a second industrial revolution has changed the Japanese way of life perhaps even more than these social developments by causing a general rise in the living standard and by making available a wide variety of consumers' goods, including household equipment.

All of these developments have meant a new challenge to Japanese architects, and the purpose of this book is to show how they have gone about meeting it on the residential front. The authors have selected seventeen recent houses that they regard as exemplary of contemporary trends in house design and have furnished a discussion of each house. To the discussions have been added luxuriously detailed illustrations, many in colour, together with floor plans and, when necessary, elevations or drawings of details.

The book is aimed not merely at revealing architectural excellence, but at showing in graphic form how architects have met specific problems and situations that exist in Japan today. It will be valued not only by architects, who will find it rich with new ideas, but by house owners looking for ways to make their own houses more beautiful. It will also serve as documentary proof that for all the outward alterations, many of the architectural principles the world has long admired in Japanese houses are still alive today.

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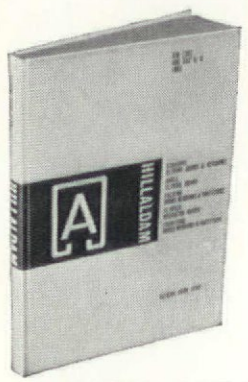

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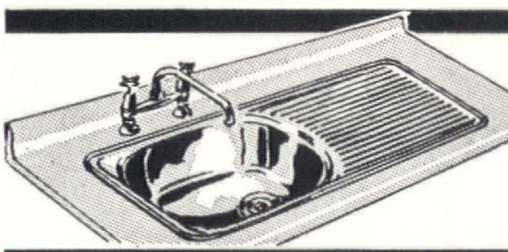

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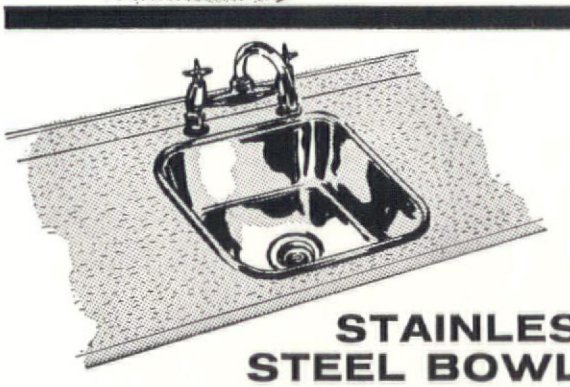

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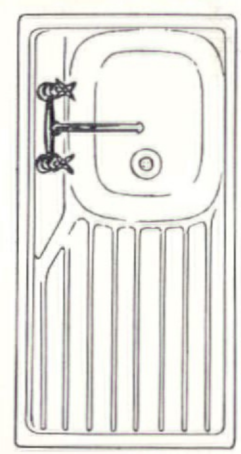

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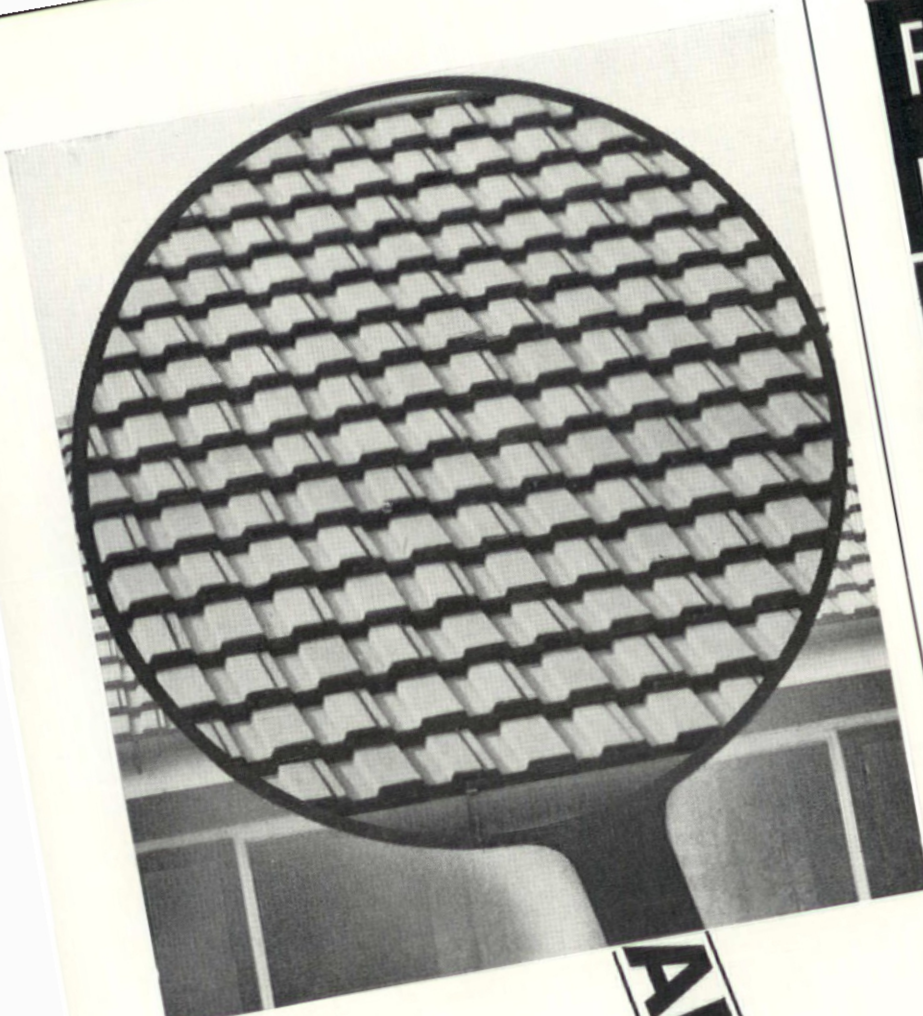

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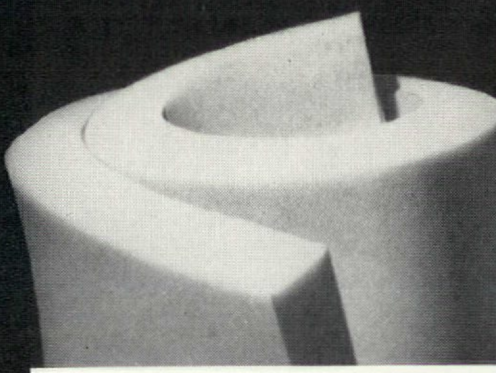

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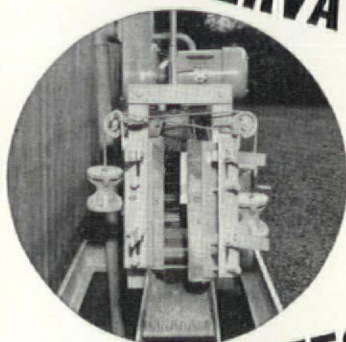

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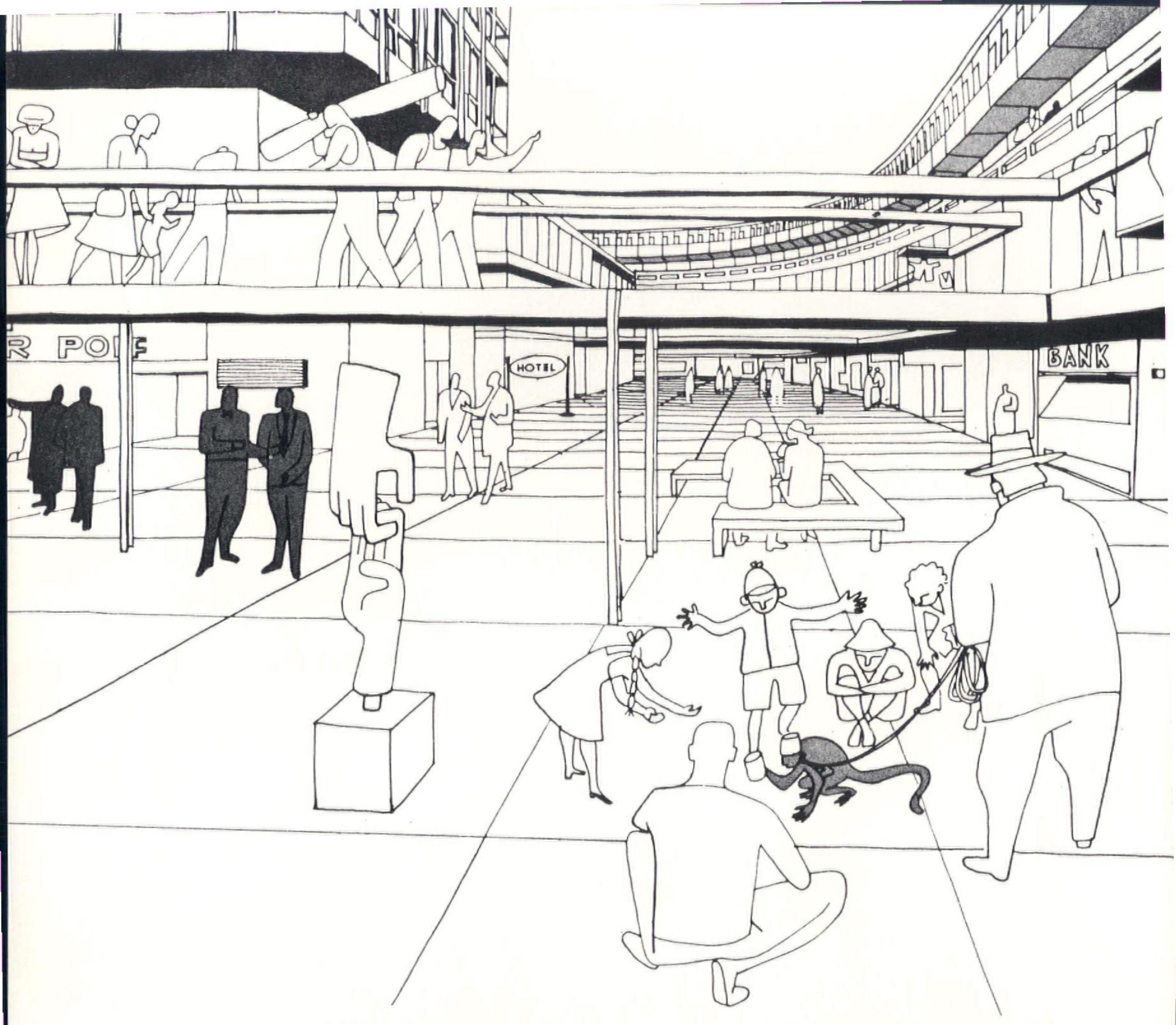
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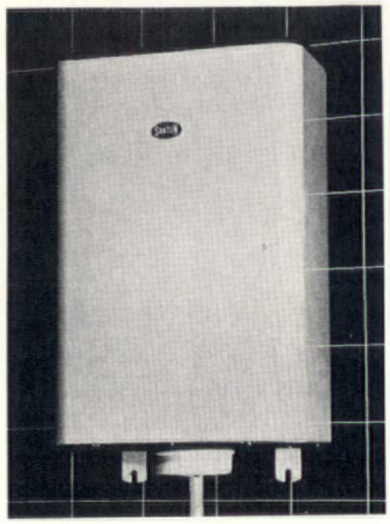

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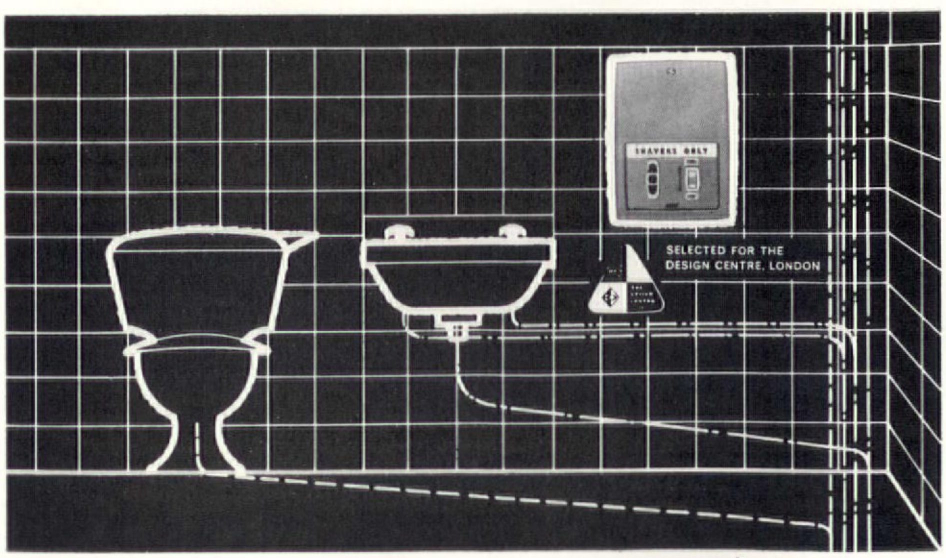

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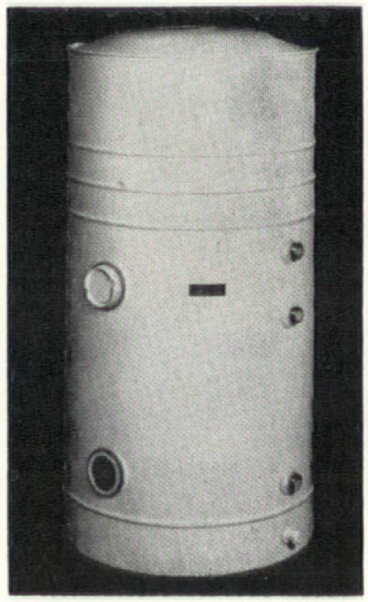

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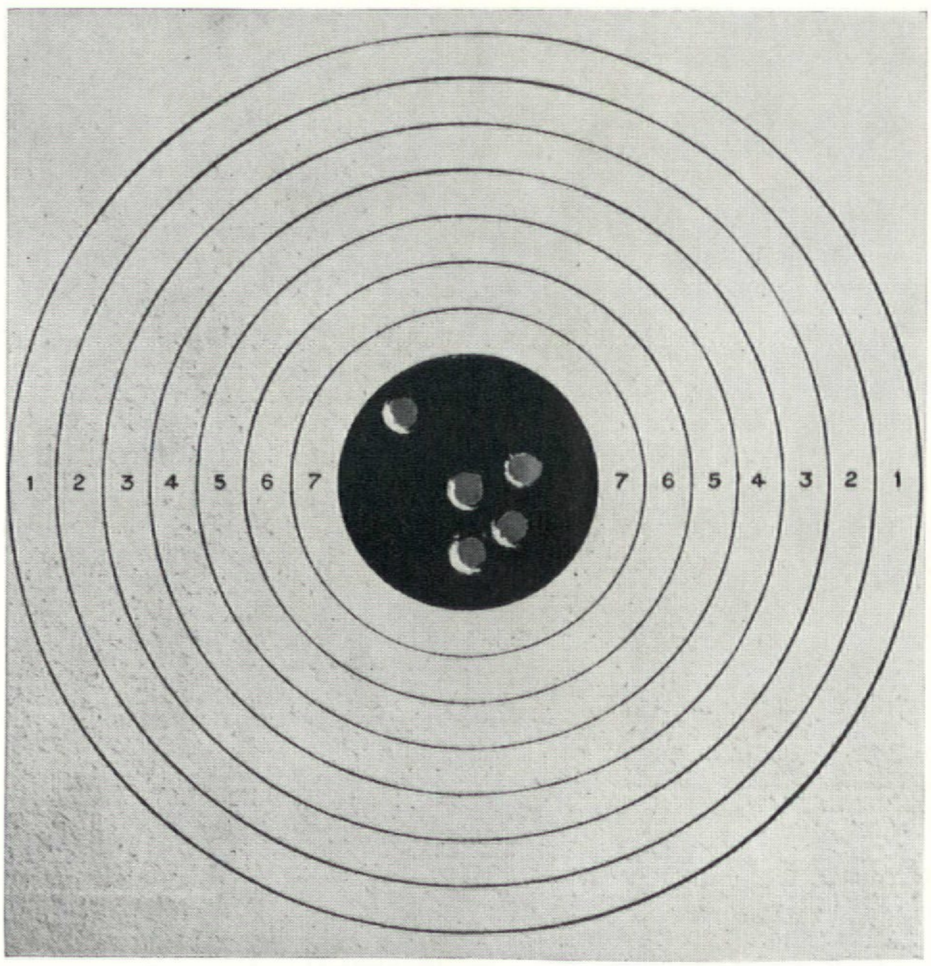

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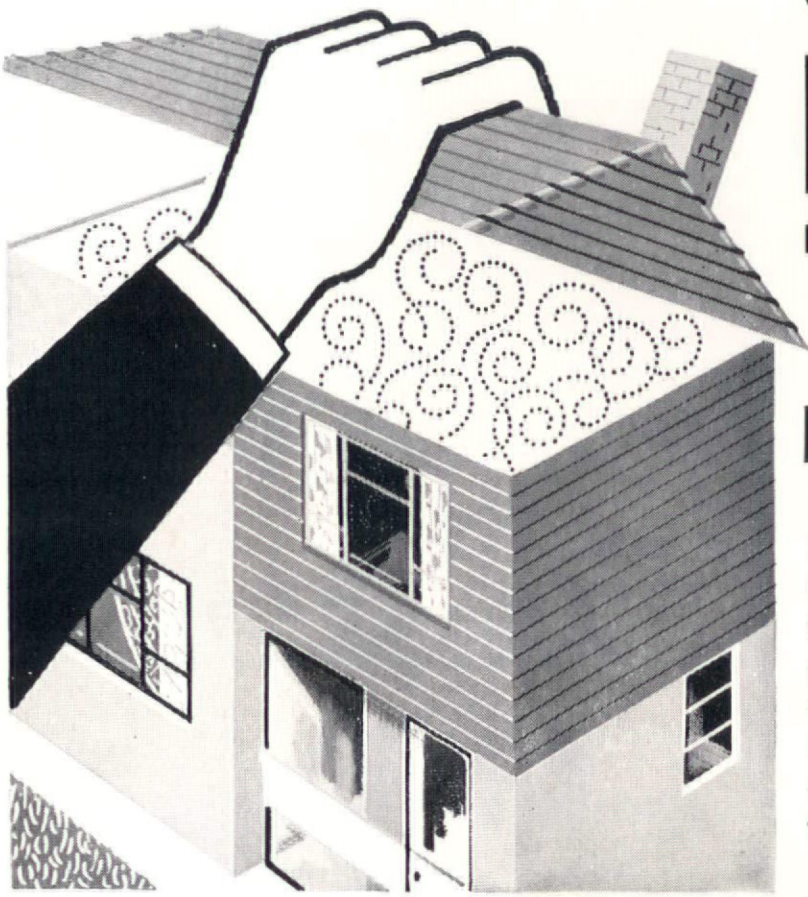

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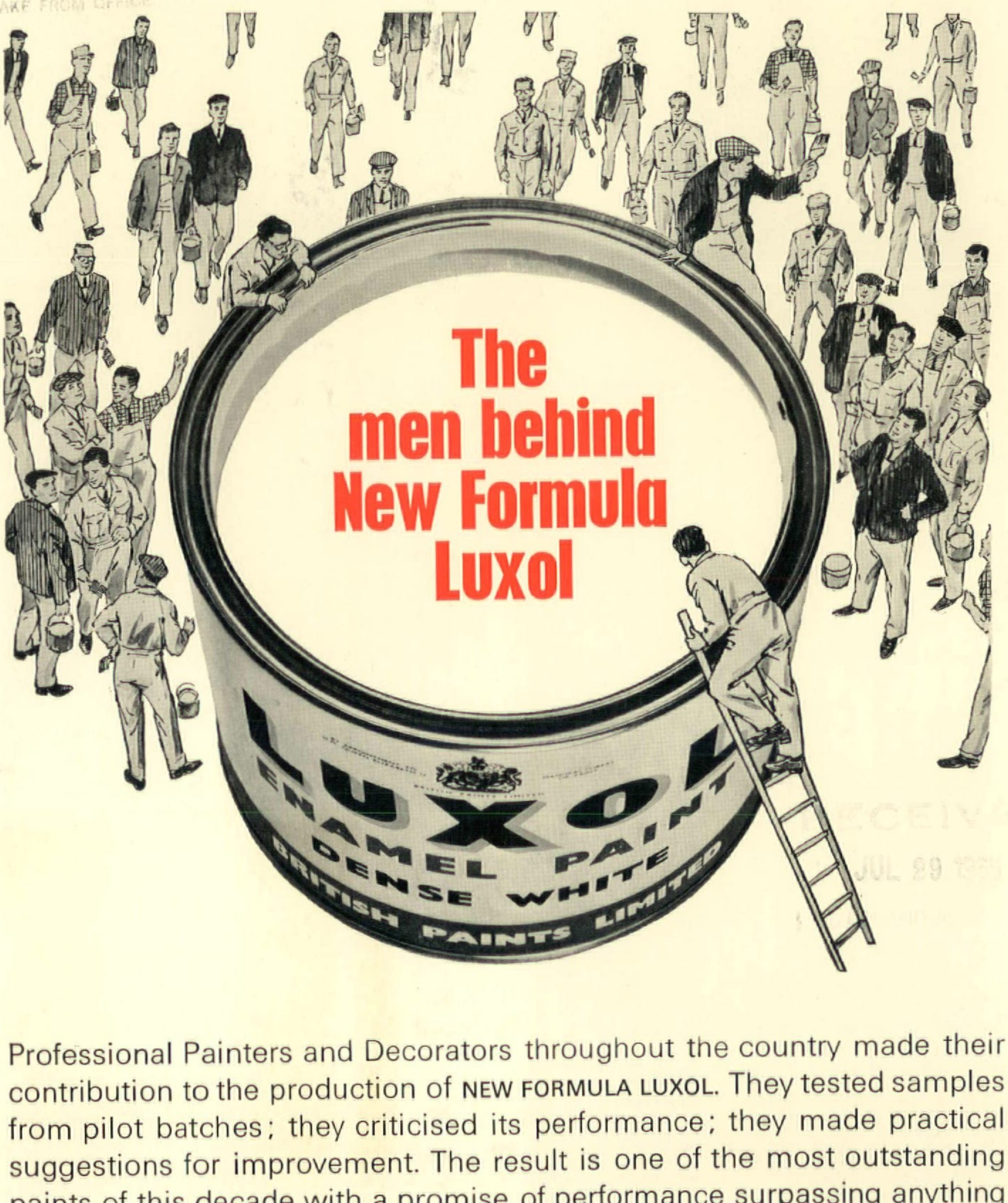

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