AD

Architectural Design May 1968. 5/-

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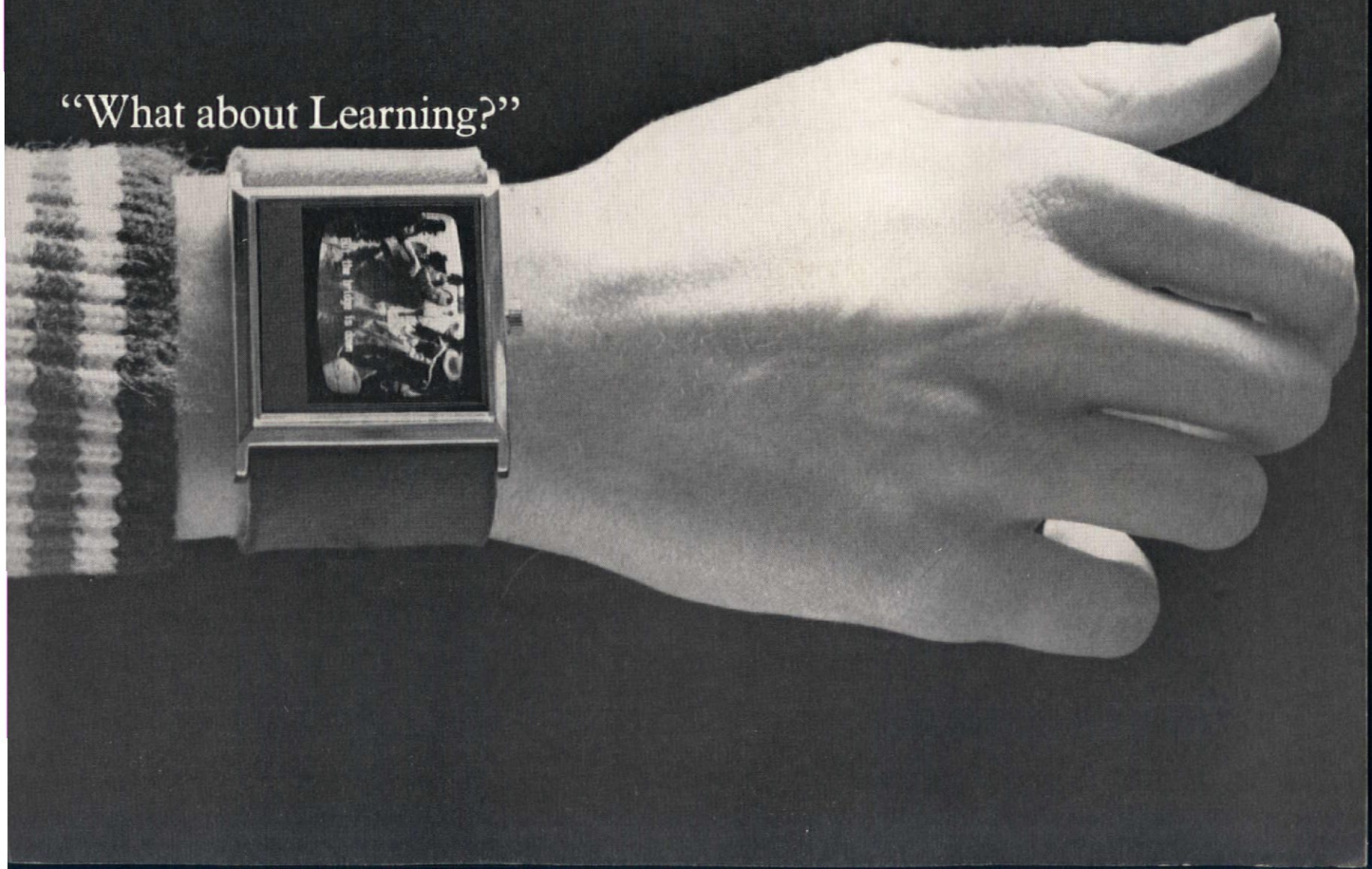

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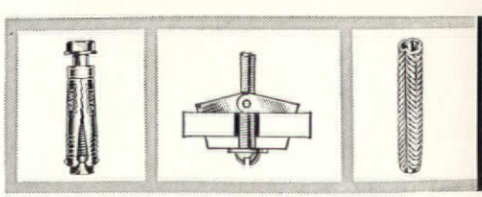

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Letters

P. J. Lord
Austin-Smith/Salmon/Lord partnership, London

J. G. Rushman
Melbourne

PROJECTS AWARDS 1968

Cranfield House site, Harefield

Sir, Michael Sassoon's letter in the March edition, with regard to our scheme, is interesting, especially when read in conjunction with that of Joe Holyoak's in the same issue.

Over a number of years, we have made a practice of undertaking sociological surveys, both before and after, in an attempt to produce basic design criteria. What comes out clearly from these, on low cost housing, is that the formalistic pattern making in use and design terms, so beloved of architects, has no place in the appreciation of the tenants.

When space restriction is inevitable, due to cost, some compromise must be made. None of our surveys give any demand for a 'formal' dining area. Perhaps Mr Sassoon mixes his requirements with other peoples, or perhaps he is telling us he thinks he ought to dine formally (with his butler?), but, in common with the majority of people, he actually eats with his family in the kitchen.

What we have attempted to do at Cranfield is to provide a house unit which will provide the tenants with maximum flexibility and encouragement to develop their own desires in use. Our intended survey follow up will show if we are right. Yours etc.

P. J. Lord

Pains factory site

Sir, The *AD* project award winning scheme by the London Borough of Merton for the Pains Factory site housing scheme (*AD* 1/68) must be a matter for comment since it claims to be derived from the study on 'Land Use and Built Forms' published by Leslie Martin and Lionel March in Cambridge Research for April 1966. However, the efficiency of the technique of concentrating development on the fringe of a given area has long been apparent from the London Squares and Nash's Regent's Park complex (see Walter Manthorpe, 'The Machinery of Sprawl', *Architectural Review* for Dec. 1956). Secondly, the separation of the central open space from the road system by using the buildings as a barrier had earlier been used by Clarence Stein and Henry Wright in the Sunnyside Gardens development in New York in 1924. This scheme, as a development of the London square principle, was in itself merely the primitive forerunner of the Radburn system later developed by the same architects (see 'Towards New Towns for America', *Town Planning Review*, Oct. 1949). There therefore appears to be nothing original in the layout of the Pains Factory site scheme and, although it has a quality of clarity, one wonders why it merited an award.

If the design team did indeed reach their solution through the application of Martin and March's approach, it seems to be a case of scientific man arriving at the same point as that reached much earlier by intuitive man. This would make the 'Land Use and Built Forms' study much less original than it seemed at the time of publication. Or is it simply that there is nothing new in architecture? Or is *AD* over 40 years behind the forefront of creative development in the housing field?

It is to be hoped that the Merton architects will pursue their course of reason and mathematical certainty as applied to the design process. Although they may not come up with any new concepts they might do a useful job by providing a more factual basis for other principles which architects have been trying to put across for many years, such as Radburn planning and traffic segregation, planned neighbourhoods etc. Alternatively, of course, they may be able to knock some of our cherished notions decisively on the head. Yours etc.

J. G. Rushman

P. J. Whittle, Borough Architect, replies

The London Squares were indeed the model for Pains—what 'original' solution would be better? Nor does research at Cambridge pretend to be radical. It has developed the perimeter idea implicit in the squares and Steins work, and demonstrated unexpected properties at a range of scales, with new clarity.

This explicit method led us to investigate site layout at a simple mathematical level and this revealed surprising relationships between density, open space and building height.

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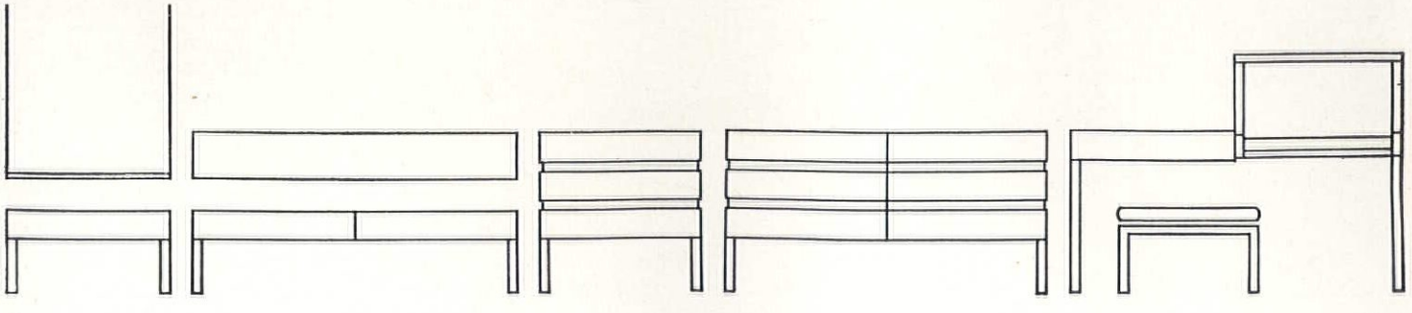

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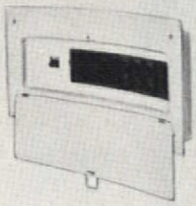

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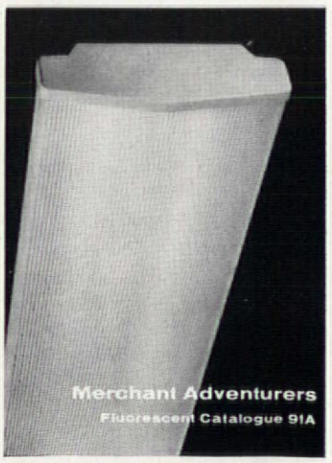

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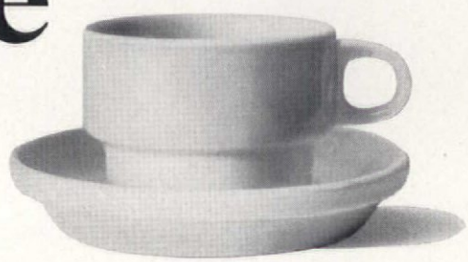

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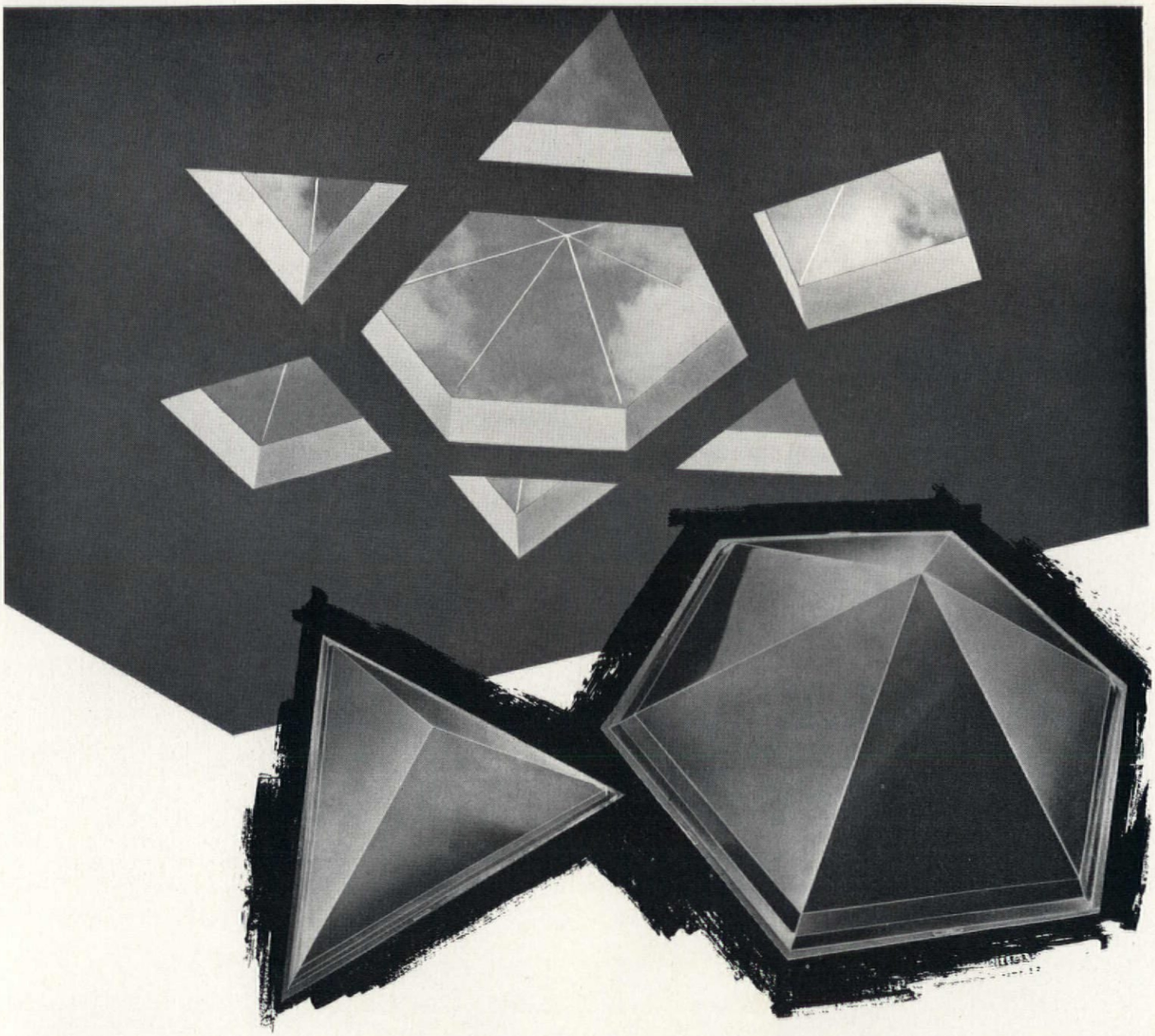

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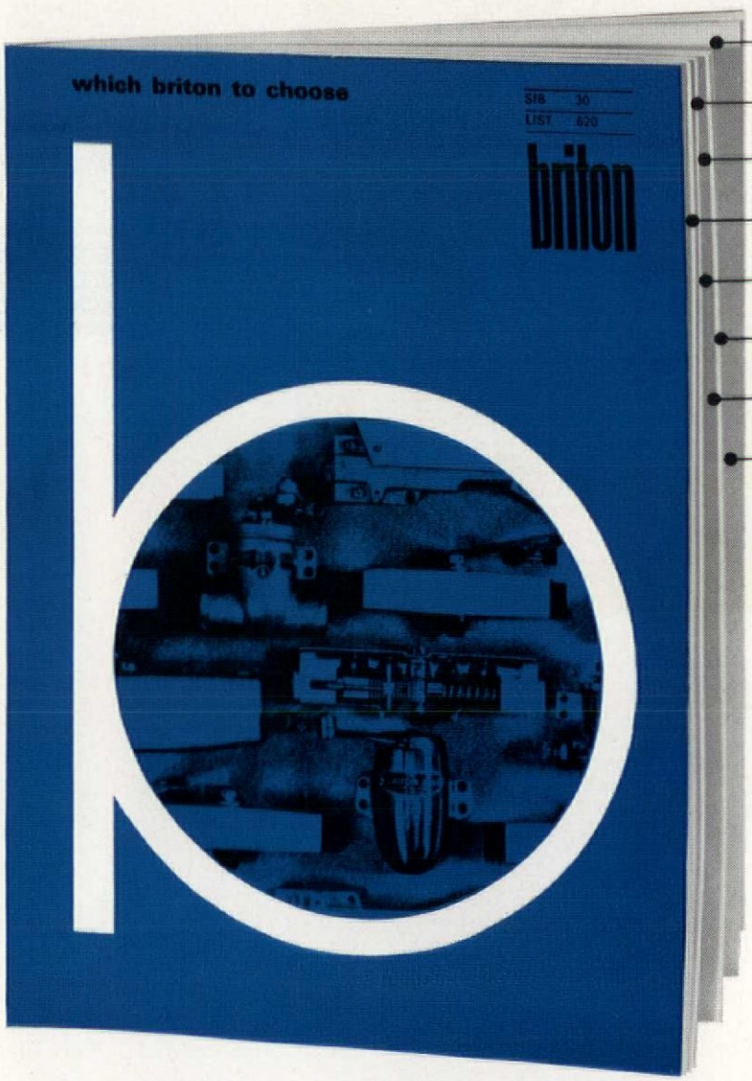

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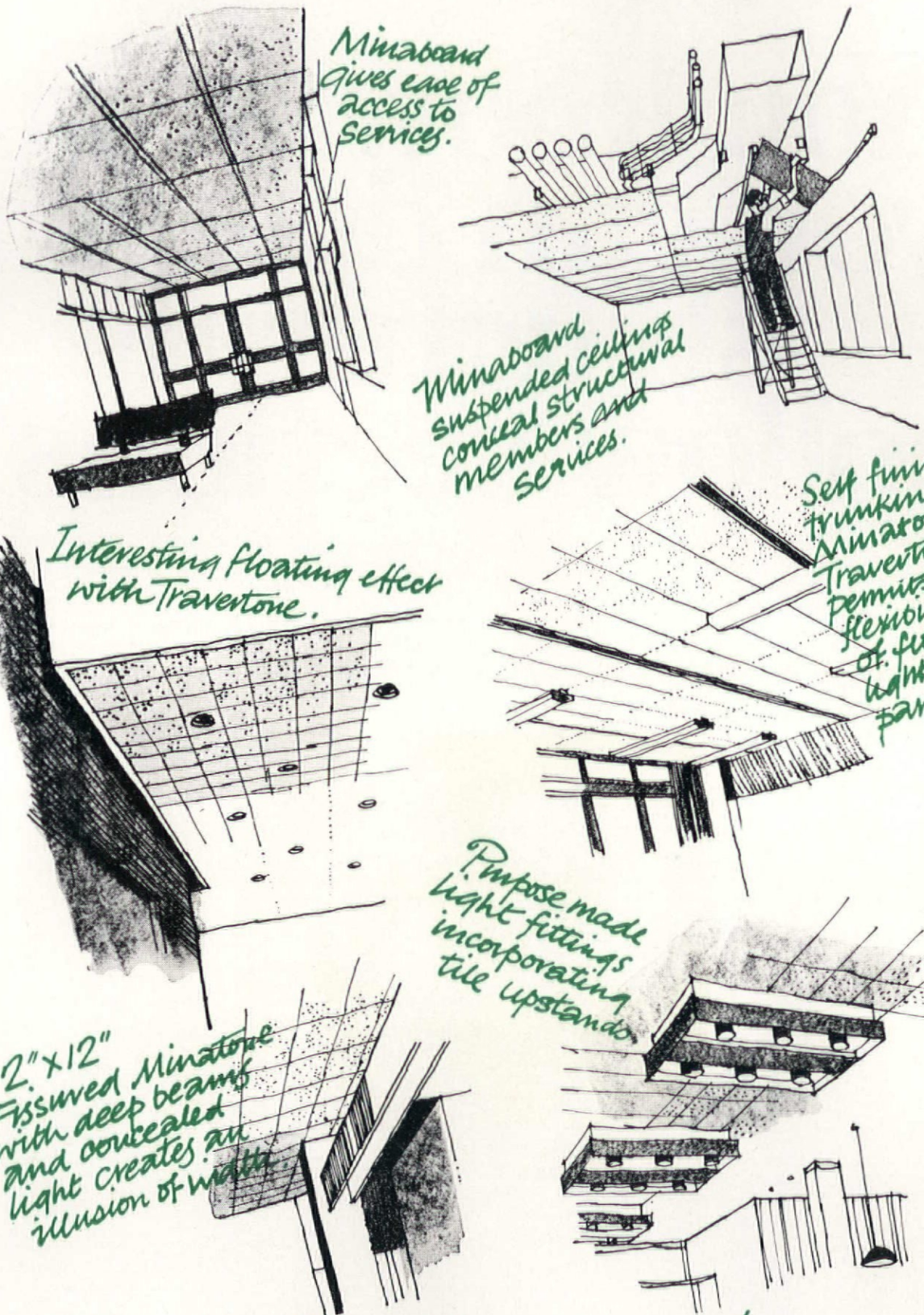

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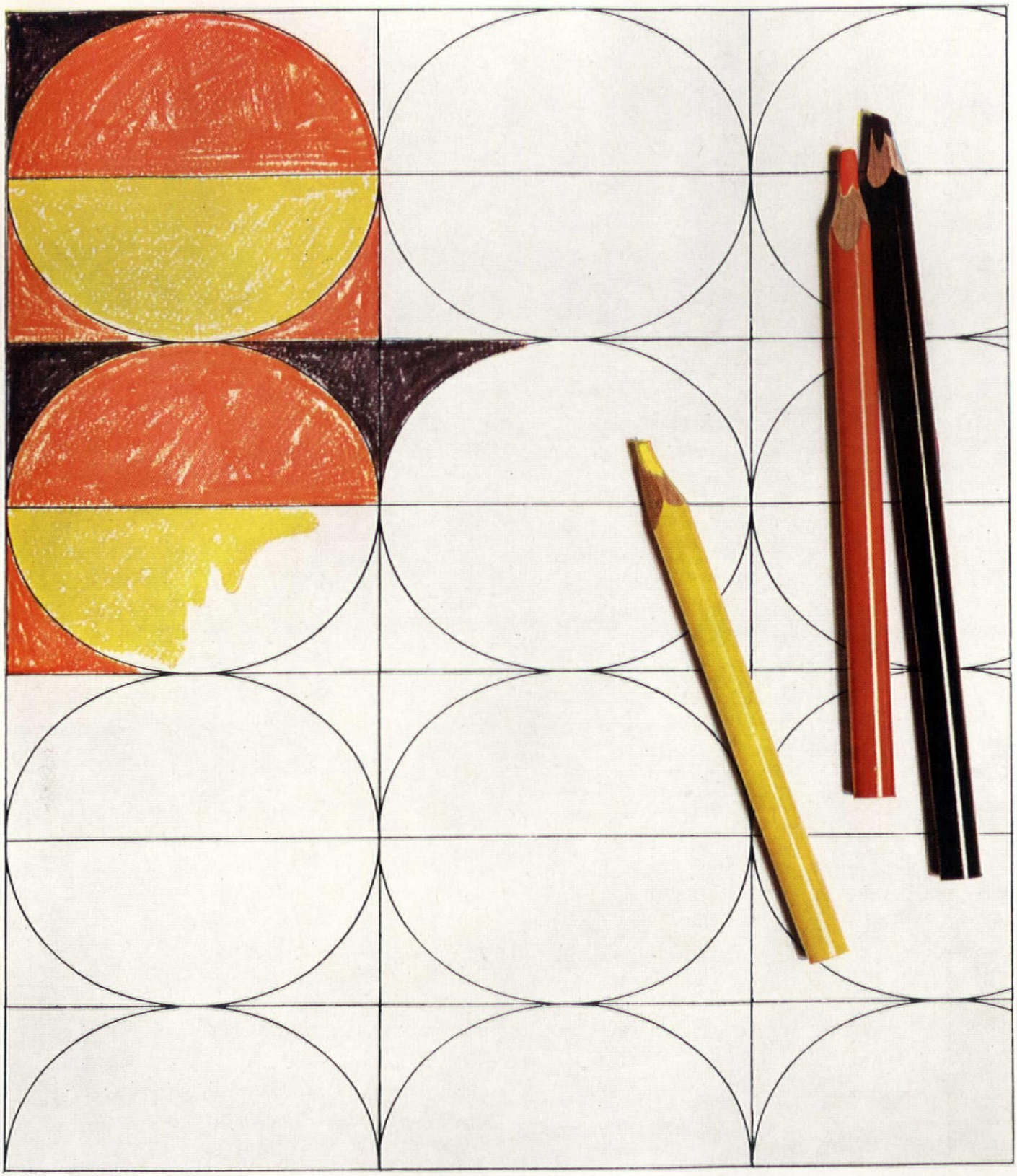

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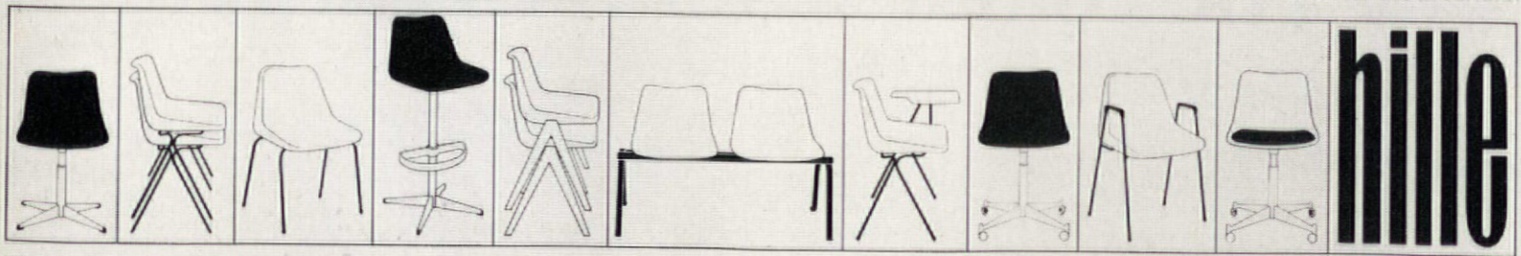

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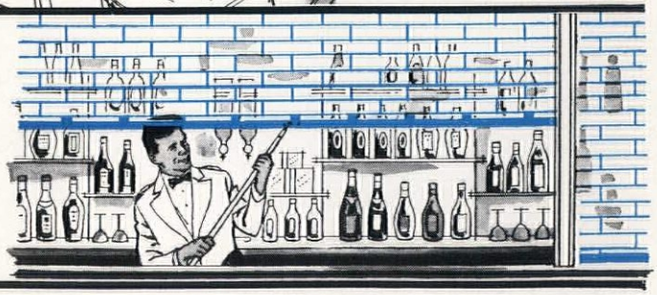

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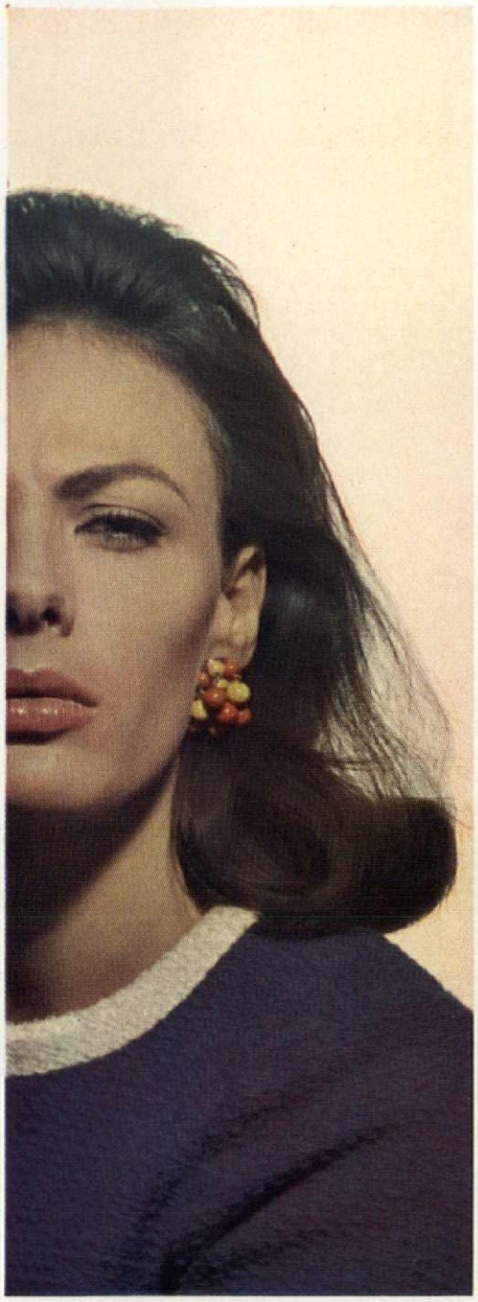

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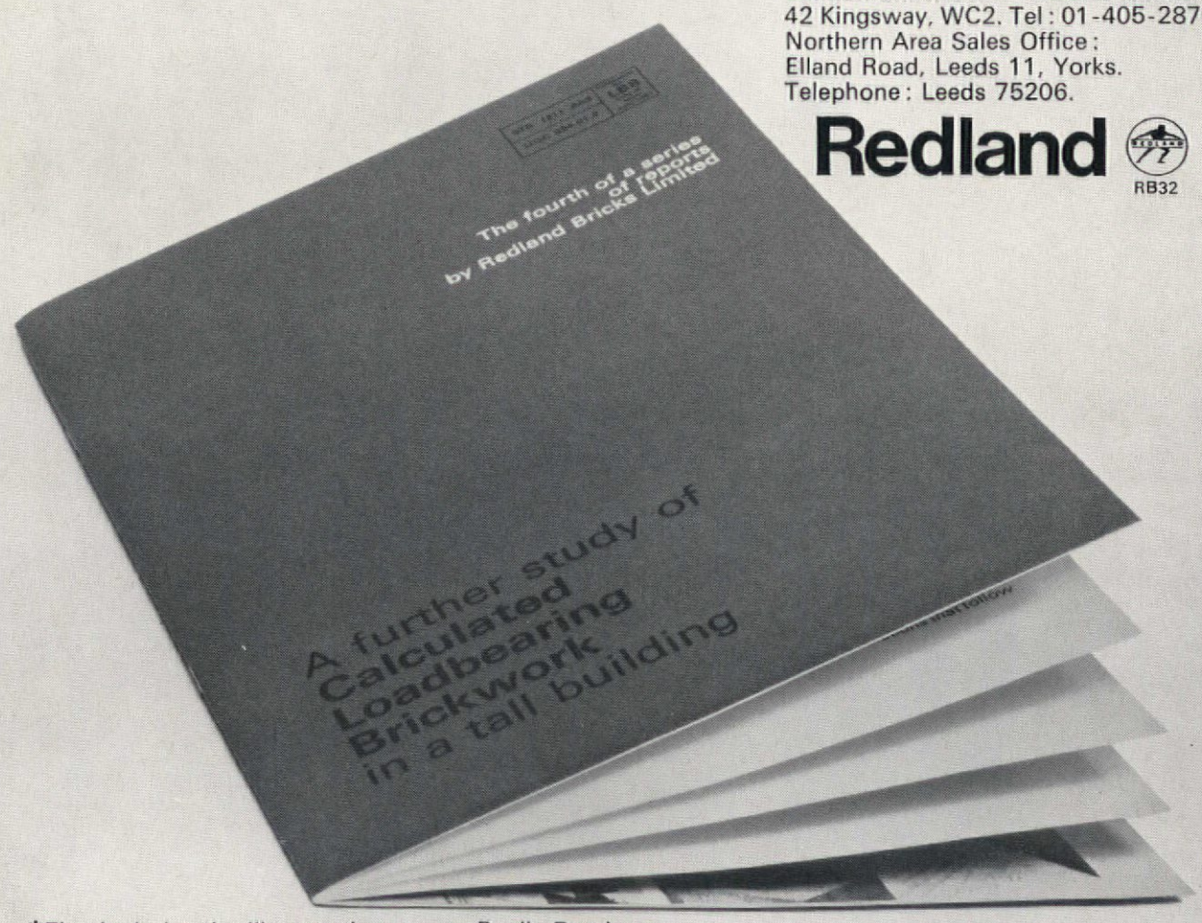

*Five includes the illustrated report on Baylis Road.

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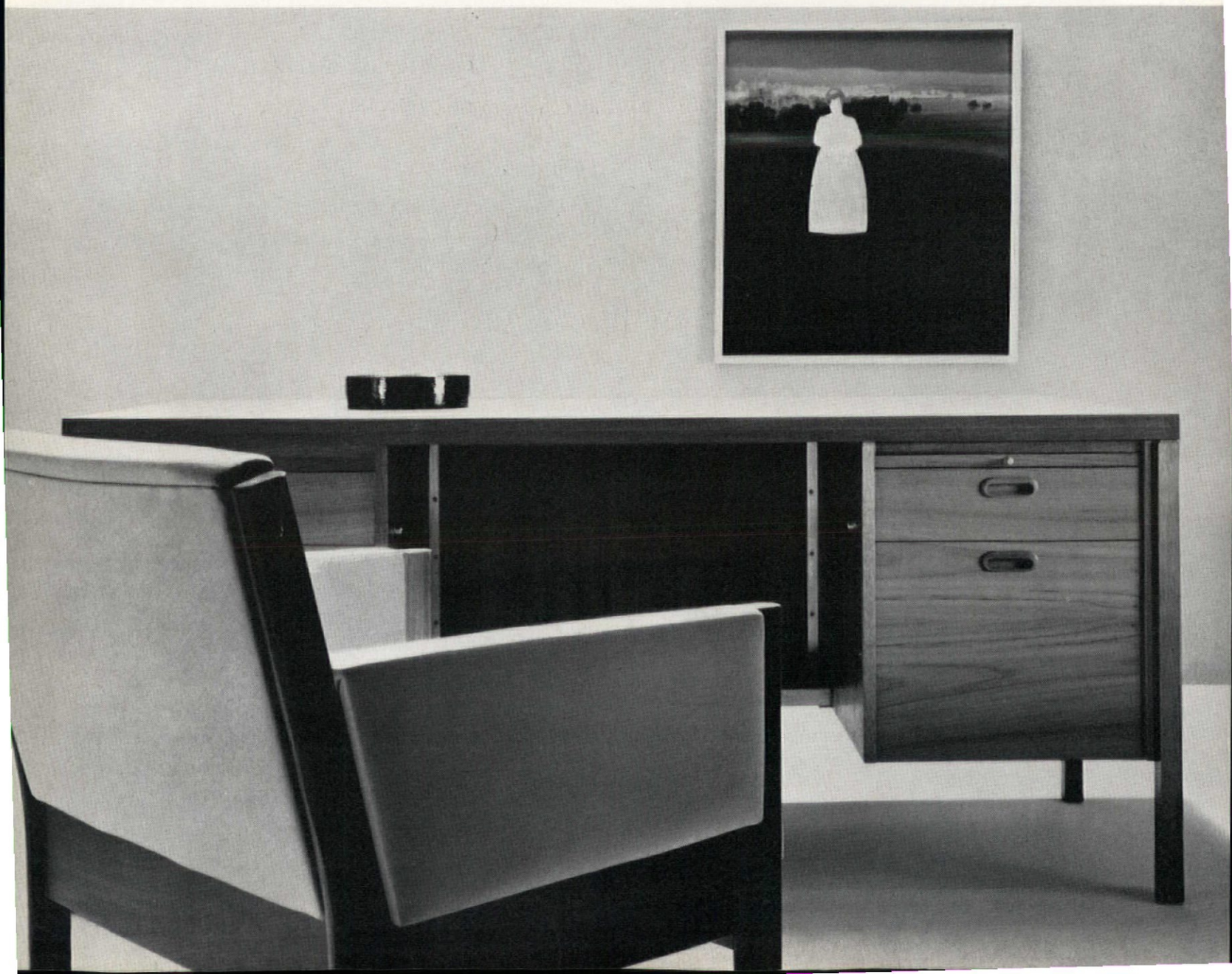

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ANNOUNCEMENTS

E. A. Fowler and Partners, Consulting Engineers are now operating the practice from 28, Crown Street, Ipswich, Suffolk. They are specializing in the fields of Civil, Electrical and Mechanical and multi-services requirements associated with Building Construction Industry.

David Bristow, Roger Button, James Connell, Julian Keable, Murray Simons, Rex Topham, David Waterhouse, Jack Wood and Gerald Woolnough, the partners of Messrs. Waterhouse and Ripley, Messrs. Adie Button and Partners, Messrs. Julian Keable and Partners, and Messrs. Bristow and Topham announce the amalgamation of their practices into one partnership to be known as:

TRIAD architects · planners

which will practice from their new offices at Triad House, 18 Hanway Street, London, W.1. telephone no. 01-580 6833.

Note: A "Triad" is the union of three principles into one whole, e.g. "Firmness", "Commodity" and "Delight"—into architecture.

AD Competition 5/68

What, where, when and by whom?

Answer

name of building or construction .....

address .....

date of construction .....

designer (if any) .....

Name of competitor .....

Address .....

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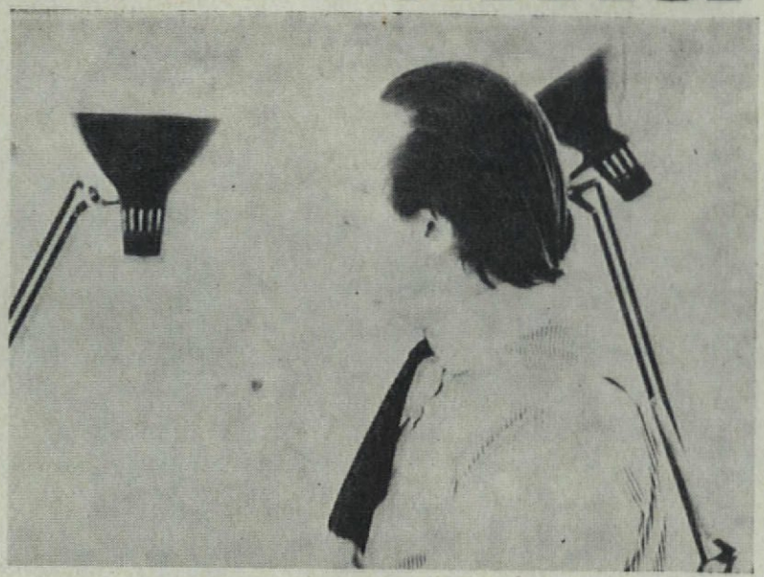
Man of the month

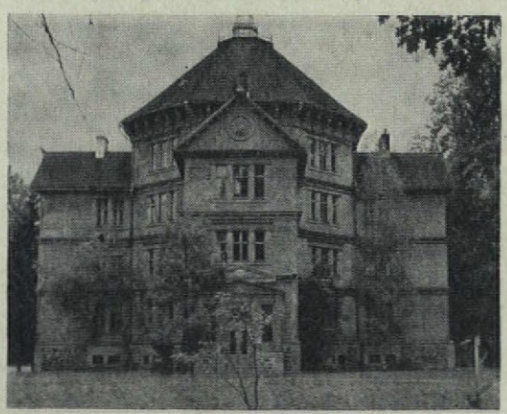


What Where When Whom

So few correct entries are sent in for the monthly competitions that there was some doubt as to whether or not anyone even looked at the photographs. But the April competition is reassuring, there were no less than twenty-two more or less correct entries — and so there should have been, for the photograph has already been reproduced in Professor Nikolaus Pevsner's *Pioneers of Modern Design*.

The winner for April is J. Quentin Hughes.

The correct answer: factory at Queensferry, Flintshire, designed and built in 1901 by H. B. Creswell.



This month's problem picture will no doubt attract fewer entries. The sender of the first correct entry opened in our office on the 20th of this month will receive £5.

The entry form is on page AD22.

Envelopes should be marked *Competition*.

Magazine ups and downs

Interbuild has ceased publication, and its last editor, Simon Klinger, will edit a new four-language building-technics quarterly called *Build*, published from Rotterdam by the Build Foundation under the patronage of the International Council for Building Research Studies and Documentation (CIB).

Arena, left high and dry by *Interbuild*'s decease, will revert to its solo status and continue to be edited by Dennis Sharp. But it will probably appear quarterly after this summer.

Missing link

The missing link with the wriststrap TV set envisaged in our cover design was advertised in Exchange & Mart, *April 4th, 1968.*

Urban patterns

Prof. Chilvers, Director of London's new Centre for Environmental Studies announced the recent formation of a working group of researchers to study 'Patterns of Urbanization'. It includes P. Cowan (London Univ.), Prof. P. Hall (Reading Univ.), Prof. D. V. Donnison and Prof. Emrys Jones (L.S.E.), Dr P. A. Stone (Nat. Inst. of Economic and Social Research), Prof. M. M. Webber (Univ. of California), and P. Willmott (Inst. of Community Studies, Bethnal Green). They will explore current techniques of scientific forecasting and will, over the next few years, publish papers on aspects of their subject.

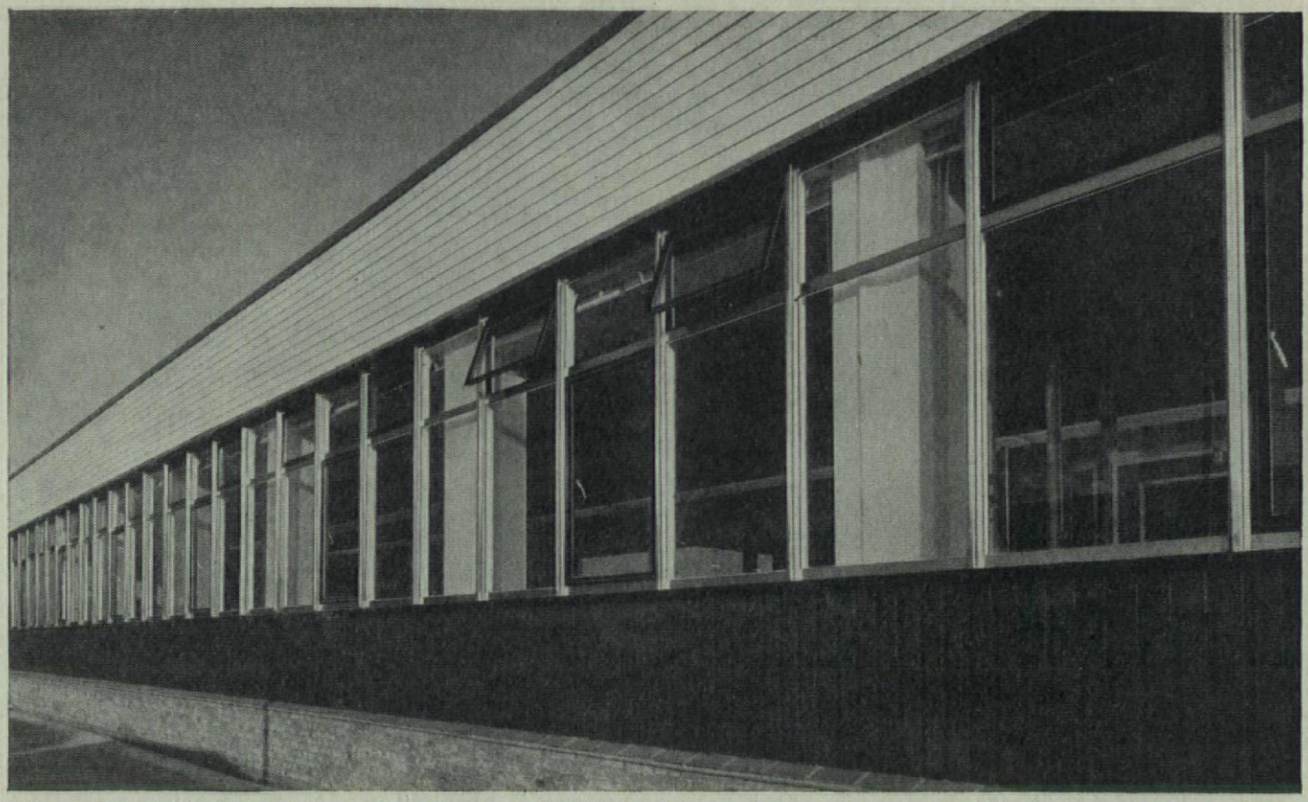
Opportunities abroad

Up to fifteen foreign architectural and planning students, graduates or school staff are invited to join a Summer Institute at *Ahmadabad*'s School of Architecture, July 6th to September 2nd. Tuition $150, keep $200. Apply to Bernard Kohn, Director.

The Municipal Administration of *Cuneo, Italy*, is planning a 3620 million lire, four-year school building programme. British architects interested in supplying services should apply (in Italian) for information, to Ing. Lamberto Bellini, Assessore ai Labori Pubblici, Divisione Tecnica, Municipio di Cuneo, via Roma 28, 1-12100 Cuneo, Italy.

Thinkbelt

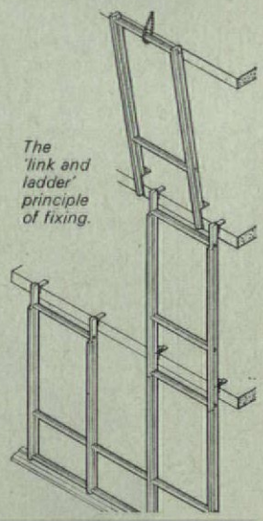
In July 1968 Cedric Price is to start design investigations into the provision of a Thinkbelt network with Think Links in Oakland County (Detroit 10 miles) Michigan, U.S. at the invitation of Oakland Community College in co-operation with Cranbrook Institute of Science.



Centralised Service Unit & Stores of the North Thames Gas Board, 40/42, New Heston Rd., Heston, Middx. N.T.G.B. Building & Property Maintenance Dept.

Up goes curtain walling

clad in Silver Fox stainless steel



The 'link and ladder' principle of fixing.

down comes its price

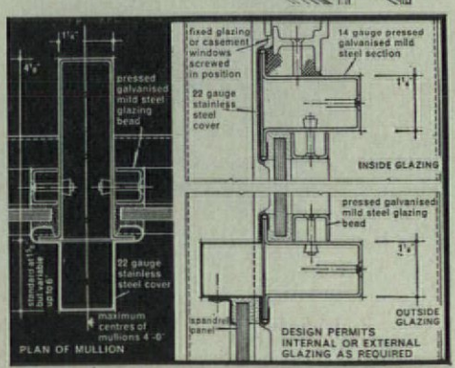
Today, more than ever, people appreciate the elegance, the long-lasting lustre of stainless steel. Its price is now highly competitive.

Thanks to improved designs and more advanced constructional and assembly techniques, stainless steel systems of curtain walling can compete in price with systems employing other materials.

Wherever 'Silver Fox' stainless steel is used, it will withstand hard wear and keeps its attractive appearance with very little maintenance. It does not require painting. An occasional wash-down will bring it up like new.

The Morris Singer Holoform Mark II stainless steel curtain walling was chosen for the Centralised Service Unit, Offices and Stores of the North Thames Gas Board at Heston. The system consists of pressed galvanised steel sections, externally clad with 'Silver Fox' satin polished stainless steel. For multi-storey applications, a "link and ladder" principle of fixing is employed. Units are fixed one above another in a series of ladders to occupy each plan module. Glazing can be done either from the inside or outside.

Further information on any aspects of 'Silver Fox' stainless steel and its use will be supplied on request.



samuel fox

& COMPANY LIMITED STOCKSBRIDGE, SHEFFIELD.

The makers of 'Silver Fox' Stainless Steel

A subsidiary of The **United Steel** Companies Ltd

1967

F 554

Exhibitions

Till June 30th	Chicago	Mies v.d. Rohe retrospective	Art Institute of Chicago
Till July 1st	Paris	Gothic Art (Council of Europe)	Louvre
May 11th to 18th	London	International Noise Abatement Exhibition	Battersea Park, London
May 15th to 19th	Copenhagen & Malmö	Scandinavian Furniture Fair	
May 27th to 31st	London	International Contract Furnishing & Interior Decor Exhibition	Olympia
May 30th to July 28th	Milan, Italy	14th Triennale of Milan	Palazzo dell'Arte al Parco
May 27th to 31st	London	Decor International	Olympia
June 15th to August 31st	Coventry	British Sculpture	Coventry Cathedral
June 22nd to October 20th	Venice	34th International *Biennale di Venezia*	
August 30th to October 27th	London	The surveyors craft since 2800 B.C.	British Museum
September 4th to 11th	London	Surveyors' contribution to human progress	Little Dean's Yard, adj. Church House, Westminster SW1
September 20th to October 27th	London	Bauhaus	Royal Academy, Burlington House
October 7th to 10th	Mexico City	Spaces for sport and culture	
1970			
March 15th to September 13th	Osaka, Japan	EXPO 70	

Conferences

May 13th to 18th	London	5th International Noise Abatement Congress	Inf. Noise Abatement Society, 6/8 Old Bond St., London W1
May 13th to 18th	Brighton	6th International Congress on Electro-Heat	Inf. Congress Office, UIE6, Trafalgar Bldgs., 1Charing Cross, London SW1
May 16th to 21st	Montreal, Canada	11th Biennial Congress of International Federation of Landscape Architects	Inf. Canadian Assoc. of Landscape Architects and Town Planners, Oakville, Canada
May 19th to 26th	Detroit, USA	UIA 5th Seminar on industrial architecture	Inf. L. A. Rossetti, Marquette Building, Detroit, Michigan 48226
May 27th to 29th	London	International congress on lightweight concrete	Inf. Concrete Society, Terminal House, Grosvenor Gardens, London, S.W.1
May 30th to June 6th	Prague	6th Congress of the International Prestressed Concrete Society	Inf. Concrete Society, Terminal House, Grosvenor Gdns., S.W.1.
June 2nd to 4th	Cambridge, Mass., USA	International Conference of International Design Methods Group	Inf. Coll. of Environmental Design, Dept. of Arch. re Berkeley Univ. of California, Calif. 94720
June 7th to 9th	Chipping Camden	SIA Annual Conference	Inf. SIA, 12 Carlton House Terr., London SW1
June 16th to 23rd	Aspen, Colorado, USA	International Design Conference	Inf. IDCA, Box 664, Aspen
June 21st to September 22nd	Brno, Czechoslovakia	2nd Biennial of Applied Graphic Art	Inf. Organizing Committee, Husova 14, Brno
June 26th to 29th	Cambridge, England	RIBA Conference (Building for education. Looking forward)	Inf. RIBA
June 30th to July 6th	Philadelphia	29th Congress of International Federation of Housing & Town Planning	Inf. Office of IFHP Development Coordinator, 702 City Hall Annex, Philadelphia, Pa 19107, USA
July 1st to 6th	London	8th International Congress on glass	Inf. Society of Glass Technology, 'Thornton,' Hallam Gate Road, Sheffield S10 5BT
July 6th to 13th	Greece	Ekistics tour of Greek settlements and attendance of closing session of Delos 6 Symposium	Inf. P. Psomopoulos, Athens Centre of Ekistics, P.O. Box 471, Athens
July 15th to 26th	Athens, Greece	Ekistics seminar	
August 18th to 24th	Eindhoven, Holland	3rd ICOGRADA Congress	Inf. Sjoerd Bijlsma, "Bijland", Kreiël 16, Winterle gem. Vessem, Holland
September 3rd to 12th	London	12th International Congress of Surveyors	Inf. Secretary General, FIG Office, 47 Tothill St., London SW1
September 4th to 13th	Manchester	Town and Country Planning Summer School	Inf. Sec. 26 Portland Place, London, W.1.
September 9th to 14th	New York, USA	7th Congress International Bridge and Structural Engineering Assoc.	Inf. E. K. Timbly, c/o Howard Needless, Tammen & Bengendorf, 99 Church Street, New York
October 7th to 11th	Ottawa, Canada	4th International Congress for Building Research and Documentation (CIB)	Inf. Miss Milroy, Information Division, Building Research Station, Garston, Watford, Herts.
October 7th to 10th	Zacateno, Mexico	Meeting of architects under 30	Inf. Arg. Ruth Rivera, Organizing Committee for Olympic Games Avide la Fuentes 170, Jardines del Pedregal, Mexico 20DF.
October 21st to 23rd	Budapest	2nd Conference on Industrial Architecture	Inf. Sec. of Scientific Soc. for Building, Budapest V Szabadság ter 17. III Technika Háza.
November 13th to 15th	London	International reinforced plastics conference	British Plastics Federation, 47–48 Piccadilly, W.1.
November 15th to 17th	London	Art, technology and society	Inf. DIA, 13 Suffolk St., London, S.W.1
1969			
February	London	Reinforced plastics in building	Inf. Plastics Institute, 11 Hobart Place, London S.W.1
October 10th to 15th	Buenos Aires, Argentina	10th UIA Congress	Inf. UIA Secretary, RIBA, London

Competitions and awards

Low cost flats for elderly people	Registration May 15th, entries Oct. 23, 1968	Inf. RIBA (Kathleen Hall)
Financial Times Industrial Architecture Award 1968	Nominations by June 7th, 1968	Inf. F.T., Bracken House, 10 Cannon St., London EC4
Civic Trust awards	Entries by June 14th, 1968	Inf. Civic Trust, Walter House, Bedford St., London WC2
Hotel bedroom suites	Entries by June 14th, 1968	Inf. Formica Ltd., Dela Rue House, 84 Regent St, London W1
Residential development	Entries for Stage 1, June 21st, 1968	Inf. Runcorn Devt. Corpn., Chapel St., Runcorn, Cheshire
Plastic light fitting	Entries by June 27th, 1968	Inf. British Plastics Federation, 47–48 Piccadilly, W1
Furniture design (dining suite) 1st prize, £750; 2nd prize, £250	Entries by June 29th 1968	Org. Donald Macpherson Group, Jenkins Lane, Barking, Essex
Carpet design, 'Gilt Edge'	Entries by July 31st, 1968	Inf. Carpet Trades Ltd., PO Box 5, Kidderminster
Investiture souvenirs	Entries by September 30th, 1968	Inf. Council of Industrial Design (Michael Kitt)
Data processing	Entries by March 31st, 1969	Inf. Cape Building Products Ltd., Uxbridge, Middlesex

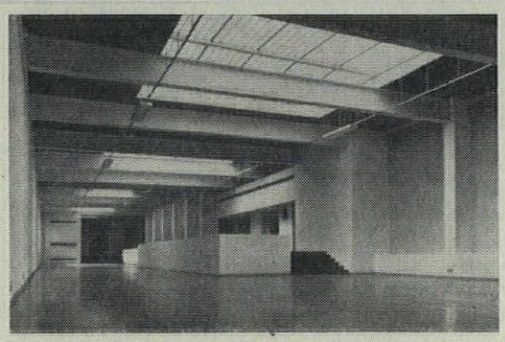
Study tours

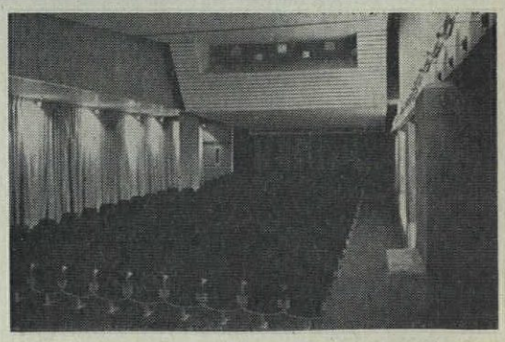
July 15th to 19th	Finland (£168)	Inf. Concrete Society, Terminal House, Grosvenor Gardens, London, S.W.1
September 1st to 15th	Germany and Czechoslovakia	Inf. Victorian Society, Dr Paul Thompson, Sturricks, Great Bently, Colchester, Essex

Nash House, Stage 1

The first stage of Nash House—the conversion of the east podium of London's Carlton House Terrace into a 6000 sq. ft gallery and a 250-seat auditorium—was completed in mid-March (architects, Fry, Drew & Partners; contractors, Mowlem). The five occupants—ICA, SIA, DIA, D & ADA and ILA—will now maintain a full programme of exhibitions, lectures, films, among a lively variety of activities in the field of the arts and modern design

The next stage will be a public buffet restaurant on a terrace in the long gallery. While the final stage—expected late this year—will be the conversion of the adjoining No. 12 Carlton House Terrace into a club.





Over 5 million people tested this Marley HD floor

British Pavilion, Expo '67. Architects: Sir Basil Spence, Bonnington & Collins.

...now it's your turn!

In September, with Expo '67 still to run another month, the Technical Manager of the British Pavilion wrote to us. He said, "Although we have had more than four million visitors to the Pavilion so far, the tiles show no signs of wear and look as good as the day they were installed".

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We reckon their history proves our claims about H D's outstanding wear resistance, indentation recovery, resilience and non-tracking properties. Now, if you've any doubts left, you can test these things for yourself.

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PRACTICE/COMPANY/AUTHORITY _____

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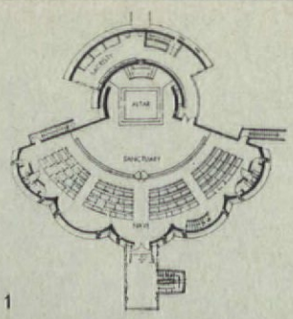
THE QUEEN'S AWARD TO INDUSTRY 1967

MFH 6

Tokyo cathedral

Antonin Raymond's enlightenment—stirred in 1926 by the ideas of Paul Claudel—on the subject of the new liturgy, has already been briefly outlined and illustrated in *Architectural Design*, 10, 1967, p. 440. These ideas have since been further elaborated by a reading of the books of Peter Hammond and the Fathers of the Society of the Divine Word and have been given form in the concrete church of the Nanzam seminary at Nagoya, Japan **1**, **2**, and in the newly published designs for the Episcopal Cathedral in Tokyo **3**, **4**. Paradoxically Kenzo Tange, in designing the Catholic Cathedral in Tokyo (*AD* 5, 1965) followed the conventional Gothic plan. Raymond in designing the Protestant Cathedral has opted for the new liturgy —the faithful surrounding the altar, the seating for 1000 sloping towards it as in an auditorium, no communion rail and no sanctuary. In addition the altar is movable so that the platform can be used for massed choirs and Passion plays—all to be televized.

The double dome is to be of precast, pre-stressed panels of concrete erected, without scaffolding, with circular booms.



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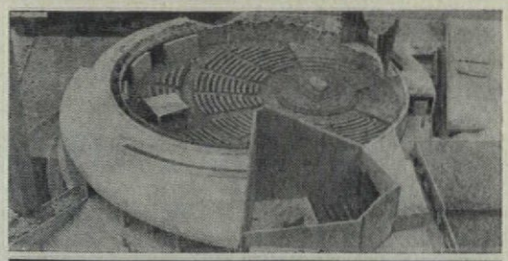

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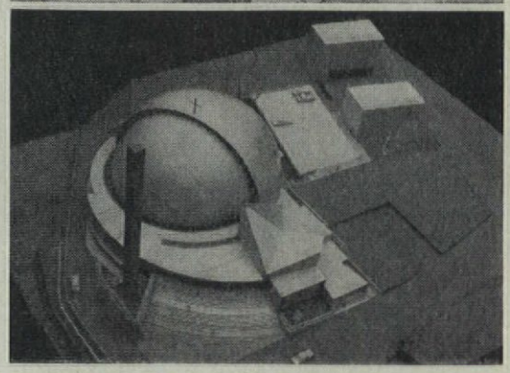
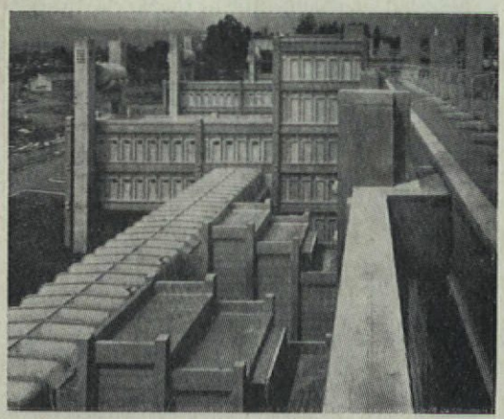
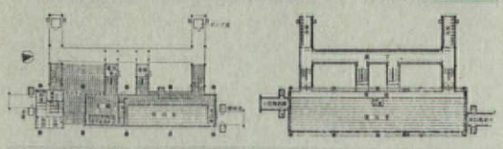


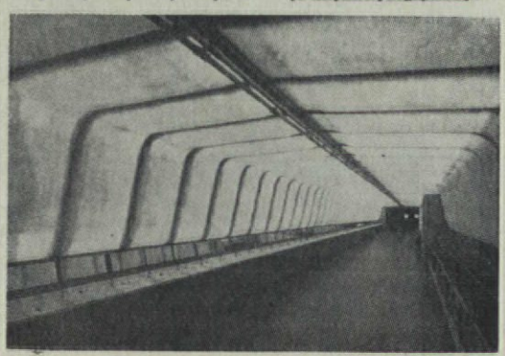
Display

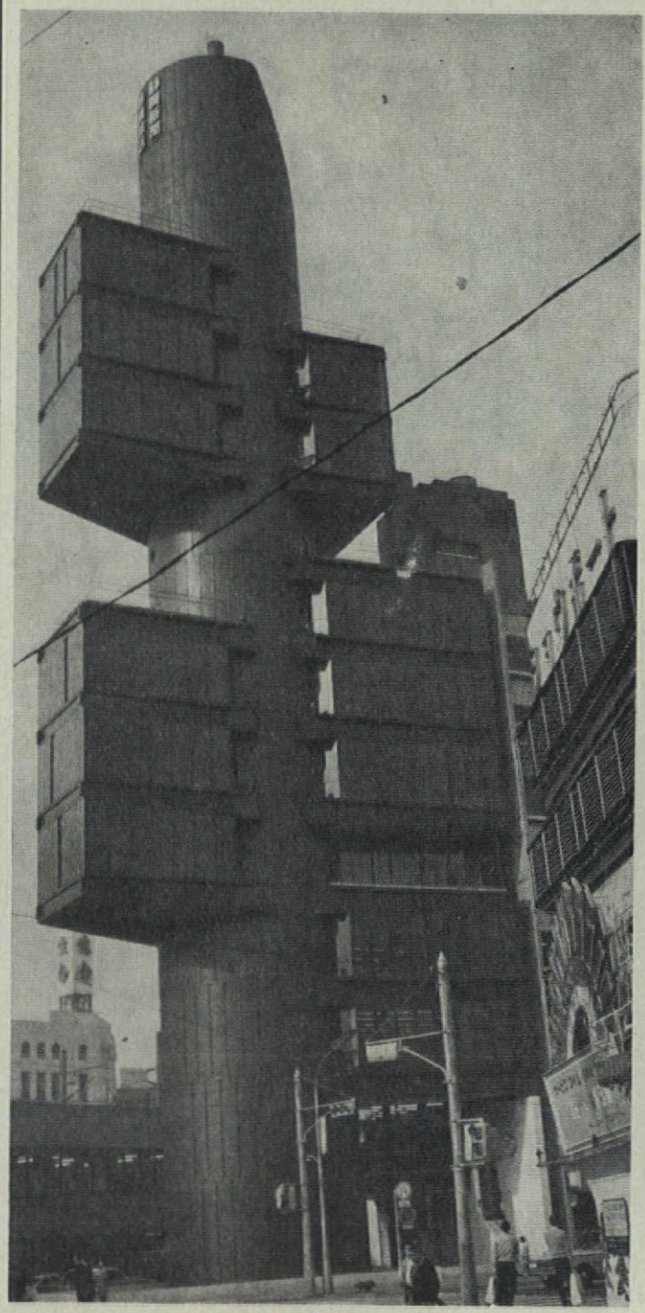
The hospices designed for pilgrims to the Daiseki-ji Temple by K. Yokoyama and Associates are, as the plan of one of them indicates, relatively straightforward in arrangement and conception, but when grouped together, albeit in straight rows, with each element, each beam, each bolt wilfully displayed, they take on a complexity of form and detail that is wellnigh indecipherable. Certainly, the mechanics of the architecture is not to be easily apprehended. The clarity of expression that is usually sought in such an exposition of construction and formal relationships is discounted. The result is an obsessive fantasy on 'functionalism' or, as this building is in Japan, on 'traditionalism'.

Kenchiku Bunka, November 1966







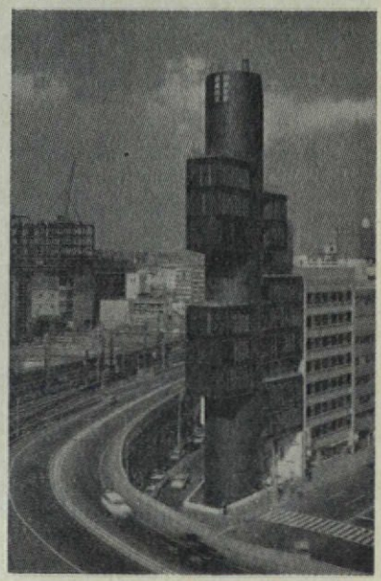


Prototype or wishful thinking

Isozaki's concept of a 'cluster in the air' (*AD* 10/64, p. 22) in which the *service* spaces are accommodated in columnar cores supporting the *master* spaces spanning between them bridge fashion, was given its first tragi-comic application in Kenzo Tange's Communications Centre at Kofu (*AD* 5/67). It has now been adapted once again for Tange's Shizooka communications centre in the Ginza district of Tokyo.

The single core not only acts as the main structural support for the building but incorporates all the services, thus that part of the architecture—*the services* —which is generally assumed to be the most likely to require early change is integrated with that part—*the structure* —which is most likely to remain in position until the building is demolished. The whole is a cumbersome fantasia on an unsound premise—quite apart from the difficulties of the site, which have rendered the concept, with its inherent ideas of flexibility and extension, ludicrous. *Günther Nitschke*

Large photo G. Nitschke, small photo Forum 3/68.



Expo 70

So much for Tange's *Urban Technology* for Expo 70 (*AD* Nov. 1967). After all the expectations of an exciting urban complex and an architecture so integrated with its environment as to be indistinguishable from it, the project is resolving itself into yet another conventional master plan for an exhibition. It has little, if any use beyond Expo itself.

The site is served by four sub-gates from peripheral parking areas which are connected by an outer ring road. Access to the axially planned symbol zone is by 'moving roads' along which are located the various pavilions.

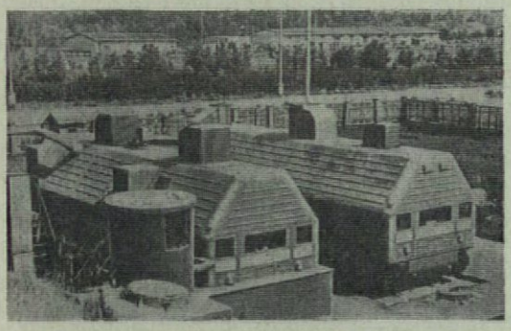
The result is a self-contained layout which fails to recognize the potentials for future urban development in the area. Senri New Town borders the site to the west and the new Osaka University is proposed to the north.

So far, no indications have been published as to how, if at all, these projects could exploit the communications network left after 1970.

With the theme of Expo as *Progress and Harmony for all Mankind* it would seem a worthwhile gesture for governments such as our own to present their pavilions to Japan as a contribution to the start of the university; but it is difficult to see how ideas such as this could be developed within such an inflexible layout.

Geoffrey Payne

COI have appointed Takaki & Dodd of Tokyo, Japan, as associate architects of Powell & Moya, London, on the British Pavilion at Osaka 1970. UK participation will cost an estimated £2 million.

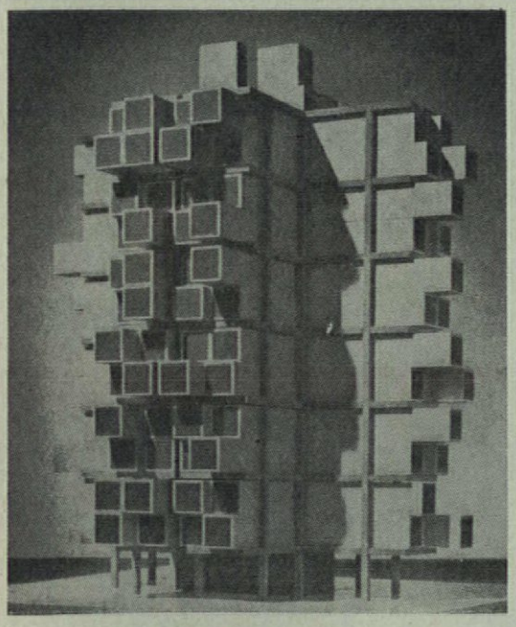


Power station on wheels

A highly reliable and compact atomic reactor operates at the heart of these mobile, self-propelling power stations designed by the engineers of the Institute of Physics and Power Engineering in Obinsk near Moscow.

The power stations, called SEVER, weigh 360 tons and generate 1500kW. The whole reactor, steam raining equipment and power generating system is housed in two units running on their own tracks, although the weight and size of these units will permit other means of transportation between construction sites.

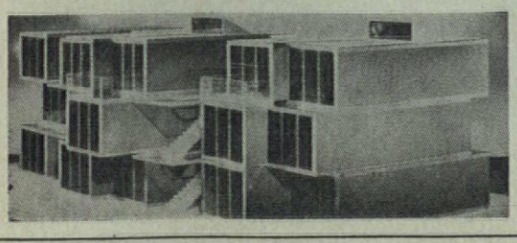
New Scientist, March 28th, 1968

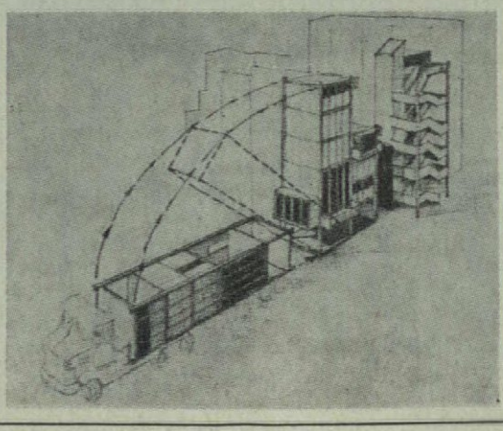


Steel prefab

Low-cost housing is the subject not only of government investigation in the USA but also of individual firms hoping to ensure that their products are used in any building boom. Most of their offerings are unmemorable, but the Jones and Laughlin Steel Corporation design for low- and high-rise housing, commissioned from Dalton-Dalton associates, is both of an admirable simplicity and engaging variety. Also, it is cheap—costs are estimated at between $9 and $12 per square foot. The low-rise units would be fully factory-built, to be stacked alongside a standard stair unit. The high-rise buildings would be mounted and raised together in steel frames. Individual units could be of different sizes and finishes in any material required.

Architectural Record, October 1967
Architectural and Engineering News, November 1967
Industrial Design, December 1967





Hot coat

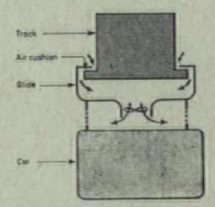
Coats and bedcovers with built in central heating but without any wires at all were on display at the Test-O-Therm stand at the UK Electricity Council's exhibition at Brighton earlier this year.

The exact nature of the conducting cloth from which they were made has not been revealed (pending completion of patent negotiations), but it is a nylon material coated with a silicon polymer carbon composition. The fabric is exceedingly durable and any coat could be lined with it, used in the normal way, and dry cleaned. To bring it to the required temperature the coat is plugged into a 2·7kg power pack of cadmium/nickel cells. The effect lasts for six hours. The pack costs £35, the coat £17.

The material has potential uses outside the clothing field and has already been tested successfully as a means of keeping stretchers warm.

Science Journal April 1968

Hovertrain

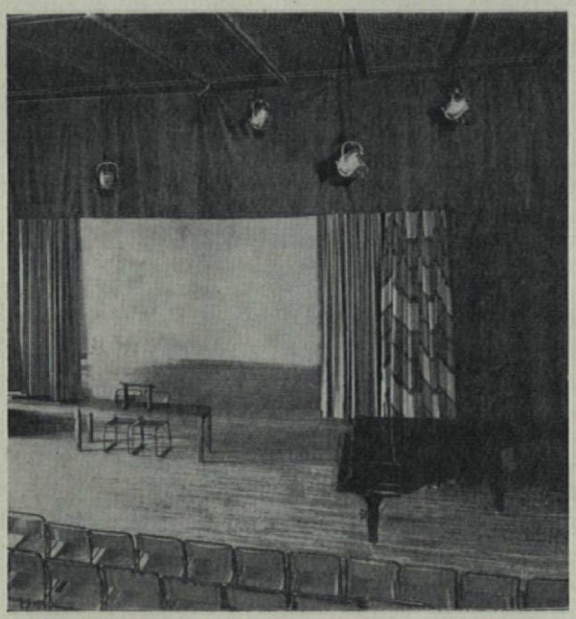


Urba IV, invented by M. Maurice Barthalon and powered by the Merlin et Gerin linear electric motor, has just been demonstrated in the *Ecole Centrale Lyonnaise*. It is an inverted hovertrain, air is sucked in to pull the vehicle towards an overhead beam from which it is suspended without being in contact. It can take hilly or winding routes, maintaining high speeds around curves and up gradients steeper than 1 in 5. It is quieter than other air cushion vehicles. All mechanical transmission components are eliminated —e.g. problems of mechanical adhesion of wheels to rails to not arise. If there were a power failure the cabin would sink back to a position of rest on the flanges and friction would bring it to a halt.

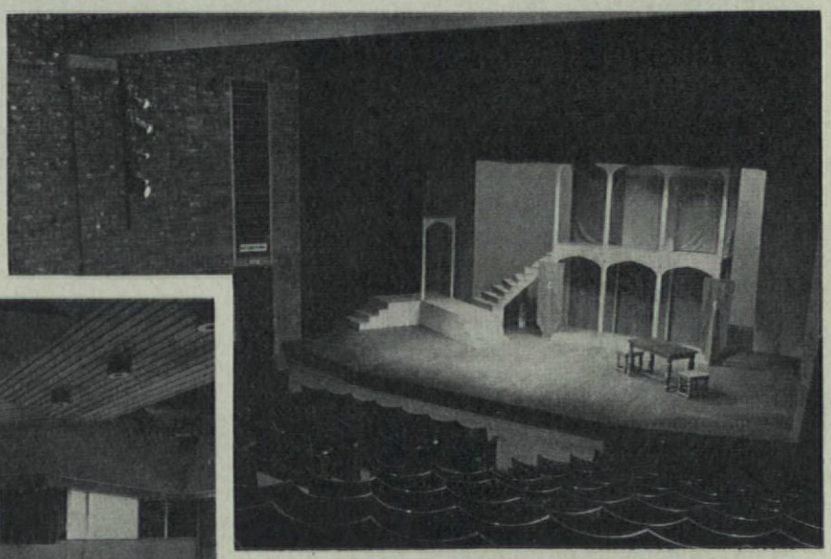
The first mock-up of Urba was built in November 1965, in M. Barthalon's drawing room; the lifting power used was the domestic vacuum cleaner. Lately this little machine has been used in a number of unlikely contexts, from inflatable bath-aids for disabled people to band-saw dust extractors. It would seem that the principle is being more and more fruitfully exploited, and soon possibly, we will be one up on the witches as we travel by our own vacuum cleaner appliances.

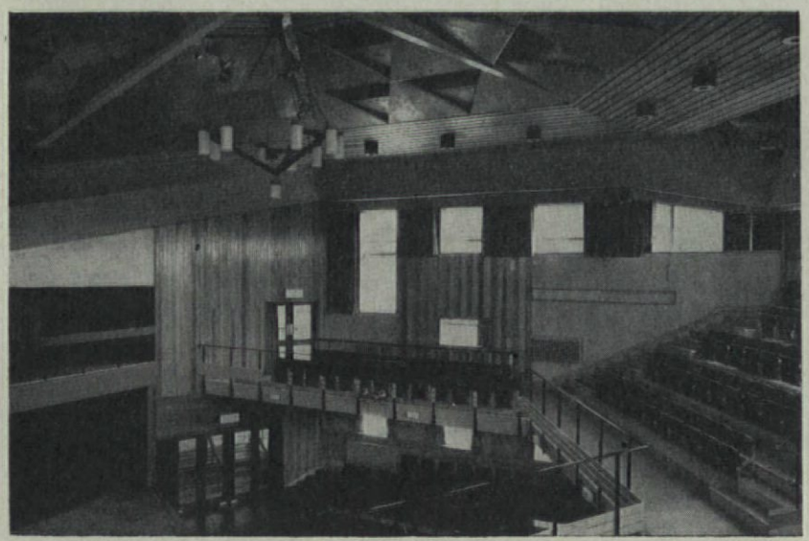
New Scientist, March 14th, 1968; *Financial Times*, March 18th, 1968.

Stage lighting for School Theatres and Educational T/V studios



Strand's expertise in theatre and T/V stage lighting is available to all education authorities, schools and architects planning a theatre or embarking on an educational T/V studio.
It takes the form of a wide range of professional lighting and control equipment, full planning and lighting layout services and a great deal of published information not available elsewhere. Two such booklets are *The Design of Drama Spaces in Secondary Schools* and *Lighting and Layout for Small T/V Studios*. Copies are free and post-free from Strand as are copies of our quarterly journal Tabs, which regularly contains contributions on the design and equipment of school theatres.





Above: *Clifton College theatre, Bristol, successfully serves the many purposes for which it was designed.*
Architects: Whicheloe, MacFarlane & Towning Hill.

Lower left: *Forest School, Snaresbrook, London. A real theatre that will also serve other school purposes.*
Architects: E. Shenstone & Partners (J. Nekanda-Trepka)

Upper left: *School Theatre and Hall, Wennington a simple uninterrupted space offering various possibilities for actor/audience relationships and complete flexibility for the deployment of lighting.*
Architect: Norman Branson ARIBA.

STRAND ELECTRIC

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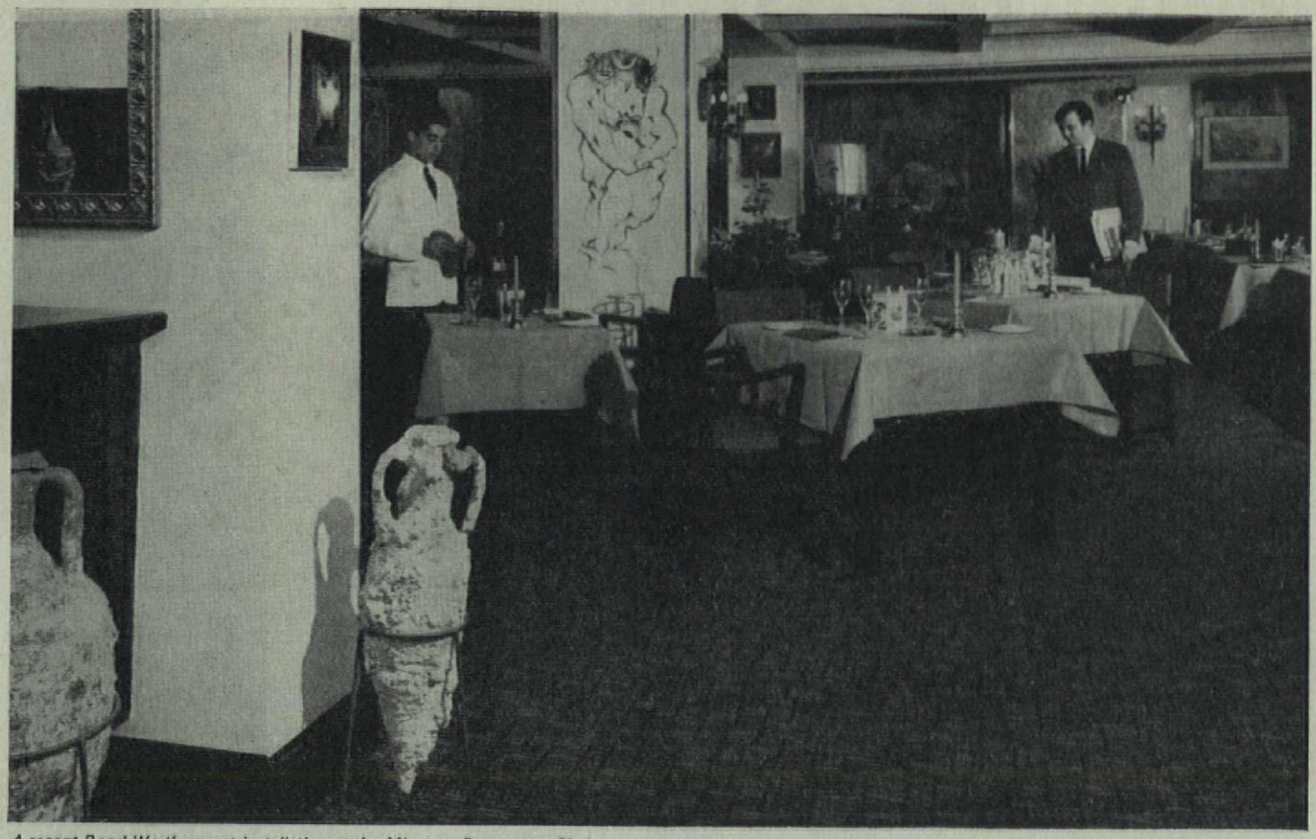

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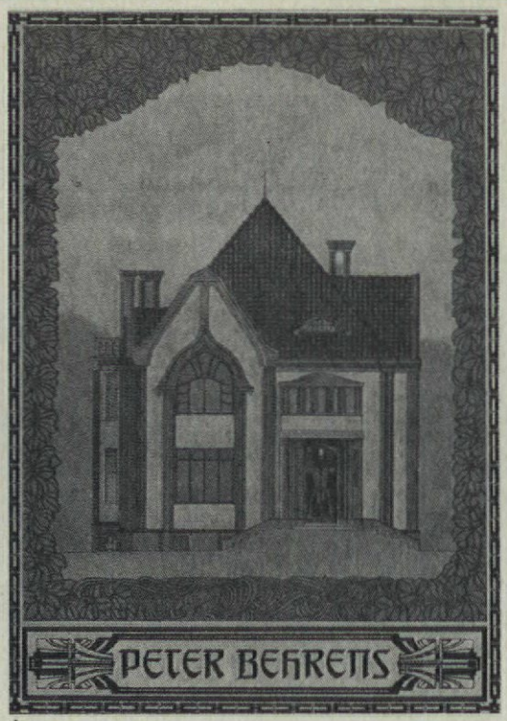
An Odd Specimen



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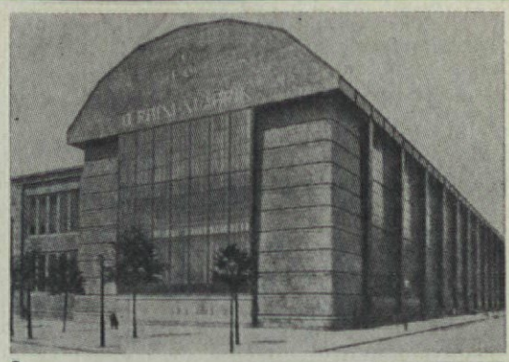

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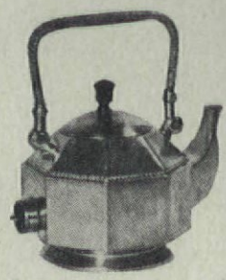

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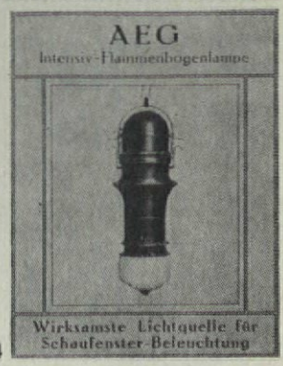

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There should be no need to question the reputation of Peter Behrens (1868–1940). He was the master of Gropius, Mies van der Rohe and Le Corbusier. He was the designer of both the AEG *Turbin-fabrik* (1908–9) **2** and *Kleinmotorenfabrik* (1910) in Berlin. Professor Pevsner has enshrined him as an immortal in the Pioneer Pantheon, Reyner Banham has accepted this estimate (demurring only at the gas works at Frankfurt-am-Main, 1911–12). Even Professor Henry Russell Hitchcock, though he clearly mistrusts the master, has ranked him high—and more or less consistent. Peter Behrens is upheld as a reliable, hard headed designer, classicist in spirit but knowing how to temper his classicism to produce buildings of a noble vigour, utterly opposed to wild expressionist fantasy.

But the comprehensive exhibition of his work that toured Germany and Austria last year suggests that his classicism was neither as noble and muted as has been suggested, nor was his German expressionist streak so firmly controlled. He is not an altogether respectable father figure. He began, like Henry van de Velde, as a painter of the most lacklustre sort, he turned then to graphic and applied art and thence to architecture. His first building, his own house at Darmstadt (1900–1) **1**, exhibits clearly his fertilizing interest in Art Nouveau. It was an interest that, under the influence of Hermann Muthesius' functionalist credo, was to be suppressed, but it did not disappear. In 1907 he was appointed adviser to AEG and in the following years designed for them those stern, finely proportioned buildings and industrial objects on which his fame still rests **2–4**. The fumbling, awkward beginning was forgotten. But the honeymoon period did not last long, it was succeeded by years of respectable stagnation in which he produced buildings of the dullest and most ambivalent classical kind—the Festhalle of the Deutscher Werkbund exhibit in Cologne, 1914, is one example **5** that at Berne of 1917 is another **6**—but the boredom of producing such architecture proved intolerable and by 1920 when he started designing for the I. G. Farben Company at Hoechst he had determined to cast aside all classical restraint. Hans Poelzig was imitated in one building, Max Berg in another. The exposer of Expressionism had become himself a sham Expressionist. We may grin at his industrious crankiness, his self-conscious hedonism. His jazzy brickwork at Hoechst (1920) **7** or at Munich (1922) **8** is mildly engaging, but it was neither a shrewd nor a particularly successful architectural fling. Most historians have ignored it. It had no very significant influence. The late Behrens is remembered rather for his more chaste buildings—the Ring der Frauen at the Berlin Building Exhibition, 1930 **9**. But evidently he was a more cranky and inconsistent architect than has up to now been allowed. Very few of his buildings are commanding of respect. The iron repression of Muthesius functionalist credo, though it might at first have disciplined him, soon proved so intolerable a strain that it sapped all power and was succeeded by an emotional architectural outburst that has embarrassed commentators. Behrens may seem a respectable father figure, but he clearly had insufferably boring and hectic affairs on the side.

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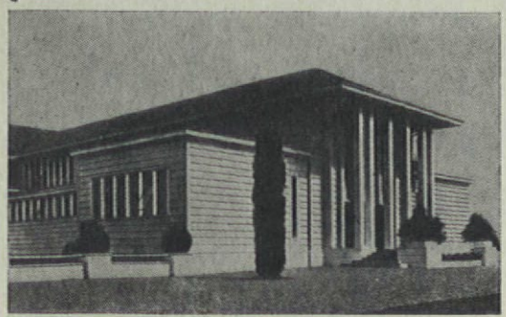

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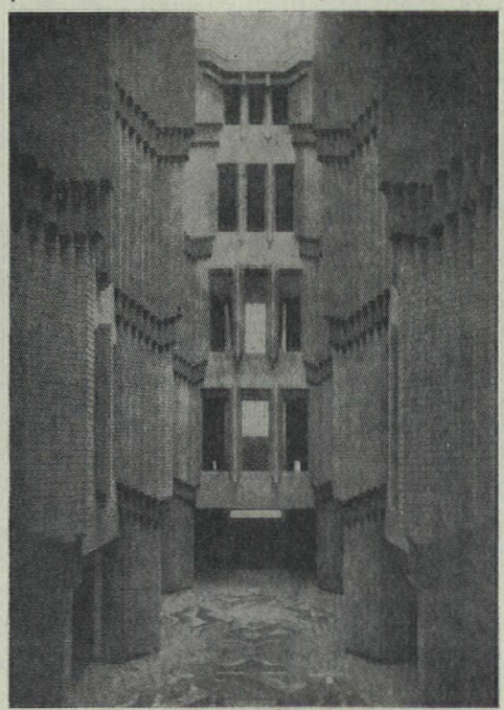

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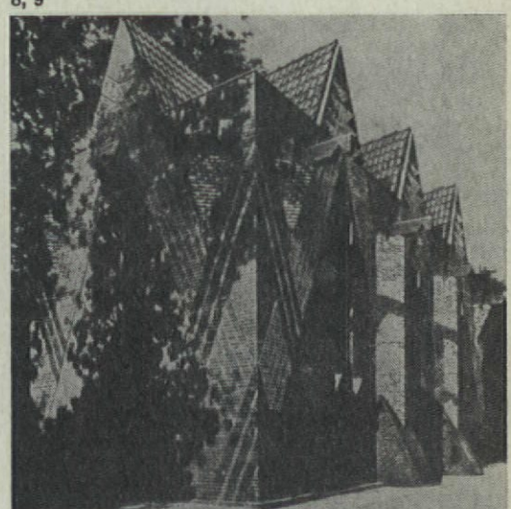
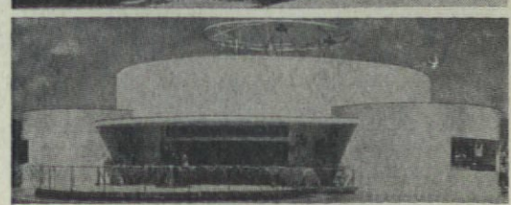




cosmorama

The summer 1967 issue of *Dædalus* (Journal of the American Academy of Arts and Science) was devoted entirely to work in progress towards the year 2000, the record and published papers of a large and serious commission headed by Daniel Bell of Columbia University. Most of the papers were concerned with prophecy, of the type made in Theodore Gordon's article in *AD*, February 1967, though their range was naturally wider and more extensively explored. Many new and alarming prospects were suggested, among them the likelihood that personal privacy might be well-nigh unattainable in the future. Excerpts of Professor Kalven's article on this subject are printed here, a token only of the many thoughtful articles in an admirable issue of *Dædalus*.

The problems of privacy in the year 2000

Changes in the sphere of privacy may come from changes in technology, in social institutions, or in norms.

The first and most obvious prospect, one that is already receiving alarmed attention, arises out of what might be called improvements in the technology of eavesdropping. It is becoming increasingly possible to invade privacy without trespassing—that is, to invade it by remote control. Man can now photograph from afar, conceal microphones in tiepins, observe by closed-circuit television, tap telephone lines, pick up conversations in another room by the use of electronic devices, and determine the content of mail without opening it. There is no reason to doubt that the technology will continue to improve—probably at a geometric rate—and that by the year 2000 it will be possible to place a man under constant surveillance without his ever becoming aware of it. Moreover, since the culture will become cognizant of this advance, men will live with the constant possibility that they are under surveillance without ever being able to be sure whether this is so.

One can only wonder which is the greater evil here: having one's privacy intruded upon without being aware of it so that reliance on privacy has been upset; knowing that there is no escape from surveillance; or, finally, never being able to resolve the doubts about whether any given moment is private.

The intrusions will not be limited to government measures in aid of law enforcement or national security. The technology may become a commonplace in the hands of private parties—employers interested in the off-hours activities of employees, competitors interested in one another's integrity and trade secrets, estranged spouses interested in perfecting grounds for divorce, insurance companies interested in the subsequent health of personal-injury claimants they have paid, and the idly curious who are just interested. Thus, by 2000, man's technical inventiveness may, in terms of privacy, have turned the whole community into the equivalent of an army barracks.

There will be increasing pressure on people to surrender their privacy. Recipients of the government's ever expanding welfare benefits will not find it easy to resist government claims to a wide amount of information about their character, personality, and living habits. With ever increased emphasis on consumer credit, people will be induced to disclose all sorts of information about personal tastes, income, and habits in handling money. Indeed, privacy about one's financial situation and personal budget, once so deeply entrenched in middle-class mores, will become a forgotten value. Increase in insurance coverages, pension plans, and government medical services will bring increased medical scrutiny lessening any privacy in one's health, weight, digestion, and so forth.

A third kind of threat also depends on technology and probably on the computer. It turns on the prospect of a great improvement in the process of record-keeping and of collating information about individuals. When, as is likely, this technological efficiency is coupled with the government's ever increasing demands for special information, the prospect is one of a formidable dossier on every member of the society. Information may initially be collected for relatively innocuous purposes such as income tax, social security, special aid programmes, and special support for education. One can also anticipate increased interest in testing competence, aptitude, and personality. At some happy future moment, all this information could be combined with the police files so as to produce a devastatingly detailed and accurate profile of each member of the society. The disturbing result could be that everyone will live burdened by an unerasable record of his past and his limitations. In a way, the threat is that because of its record-keeping the society will have lost its benign capacity to forget.

The ambivalence with which the public has greeted the Kennedy-Manchester dispute, the protests of Mrs Mary Hemingway over publication of A. E. Hotchner's *Papa Hemingway*, the unease over the memoirs of Churchill's doctor, and the appearance of the Bullitt-Freud study of Woodrow Wilson point up the serious puzzle about the private life of the public figure and suggest the likelihood that there will be further changes in the norms as to what is appropriately newsworthy. The privacy of the famous, the great, and the important may yield to the notion that it is in the public interest to have every last detail of their lives and correspondence fully in the press and public record. The great will live in the public domain.

Various other norms about privacy may also change. With so much technological eavesdropping going on, the informer—if he does not become a victim of technological unemployment—may find his image improved. He may be seen as doing what is, after all, rather useful work. Further, the traditional confidentiality of the confessional, of lawyer-client, doctor-patient, and husband-wife relationships, and even of the voting booth may come to be re-examined critically. The grim hypothesis latent here is that some 'critical mass of privacy' in a society may be necessary if privacy is to survive at all.

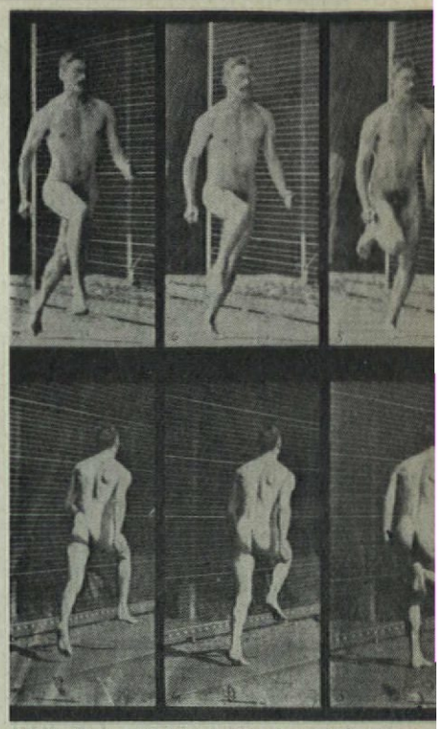
Three changes in culture already visible may bring as by-products dramatic changes in privacy: the decline of the family, the decline of religion, and the decline in the habit of reading. Arguably the family has been the citadel of privacy; it has provided an institution within which private things were shared and has set a boundary point beyond which things were no one else's business. Family-centred life was deeply supportive of the values of privacy; as it declines in importance, there may be a concomitant loss in our appreciation of privacy as a value. The decline in religious observances may mean that man, never alone with God, will find that he has lost one of his recurring opportunities to be alone. Similarly, with the decline of reading, men lose the intellectual privacy afforded by being immersed in a book. This is one difference, among so many, between reading a book and watching television.

Can a public opinion more sensitive to values of privacy be generated? This, perhaps, may be the crux of the whole matter, and one might even contemplate a programme of education for privacy.

Can psychological and psychiatric studies be made that would add anything to our current knowledge about the importance of privacy to the mental health of the individual? I would assume that one subtle but sure way to drive a person crazy would be to keep him under constant surveillance for an extended period of time. Might we begin to see therapy for loss of privacy?

Can changes in living habits be developed to counteract some current habits that seem to endanger privacy? Can we develop habit substitutes for religion, reading, walking in the woods, and so forth?

For me, the most interesting possibility is that we might see the development of new institutions designed to ensure some private moments in otherwise unprivate lives. I have only the dimmest sense of what shape these might take. Possibly some analogue to the religious retreat might be developed. Such a secular retreat might be provided by the welfare state as a final self-denying form of welfare—or conceivably it might even be provided commercially. It may be a final ironic commentary on how bad things have become by 2000 when someone will make a fortune merely by providing, on a monthly, weekly, daily, or even hourly basis, a room of one's own.



During the 1880's Eadweard Muybridge recorded animals and human figures in motion. His observations were quite straightforward and dispassionate; they are revealing of no moral complexities, no guilt or shame—

Looking at you

A man hired a New York theatre, inserted a sheet of one way glass between the stage and the auditorium, constructed a set reproducing a domestic interior, and hired a family to live in it. The theatre was open 24 hours a day and did quite good business over a period of weeks. One can be sure that any sociologist would give his PhD to have such access to an authentic domestic situation. The human race has proved remarkably difficult to observe in its natural environment; we have relied upon art forms to provide us with information about this—from Dickens, via *Wigan Pier* to right *Up the Junction*. Unfortunately, the information we get refers mainly to the art form rather than the situation. Similar shortcomings apply to such historic documents as the Parker Morris report and *Space in*

Center for environmental studies

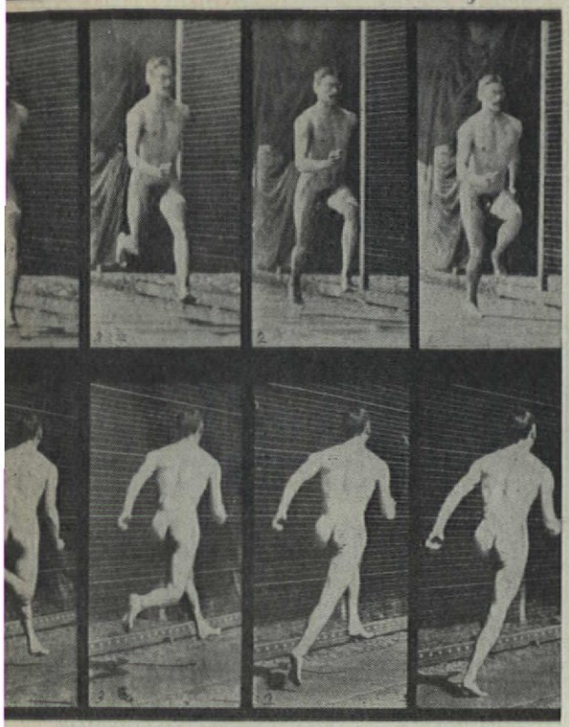
The Center for Environmental Structure, an independent, non-profit corporation started by a grant from the Edgar J. Kaufmann Foundation, was set up in March 1967 at Berkeley, California, to formulate an environmental pattern language. The members of staff are Christopher Alexander, Sara Ishikawa, Roslyn Lindheim, Murray Silverstein and Sim Van der Ryn.
The aims of the Center are set out below:

The cities and buildings we live in today, do not meet human needs. The environment does not form an organic whole; nor does the urban life within it.

In the current practice of design, two problems are responsible for this:

The hundreds of social, psychological, economic and technical questions which occur in any design project are never thoroughly answered. The schematic design phase is too short for them to be answered in any one project: yet there is no mechanism by which schematic solutions can be carried from one project to another, and so improve cumulatively and systematically over time.

Even if we design individual projects well, these individual projects will not function perfectly until they are coordinated with other projects. Today, the professions and agencies concerned with urban problems work independently, each designing one



nothing is hidden. Yet they are deeply humane and truly informative; pictures show how people and animals are and how they move. Certainly they revolutionized conventional art representations of figures in movement.

The Sony Videocorder which records both images and sound is no more than a rudimentary (if comparatively advanced) form of the equipment that will soon be available for public eavesdropping. Such equipment may destroy squeamish notions of personal privacy.

the Home with people immortally ensconced on their three piece suites. It is presumptious to take either the art forms or the sociological reports as definitive, particularly now that we have the ability to observe the present and to live in the present by means of evolving electronic means—of which television is only a badly misused part. There is now a centering of interest on human process in all areas of investigation. The Renaissance dictum of man being the measure of all things becomes increasingly relevant; for the first time we are in a position to determine what that measure is—and it's definitely not the Golden Mean.

While admitting that there's too much bugging about today—too many people listening to one another's telephone calls—one should re-examine the concept of total privacy; though this need not be taken as a justification of electronic voyeurism. The danger of not doing so may allow for the worst type of Big Brother developments. One must understand a process in order to control it, and this does not imply morality judgments. A parallel can perhaps be drawn with the nineteenth century when the philosophy upheld the by power *élite* focused on the rural good life, which in a very real way allowed by default the development of the extreme physical tyranny of the new industrial urban environments. Now one senses a new process, involving sophisticated information storage and retrieval, electronic devices and massive research effort, which could produce an extreme mental tyranny, but, like industrialization is unstoppable. Perhaps then we must accept the new process, understand ourselves in relationship to it, and use it.

We have for a long time accepted a static form of bugging in birth certificates, passports, etc., and would accept much more in certain areas—obviously in those relating to our health. A radio pill, which already exists, would probably be welcomed in return for a constant surveillance of our health. Surely, the main worry is the intention rather than the means. Similarly, the project to fingerprint the whole population—a crude prototype for assimilating information on human behaviour—might make us feel that we are all criminals, just as Dr R. D. Laing has suggested that we are all mad. The way to prevent this unease is an acceptance of the facts. We live by an ethic of Christian forgiveness, an ethic which only obtains because of human forgetfulness. We have now the means to store and retrieve information at any time in the future, the computer never forgets. Perhaps we can forget the moral prejudices we operate so inefficiently—our unease and guilt—and accept the present realities unselfconsciously leaving the computer to determine right and wrong, innocence and guilt. The computer will be our first saint. Perhaps the message of bugging is a different sort of freedom, rather than oppression. It may be that Orwell was as wrong in *1984* as Fritz Lang was in *Metropolis* concerning our personal freedom. It should be remembered that large sections of the community are victims of privacy—most obviously old people. The telephone does surely benefit old people who suffer from privacy. An extension of more subtle devices, using wider channels of information, may benefit us all. Perhaps what is required is a Eadweard Muybridge of the bugging devices—someone who might so dispassionately and humanely investigate the possibilities of bugging devices that new facets of our activities and thought processes are revealed and laid bare, opening up vast new potentials of behaviour and thinking. This could be what Norbert Weiner calls the human use of human beings.

One suspects that the old channels of information dissemination, whether they be Shakespeare's art, TV programmes as such—but not TV—the Kinsey report, Lichenstein, etc., etc., may be irrelevant in the future, they can be short circuited in real time, not by artists or nouveau *shamans*, but by everyone. New means of communication and information retrieval should enable each of us to perceive and experience directly—without the intermediary of art—the essence and reality of the world around us. As a thought for the future, how does Ted Serios make those 'thoughtographs'?

Warren Chalk often says he doesn't listen to people but watches them. As the Beatles say, 'I am he, as you are me, and we are all together'.

Fred Scott

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part of the city without any idea of how this one part relates to all the other parts.

To solve these two problems, we have introduced two concepts: an environmental pattern and a pattern language.

An environmental pattern is an abstract solution to a restricted design problem. It can be applied many times over, and can be improved cumulatively.

The environmental pattern language is a system which coordinates the patterns with one another. It makes certain that the solutions to various projects are properly related.

These ideas are not new. Experienced designers have always used pattern languages of their own. For example, a hospital designer has a personal vocabulary of prototypical solutions which he uses over and over again, modifying them slightly each time. He knows how the various elements of the prototype fit together; and he knows when to use which variants. The elements of the prototype are patterns; the rules which tell him how these elements fit together, form the pattern language. The patterns and the language improve as he learns from his successes and mistakes; the more hospitals he designs, the better his language becomes.

This process sounds good—in fact it has a fatal weakness. Since all the designers' languages are essentially private, the contents of these languages are never subjected to public scrutiny and criticism. This means that solutions never improve systematically over time. Worse still, because the languages are private, the solutions are inevitably uncoordinated. The environment as a whole stays bad.

Instead of individual designers producing essentially private languages, we need a public language of solutions for all environmental problems. This language would improve by a process more stringent and reliable than self-criticism and self-education, for it would be open to scrutiny by everyone involved with environmental problems. All designers would be able to draw on the insights in this pattern language. All designers would be able to contribute to it.

To make this possible, we have formalized the idea of an environmental pattern, and the idea of an environmental pattern language. The effects of the formalism are these:

Any aspect of the environment—whether at the scale of regional land use distribution, transportation networks, the layout of building complexes, the design of individual buildings, the design of interiors, or the details of construction—can be represented as a pattern.

The functional basis for each pattern is clearly stated.

Each pattern is readily communicable.

Each pattern contains a precise statement of the conditions under which it can be applied.

Each pattern has a format which encourages criticism and feedback.

Each pattern becomes a viable element in a universal pattern language.

The language coordinates these patterns. It has the following effects:

It accounts for the functional interdependencies among patterns.

It guides the process of combination, so that an individual making use of patterns knows how to put them together.

It indicates clearly how newly invented patterns are to be related to patterns already known, in such a way as to maintain the organic unity of the whole.

We hope that the environmental pattern language will ultimately contain hundreds of subsystems and tens of thousands of individual patterns. Every conceivable kind of building, every part of every kind of building, and every piece of the larger environment will then be specified by one or more subsystems of the environmental pattern language.

The Center will undertake basic research concerning the pattern language and will publish and distribute* the coordinated pattern language as it evolves. The Centre will also accept contracts to develop specific patterns within the pattern language and to design parts of cities and buildings according to the language.

*** Anyone wishing to be on the mailing list is asked to write to the Center for Environmental Structure, 2701 Shasta Road, Berkeley, California 94708.**

Book notes

Organisation and handling of bibliographic records by computer
Cox and Grose. Oriel Press, 65s.
The speed with which this book was edited, printed and offered for sale—a period of 40 days—is a good indicator of the character of the seminar it records. (University of Newcastle, July 1967.) Useful information is given on work and ideas current at such centres as Newcastle upon Tyne, while the section headings Processing Systems, Structure of Libraries, Information Retrieval, National Catalogues and Specific Processes indicate, in that peculiar sequence, the scope and worthwhile unevenness of this book.

The MARC work described, not only indicates the value a National Bibliography can draw from becoming International, but also the very existence of such a programme seriously questions the glib assertions made in the immediate past (*AD*, June 1967) on the impossibility of the *eventual* computerization of currently-assumed, vast collections of varied recorded information in such places as the British Museum and the Library of Congress. (See also Communications Satellites for Learning, page 212, this issue.)

The application of computer mechanization to the Library Service as a whole (as distinct from the use of mechanization for certain easily-quantifiable features), has complexities built into it of a similar sort to those which philosophers tussle with, over whether there can be a single (usable) language of science, or whether each separate problem should call for its own language.

Seen from an individual library point of view, libraries find it their responsibility to recognize their own special relevance to their own highly particular situations, which, when they attempt to improve the efficiency of their service, they tend to particularize even further. But the systematizer, on the other hand, is concerned with areas of similarity rather than peculiarity in the Library Service, and the benefits to be gained from a national and international network of inter-library service connections.

That both points of view are responsible and valid cannot be questioned, but to doubt that they are compatible would be to miss the point, since the two positions do not in any way deny each other, but merely emphasize the complexities to be understood and to be resolved—the sooner the better.

Roy Landau, Cedric Price

Computers in architectural design
David Campion. Elsevier Publishing Co., Barking. £4.
Computers seem to divide architects into two camps. On the one side, those who say that the machine is the answer to all our problems and has the ability to replace man who created it. At the other extreme, those who see the machine as evil, not in the 'tradition of man' and should not, therefore, be given the chance to replace. Both are absurd. The computer is only a super calculating machine; an information handler and not a maker of judgments. Both man and machine have strong points but they are not in conflict; in combination they can augment and complement each other in a natural partnership.

Until now, many architects, wise and unprejudiced enough to know that the computer must have something to offer them, have not known where to start and in the many demands upon them, a time consuming study has not been a top priority. At last, we have a book on the subject, written by an architect for architects.

David Campion's *Computers in architectural design* is an excellent introduction to the subject, combining just the right amount of background information about computers and programming techniques, with practical examples of how the author has already harnessed the machine to aid the work of an architectural practice.

It is to be hoped that it will encourage others to do the same.

Alex Gordon

Barbara Hepworth
A. M. Hammacher. Thames & Hudson. 21s.
A soft-back large-size pocket book on Dame Barbara Hepworth's work is very welcome. There are 173 photographs, 18 in colour, and the book is reasonably well produced. It provides an opportunity to reassess her work, along with the current Tate retrospective. No longer in the *avant-garde*, but still keeping up, most of her work now appears purely, and perfectly academic.

Her public commissions have been unfortunate: those on view in London or New York are sterile and lack entirely the love and delicacy of the smaller works. No amount of Mr Hammacher's puff is going to persuade anyone here, but there are some marvellous things to be grateful for. She has a quality of caressibility, an eye for line and light.

Mr Hammarcher's text is throughout overblown, uncritical and adoring, full of tender attributions and personal delicacies; it's known, I believe, as the St Ives effect.

There is a bibliography, and a useful list of works.

Theo Crosby

Publications received

An introduction to english mediaeval architecture
Hugh Braun. 297 pp. Faber & Faber, London. 84s.

Imagini sulla struttura urbana
Webber, Dyckman, Foley, Guttenberg, Weaton, Wurster. 267 pp. Il Saggiatore, Milan.

Idee per la citta communista
Barbura, Pjumenton, Gutnov, Kharitonova, Lezava, Sadovskij. 171 pp. Il Saggiatore, Milan.

The great ages of world architecture
Baroque and rococo—Henry Millon
Chinese and Indian—Nelson I. Wu
Early civilization and byzantine—William L. Macdonald
Gothic— Robert Brauner
Greek—Robert L. Scranton
Modern—Vincent Scully, Jr.
Pre-Columbian—Donald Robertson
Renaissance—Bates Lowry
Roman—Frank E. Brown
Western Islamic—John D. Hoag
Studio Vista, London. 25s. each.

Fun with architecture
William C. Cartner. Kaye & Wood Ltd. London. 16s.

Victorian suburb
H. J. Dyos. 240 pp. Leicester University Press. 42s.

Driver behaviour
S. W. Quenault. Road Research Laboratories, Berks. Free.

A J metric handbook
Leslie Fairweather and Jan A. Silwa. 160 pp. Architectural Press Ltd. 15s.

Architects' working details. Volume 12
Ed. Daca Boyne and Lance Wright. 160 pp. Architectural Press Ltd. 30s.

A study of education for environmental design
(Pre-publication report)
R. L. Geddes and B. P. Spring. Princeton University. American Institute of Architects.

Selected films on building
Ministry of Public Building & Works, Research & Development.

Sunlight in buildings
Ed. R. G. Hopkinson. Bouwcentrum International, Rotterdam.

Jerusalem—A new era for a capital city
R. Westmacott. 40 pp. (pamphlet) The Anglo-Israel Association, London.

The year 2000
Herman Kahn and A. J. Wiener. Macmillan & Co. 63s.

Learning to see. I and II
Kurt Rowland. Ginn & Co. London.

Prince Albert and Victorian taste
Winslow Ames. 238 pp. Chapman & Hall Ltd, London. 84s.

CITB training recommendations. Scaffolding
Construction Industry Training Board. 64 pp.

Contributors to this issue

Sol Cornberg
Sol Cornberg Associates Inc., New York.
Designers in the Communications Arts (Systems & Facilities).

John E. Tirrell*
President, Oakland Community College, Michigan; and Director, Planning and Consulting for Education.

Albert Canfield
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Michael Pearson*
Partner, Charles B. Pearson, Son & Partners—Architects. (Edited special issue of *Arena* July–August 1967 on Secondary Education.)

Jonathan King*
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*Articles specially written for this issue

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Department of Machine Intelligence and Perception
University of Edinburgh.
Professor Donald Michie, Dr J. S. Collins

Bionics Research Laboratory
Department of Machine Intelligence and Perception
University of Edinburgh
Professor Richard L. Gregory

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At Cambridge, England, 26-29 June 1968, the RIBA is holding its Annual Conference on the subject 'Building for Education : Looking forward' (presumably as opposed to 'looking back').

To all who attend, we dedicate this issue of AD

LEARNING

Learning—possession of knowledge got by study (Oxford English Dictionary)
Education—Bringing up (of the young); systematic instruction (OED)

At different times the need to learn has drawn on varied patterns of education to achieve the desired condition in a fixed period. Such educational patterns were usually produced by a few, who as a result pre-assumed what and how much should be learned. The provision of education has therefore often been related to a particular human end product. Children have been educated to become educated adults—not educated children. Industrial and professional education has been aimed at the production of people equipped with skills previously recognized as necessary by their educators. Thus education, whether for children or adults, became a method of creating an ever-increasing number of people capable of recognizing the value of assets produced as a result of increasing educational servicing. This in turn enabled education, not necessarily learning, to be used by its recipients as a social emancipatory tool by which previous social structures could be questioned. As the amount considered necessary to learn increased, so educational patterning became increasingly compartmented and specialized. The primary, secondary and tertiary periods were joined by adult and mid-career education. In all cases an end product was required in a fixed time.

Education is today little more than a method of distorting the individual's mental and behavioural life span to enable him to benefit from existing social and economic patterning. Such an activity, benevolently controlled and directed by an elite can, in relation to the physical structuring that its system requires, do little more than improve on the range and network of structures it already has under its control.

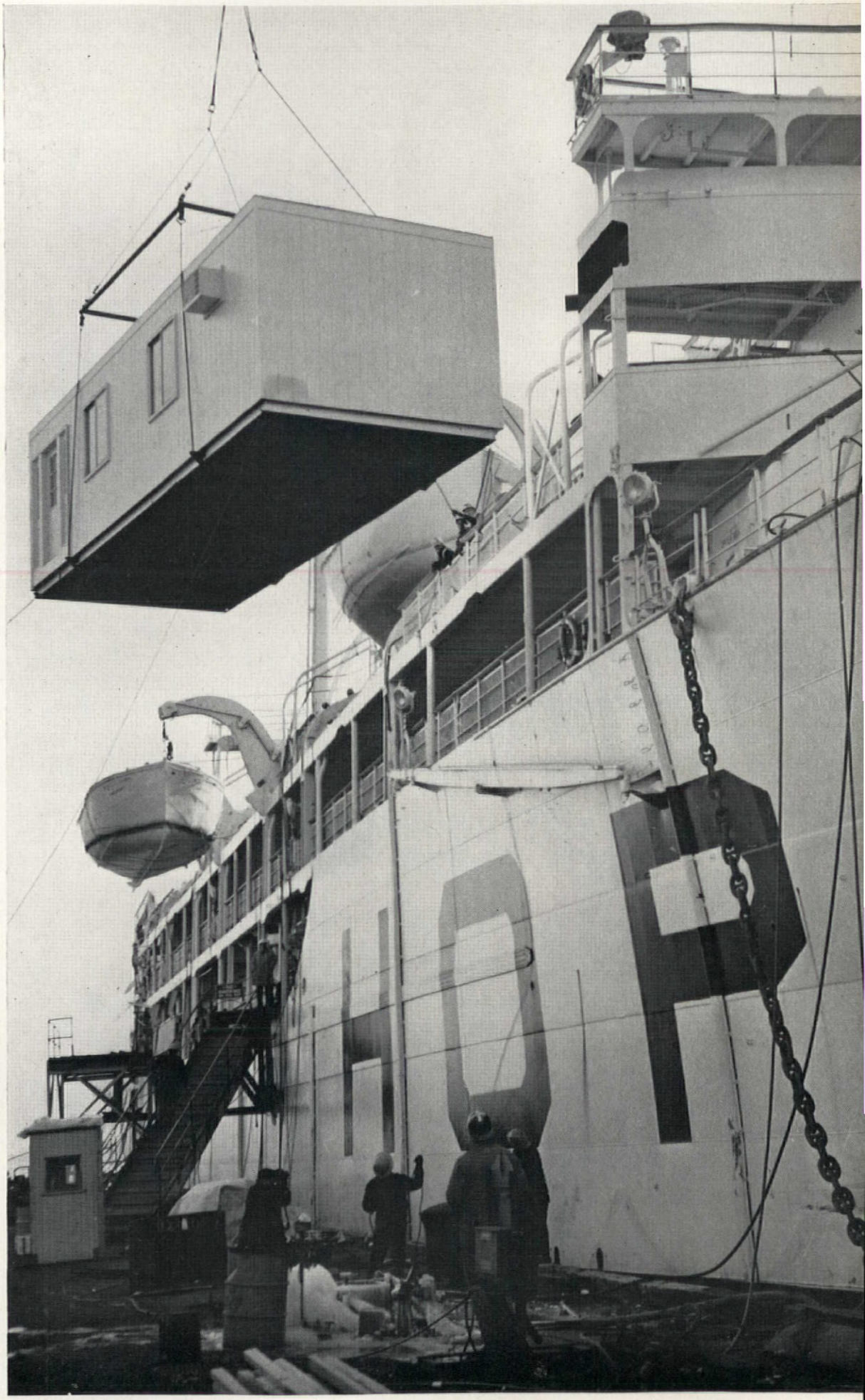
concluded on page 242

GUEST EDITOR CEDRIC PRICE

A general disquiet with the insenstive attention still given by architects to the scho

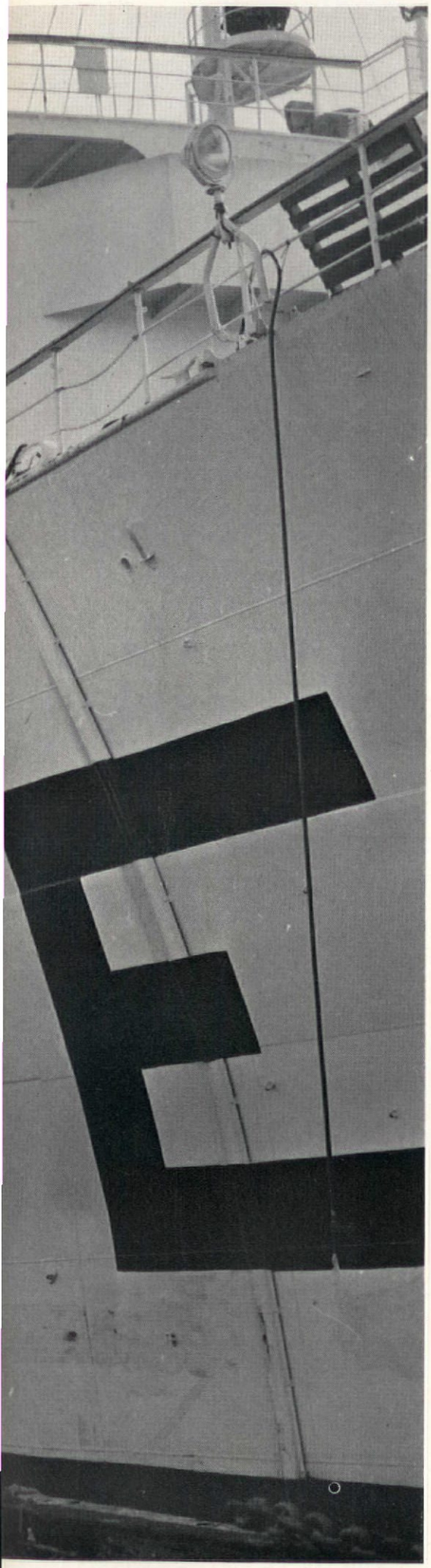
DING DONG DULL

Jonathan King



Heavy pressure on school facilities has led to the production in the US of the prefabricated classroom shown here. It is being swung on board the hospital ship SS *Hope* where it will provide extra training facilities when the vessel arrives in Colombo. There, doctors, dentists, nurses and medical technologists will provide a series of courses to train students from various parts of Ceylon. The unit measures 12ft by 36ft and provides a centre which can be moved to another site with the minimum of trouble. Maker is C.I.T. Educational Buildings.

an isolated built object rather than a means of improving a humane service,



It's odd that the setting for education should almost invariably be dull. The long, sterile halls, the repetitive classrooms, the unyielding and antiseptic surfaces, the drab furnishings, all make a strange setting for an institution the mission of which is to stimulate the mind, expand the senses, and communicate the values of a dynamic society.

There is little satisfactory evidence to indicate any strong connection between the stimulation of ideas and spaces. Indeed many of our greatest institutions and teachers have functioned in facilities that were depressing or worse. Rutherford's laboratory would hardly classify as a model of superior design. Much of MIT's best research has been done in temporary barracks. The Architectural Association School seems to function with a remarkable degree of success under conditions which even Ebenezer Scrooge would consider deprived if not, indeed, depraved. Somehow the effort to function at all in some of our worst educational facilities seems to stimulate or at least challenge their occupants.

But by and large the picture is not of extreme privation but of extraordinary mediocrity on both sides of the Atlantic. There are of course some outstandingly well-designed and impressive educational buildings here and there, but despite the efforts of well-meaning educators, architects and bureaucrats the picture is not a happy one. We have largely conquered the fire and health hazards which dominated the school building field at the turn of the century. Running water, decent plumbing, fire resistent structures, reasonable levels of heat and light are the rule. But still the run-of-the-mill schoolhouse is a bore. It lacks colour, spirit, surprise, and culture. This is particularly true of intermediate and secondary schools.

The warmer feeling which our societies have for younger children seems to be reflected in the design of primary schools. The general distaste for adolescents seems to dominate the design of institutions for their use. Uninspired and often indistinquishable colours, brittle surfaces, uncomfortable—and by any standard ugly—furniture, usually in eight equally nondescript pastel anti-colours, uniform and rarely attractive lighting, minimal landscaping, all point to a kind of tired acceptance of education as a necessity which society accepts without question but equally without joy. The senseless monumentality of yester-year is now replaced by the thoughtless utilitarianism of today, a kind of minimal architecture.

Budgeting consideration, maintenance costs, the ever-expanding school age population, are part, but not all, of the reason. The sociology of building allows even the casual observer to tell what activities are valued by the nature of their housing. Education below the collegiate level is increasingly discussed in terms that would suggest that it is the contemporary substitute for religion. But the schoolhouse tends to sing a different tune to its users and raises some question as to how much we really value education.

Increasingly our significant environment is electronic rather than architectural and yet here also education is impoverished despite recent increases in the use of communications equipment. Only in a few lively suburban schools in the United States and Canada and in a minority of the Scandinavian schools is there likely to be as much electronic equipment in a typical schoolroom as there is in the students' living rooms at home. Even where such equipment is prevalent in the schools, little architectural thought has been given to facilitating its use.

Nor have the schools been able to keep pace with the mobility of contemporary society despite the fact that the means to do so are within our technological grasp. But the ability to organize our building and planning efforts has nowhere kept pace with the needs for schools for our mobile societies. Indeed, the increasingly complex bureaucratic efforts necessary to plan, fund, build, or even add to a school, seem to get even more time-consuming in accordance with some kind of Parkinsonian law.

While there is increasing acceptance that our schools are more significantly a service rather than an object (i.e. like the telephone system) we still plan them as if they were to be individual medieval castles. Rarely do we even try to organize school systems; rather we attempt to build a system of self-contained schools.

History is only clear after it has been written and the tendencies and contradictions of this era are confusing. But there do seem to be some hopeful signs of more promising ways of coming to grips with the problems of school building and the communications equipment which will bring schools into the contemporary world. The building systems projects now being completed in California (SCSD, see *AD* 7/65 and 11/67) and those getting under way in Toronto (SEF see p.226), Montreal (RAS), Florida (SSP), and Pittsburgh (the Great High Schools) seem to point in hopeful directions. By their very scale these projects offer the potential base for major improvements in both the processes and end products involved. For example, the Pittsburgh Great High Schools Program will produce some $150 million in building. As a result of this scale, and because the five schools are treated as a programme rather than as five separate buildings, funds and personnel are available to attack the sociological, pedagogical, building, and programming factors involved.

The complexity of dealing with all these problems at once within the omnipresent cost context under which education operates and builds, requires new kinds of design analysis. Individual schools simply don't permit the kind of professional services and study necessary to take on all these disparate factors at one time. None of these building systems programmes has yet been able to deal with education as a total system. But they are getting closer and pointing in the right direction.

To date, the work on major building systems for schools is not lacking in defects but it has gone far enough to suggest that it is possible to build exciting and successful schools on a large scale. In an era when instantaneous communication is the rule, where any decrease in skirt length in London brings out pinking shears in California before the day is out, the cultural lag in education is still unbelievably protracted. Most schools are still being built as if World War II were still on the horizon. Even now, for example, the notion of disposable literature—the cheap paperback book—is just gaining some respectability in schools more than a generation later than one would expect. How long will it be before we have disposable classrooms or cheap multi-media, take-home learning packs?

There is no reason why we shouldn't have expandable-retractable schools with variety and excitement, efficiency and comfort, networks of electronic devices to do what can't or shouldn't be done by teachers, and even a comfortable school chair. The technology is here, the problem is *now*. □

is factually re-inforced by work being undertaken in the science of communication

PROGRAMMED LEARNING IN BRITAIN

In October 1962 the Minister of Education asked local education authorities, area training organizations and colleges of advanced technology to provide a brief account of any work in progress or planned using programmed learning and/or teaching machines. The following provides a general review of the subject.

Any teacher who has carefully planned the sequence of a lesson has employed some of the techniques of programmed learning, but the history of programmed learning in the sense in which the phrase is here used is very short. Modern research into psychology of the learning process has emphasized the importance of the following principles:

(*a*) There must be maximum participation throughout by the pupil, preferably by way of overt response (i.e. by doing something and not simply thinking something)

(*b*) there must be immediate assessment of the response and confirmation if it is right

(*c*) reward is a more effective stimulus to learning than punishment; producing the right response is in itself a real reward.

The teaching by a good tutor of one or two pupils has usually followed these principles, but they are clearly much more difficult to satisfy, for all the pupils all the time, in normal class teaching. And there has been a strand of educational thought which was doubtful about the validity of (*c*), preferring instead the 'stretch' or 'intellectual gymnastics' theory of learning, in which overcoming a difficulty provides much of the stimulus. Programmed learning sets out to satisfy the principles by providing each pupil with the material to be learnt, broken down into small or very small steps (or 'frames'), each requiring a response (normally the answer to a question), the correctness or otherwise of which is immediately revealed to him. Because each pupil with his own programme can go at his own pace, the teacher is free to give individual attention where appropriate and to concentrate on those skilled teaching tasks which cannot be performed by a machine.

From the first, efforts have been made to produce mechanical devices for use with programmes. It has been claimed that teaching machines have various advantages over book-type programmes. Though more bulky, they may be less cumbrous to use than a book set out in an unfamiliar way; in the early stages at least their novelty may stimulate pupils; and the feeling of playing against a machine may improve the pupil's motivation. Not all these claims in favour of the machine as against the book are however yet well supported by experimental evidence. *April 1963*

In March 1964, a memorandum issued by the Department of Education and Science, attention was drawn to the rapid development of programmed learning for educational purposes and to the considerable amount of research and experiment being carried out in different centres throughout the country. The memorandum stressed the need for coordination and assessment of these experiments and the importance of making generally available the results of research, since incomplete knowledge might well lead to duplication of effort. It was clear that there was a need for a centre with responsibility for coordinating research and development, and for collecting and disseminating information in England and Wales.

In response to this need the University of Birmingham set up a Research and Documentation Centre for Programmed Learning in 1965 with a grant from the Department of Education and Science. □

INFORMATION SCIENCE

Basil de Ferranti

The dead languages are dying. The influence of classical Greek and Latin in our educational system is waning and it is fitting to let their importance decline gracefully. They were useful for disciplining the mind and instilling in the young a proper appreciation of logic, clarity of thought and reasoning ability. But this can now be better achieved by studying the so-called 'information sciences' —the techniques of processing information for the computer.

In their day the classics were very exciting. When the Church relinquished its monopoly of education in England 300 to 400 years ago, the classics were the sole means of acquiring knowledge. They were the key to the (then) new learning. They provided a universal means of communication throughout the western world, and were a record of man's early endeavours and aspirations. They were the languages of civilization and progress.

Nowadays technology is the means of achieving man's most immediate ambitions. The idea that technology is cold and arid, and of interest only to engineers and scientists, must be dispelled because it is the key to today's new learning. If we are going to use this new key properly, we must revolutionize our educational methods. This will take time but it is worth while because in the end the benefits that flow from education are greater than the benefits that come from any other change in society.

Fine. Teach people about computers at technical schools or set up postgraduate courses at universities. This has already been done. But it is not enough, and it is now being recognized as not enough. The existence of the computer and its associated techniques means we must ask ourselves why we teach certain school subjects (particularly mathematics) in the way we do. We must also become more aware that information processing is a science in its own right. Future generations must be brought up to use computers as a natural and readily available tool. They must be able to think unconfined by the restraints that are imposed when information has to be manipulated manually. Hence the need to start learning computer techniques and concepts at school—not after. The information sciences must become the fourth R of any basic educational syllabus.

Much exciting work is already being done on this in England. At least one school has a computer and several others have access to one. Many interesting experiments are being done—mainly at sixth form level. In other schools pupils build computer simulators, they write programs, they study computer applications. At the moment most of the school computer work is carried out within the framework of the various 'new mathematics' or modern mathematics projects (like the Nuffield Primary Mathematics Project, the Schools Mathematics Project and the Conference on Mathematics in Education in Industry).

But none of these projects is based particularly on the computer. They are mainly concerned with a more practical approach to the teaching and learning of mathematics and to the spread of numeracy.

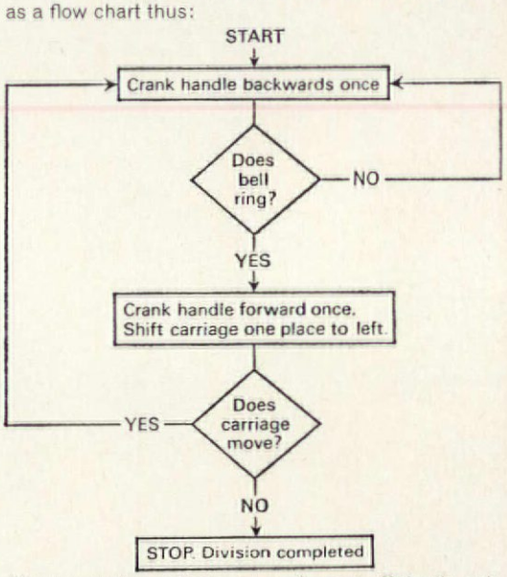
This is important but it is only a beginning. All pupils—whatever their intelligence, whatever their school—must be exposed to the ideas and concepts of modern maths and machine computing. Critics will say we cannot afford this. But much can be achieved without expensive equipment or the need to operate a computer as such.

This fact is confirmed by the first volume of a new series of mathematical textbooks for schools which has just been published by Macmillan. The eight-volume series covers the educational syllabus up to O-level for pupils between 10 and 16 years old. The general title of the series—*Pattern and Power of Mathematics*—recognizes the two aspects of mathematics : the pure and the applied.

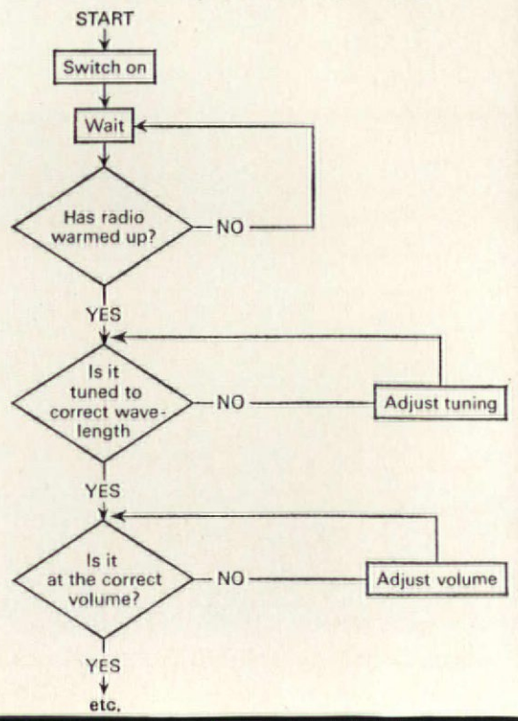
These books use computing concepts, where this is appropriate, both to hold the pupil's interest and to let him see how computers operate and what they are capable of. The first chapter of volume 1, on 'Numbers for counting', describes the use of numbers to other bases than 10 and explains the technical reason why binary notation (to a base of 2; see note at end) is preferred for electronic computers. There are examples of binary calculations and exercises.

Mathematics gives unexcelled training in logic and volume 4 (not published yet) extends the training by considering computer flow charts. Knowledge of flow charts is part of the computer user's basic expertise. By preparing flow charts of simple activities pupils can learn the logical steps involved. The technique of doing division sums on a hand machine gives an elementary example of a flow chart.

The machine divides by what is virtually 'long' division, but it takes away the number only once at a time. The operator keeps on 'taking away' in each position as long as he can. If he does it without looking —as an automatic machine would—he is warned by the bell that he has gone too far. This can be expressed as a flow chart thus:



Many everyday actions are performed efficiently only because people analyse them logically with YES/NO decisions. For example, to tune into a radio:



ch work could drastically alter assumptions on the link between teacher and taught.

MULTI-POP

Department of Machine Intelligence and Perception
University of Edinburgh

*Multi-POP is a computing system based on Pop-2, a conversational programming language, developed by Mr. R. J. Popplestone, the creator of Pop-1, and Dr. R. M. Burstall.

Multi-POP/67* is the name of a computing system developed under the direction of Professor Michie in the Department of Machine Intelligence and Perception, University of Edinburgh. The work has been supported by grants from the Medical Research Council and the Science Research Council.

At present computers can only be used by people of the following kinds:
Computer programmers.
People able to hire a programmer.
Users with some particular restricted and stereotyped need (e.g. air-line reservations).

The chief aim of programming research is to abolish the need for programming. Doctors, architects, lawyers, teachers, accountants, engineers, scientists, businessmen and administrators should be able to communicate freely with the machine in a language which they can understand.

This aim has been pursued by the Edinburgh Multi-POP team through their POP-2 programming language and the POPCHAT conversational vocabularies. POP-2 is used by programmers to teach the machine the skills which it needs in order to be able to converse *intelligently*. POPCHAT is the language in which the conversation is *actually conducted*.

At present POPCHAT only stretches to numerical and statistical calculations. During the next year a whole range of 'non-numerical' aptitudes are to be incorporated, including fact-retrieval, learning, and common-sense reasoning.

Thanks to POPCHAT, a unique feature which serves up programs to the user dressed up in English dialogue form, even lay users with no knowledge of computing can get useful work done. Because teleprinter signals can be transmitted over ordinary telephone lines, the user no longer has to travel to the computer in order to get a calculation done. Teleprinters can be located where the problems arise.

Multi-POP/67 runs on a hardware configuration costing between £50,000 and £70,000. As well as being economical on hardware costs, Multi-POP/67 can make significant savings in the cost of writing programs. Experience to date indicates that programs can be constructed in a fraction of the time needed when conventional languages and operating systems are used.

Faculties of 'intelligent' computer behaviour are currently being incorporated into the Multi-POP library. These will feature in the extended system (Multi-POP/70) for the Elliott 4130 computer, to be completed by 1970. Through arrangements with NRDC and help from ICI and NEL work is also in progress to provide POP software for almost the entire range of British computers by early next year. □

Schoolchildren enjoy preparing flow charts of familiar jobs. Another example would be testing a tyre you think is punctured (starting with 'examine valve'). Flow charts can be approached as a logical technique in themselves, besides their application in computing. When pupils come to use a computer, flow charts will be a familiar method of defining how to perform tasks.

Nor is it just a matter of YES/NO. Boolean algebra—the mathematical method developed in the nineteenth century by George Boole for manipulating the linguistic logical concepts AND, OR and NOT—will be essential knowledge in the future, as basic as the alphabet is now.

Nowadays the arts in general provide the humanitarian values essential in education. So that function of the study of Latin and Greek is taken care of. It is simple to show how very similar the logical discipline of studying the classics is, in practice, to the information sciences, and how these sciences can therefore supersede them. Take this typical sentence from Cicero:

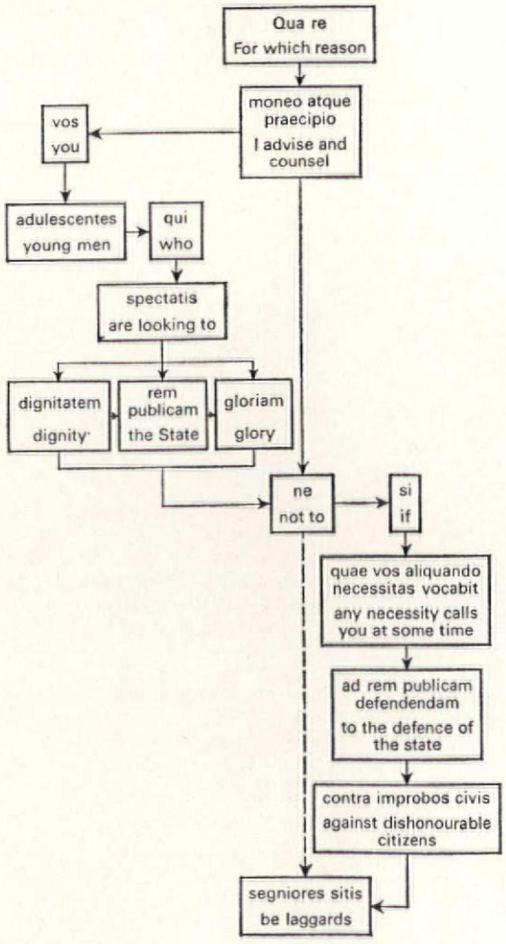
Qua re moneo vos, adulescentes, atque praecipio, qui dignitatem, qui rem publicam, qui gloriam spectatis, ne, si quae vos aliquando necessitas ad rem publicam contra improbos civic defendendam vocabit, segniores sitis.

The order of the Latin words differ considerably from that of the corresponding English words. But the meaning becomes clear once their interrelationship has been established, as shown in the figure alongside. This is an exercise in logic.

The rigorous grammar of Latin is duplicated in the equally rigorous grammar of high-level computer programming languages (which have the bonus of being practical and useful). This discipline is exacting. A list of instructions—the program required to make a computer operate—has to be 100 per cent correct or the job cannot be performed. And the answers produced by the computer depend absolutely on the correctness of the logic embodied in the proposed solution. This is surely an adequate enough discipline for anyone.

Furthermore, before a job can be programmed, it has to be analysed in detail. Analysis teaches the principle of control. Having analysed a problem, one must devise a formula to achieve the specified objective. Whether the solution devised provides the correct answers or not, then needs to be confirmed. It has often been said that the best way to learn a subject is to teach it. Similarly the best way really to understand the solution to a problem is to program it for a computer.

Many computer languages exist—Algol, Plan, Fortran, PL-1, Nicol are a few. Some were developed primarily for defining mathematical tasks to a computer, others for specifying commercial tasks, others yet again for simplifying the definition of simulation problems. Semantics is therefore crucial to the information sciences. It will give pupils insight into the construction and requirements of languages, and into the problems of communicating knowledge not only between men and machines, but also between man and man. It is even possible that Cobol, a Basic English programming language, or a derivative of Cobol, could become an international language for man, because it is so widely used by both English and foreign computer programmers.



Computers alter the emphasis of human effort in a way that educationists should acclaim. What matters is the quality and clarity of the thought about the desired solutions. The calculations needed to derive these solutions are relegated to a subservient mechanical level. Being released from the deadening chore of arithmetical calculation, the human imagination will be less stifled than in the past. Just as mechanical power released man from the drudgery of physical labour, and from some of the poverty with which it is associated, so the computer will release man from the tedium of mechanical thought and the intellectual stagnation that results.

We are now at the beginning of a new revolution—the Information Revolution—the economic and social consequences of which, I am certain, will overshadow those of the Industrial Revolution. Sooner rather than later the lives of everyone will be directly influenced by the computer. For this reason, if for no other, future generations will need a schooling that ensures they are numerate (in the computer sense) as well as literate.

This article first appeared in *New Society*, January 4 1968

Binary arithmetic

The binary notation specifies numerical values by using only two figures: 0 and 1. From an engineering point of view it is much simpler to represent the two values 0 and 1, than (say) the ten numbers 0 to 9 of the decimal notation. The binary digits, or 'bits' as they are called (0 and 1), can be represented by an electronic circuit, or switch, simply being ON and OFF.

The rules of binary counting are the same as those for decimal. When 1 is added to the highest digit (in the binary system this is, of course, 1; in the decimal system it is 9), 1 is carried into the next column of the left and the digit in the first position reverts to 0. For example:

decimal counting	**binary counting**
0	0
0 + 1 = **1**	0 + 1 = 1
1 + 1 = **2**	1 + 1 = 10
2 + 1 = **3**	10 + 1 = 11
3 + 1 = **4**	11 + 1 = 100
4 + 1 = **5**	100 + 1 = 101
5 + 1 = **6**	101 + 1 = 110
6 + 1 = **7**	110 + 1 = 111
7 + 1 = **8**	111 + 1 = 1000
8 + 1 = **9**	1000 + 1 = 1001
9 + 1 = **10**	1001 + 1 = 1010
10 + 1 = **11**	1010 + 1 = 1011

A technique separating source from receiver and rendering the latter immeasurab

COMMUNICATION SA

The entirely new dimensions offered by telecommunication satellites represent a turning point in the history of human communication. Education by means of television can be vastly expanded. Natural barriers to cultural exchange between peoples can be overcome. Technical obstacles to free flow of information can to a large extent be removed.

The General Conference of Unesco has accordingly established a programme of studies and research on the uses of space communication for the free flow of information, the spread of education and greater cultural exchange.

The excerpts printed here from the present paper form part of that programme. Its author, Dr Wilbur Schramm, is Director of the Institute of Communication Research at Stanford University, California (USA). He has written widely on mass communication including, most recently, the implications of space communication.*

The opportunity now exists to share data over long distances as never before in the history of mankind. The development of computers of great capacity has made it possible to store enormous quantities of information in digital form, and to search efficiently for and retrieve any part of what is stored. The development of the related arts and sciences of indexing, abstracting and programming has brought into being a new force in human affairs, which we describe as information science. Fortunately for us, these developments come at a time when many of the natural sciences are experiencing a glut of research information, when information of great importance to scientists and policy-makers is being produced at many and distant places on earth, and when rising educational levels and expanding scholarships are creating new world-wide needs for information.

In this race between information needs and new information capabilities, communication satellites will play only a facilitating role, but probably an important one. Indeed, some space scientists have predicted that communication satellites may be used more for data than for telephone transmission. Their function will be to extend the connection between data sources and user. Already computers have been connected to other computers or to data consoles, over thousands of miles, by means of land lines. They can also be connected by satellite. Weather data have been exchanged, by words, numbers and pictures, over most of the world, by satellite. Telemetry and even television from satellites have been received on earth from many hundreds of thousands of miles away in space. Can we now adapt these proved capabilities to the needs of scientific and educational information?

Men have dreamed of a new age of information. Great data banks, established centrally, would be available to the most distant users. Scientists in developing countries or at isolated locations would have as ready access to the research in their fields as would their colleagues in the great centres. A sick man in a distant location could count on the help of a great medical centre. There would no longer be a stultifying lag between new knowledge and its dissemination. New findings in medicine, for example, would be promptly available to clinics and hospitals and medical schools everywhere. The effective resources of a small town or school library would no longer be a few hundred or a few thousand volumes, because there would be available by quick data transmission, when needed, the enormous resources of such great information centres as the Library of Congress, the British Museum, or the Lenin Library. National, and ultimately international, information systems would come to be realities, and computerized indexing and cataloguing would take much of the drudgery out of working with them.

Let us not mistake the dream for present reality: we are far from being able to make that kind of dream come true. We are still very far from having the computer capacity and strategies even to computerize a great library—like those just mentioned—for ready use. But we can already do remarkable things in using computers for information storage and retrieval, and it is safe to say that whatever we can store on a computer we can transmit and retrieve at the end of a satellite circuit.

Most of what remains to be done, in data exchange as in other uses, must be done with the ground system rather than the space components; and most of it does not even involve hardware development.

Present needs, as we move toward full use of satellites for scientific and educational data transmission, are to establish the needs for such data, the locations where the data exist, the forms in which it must be packaged in order to be useful, and the institutions and organizations which must come into being in order to collect and disseminate the data. This is planning of a high order which must involve many parts of the academic community and the information professions.

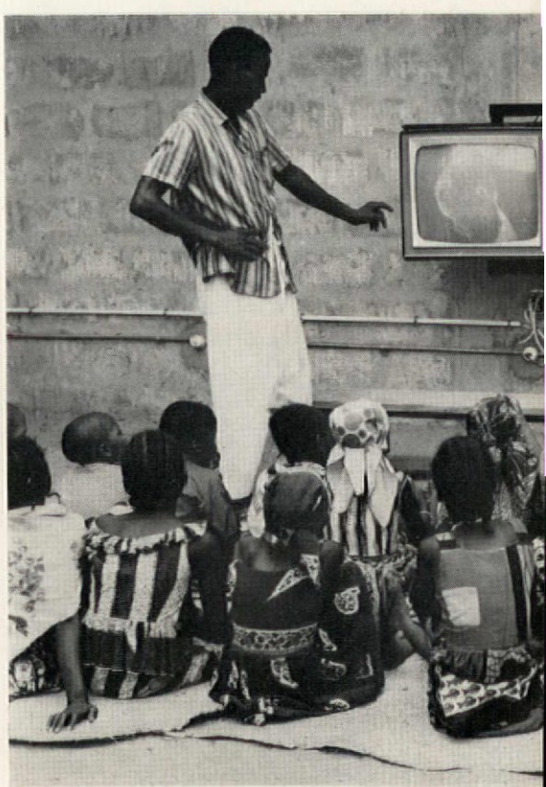
International data exchange will require building up *national* capabilities for information exchange. Indeed, among scientists, physicians, librarians, educators, a great deal of work is already under way in a number of countries to assemble and index needed data, using computers wherever possible; and to provide abstracts and build procedures and organizations for disseminating. The increasing development of abstracting services at national and international levels in many fields of learning is evidence of this activity. So also are the numerous projects in computerizing library services, and the existence of high-level committees and commissions in some countries trying to match the needs for information with the new capabilities for providing it. Some of these scientific information systems try to collect research results throughout the world. Information scientists from different countries have already taken steps to share developments in information technology. The impetus is coming chiefly from countries where data needs are great, and where the systems of gathering and exchanging information are relatively far advanced.

No use of modern communication has so interested the planners in developing countries, and other individuals and groups concerned with economic and social development, as the possibility of using it in support of education.

For countries where well-trained, well-educated teachers are in short supply, there is the chance to share the best teaching widely. For countries where schools are short in teaching aids, there is the chance to distribute audio-visual materials and demonstrations from central places. Where special courses or special kinds of instruction are needed, there is the chance to produce it in one place and distribute it to many. Teachers can have access to continuing in-service training without having to go back to the teachers' college for it. Where schools do not exist, education can still be carried by broadcast and correspondence study. Where literacy classes are needed, basic material can be offered by broadcast or films, and a monitor not specially trained for literacy teaching can conduct the class. Films and television can speed up the learning of mechanical and electronic skills. Broadcasts in support of rural forums, telecubs, village level workers, or agricultural extension, can help impart needed knowledge of health, agriculture, or community development. And in all these uses, modern communication can help to broaden the perspective of its users—beyond the village, beyond the state, beyond the nation—and implant ideas of how other people live, of the national plan and purpose, and of the changes under way.

Modern communication, of course, includes all the media, and all are useful in one way or other. In developing educational systems, however, modern communication has most often meant radio, television and films, and the most dramatic uses of these—because of their ability to multiply communication resources and distribute them simultaneously over large areas—have been with radio and television. These have included, for example, television and radio in schools (as in Samoa, Nigeria, Colombia, Thailand), radio in combination with rural forum groups (India and Togo), radio or television combined with correspondence study (Australia and Japan), television with literacy study groups (Italy and the Ivory Coast), teacher-training programmes (in many countries). Projects like these have attracted wide attention and whetted appetites. And because television and radio have played such a large part in all of them the question has inevitably been raised whether a communication satellite could not do better, and perhaps more cheaply, over a far greater area, what radio and television have done in limited areas.

A point-to-point satellite, of course, could not contribute much to an operation of this kind. A distribution satellite, at least, is required and, if possible, a satellite that would have some capability for both direct broadcasting and distribution. For example, preliminary cost studies indicate that for a country like India where television exists in only one city, where telecommunication is not well developed, and where perhaps one-fourth of the population could be reached by television stations in the large cities, the least expensive way of bringing television to most of the



Children in Niamey (Niger) learning by closed-circuit telev

l, through sheer range, accelerate ground installations at an entirely new rate.

LLITES FOR LEARNING

country would be a combination of rebroadcast and direct broadcasting from a satellite.

If a distribution satellite could be used in a developing country, it would, in effect, take the place of microwave links or long lines to local stations, and the country could, for the time being, forego that expenditure. If the whole country could be served by direct broadcast, it would be possible, if desired, to leap over the stage of building local stations.

A considerable part of the ground cost, however, could not be avoided in any case. Receiving sets and antennae would be needed. Electric power would have to be available, either generated locally or supplied from some regional source. There would have to be provision for maintenance in the villages as well as the cities, and a number of electronic components and units (including sets) would either have to be manufactured or purchased with foreign exchange. In Samoa, to take one example, it was found that new schools had to be built before television could be effectively introduced. For any large country, the cost of the ground segment would probably be considerably more than that of the space segment. And the annual operation of the ground segment of the system would be very much more than that of the space system. It would include the programming, the maintenance, the very extensive arrangements for cooperation and liaison between schools and programme centres, and the materials that would have to accompany the broadcast instruction.

Just as television is a mass medium and has to be used in a large way if unit costs are to be acceptable, so a communication satellite is a very large telecommunication system which has to be used to serve a great area lest the unit costs be out of reach. 'A little' use of a satellite system for education and economic development is therefore not a reasonable policy for a developing country. Any such use involves a major investment in money, manpower and technical resources.

This is not to say that such an investment is not justified. Rather, the point we are trying to suggest is that it is probably justified for some countries, under some conditions, at some stage of development.

One of the touchstones is the size of the country. For unit costs to be favourable, in comparison with other ways of delivering a signal, the country must be a very large one—perhaps something of the order of a million square miles in area—or the satellite must be used to serve a cooperating *group* of countries. For educational use of a satellite, however, this raises the question of local needs and local patterns of education.

One of the essences of education is localness—individual differences among students and consequently different needs for instruction; local class schedules and local curricular patterns; differing content of courses based on local interests, surroundings and occupational goals; differences in standards of accomplishment between schools or regions; different customs; sometimes different languages. These differences are much greater in some countries than others; in France, for example, there is greater uniformity of curriculum and standards than, for example, in the United States. The same problem carries over to adult education and development information. For example, dry wheat farmers will be very little interested in the kind of advice to be given wet rice farmers; the fishermen of Kerala would gain little from instructions broadcast to Rajasthan about the diseases of camels.

Where television has been used for education, it has been found that a great deal of its effectiveness depends on the kind of activity that is stimulated at the receiving end. Learning activity is stimulated in part by the broadcast, and in part by the classroom teacher or monitor. Some of the most effective television teaching encourages pupils to be quite active and responsive during the lesson, and leaves them with curiosity and interest they want to satisfy after the broadcast. The classroom teacher must prepare the children for the broadcast, and afterwards take care of their questions and build, around the broadcast, appropriate practice and demonstration, individual learning and study activities. In many of the most successful television projects the classroom teacher performs as a true partner of the studio teacher; in fact, it becomes a kind of team teaching, in which the television teacher does a part of the job, and the classroom teacher another part. To accomplish this, both teachers must learn new roles. The feeling of being on the same team comes usually from common planning, or from very close liaison and constant feedback from the schools to the studios.

This kind of problem will be even more demanding when a satellite is put into the communication chain. It is harder to bring all teachers into the planning, to keep up liaison and feedback, and to pitch the broadcast at a level that will stimulate all classrooms. At the very least, therefore, educational use of a satellite would require very careful and skilful administrative planning, a considerable effort to assist the classroom teacher to learn her new role, and a large staff of field workers, supervisors, and counsellors to maintain contact between central administration and programming, and the schools and classrooms. In a country large enough to use a satellite expeditiously—that is to say, a country like India, Indonesia or Brazil—that field staff would probably be numbered in thousands. For adult education the broadcasts would have to be combined with a field staff and organization even larger—perhaps something of the order of India's 35,000 village-level workers. If a group of countries use a satellite for education, they will almost certainly need an international organization to plan and coordinate programmes and provide for liaison with users.

A country that is considering the use of a satellite for education must neither be frightened away by difficulties like these nor carried away by the heady prospects. Rather, it must ask some very hard questions about whether its educational problems are better solved in the future by a satellite system or by some other solution—for example, ground-based television, or an expanded and improved programme of teacher training. And if the satellite looks attractive, then the country must ask what steps it must take to prepare for the satellite system. It cannot make this plunge at once. There will be some curricular changes to consider. What courses can best be assisted by mediated teaching from a distance? What changes, if any, should be made in the content of those courses and the methods of teaching them? For example, if mathematics and science are in the list, is this the time to introduce the 'new maths' or the new science curricula?[1]

When the preliminaries are done, the country may wish to move into instructional television on a small scale, so as to gain experience with it. Such a step will let the schools try out the new courses so that they can be revised before the country commits itself to them on a broad scale. Prospective studio teachers can gain some practice with their art, and schools can experiment with different classroom practices related to the broadcasts. At this time, also, something can be learned about how to maintain liaison between schools and studios, and what kind of assistance both the classroom teacher and the studio teacher will need.

At the same time, the community development, adult education, health and agricultural agencies can begin to use the television system in out-of-school hours, so as to find out what tasks it can best do for them, and what skills and supporting activities it will require.

With this kind of procedure, nothing is lost with each new step. The curriculum is reviewed and improved. A nucleus of trained and experienced people is being created. Instructional television is operating in at least one region, and enough is being learned about it so that the country can decide whether it wants to go ahead with it, and where it is likely to be most useful.

If we want to help bring satellites wisely into use for education, therefore, one of the most useful things we could do would be to make it possible for some of the most interested countries to take the first step: that is, to conduct planning reviews of needs, resources, alternate strategies, and technological possibilities. These reviews could be undertaken with the aid of outside experts, if needed. The purpose would be to place a clear picture of educational needs against a consideration of available technologies, so as to answer the primary question, from the country's own point of view, of *what technological aids*, if any, would help advance the educational plans; and the secondary question, would a *satellite* be a desirable and feasible solution to these problems in the foreseeable future, and if so, what steps must be taken, at what cost, into the satellite age? □

* *Communication satellites for education, science and culture* by Wilbur Schramm, paper no. 53 of the series *Reports and papers on mass communication*, issued by the Division of Free Flow of Information, Unesco, Place de Fontenoy, Paris-7e.

[1] A time of impending change is the best time to review the goals and means of an educational system, against the national goals and the available means. Thus, there is a very close relationship—or should be—between planning for new technology and planning for new curricula and more efficient teaching methods. As Jerome Bruner has said (*Inquiry*, ed. by Wilma McBride, Washington, 1966, p. 58), 'for the future of TV, the worst mistake would be to put it to work sanctifying the traditional'.

Cornberg's expert realization of the beneficial social potential in the use of systen

CREATIVITY AND INSTRUCTIONAL TECHNOLOGY

Sol Cornberg

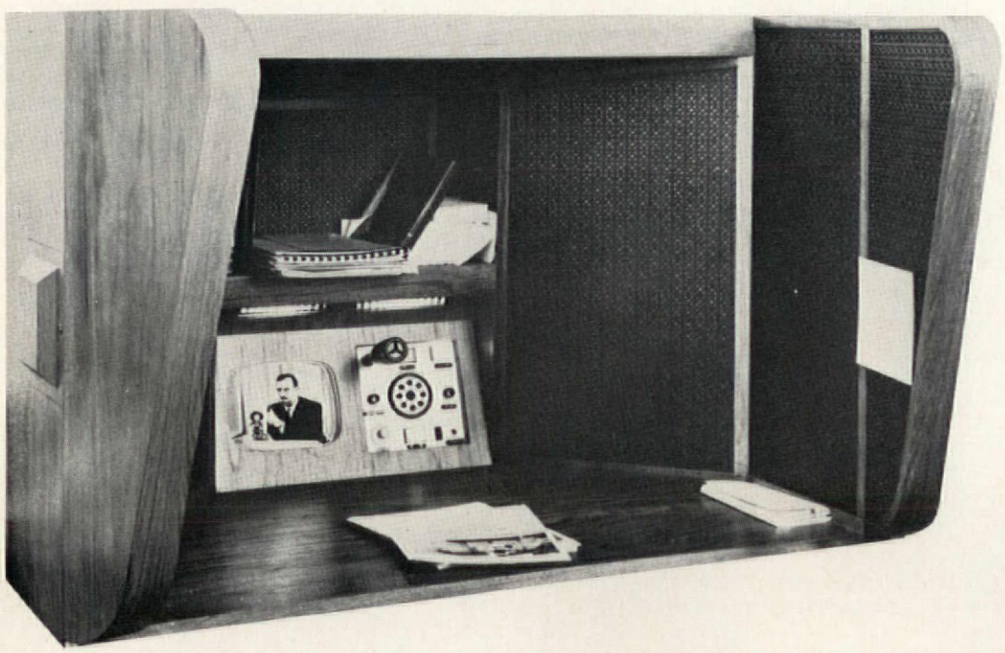
I wish we might arrive at a semantic definition of terms:

Creativity:
In addition to 'bringing into existence out of nothing', it is also defined as 'the act of investing with a new character'.

Instruction:
'To impart knowledge, to inform, that which instructs or is imparted to instruct, especially a lesson or teaching.'

Technology:
'*Techno*; a combination form meaning art, skill or craft, systematic knowledge, applied science.'

I would like to suggest the definition these terms generate for me:
'The act of investing the art of instruction with a new character, through applied science.'



Self-pace student study station*

Sol Cornberg Associates, Inc.

Permits random access to any information which is stored in such a fashion as to be converted into video or audio signal. Selection may be made by push button, dial, card insertion switching, mark-sense devices, as well as others, irrespective of media programme origin—cartridge loaded audio tape, cartridge loaded 8mm and/or 16mm film, 35mm film strip, slides, microfilm or microcard—whether transparent, translucent or opaque. The station permits access to live vidicon cameras or microphones anywhere in a school complex, to off-air broadcasts: radio; AM, FM and short-wave, or television; UHF or VHF.

The student may select an unused audio tape deck, talk to it, listen to what he has said, erase, talk again, enjoy it, and call his instructor to have his work checked out. The student may be listened to while work is in preparation, and may be dealt with by an instructor, as an individual or as a member of a group.

Audio is introduced into the study station through speakers embedded in the side walls, and ear-phones are only used to overcome impaired hearing (the carrel creates its own acoustical environment).

*Patent issued

In the beginning, there was the word—and there was a man—and he spoke. He who was within earshot of that voice listened and said to the next, 'He said'. The next said to somebody, 'He said, he said', and somebody said, 'He said, he said, he said', and in the case of The Man on the Mount and The Man in the Temple, we are listening yet for what was said. We are trying to communicate. We are passing the word.

No teacher has all the words, nor all the experience desirable or necessary to the full exposition of a subject course. Resource is reached by teacher and student through the use of books and other audiovisual aids.

Audios and visuals, as tools for education, had their beginning—we don't know when. From the voice of the first teacher being heard by a student with amplification—for the populace at Epidaurus and distributed for the mass—the fireside chat—we have progressed to storage in cylinder, disc, wire and tape—for hearing yet again.

As to video—the marking of the trail, the writings on cave walls, the printed word, the book, the slate and the blackboard, the introduction of projectors—candlelight, carbon and incandescent, still pictures, moving pictures—television.

The book is an archaic method of storing and permitting retrieval of information. Fortunate are we, when dealing with a class of 30 students, to have 30 copies of the assigned text in the library stacks, more fortunate if we have had the foresight to put them on the reserve list—and yet more fortunate if good, bad, and indifferent answers have not been written into the margins or that several plates or pages are not missing. Result? An assignment stretched out to accommodate information retrieval time, rather than the student's comprehension time.

A cursory examination of a catalogue of equipment for use in educational audiovisual communication, discloses an almost unmanagable herd of devices—motion picture projectors, slide and film strip projectors, record players, microphones, loudspeakers, overhead projectors, micro-projectors, tachistoscopes, radio receivers, television receivers, audio and video tape recorders, television microscopes, television scanners, language labs, teaching, as well as 'learning' machines. Not a complete list, but one which implies that there is yet another way to produce, store, retrieve and display information—to purpose. None of these methods now in use, nor sophistications which may develop other methods, precludes knowledgable, qualified, dedicated information and/or programme researchers and creators.

The market is inundated with hardware for the mutation, distribution, and display of information which has been converted to transparencies, opaques, tape, film, and electronic signals. All of these equipments are well designed or not, well functioning or not, well priced or not, but all of them are well intentioned.

That the educator has embraced 'technology' as a tool is evident by the hardware available, the money volume of equipment purchased, and the many 'offerings' being made. That the educator has reservations and disenchantments with 'technology' is also evident by the amount of gear that is standing idle and/or in a state of disrepair in schools and on campus throughout the world. For reasons best known, there are those who have not opened their arms to embrace.

d machines enables a resultant directness in his projects, which, in the case of the

John W. Gardner, in his *Self-renewal*, is worth quoting:

In a recent visit to a college professor, this was the scene: he sat in his air-conditioned study. Behind him was a Hi-fidelity phonograph and record library that brought him the choicest music of three centuries. On the desk before him was the microfilm of an ancient Egyptian papyrus that he had obtained by a routine request through his University library. He described a ten-day trip he had just taken to London, Paris and Cairo to confer on recent archaeological discoveries. When asked what he was working on at the moment, the professor said, 'An essay for a literary journal on the undiluted evil of modern technology'.

Has the educator come to terms with technology, i.e. the machine? As a person, he has. On entering a ship, plane or train, he expects to, and does, arrive at his destination—more often than not. Barrelling along the highway at 60 or 70 miles an hour, there is no concern that the brakes will not act when needed; pushing a button in a lift, he usually arrives at the floor desired; dialling a number of the telephone, he expects, and usually receives, an answer . . . 'Hello'. . . .'Wrong number'. . . . 'So-and-so is out; would you like to leave a message? Speak when the you hear the tone'. . . . (Somebody or something has programmed the other end of the selection made).

As educator, he is too often prone to equate himself with a piece of equipment. He who is capable of indulging this fantasy, might better be replaced by the equipment. An 'implied security' need to maintain the *status quo* rejects the fact that many of us have witnessed the passing of the horse as the source of horsepower, the passing of candles as the source of light, and the juxtaposition in our homes of the bathroom and the dining room.

The younger we are—of heart and of head—the more readily do we live current procedure as traditional mode. A phenomenon of our time is the pre-school child; not being able to control its bowels, we cannot give it away to the educator—a prerequisite to becoming a student.

At this point in time, the child has no preconceived notions about a book. This child's babysitter, each weekday morning in the home, is Cyclops, which is programmed by the commercial television networks and stations. This child who cannot count, cannot read, cannot reason, knows how to turn on his or her programme, turning on the set and selecting the channel of choice. We are told by the doting parent or relative: 'You know, she is only two-and-a-half years old, and she can find her own programme'. The pre-school child is being occupied, and we want it so—mother has her hands full of a morning.

At predetermined span-of-attention intervals, the voice of authority and responsibility says: 'Call Mama'. She is called, and wham! 10 seconds! 20 seconds! 30 seconds! 60 seconds! She gets the commercial! Blast! 10–20–30–60 seconds! The biggest buy—dollars spent for commercial television time—is the 10-second spot. Ten seconds to get a message across—to pass the word—to cause information to go from point A to point B—to cause somebody in their own environment, once removed from the place of action, to act when they arrive at that place of action, to act—hours, days and miles away!

Mother takes the pre-school child to the market-place with her (having no one to leave it with) and, having arrived, reaches for an article and hears: 'No, Mom—they said the blue one!' And her hand moves across and she takes the blue one! The pre-school child cannot count, read or reason, and yet is dictating buying habits in the home and, too often, in an extremely sensitive area—that which goes into the mouth. How and where did this child win this information? By self selection, in his own home, on television.

Radio and television are the most efficient methods of distributing mass information to the mass. As we know, commercial television, motivated as it is to sell, does a demonstrably effective job. Sales curves of companies who use commercial television to move their products are *prima facie* evidence of its effectiveness. With little or no concern for the environment, architectural, economical, emotional or racial, commercial television enters, invited, and accomplishes its mission *—to sell.* Let us not add education to their chameleon-like and voracious proclivities, nor endow with the educator's mantle, the broadcaster who is operating a community and/or public service station.

Educational television, the broadcast signal, an in-classroom service with which we are financially burdening our immediate future, is wanting. It is uneconomical. It is inefficient. It is immoral.

Is it *uneconomical?* Given an enrolment of one million students (New York City) and some 300,000 more in-classroom students in proximity to a single broadcast signal, and given a $3 to $4 million cost for television production and transmission facilities, simple division implies we are making a good buy.

A second look shows that, of 8000 classrooms of all classes, if 200 classrooms need the signal at any given time, it is a lot. Put your own head count, capital and operating costs into this picture and you will see that the cost of the signal is inordinately high, and we are once again feeding horses so that sparrows may eat.

Is it *inefficient?* The broadcast television signal implies that all classrooms are ready for the signal at a given time, no consideration being given to where the students are coming from—gym, study hall, refectory or laboratory. Only the classroom teacher can feel the fever and the pulse of the room; only he or she can know when audio-visual support information is to the point.

Is it immoral? The broadcast signal, crossing over all boundaries of school, city, county and state; of ethnic and emotional values; of time—implies the lock-step and *is* indecent. We are entitled to better than that in a democracy. Discipline—yes. Dictatorship—no.

The average American home has a telephone and the average American home has a television receiver. May we not expect these to be coupled, programmed to purpose, educationally motivated, and thus free the educator and the student from the emotional involvement in the reach to basic and rote educational information? The potential—an infinite reach to infinite resource—the library of total and ever-increasing knowledge—no matter where physically housed —need never be closed.

Prerequisite to the use of known and available technology to this educational purpose, is that the school be not the purveyor of the student's warm meal and warm room of the day. I would live to see it come to pass. The result may only be the educational plant *new. New.* Not new modernistic, not new futuristic, not new flexible, not a new reproduction of the old, and not new because the allocation must be spent, but *new* because it has literally been shaped by the technology which is available.

In the *new* plant, spaces will not be dedicated to body-holding actions, group sizes will be limited, laboratories will be great and people, as individuals, not as bodies, will rub off on each other—even though our capacity to manufacture students well outpaces our capacity, and too often, our desire, for fabricating educators.

The past is prologue: the market is inundated with educationally-orientated audiovisual hardware for the mutation, distribution and display of information. The equipment available, by and large, is made so through an evolutionary supply and demand process of creating saleable hardware, which has caused the educator who could be coerced to serve as equipment mover, installer, repairer and operator. And, having been flattered into believing that he or she is uniquely qualified to produce all manner of audiovisual media, the result is time and energy diverted from purpose—*to teach.*

Presupposing that the teacher can operate any kind of projector, or will give up a student to do it, we pool the gear, schedule it, move up and down the corridors—chipping away at both the architecture and the equipment—move in, and create a third-person sideshow activity in the learning space, and lose the projector in the classroom for an hour because we want it for ten minutes.

Another way to do it is to fully equip an audiovisual room with overhead, underground, front, rear, micro, *et cetera* projectors, with several people to operate them—and now we will move the students.

On the one hand, we move equipment; and on the other hand, bodies—and that which we really want to move is information—for particular and selected purpose, in particular and selected time, to a particular and selected place.

The teacher, ever desirous of achieving a tutor–teacher relationship, does not want the equipment—less does he or she want the craft talent of equipment operation. What *is* wanted is the information available at hand and displayed orally or visually, as and when needed—a potentially true tool to the educator.

Implicit in the use of information in so facile a manner, is random access to information stored in an 'in use mode' in a centrally-located communications centre. From the *centre*, through selection, display is made to the individual, the small, or the large group. No matter what the media origin of the information may be—opaque (book), film, slide or tape—there is a projector for its display.

In the communications centre, this projected information is converted into an audio and/or video signal, and is distributed over a wire (closed circuit) to be displayed on television picture tube for individual or small group use, or through TV large-screen projection to larger groups. By schedule and preparation, the equipment, centrally-located, may serve any and/or all viewing positions.

In schools throughout the USA where the random-access concept is integral to the educational programme, we see architecture, in plan and in use, which has shaped itself about the requirements of audiovisual display. The student-paced study station is indicative of the direction that is being taken. ▷

World University, so cools the role of the required enclosures that their design, sitir

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Any programme content which can be converted into an audio or video signal—and all of it can—can be delivered instantaneously to the study station from a location as far away as one cares to extend the communication lines. Selection may be made by push button, dial, card insertion switching, mark sense devices, and others, no matter what the media of programme origination—cartridge-loaded audio tape, cartridge-loaded 8mm or 16mm film, 35mm film strip, slides, microfilm, microcard or computer. Books may be accessed, as well as live television or radio broadcasts.

The presentation may be designed so that the sequencing of appropriate sections of it is completely predetermined, or so that the student's response may control it. The student may use calculators or even computers in the solution of problems set either by the materials or by the student himself. Simulation techniques may make it possible for him to perform complex experiments or try out his understanding in situations which approximate 'live' conditions. The student may go back in lesson content for refresher or clarification and, with courage, may browse into the future.

The student may select an unused audio tape deck, talk to it, listen to what he has said, erase, talk again, enjoy it, or call his teacher to have his work checked out. The student may be listened to while work is in preparation, and be dealt with by a teacher, as an individual or as a member of a group.

Audio is introduced into the study station through speakers embedded in the side walls. Earphones are only used to overcome impaired hearing, since the station creates its own acoustical environment. The station, being a select and display device only is, with the exception of its umbilical to the communications centre, a self-contained unit.

The study station is finding its place in classrooms, libraries (*sic*), living rooms, and bedrooms. It will find its way into all homes.

The number of millions of programmes which may be made available is only limited by the possible configurations in sequential digital selection, to all intents and purposes limitless, and by the funds available for storage and retrieval equipment.

A television camera is 3in by 5in by 10in, and weighs about 9lb. It is the total unit necessary to make a picture. The TV monitor is the total unit necessary to display a picture. A cable, in diameter less than an old-fashioned lead pencil, is all that is required to carry the picture information. The same cable can carry the accompanying voice or sound message. Its function and purpose are simple; its potential is great. First, as a magnifying glass, it gives all as good or better a look at the information at hand—unlike the teacher, the camera need never move away from a toxic or odorous experiment. Second, it serves as a multiplier, carrying to yet another laboratory or educational space. Third, given that he who would be seen and heard is worthy, while being magnified and multiplied, we record the session on video tape with the accompanying audio. The tape is reviewed by the teacher and those privileged, and, if found wanting, the erase button is pushed, and having had an early night, we try again. If deemed to be right, we have created a piece of resource. This being available through selection in the system, we have thus written a chapter in the old book with a new binding.

The criteria for academic acceptance, particularly at college and university level, being consultancy absence from the campus, who better to leave behind than oneself? The student is entitled to no less.

The camera on a wall or ceiling mount in the classroom or laboratory is yet another auditor of the proceedings and, not unlike too many students, its electrical, mechanical, and electronic wellbeing is remotely controlled from the communications centre. Being small and unattended, the camera takes its place in the classroom or laboratory; that space on which time in planning and money have been spent is the best place from which to originate a programme.

A distinction should be made between a communications centre and a television studio. The communications centre is the 'in use' storage repository from which random access selection feeds information through the distribution system.

The television studio is the factory in which a programme may be manufactured. It is not enough to reproduce in the television studio with limited equipment and service, that which can be produced in the specific, fully-equipped laboratory or classroom, that space in which the teacher is most comfortable.

When capital budget would permit limited laboratory installation in various school premises, the well-equipped laboratory, as part of the television studio would, through programme production and system distribution, permit better service to all.

We will place the educational television broadcasting station in an economical, efficient and moral light when it is broadcasting on a twentyfour-hours-per-day, seven-days-per-week basis, as a distribution vehicle. The signal will be received in school or on campus, with technicians in attendance or not, for recording, and with information stored in the system for retrieval on a random access basis for display in the teaching-learning spaces.

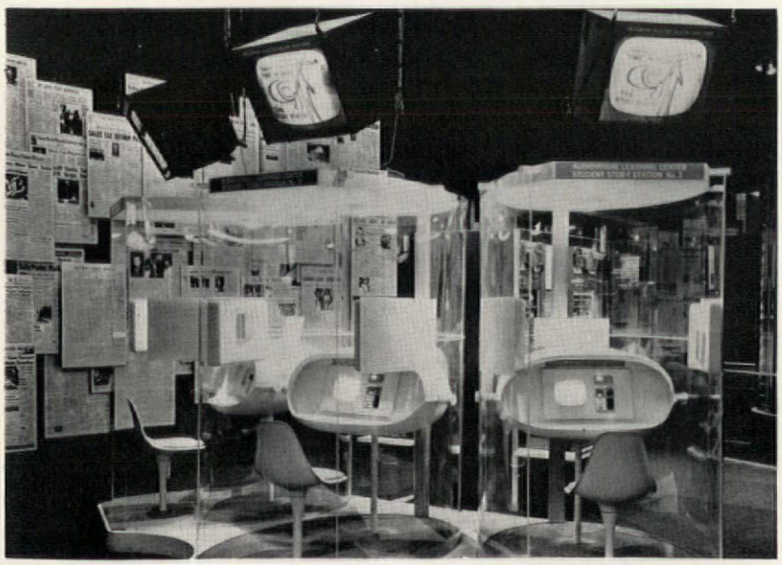
And what of the teacher? Having been taped and been freed from the repetition of that which was and is repetitive, to what purpose? Our submission is that he or she is now available for the tutorial or seminar—to help in smaller groups or as individuals those who should and would benefit from face-to-face exchange.

Having thus multiplied an invaluable resource, the teacher, we assume a responsibility, and must recognize that compensation is due for extra and/or extraordinary services rendered. Compensatory or residual returns must be made. New-found time for the teacher to research, to enter into tutorial or seminar modes, to refresh the well-spring, may not cause us to lose sight of the obligation to the teacher left behind in any recorded media.

Good work is already being done to establish equitable procedures in this area, which is part and parcel of the new technology.

And what of costs? We are familiar with a situation in which a professor who had been teaching a given course for 18 years valued that time in which he was present in the classroom, speaking to specimen or visuals, as well as students. In taking the time and energy to tape these time periods, he was freed from being present some 15 hours per term. How do we value this new-found time?

Calculating the per-hour teacher cost, and accounting this by 10, 20 or 100 on the larger campus, is not enough—formidable as this figure might be. If a dollar figure can be put on this new-found time, this figure related to the potential multiplication of a basic resource, *the*



Audio-visual learning centre and carrel by Sol Cornberg Associates Inc. shown at the US Pavilion, New York World's Fair, 1964–65

vnership, can readily be attuned to both their urban and educational context.

teacher, the costs of the technology—the hard ware that makes this possible—large as they are, assume a proper place and perspective in the total capital expenditure.

The technology for achieving the necessary communication between study station, classroom, laboratory, the communications and production centres, is already in being and in use. What remains is to develop the learning materials. This is the major task which lies ahead if modern technology is to be effectively utilized in education.

This requirement reminds us that the self-paced student study station and its supporting apparatus are not substitutes for the teacher. Like the book, they do extend the reach of the teacher. The creative teacher must provide content and structure and he must be ready to work with the student when the student has exhausted the content or can no longer learn effectively from it.

The new technology would not only extend the reach of the student and the teacher, would not only free the teacher from the rote and the routine, but would permit the educator to take back and exercise his responsibility and duty to programme the tool—by teaching, to create the programme, and by recording, to publish in the new media.

In exploiting and using it, may we remember the pre-school child whose information, received and acted upon, was derived in 10-, 20-, 30- and 60-second increments. Are there 13 chapters in the textbook because there are 13 weeks in the term? To reproduce the book for reading on the television tube is to miss the point.

The usual finish of a commercial television programme shows us the performers taking their bows with music accompanying. The crawl is carrying credits—the names of those involved and the voice-over is alerting us to the programme to follow. Here are four pieces of information—two audio and two video—one for each ear and one for each eye—to which the average person, of varying age and degree of educational background, is able to relate.

This average person has an infinite capacity for informational intake, and he wants to be stretched. Why may not this technology, its content and its auditors, be educationally motivated?

In using and exploiting the new media, let us be cognizant of the ease of keeping current. Thirty-six months from the signing of the contract to write the new text, through publication and distribution of the book, is too long a time. Textbooks which carry copyright dates of 20 years back are out of tune with the times.

The dissenter to my thesis, will find a distinguished companion in Mr Igor Stravinsky who, in a recent article said, 'The wisdom of the world on tape, complete with dial systems . . . the Cornberg Carrel . . . is yet another of my versions of purgatory.'

The dissenter notwithstanding, in embracing the technology we would defeat the educational impoverishment of our communities, and place a value on the perpetual student, whom this same technology will keep unemployable.

In embracing the technology, we would value the student as an individual, permitting him to go at his own pace, to top out at the peak of his own potential. The great and inspired teacher will have been multiplied and be available to more—or all. The machine need not create a machine—there is a morality inherent.

The world is full of answers, have we asked the germane questions? □

WORLD UNIVERSITY

World University at San Juan, Puerto Rico, now in its third year of activity, is dedicated to providing the maximum of educational excellence to the student for the tuition accepted.

World University, in furthering its objectives, enlists the energies and capabilities of the community in the art and the act of learning-teaching.

First steps were taken to establish working relationships in the community, specifically in the areas of housing, feeding and tuitions payment with those whose expertise lay in these areas, thus freeing itself of those duties which have been foisted upon, and/or grasped empirically, by the educator—duties by and large, time, energy, and fund-consuming.

World University is housed in three metropolitan area office buildings. The main 'campus' is housed in a multi-storeyed modern building which also has as tenant the Puerto Rican Courts.

As to housing, all building services are supplied to the University without the necessity for staffing and administrative attention usually associated with a servicing and maintenance complex.

Feeding is accomplished by coin vending machines which are in an area under direct control and supervision of the students. The vendor supplies and maintains his equipment at no cost to the University, and the commission received for the placement of the machines is divided to return to the University a fee for space rental; the balance goes into a Student Council Fund, which will return to the students, through activities and/or scholarships. Again, this places no administrative or staff burden on the undertaking.

Tuitions of all students are paid to the branch of the Banco Popular which is closest to the student's home. In this fashion again, the University is relieved of the need for housing and supporting a Bursar's office with its attendant staff, equipment and space.

Medical services are contracted for and/or made available through Government Clinics, and again the University is freed of the overheads specific to staff, equipment and space.

It is the University's intent to pursue this method of operation in any and every area where this is practicable; sports, drama, technical and art courses through participation with already established working groups in these and other activities, throughout the community.

Libraries, laboratories and workrooms are to be found in Government, commercial and industrial complexes throughout the community. Need the University resources be expended on duplication of these costly facilities? May not the student and teacher be welcomed into these dedicated and producing environments, which are in fact the recipient of the graduate? Together, the University, the student and the community would embark on a vital adventure in and for learning.

To fully exploit this potential, the university should embark on a programme which would use to its maximum the technology available to the educator, 'for the development or improvement of educational communications facilities'.

Banco Popular, where student tuitions are now being received and processed, shopping centres and service clubs and like community orientated and available facilities, would be asked to set aside space about the metropolitan area, where individual student study stations could be installed. Trailers could be strategically placed in proximity to populated areas and moved as experience indicated.

These spaces through electronic reach, via cable and/or microwave, would permit access to a bank of educational information, stored in an 'in use mode' at the University Communications Centre. The student, in the study station, would select, have displayed—audio and video—respond by voice or digit, from and to electronic device and/or live teacher. That number of students as desired could, by schedule, be convened into the electronic classroom. Working through a system as an individual, the student may be valued as such and be permitted to progress at his own pace.

The reach, to rote, resource and research information, as well as student response and administrative and scholastic progress would be stored, processed and available, remotely and electronically. Convened classes, would require student presence at the University at scheduled to purpose intervals, rather than at clock and calender schedules.

When present at the University the student would then be able and ready to meet in group, seminar or tutorial with no emotional involvement in the process of acquiring the basic educational information to which, as a student, he or she is entitled. The teacher-dominated rote learning procedure having been made unnecessary, the student may be valued as a contributor and participant in the group, rather than as a body present. The teacher having been freed of the routine, repetitive and administrative, would meet with students in seminar, small groups or tutorial. The teacher would further continue actively and enjoy the on-going learning process so vital and necessary.

The study stations could be made available for adult education programmes, at such times as participants would be free of their for-gain or household preoccupations. Through systems, the communications centre and its scheduled to-purpose-and-time information would be available on a round-the-clock basis, seven days a week.

Teacher-dominated spaces — classrooms, seminar and tutorial spaces at the University campus sites—could serve two or three times the number of students in the same space as now required by tradition-established, emotion-orientated inefficient school-space utilization. University paid-for real estate would be kept to a minimum and used to the fullest.

The individual student of all ages, may be motivated, encouraged and permitted to proceed at his own pace, to top out at his own potential, and to make his maximum contribution with a minimum of frustration.

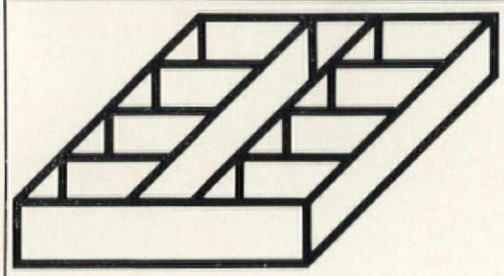
As the average home acquires a telephone and a television receiver, we may expect to couple these, and permit attendance at the Institute of Learning to begin in the home.

Sol Cornberg

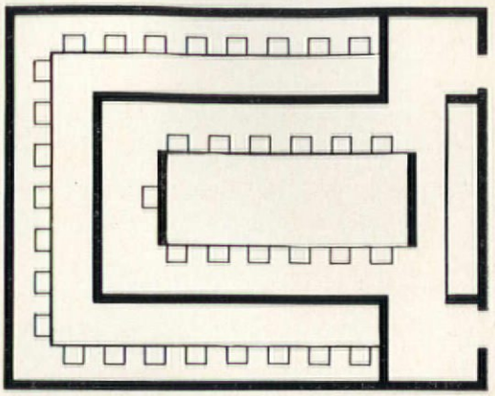
Report draft, February 26th, 1968

The classroom is probably the strongest of all educational totems—its ver

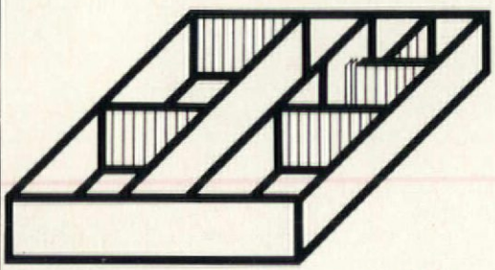
WHAT'S STILL HAPPENI



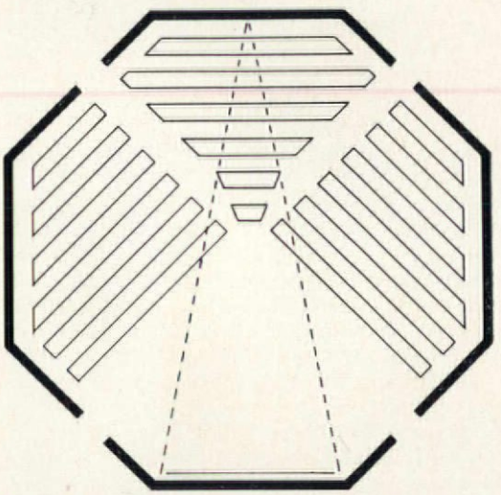
In the beginning there was the classroom —strung out along a corridor—with rigid walls—the much-maligned 'egg-crate' by Bill Cadill.



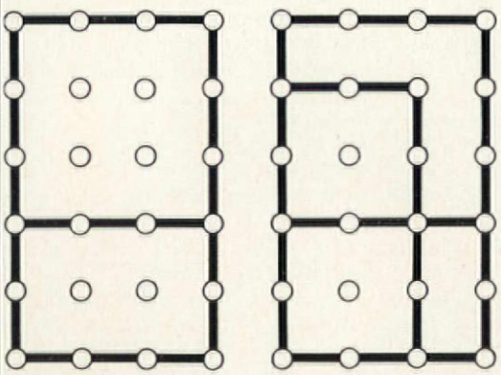
and Eero Saarinen designed interesting two-level classrooms (at University of Chicago Law School for instance).



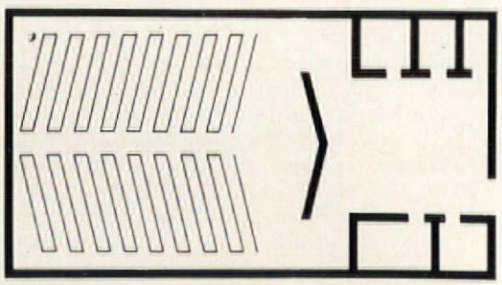
Flexibility came to the rescue with folding and movable walls, accommodating small, medium and large groups.



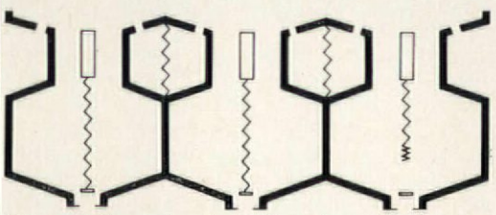
Beardsley Rummel and others pointed out the attractive economics (at least) of large group instruction[1], and 'university type' stepped lecture rooms appeared in high schools and colleges.



John Lyon Reid pioneered the 'loft space' concept with Hillsdale high school's adaptable space (they've actually changed many partitions since 1958).



Lloyd Trump's plan promoted 'team teaching'—instead of one teacher in one room—a team of teachers using a cluster of varying-size spaces. Evanston high school (leading innovator in team teaching) remodelled large study halls to gain large group rooms.

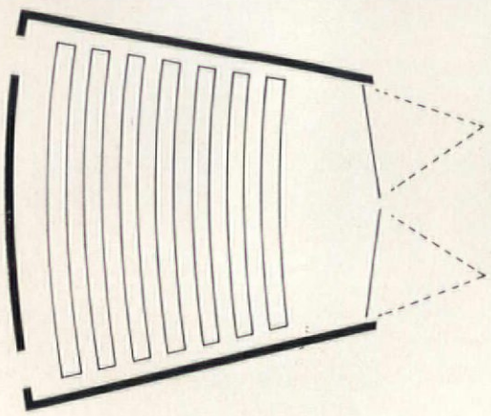


Meanwhile—also deviating from the rectangular grid—Chicago teachers' college (Perkins & Will *circa* 1960) achieved better acoustics, sightlines, spirit . . .

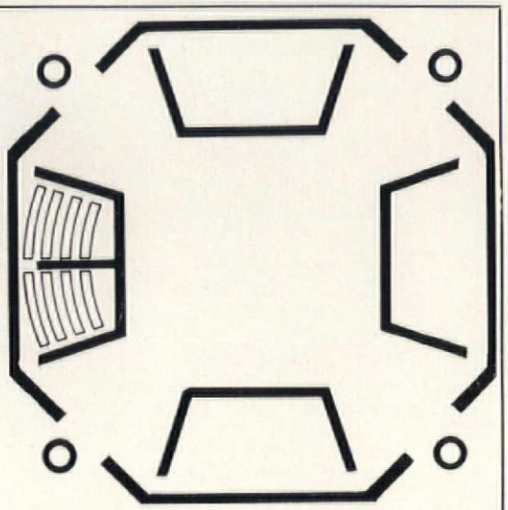
ame presupposing a rigidness irrelevant to present-day educational patterning.

G TO THE CLASSROOM?

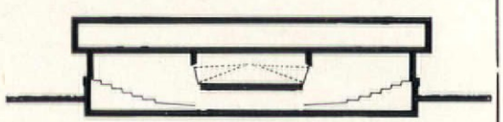
Based on notes and drawings by Charles William Brubaker, the Perkins and Will Partnership.

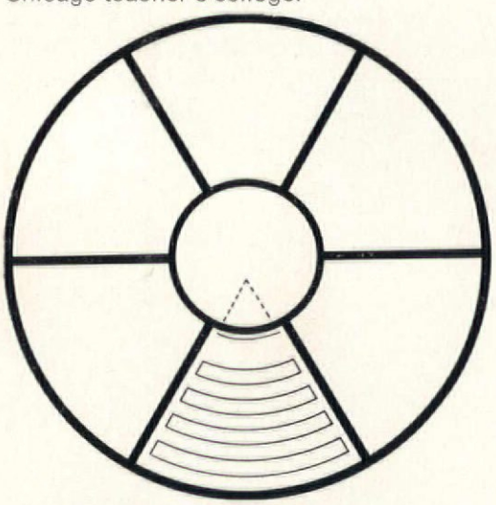


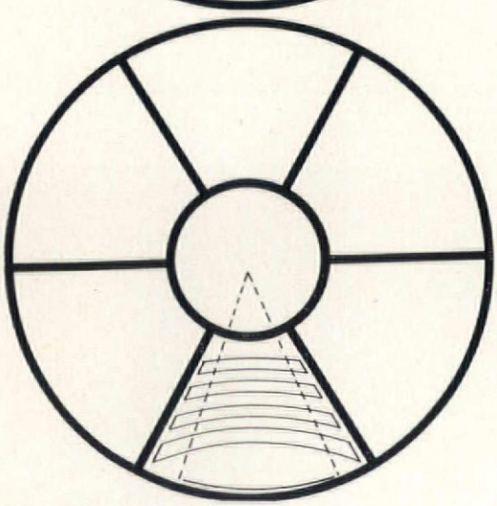
Rear screen projection burst onto the the lecture room—from behind the front wall. Used effectively by the military first, then in college experiments, as at Chicago teacher's college.



Meanwhile the RPI lecture centre design (a competition won by Perkins and Will... *not* built yet) achieved a fine *social* space at the centre (with projection *above* it). The ground floor for lectures, an upper floor for studios, offices, etc.







Then the *Lecture Center*[2], often around a central rear-screen projection room (as at the University of Miami, Florida).

Note alternate 'front' projection from centre.

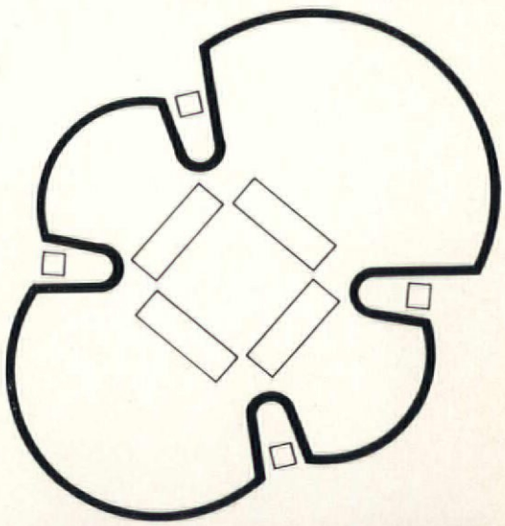
Circa 1959 research, like that by Dr Walter Cocking, Bill Brubaker and Larry Perkins, *Space for Individual Learning* (published in the 'School Executive', February 1959), explored the future possibilities of a school *without* classrooms—individual scheduling—new media and a place for each student's own quest—dial access systems (note research by Ira Singer) and computer assisted instruction—all stimulated a new interest in the concept. By 1967, the carrel was a standard piece of equipment in some colleges—Oaklahoma Christian, Oral Roberts, Grand Valley—and some schools. Middle School, Mt. Kisco, N.Y., and Orchard Ridge Campus of Oakland Community College, Detroit, (see page 223) challenged the entire concept of the'classroom' with the new media carrel and tutorial system.

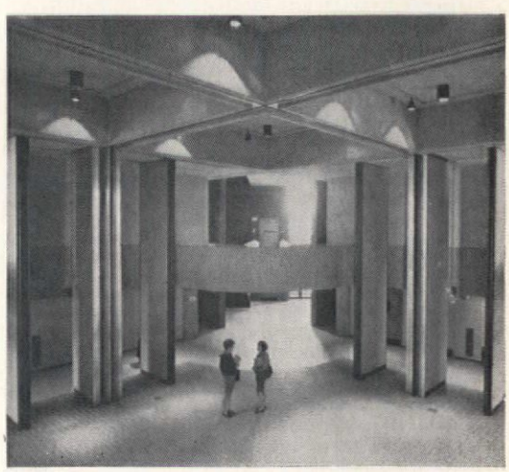
[1] more recently, ETV, did access, other media, and computer assisted instruction to challenge it.
[2] Outstanding research by Alan Green at RPI.

The RPI lecture center design influenced the new Communications Center at NY State Univ. College at Buffalo (1967 . . . Perkins & Will, architects)
First floor=offices, TV, media studios, etc.

Total=11 lecture halls

= one	400 seat	=	400
= two	185 seat	=	370
= four	90 seat	=	360
= four	50 seat	=	200
lecture hall total		=	1,330

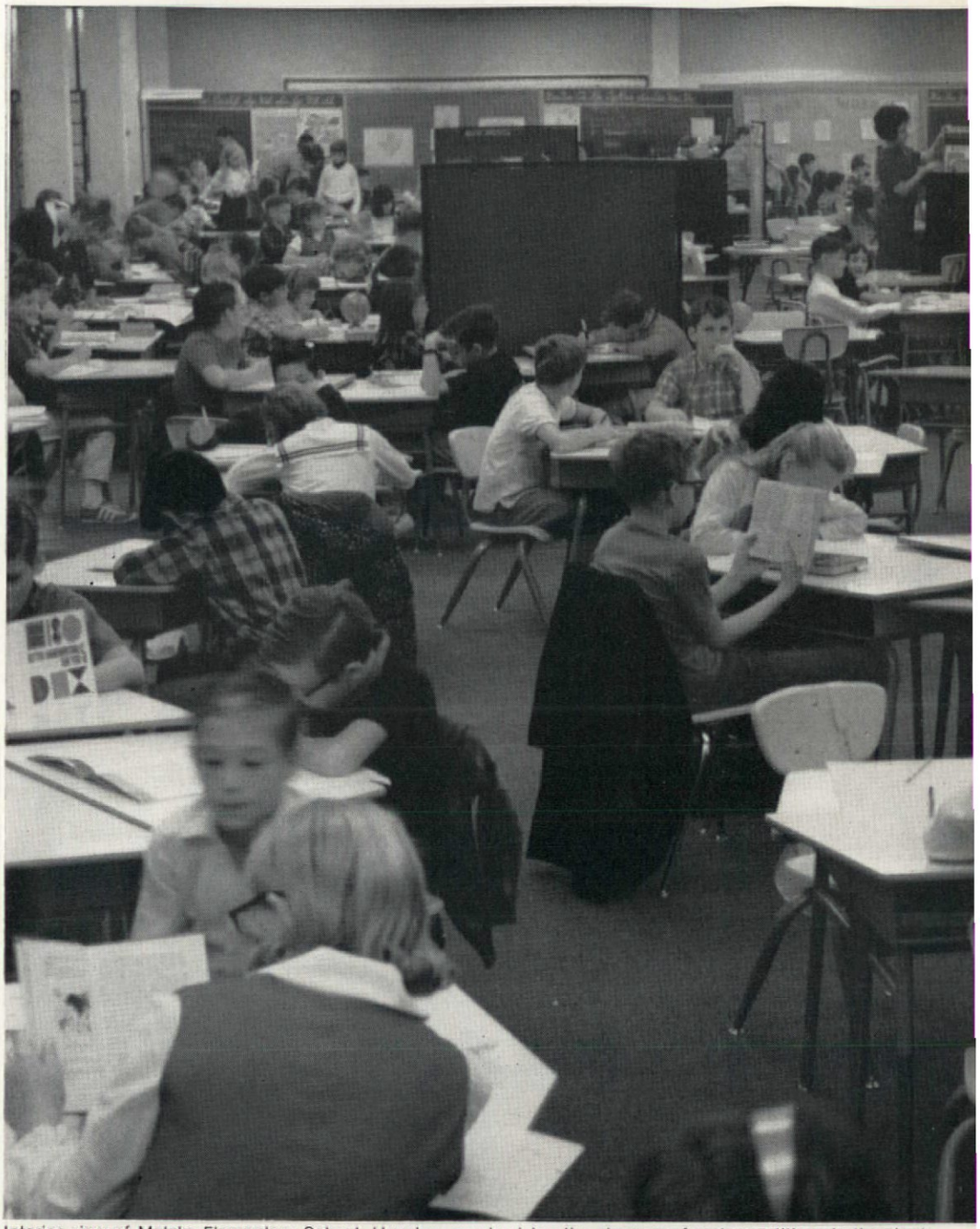




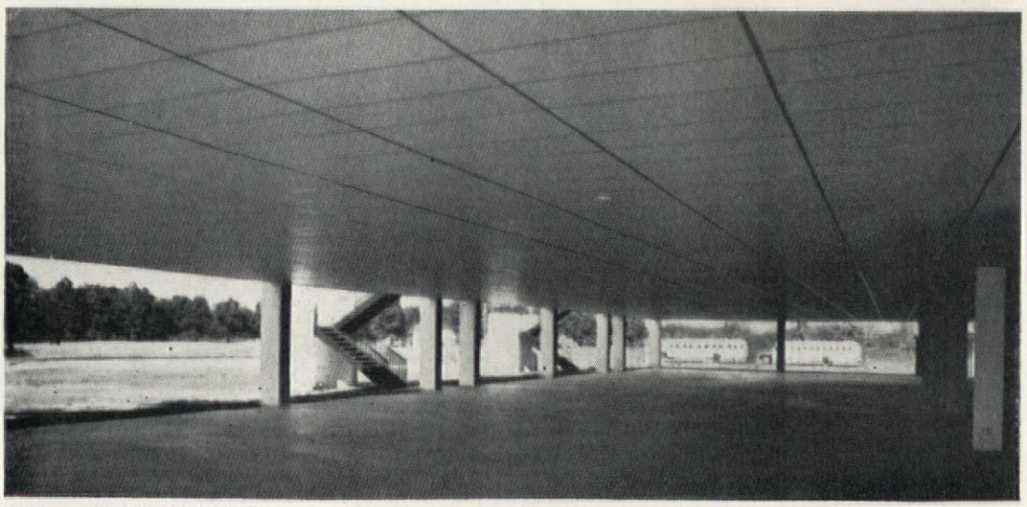
Entered from grade level, second floor 'commons' area is centre of the building. Two stories high, the area may be subdivided into seminar rooms by partitions

The single cell school encourages new uses to be made of existing staff and enabl

2 TEXAS SCHOOLS



Interior view of Matzke Elementary School, Houston, emphasizing the absence of major partitions in the single teaching space at first floor level. Architects: Wilson, Morris, Crain and Anderson



Undercroft at the Matzke Elementary School, Houston, intended as a sheltered playground

ıift working of staff and pupils to attract new labour and overcome space shortage.

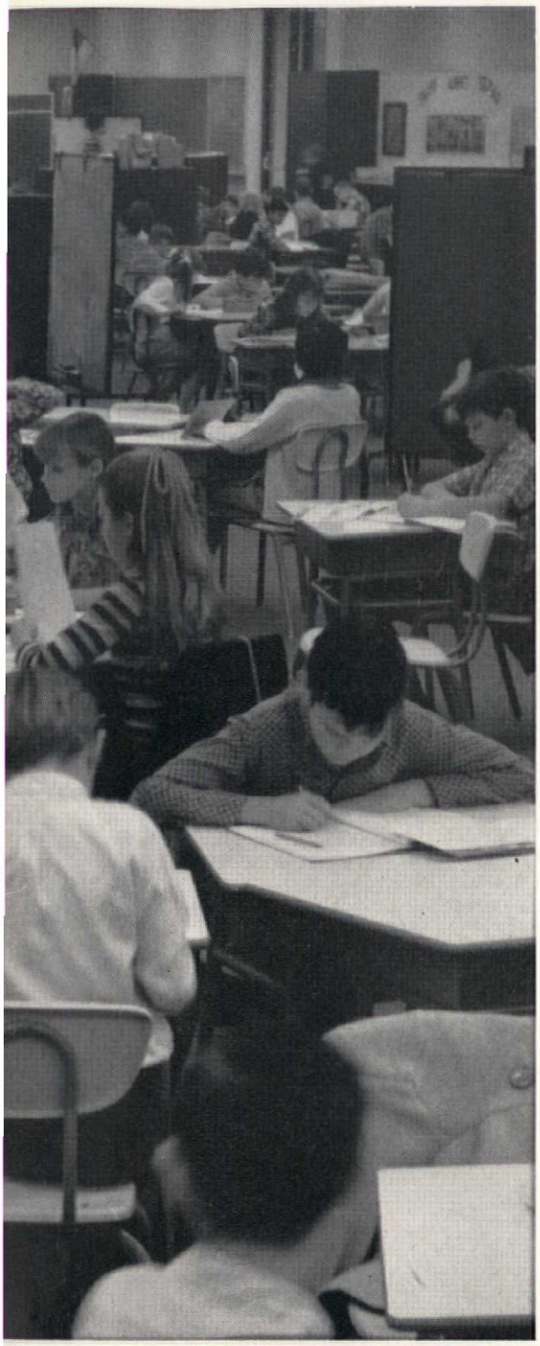


Photo: Paul Peters

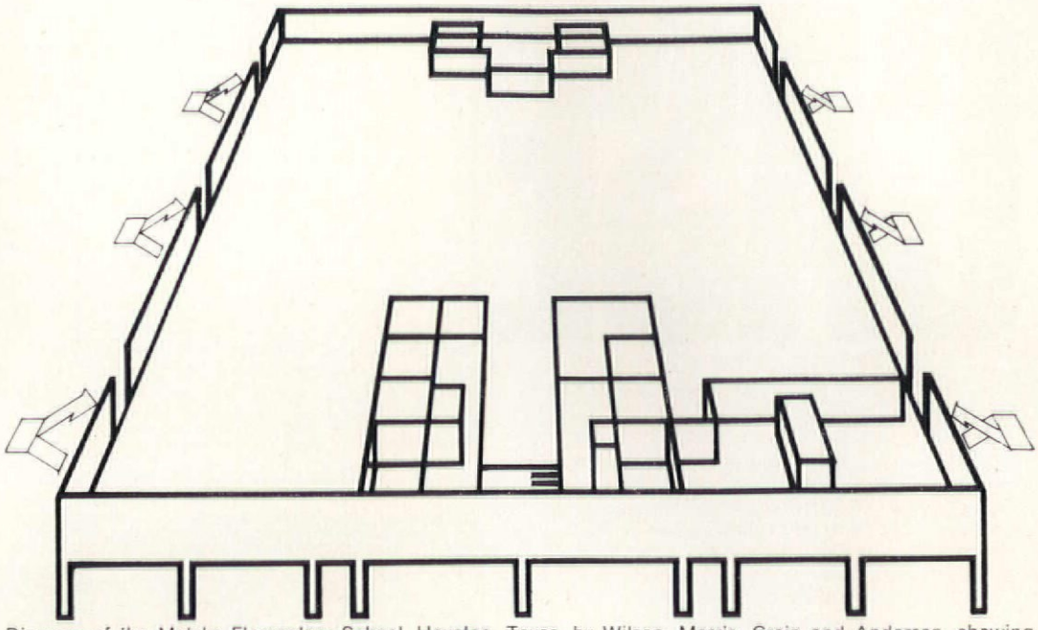
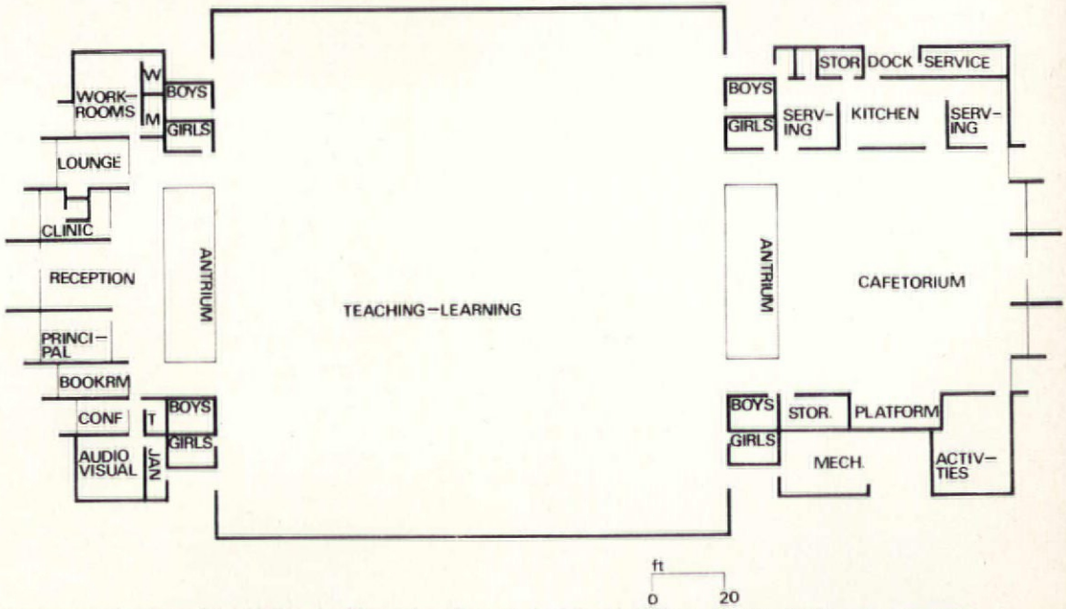


Diagram of the Matzke Elementary School, Houston, Texas, by Wilson, Morris, Crain and Anderson, showing the general arrangement of the first floor level. Classrooms, administrative offices, conference rooms, TV studios and equipment stores are grouped in two blocks at the ends of the central zone. Only the kindergarten in the bottom right hand corner is partitioned from the general teaching space. The service and plant rooms, kitchen and cafeteria and sheltered playground are at ground level



Diagrammatic plan of the Holbrooke Elementary School. Architects: Wilson, Morris, Crain and Anderson

Child learning at Matzke School

Time flexibility must be matched by flexibility in locale and assessment of results.

CASE

Contingencies Applicable to Special Education*

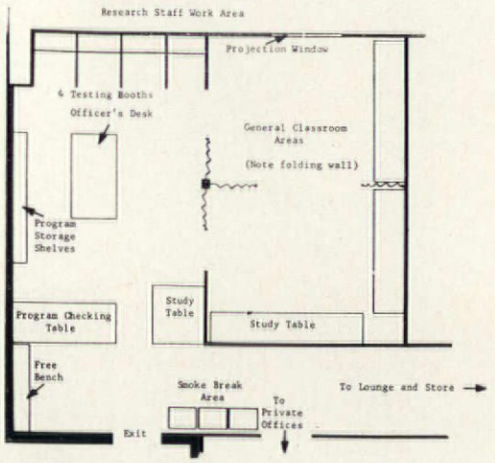
Harold L. Cohen, James Filipczak, John S. Bis

CASE was a specific educational programme designed to fulfil the educational attitudes and subject matter behaviours for a group of inmates at the US National Training School for Boys. Although the educational system evolved was within the context of a penal institution for delinquents, both the educational principles and the procedures developed have applicability to other institutions and populations.

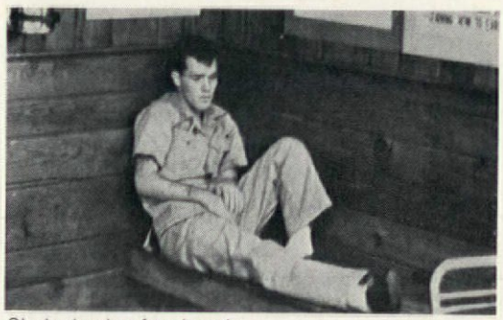
The project was initiated on February 24th, 1965, and terminated (with extension) on October 31st, 1965. On March 29th, 1965, the designed environment was opened to the first four student-inmates, followed by the addition of other groups of four every eight days. An initial complement of sixteen students was reached in four weeks. The student-inmates were available to the programme from 8–10 a.m. to 11–25 a.m., Monday to Friday. The effectiveness of the programme can be judged by the fact that the week of May 24th (the ninth week of the project), the average time spent in recorded educational activity (as opposed to mere attendance) was 109 minutes per day out of a possible 195; this figure reflects the change of class schedules, lounge rates, and other stimulus changes.

Standard procedures in rewarding academic achievement (grading, yearly class promotion, and issuing of diplomas upon completion of years of work) have not been effective goals for some students in the general school population; e.g., the dropout and the student-inmates in training schools and other penal institutions in general.

At the National Training School for Boys, a considerable number of youthful inmates were not previously challenged sufficiently to achieve successfully within the current standard educational system. In a period when technology and social change impose great difficulties upon adequately functioning members of our society, the existence of a large group of young people who are unable to meet present educational requirements within or outside the institution poses increasing difficulties for society. In general, these inadequately functioning student-inmates can be considered as lacking in two types of behavioural patterns: acquisitional and attitudinal patterns; specific background skills and information.



Detail plan of educational area



Student using free bench

The general aims of CASE were:
to raise both the general and specific attitudinal behaviours of the prescribed and randomly selected group of NTSB school age inmates to a level which more nearly approximated those established for students in the public school system;
to raise a specified list of subject matter performances of these inmates to a level nearer those of the age/class group that they would normally be associated with in the public school system;
upon successful demonstration of the above objectives, and upon mutual consent of the two agencies co-operating in this proposal, to seek funds to expand the successfully demonstrated procedures to a larger population of the subject-inmates of the NTSB.

CASE concerned itself with raising the attitudinal behaviours of the inmates within a newly-created academic environment, using as many contingencies as were possible within this demonstration period. Further, CASE attempted to raise the level of academic performance in specified areas; the most likely areas included reading, English language, and mathematics.

Among the procedures which have been recognized as maintaining behaviour is reinforcement. Reinforcement involves making a certain consequence contingent upon a performance. Reinforcement will not be available unless the specific performance occurs. The ideal situation, of course, is one in which the intrinsic consequences of the task itself maintain the behaviour. For example, one reads a novel to follow the development of the characters or plot which cannot be followed unless the book is read; or, one reads in order to learn. However, we are neither dealing with ideal situations, nor with students who have a history of such an approach to learning. Therefore, a system of extrinsic reinforcements was developed which did maintain the student's educational behaviours. The extrinsic reinforcements chosen were those that were already strong in these students' repertoires. These also were chosen because they lent themselves to being altered gradually into the generally more desirable form of intrinsic reinforcement. These extrinsic reinforcements became available (purchasable) through points. Those points were given for correct answers to programmed or semi-programmed educational problems, tests, and other academic performances. Augmenting the system of using gold stars, to which they are analogous, the points could at any time be converted to material or social reinforcers. For example, each point is worth $.01 and could be used to buy material from a Sears-Roebuck catalogue or to buy entrance into a lounge where a jukebox and one's friends were.

These points were tied into the current system of values of the student-inmates and were used to establish and maintain learning so that after an initial educational repertoire was mastered, other reinforcers and systems of intrinsic values might then take over.

The programme was voluntary and individualized. The student-inmate did not have to do academic work. Once he earned his points, for being correct in his subject matter exams, he did not have to convert them into any specified reinforcer. He could choose how he wished to spend them. He could also save them. He worked at his own pace on individualized curricula, based on the results of his pre-testing. The only way he could earn points was to engage in studying and completing the educational material recommended to him. A grading system was developed which gave the student-inmate immediate access to his own progress and the adequacy of his understanding. A grade of at least 90 per cent correct was required on all programmed instruction. Upon completion of a unit of study at 90 per cent correct responses, the student was given an exam which earned him points. The students soon learned to achieve 90 per cent on all programmed work.

To establish these conditions of learning, measurement, reinforcement, point-conversion, etc., a special environment was designed including group classrooms, individual study booths, social lounge, measurement and instrumentation room, and a small store. This environment was developed in the basement of Franklin Hall, one of the NTSB's unused cottages. □

***The text printed here is abstracted from a published report CASE I, issued in 1967 by the Educational Facility Press, Silver Spring, Maryland.**

FLYING CLASSROOM L.A.

University of Southern California press release Feb. 7, 1968

'Dirigibles and biplanes may be out, but flying classrooms are in.

That was demonstrated by thirty-two University of Southern California students who soared over the Southland in helicopters.

These were among the many unconventional "classrooms" to be used by undergraduates enrolled in the University of Southern California's Urban Semester, a revolutionary approach to the study of urban complexities.

Students were divided into two teams at the Los Angeles International Airport. One team flew to Newport Beach and back; the other flew a round trip to Pomona. Both teams were accompanied by the Urban Semester programme director Frank Tysen.

Upon their return to International Airport, each team returned by car to its flight destinations—Newport and Pomona. Upon arrival at these destinations, the teams were split up and, in small groups, returned to Los Angeles by various modes of transport—train, bus and car.

Each group was assigned to observe different aspects of the urban setting—urban planning, transportation patterns and environmental quality.

Before the flights, the students were briefed by several specialists on geographic, geological and meteorological conditions of Southern California. The aim was to give to the students an overall picture of the Southland Megalopolis before they started on their specialized research projects. They were to see how natural forces affect man and how man in turn has adapted to and changed the natural setting. Few enough people have a sense of the total shape of the Southern California urban complex.

Other unique classrooms of the Urban Semester ranged from tenements to Beverly Hills mansions, and included such diverse locales as the computer centre of a large bank, backstage at the Music Centre, the lobby of an hotel, industrial settings and political assemblies. The Urban Semester students' "regular" classroom was The Cheshire Cat, a cafe in a church basement.' □

223▷

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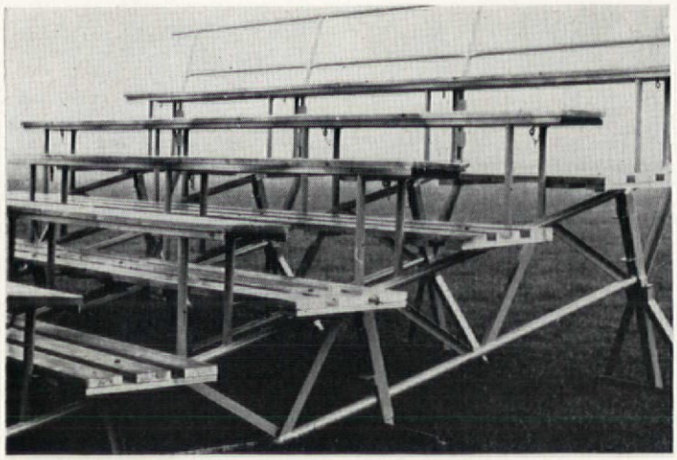
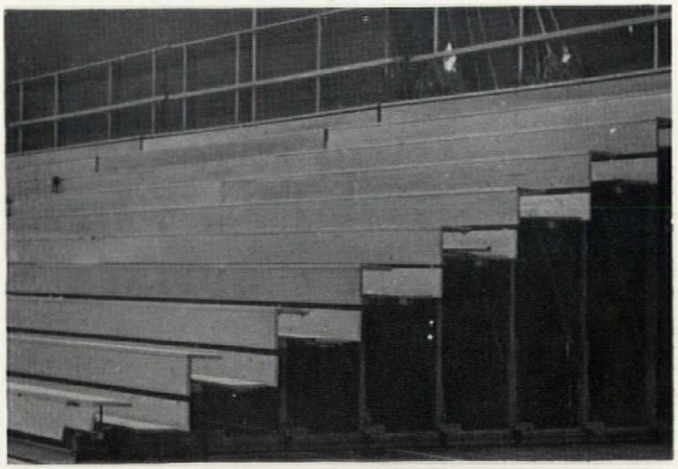
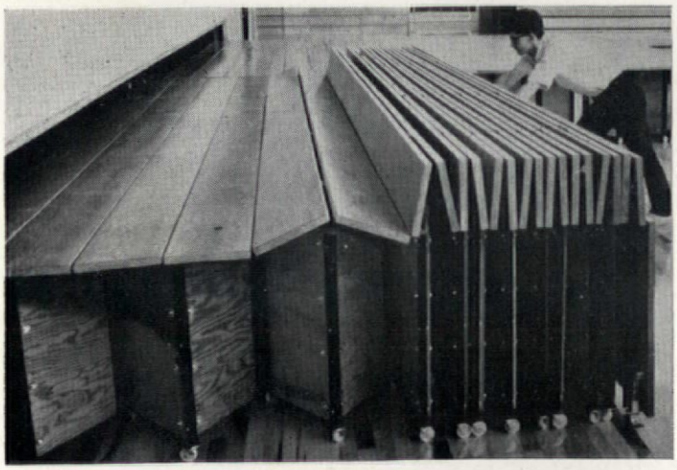


Portable outdoor seating



Retractable custom built seating



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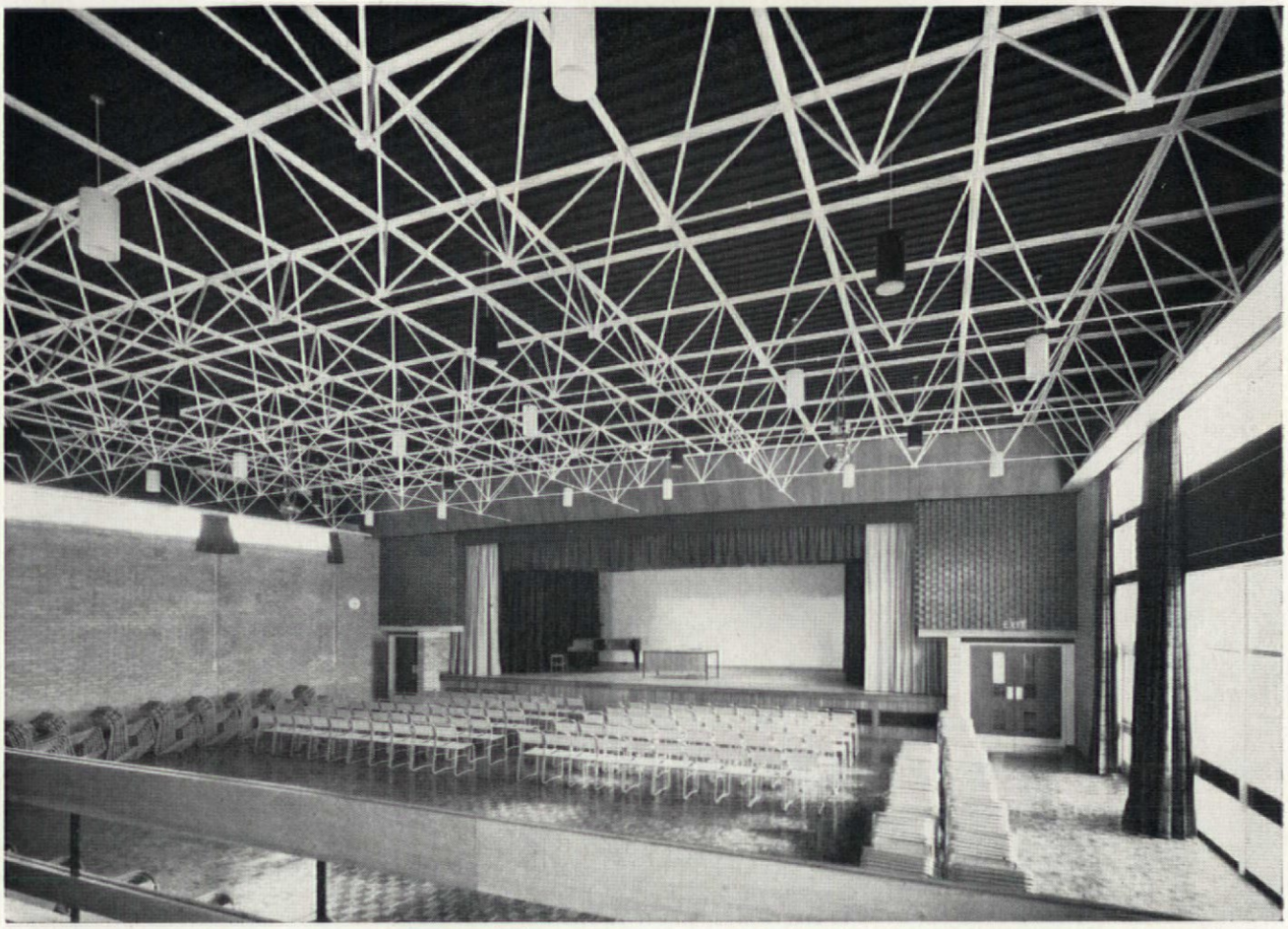

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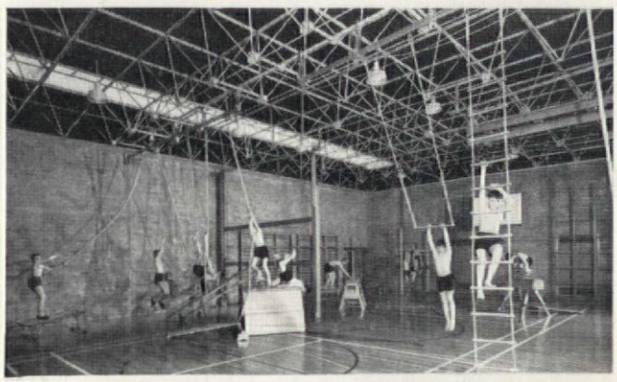

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Top: Assembly Hall at Hindley County Secondary School. Bottom: Gymnasium at Hollins County Secondary School, Accrington. Both designed by Roger Booth, Lancs. County Architect.

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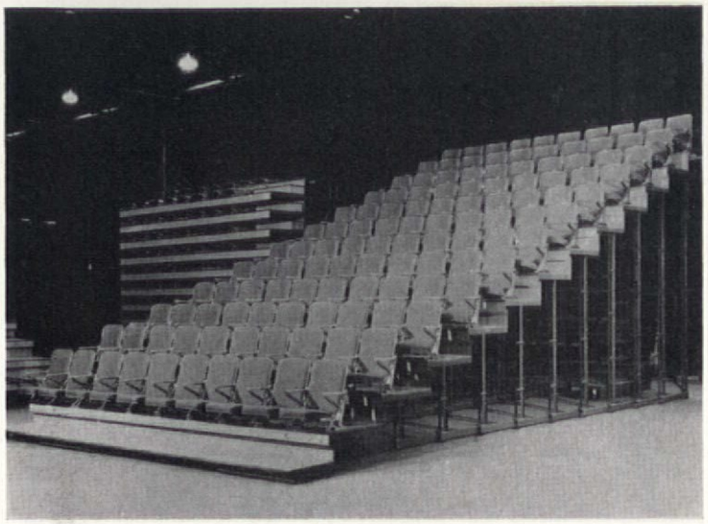

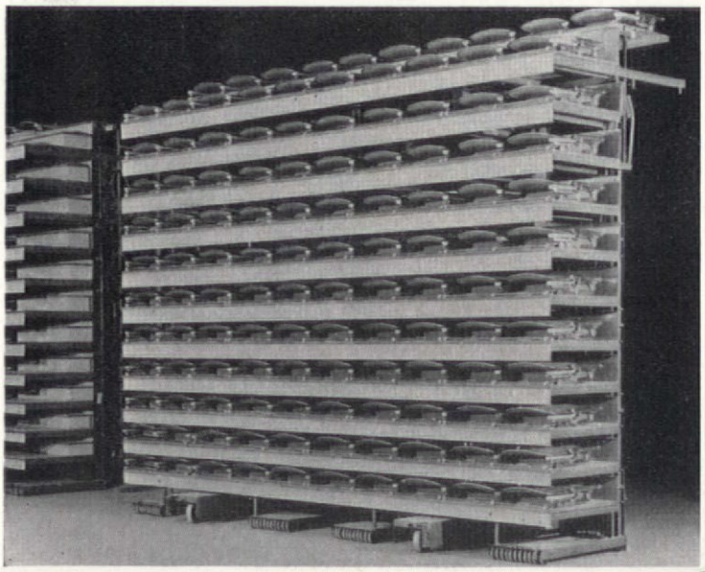

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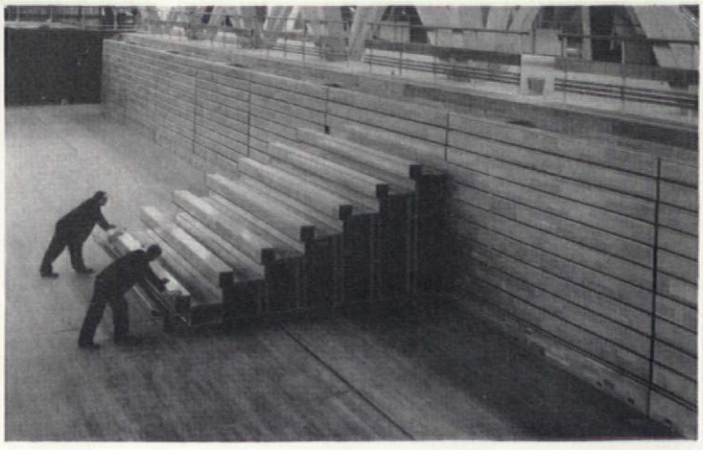

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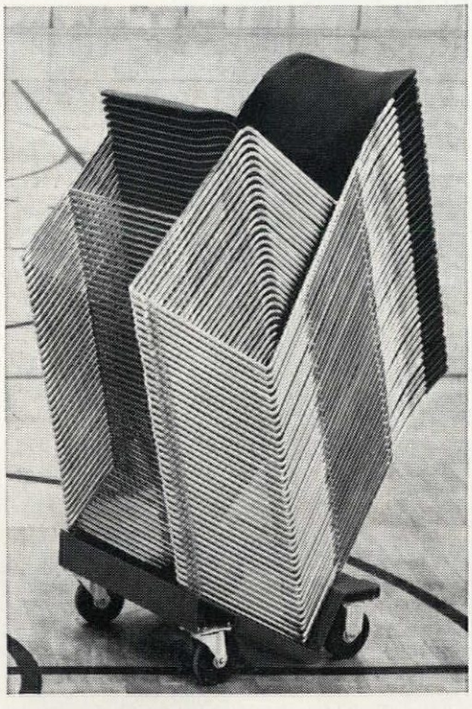

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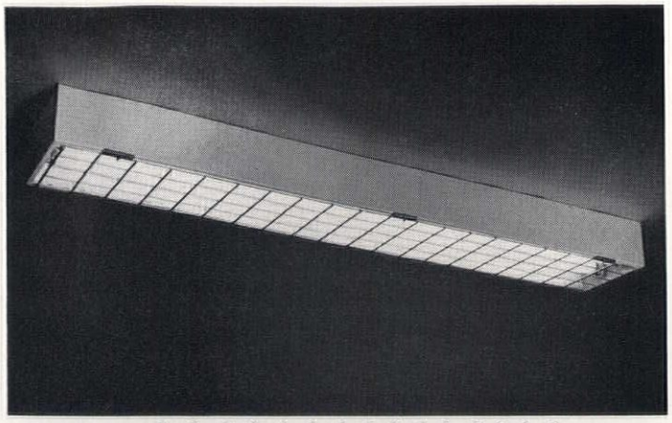

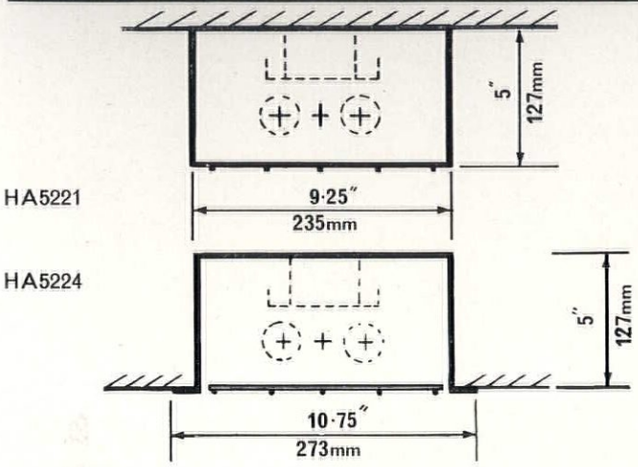

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Surface Fitting							
HA5221/1565/Q	1×5′ 65w.	61·5	1562	24	610	24	12
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HA5221/1685/Q	1×6′ 85w.	72·5	1841	24	610	28	14
HA5221/2685/Q	2×6′ 85w.	72·5	1841	24	610	34	17
HA5221/1885/Q	1×8′ 85w.	96·75	2457	48	1220	44	22
HA5221/2885/Q	2×8′ 85w.	96·75	2457	48	1220	49	24·5
HA5221/18125/Q	1×8′ 125w.	96·75	2457	48	1220	45	22·5
HA5221/28125/Q	2×8′ 125w.	96·75	2457	48	1220	52	26
Recessed Fitting							
HA5224/1565/Q	1×5′ 65w.	63	1600	24	610	25	12·5
HA5224/2565/Q	2×5′ 65w.	63	1600	24	610	30	15
HA5224/1685/Q	1×6′ 85w.	74	1880	24	610	29	14·5
HA5224/2685/Q	2×6′ 85w.	74	1880	24	610	35	17·5
HA5224/1885/Q	1×8′ 85w.	98·25	2496	48	1220	45	22·5
HA5224/2885/Q	2×8′ 85w.	98·25	2496	48	1220	50	25
HA5224/18125/Q	1×8′ 125w.	98·25	2496	48	1220	46	23
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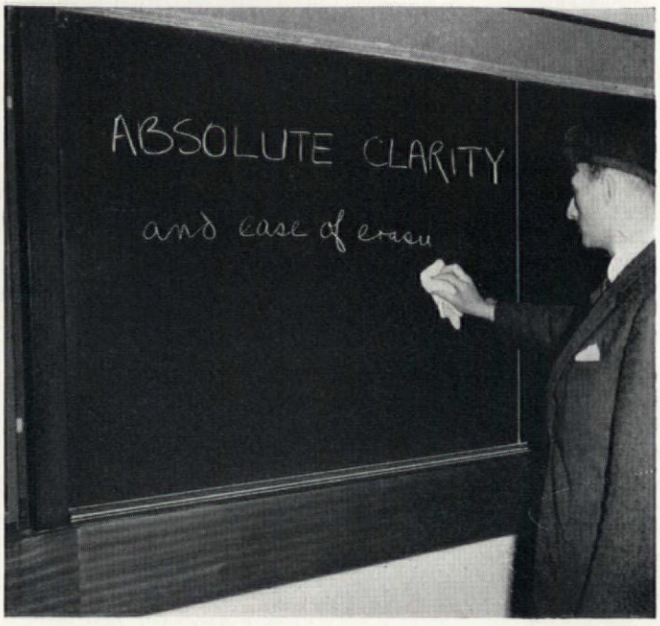

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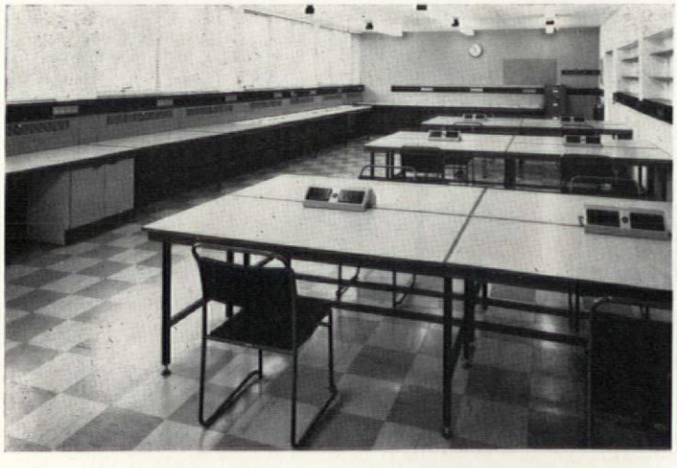

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Our Silverspan range has just won a CoID design award and our Silverline won the British Aluminium Design Award. Prizes are very nice, but what we really want is the satisfaction of completely meeting your design needs. That's why we take extra care.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

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SILVERSPAN:
A single-light all aluminium fitting $1\frac{3}{4}$″ across, with integral hinge and snap lock action. Full range of accessories for general illumination, wall-washing, directional and decorative lighting.
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An extruded anodised aluminium directional fitting. Rotates through 350°. Perfect for museums, art galleries, blackboards, wall displays. Only $2\frac{1}{4}$″ x 2″.
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GOODBYE TO THE CLASSROOM

John E. Tirrell and
Albert A. Canfield

The adoption of programming principles together with modern technology provides the basis for a remarkable extension of education into the home, the factory, the office and the shopping centre.

Orchard Ridge Campus, Oakland Community College, Bloomfield Hills, Michigan
Architects: The Perkins & Will Partnership of Michigan, and Giffels & Rossetti Inc., associated architects.

The accelerating need for education may best be met by a plan for education which recognizes the different environments and circumstances under which it can take place. If the objective of education is to prepare people for productive lives in which they maintain gainful employment, participate in civic and community activities contributing to the welfare of society, and live within the confines of accepted morality and legal limitations, then it must provide those contacts and experiences which foster the achievements of these goals.

Traditional methods of teaching must give way to a wider understanding of the process of learning and the need for spreading education among the members of a community so that education becomes an integral part of both community life and the growth of individuals.

Modern technology permits almost instantaneous interchange of information between men on earth and devices on the moon and beyond. Yet the transfer of information between teacher and student is confined to the limits of normal, unamplified sound transmission—to the classroom. Education must make use of technology.

The recent development of the programming of instructional materials has given emphasis to the possible improvement of self-teaching devices such as textbooks, films, etc. The adoption of programming principles (small learning steps, frequent success, avoidance of failure, and repeated review) together with modern technology provides the basis for a remarkable extension of education into the home, the factory, the office, the shopping▷

The resultant patterning is socially more valid to apply to community in general th

◁

centre, and the introduction of special facilities designed to produce skills, knowledge and attitudes.

A teaching model may be developed using portable learning packages and two-way communication terminals or consoles in the home, together with specialized facilities for occupational training in most (if not all) major business institutions and service agencies.

Teaching technology will develop within the coming years to provide instructional materials that are largely but not completely self-instructional. But the educational plan will lay stress on nodes or educational centres, serving relatively limited population groups in the neighbourhood, to ensure interaction and to compensate for any inadequacies in partially developed and tested self-teaching materials.

At these nodes, learners would check-out, study, and proceed from unit to unit, course to course, and class to class in accord with their ability to do the work. The teacher would serve as a producer of materials to meet individual needs, an advisor on particular requirements, an explainer of obscure points, a tutor to stimulate and to direct further study and to prompt independent investigation.

Each node would be stocked with materials to serve learners of every age; care being taken to avoid the isolation of particular age groups in casual contact, rather to ensure that there are models of social groups of all ages and interests and stages of development.

Some of the nodes would include areas and facilities for fine arts activities for all age groups, choruses, bands, and drama groups, as well as opportunities for concerts and creative arts. Some of the nodes would provide basic exercise or health club facilities for physical fitness. There would also be provision for football and athletic activities requiring large areas of land.

Opportunity for individual instruction and for sustained high productivity and high intensity contact between learner and teacher will be greatly increased by providing self-instructional materials, using a wide variety of audio-visual media. The ease with which such self-instructional materials can be moved will also provide a home-study unit which, when coupled with telephone or television tutoring, will provide the foundations upon which expanded and extended uses of technology can be based as they are developed and tested.

The objective of the plan is quality education, quality education being *the successful understanding of the maximum amount of demonstrable cognitive, psychomotive and affective knowledge by individuals with a wide range of abilities, in the minimum amount of time, making the best use of the investment of human and material resources.*

In this definition, are listed four specific aspects that require to be stressed:

Programmes are needed for *individuals with a wide range of abilities* rather than just the able, or those with cultural advantages or—at the other extreme—for special education for the physically or mentally retarded.

Successful accomplishment by the individual in *demonstrable cognitive and/or psychomotive and/or affective* areas, needs to be emphasized rather than thinking of 'failing 30 per cent' with such vague objectives as 'releasing the spirit', which cannot be demonstrated.

The *amount of time* consumed in learning must be recognized as one of the most important variables, varying significantly from individual to individual and even for the same individual with different tasks. Thus the hour, day, week, and certainly the term have no significance as measures of time for learning, and these must be varied for the individual and the task.

Strategies must be developed to make the best use of *the investment of human, physical, equipment and material resources* for the best individual results, with an awareness of the trade-offs possible to retain the results with greatest cost-effectiveness.

Each of these four points can be amplified by examples:

Dr Gabriel Ofiesh, Professor of Educational Technology at Catholic University, has recognized the 'black coffee syndrome'. Students go to the cafeteria and—even if machines alone are used—can get 1, black coffee; 2, coffee with cream; 3, coffee with sugar; 4, coffee with cream and sugar; 5, coffee with heavy cream; 6, coffee with heavy sugar; 7–12, tea with all the options; 13, hot chocolate; 14, soup, etc.... Yet, when they go to the classroom, the different abilities, preparation and experiences are not known and acknowledged—all students are given black coffee.

Dr A. A. Canfield draws a parallel between education and the organization of a hospital; teachers are doctors. How long would a doctor survive or a hospital stay open if they gave the same prescription for shortness of breath, stomach cramps, dizziness, etc. In most cases, this is what happens in education.

While not agreeing on all points with Professor B. F. Skinner, of Harvard University, the statement attributed to him that 'We can teach anyone anything, if the material is sequenced and the individual is given enough time', seems perfectly sound. An example of this point and some others can be shown by the students who successfully completed two years of secondary school work and never set foot on the school grounds. This was at Chicago Junior College—the students were in Joliet Prison. Similarly, Dr Samuel N. Postlethwait, of Purdue University, has had considerable success with a wide range of student abilities using his 'audio-tutorial' method in botany and biology—with almost no large group sessions.

A review of the literature reveals that a variance in time is one of the most important factors in bringing about successful learning. The constant inclusion of a human (often called the teacher), who is the most expensive resource in education, requires us to have groups, class hours, school days, terms—none of which are geared to aiding learning. Once again B. F. Skinner's statement is sound—'Any teacher who can be replaced by a machine—should be', for the great teacher does not just pass on facts and information—this can be done much more efficiently by a machine, audio tape, film, slides, etc., or a book.

In March, 1962, a two-week conference sponsored by the United Nations at UNESCO in Paris, was attended by educational representatives from a majority of the countries of the world. The subject of the conference was 'New Methods and Techniques in Education'. One of the major conclusions of the expert group concerned the implications of the new media and methods for education:

Particular attention is recommended to the development and use of imaginative ways of combining, for maximum educational gain at minimum cost, the resources of mass-media, of self-instructional programming methods, and of teacher-teams....

Special emphasis should be placed on adapting to all media, the techniques of feedback from individual students.... Such feedback to the producer should consider factors of acceptance and attitude as well as instructional efficiency.

Research of a fundamental nature is needed to improve basic understanding of the learning process....

Special emphasis should be placed on developing the potential of individual programmed instruction methods....

An intensive effort should be devoted to obtaining and collecting data on comparative monetary costs and expenditures required for alternative means that seem to be capable of attaining a particular kind of needed educational outcome. Factors taken into consideration in collecting such data should, however, not only be the monetary outlay, but also the effect on manpower, on the required time, and on the improvement of quality of instruction.

But some of the most dramatic savings in current practice to provide the funds for high quality education can be in physical facilities. This can be demonstrated with conventional programmes, and the use of programmed instruction, self-instruction and possibly teaching machines could further reduce the investment in brick and mortar for better quality education.

With the tremendous increase in the enrolment of students approaching higher education, an enormous investment in physical plant is foreseen in the USA. Some have predicted the doubling of the physical plant built during the last 300 years within the next decade. The cost will be astronomical. The basic assumption is that buildings will continue to be used the same way in the future. In many cases this is only 30–50 per cent of the week, from 8 a.m. to 5 p.m., Monday to Friday.

Any significant increase in the time of occupation would materially reduce the financial outlay. In the belief that the public is going to demand greater use of educational facilities, various plans for year-round operation, co-operative education and study abroad have been introduced. But these overlook that method of providing for the new students with the least possible amount of building—the increased use of both existing and new buildings.

Working with the McDonnell Automation Center in St Louis, a division of the McDonnell

erely an individual school, which, once freed of an imagined comprehensive role.

Aircraft Corporation (the prime contractor of the Mercury and Gemini programmes and the F4h fighter used by all three military services) we learned of a method of simulating the fighter on the electronic computer and 'flying' it many times, with major and minor changes made between each 'flight'. We asked, 'Why not fly a college on the computer?' We undertook a computer simulation of Meramec Community College, one of the three proposed campuses in the St Louis Junior College District.

The programmes for 4500 students, number and size of rooms planned, intended staff, and various time patterns, provided the input data. In five minutes the computer went through the thousands of combinations possible and started to print a schedule. Twenty-five minutes later the use of rooms, including each faculty member's schedule, each student scheduled, the percentage of rooms used, the percentage of seats occupied and other pertinent information covering some 100 pages was available for analysis.

From the outset we had been concerned about seat occupation as well as the use of rooms. If 25 students were in a room furnished for 50 students, this would involve 100 per cent use of the room for an hour but only 50 per cent seat occupation. Thus, in each of the 27 computer runs we changed the size of some rooms. In this way we reached 82 per cent use of the classrooms and 66 per cent of the laboratories.

The 7094 computer at McDonnell Automation Center was used with the GASP programme developed by Robert Holz of MIT. The final results were:

Room	Our total	Similar colleges Same enrollment A	B	C	Our room use per cent	Our seat use per cent
Classrooms	37	84	63	82	82	87
Lecture Halls	6	1	5	5	86	86
Science Labs	15	33	38	21	66	91
All Others	27	23	30	41	72	88
Total Rooms	85	141	136	149	77	88

In addition to proving that the desired occupation for each type of room could be obtained within the proposed master plan, it was shown how the master plan could best be modified. Conservatively this could mean a saving of $3,000,000 on this one project. Other studies would confirm that such concentrated use is possible—particularly with the use of the computer as a check in the development of a master schedule for planning and operation. These are dramatic figures and the $10,000,000 not invested in the three projects could provide the basis for quality education.

It may be possible to reject altogether the classroom as we know it. A revolution is already apparent in the ungraded classes of schools, team teaching, continuous progress, modular scheduling, instructional systems, the 'organic curriculum', and such hardware as TV, dial-access, and computer-assisted instruction.

The dispersal of education could be furthered by self-instruction and electronics in the home, the shopping centre and office buildings.

A possible programme for the node or education centre might be:

For the infant (under 2 years of age) and the elderly and infirm, educational toys or packages of materials to be checked out from the node and used in the home. These students could be visited on a regular basis, to determine their progress, interest, and reactions.

For the child between 3 and 6, the neighbourhood node would be available from 9 a.m. until 4 p.m. These would be prime hours and would provide both self-instruction and a large amount of group activity ensuring social interaction and the growing maturity of emotional responses. The major emphasis would be on the development of learning skills—reading, problem solving and techniques of investigation.

For the adolescent, from 7 to 12, the same node would be open from 7 a.m. until 6 p.m. The emphasis would be upon continued development of learning skills and the absorption of certain levels of information on arithmetic, English, speech, history, geography, etc.

For the teenager and young adult (ages 13 to 18), the same node would be open from 6 a.m. until 9 p.m. This group would have small group discussions in which they would compare and contrast interpretations of possible solutions to social and technological problems, as well as undertake work in social science and physical science areas. An introduction to the fine arts would begin with this age group, having approached them as recreational or play activities in earlier years.

Depending upon the demand, the nodes could remain open around the clock.

As the effectiveness of self-instructional materials increases, the need for tutors in the nodes will decrease. Similarly, the effect of curricula material development specialists will become increasingly effective, reducing the number of educationalists required. It is estimated that a staff-student ratio of 1 to 45 would suffice for the year 1980, a ratio of 1 to 60 for 2000, and a ratio of 1 to 150 for 2020.

As the need for teachers and media specialists decreases, however, the need for recreational/cultural activity supervisors and for monitors and leaders of discussions and social activities will remain about the same or increase slightly as the work-week is shortened, the retirement age is lowered, and the amount of free time for such pursuits increases.

The basic facilities required will include:

An administrative centre
Radio and TV studios
Information processing centre
Media preparation, production, storage and circulation centre
Instructional materials development and pre-test centre
Performing arts, conference, art collection and learning materials centre.

A node for cultural/recreational activities in each of the neighbourhoods. The nodes will be largely made up of open areas with varying sizes of self-study facilities and substantial storage and retrieval areas for unused material.

Many of the nodes will have a major facility for outdoor recreation, larger assembly facilities, and large areas for creative arts and crafts, including music and theatrical performances.

Nodes for study and discussion should be included in industrial, business and commercial establishments. These nodes would parallel the residential nodes and provide an environment for the adult at work, shopping, or waiting for children at the doctor or dentist, to maintain his speciality, learn new materials, and engage in discussions with others in a pleasant and convenient environment.

The primary changes in the educational process will involve the gradual and continuing shift away from hand skills, semi-skilled occupations, and narrow trade or vocational fields such as lathe operators, punch card operators, etc., and move toward intellectual/mental skills, semi-professional occupations, and generalized vocational fields such as metal forming, information processing, etc.

Additional facilities would be necessary to cope with the increase in non-employed adults resulting from combined effect of an increased life span and a lower age of retirement.

As education is moved from the school into the home and place of work, cultural/recreation centres will enhance and combine many of the cultural/educational/recreation activities formerly associated with separate institutions, such as the sports ground, art gallery, library, museum, elementary and secondary schools, university and factory.

If we wait for isolated efforts at innovation to make an impact on the educational establishment it will take fifty years or more to bring about change. Thus, with increasing numbers, costs will then be more or the same expenditures will result in lower quality education.

With the many restraints of deeply ingrained custom and tradition, it will not be easy for local school boards, civil servants and ministries to formally or informally bring about the desired changes, but it is possible.

Funds to further these innovations—outright experiments—must be found. The kind of funds needed for R & D (Research & Development) are essential to the free enterprise system of business and industry and are vital to military programmes, yet they are almost unknown in the field of education. With education consuming more of local and state finances, it becomes an increasing percentage of the gross national product. As more funds are invested for increasing numbers of students, 5 per cent (or even a start of 3 per cent) of the total R & D funds need to be invested in research on how humans learn, using different media and instructional strategies, with the knowledge that some 'Edsels' will come and some (like test missiles) will never become operational. If we do not do this, resources—financial and otherwise—will be consumed in ancient, inefficient organizational patterns and out-moded education.

A great teacher once viewed an innovation with alarm. He said, 'This invention of yours will produce forgetfulness in the minds of those who learn it, causing them to neglect their memory'. The speaker was Socrates—he was talking about writing. □

can be re-evaluated and re-specified in relation to particular performance. The lesso

S.E.F BUILDING SYSTEM

Metropolitan Toronto School Board study of educational facilities.

The excerpts printed here are intended to describe very briefly the major aspects of Document T-1, The First SEF Building System. *and to indicate the philosophy which led to the development of this system.*

Objectives

Expanding educational needs demand school buildings which are both economical and inherently adaptable.

A building system is required which offers:
Flexibility in interior walls, mechanical and electrical systems, storage and casework, air conditioning and climate control. These facilities must be relocatable on a near plug-in basis.

Quality and speed of construction.

Long-term reduction of school building costs.

Freedom of design which allows the project architect to create a building for the specific needs of the particular group.

Stimulation of interest among building users in the creative potential of buildings which can be readily changed.

It is suggested that the *building system* which utilizes *the most advanced organizational and functional methods available to the building industry* through a *specific tendering system,* can achieve the above *objectives.* The First SEF Building System, shown here is a 'closed-open' system,[1] based on a competitive, functionally interfaced,[2] performance controlled, tendering procedure.

Advanced industrial methods

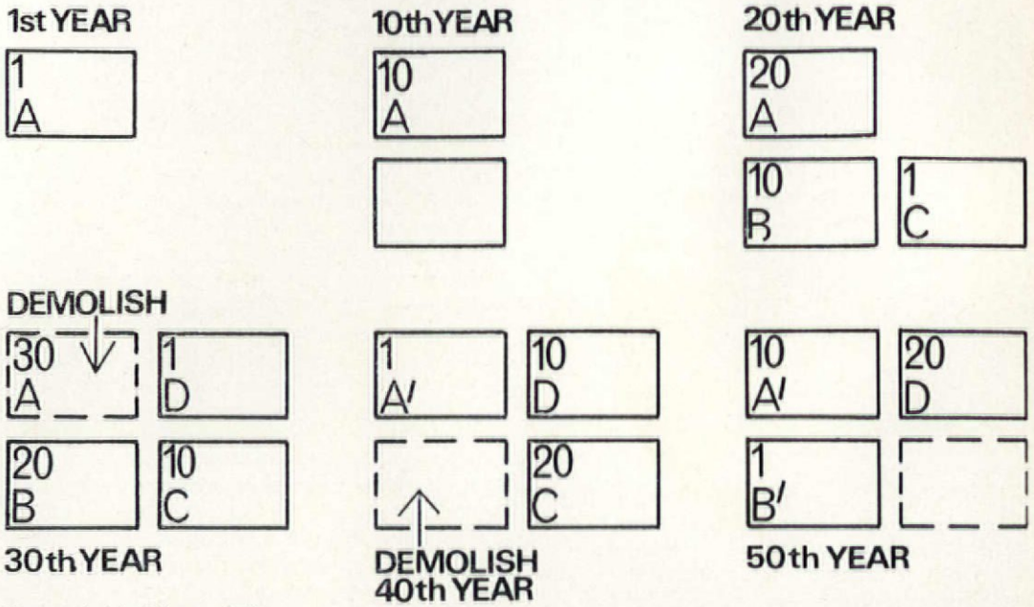
Systemization (Systems Approach to Building)

By applying interrelated and integrated *quality, cost* and *time* control procedures to the entire building industry, systemization improves performance in these three areas over that possible by traditional construction methods.

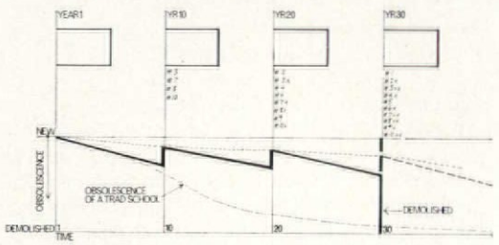
Industrialization

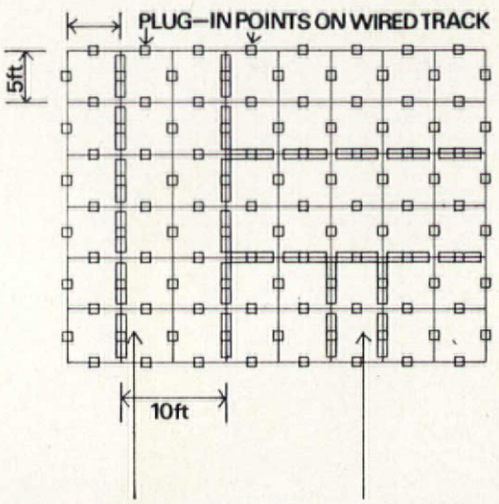
The building industry can be industrialized by applying the best methods and techniques to the integrated process of demand and design, manufacture and construction. To be fully effective, the entire industry must be industrialized; and to allay the high initial costs, the greatest possible application must be made of the products of an industrialized process. At present only isolated fragments of the building industry are industrialized. The result is an expense in capital investment and time. Successful industrialization cannot occur without systemization, and dimensional coordination of building components, sub-systems and systems.

[1] A closed-open building system is a specific choice of sub-systems from a range of sub-systems which have external interchangeability.
[2] An interface is the point of contact or blending of two objects or systems.

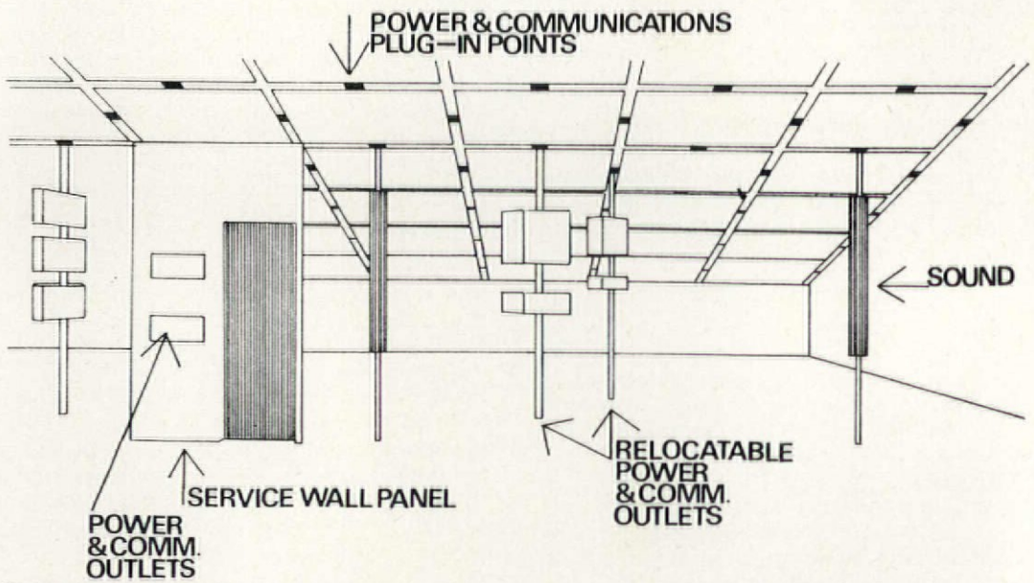


Open-ended building evolution
The principal of cyclical renewal extended to a total building, making it possible to replace a building with a radically new one over a period of years and yet to have a building which, at any time, has a maximum performance age of 10 years



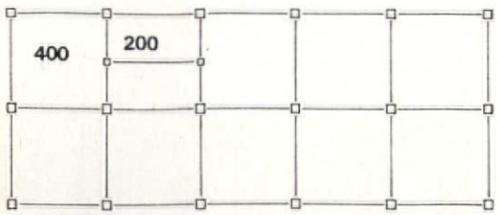


The intention is to concentrate all services in the ceiling
In actual school layouts outlets will be provided on a 10' 0" track in one case; 5' 0" in another. Installed plug-in points are indicated as squares



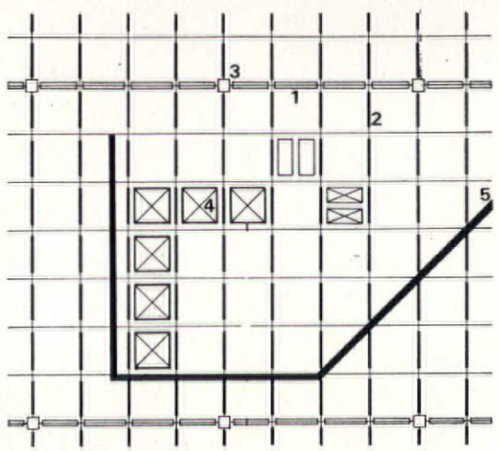
Sub-system no. 7. Electric-electronic
The unit of increment for the electric-electronic sub-system is 5' 0" × 5' 0" for power and communications outlets

f the S.C.S.D. have enabled further programmes in North America to develop.

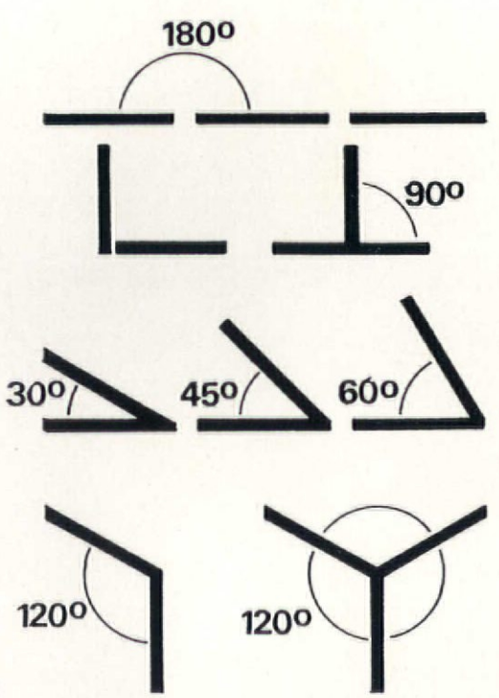


Sub-system no. 2. Atmosphere
The unit of increment for the atmosphere sub-system has been based on the probable minimum unit of expansion of floor area which may be considered for an elementary school

This has been assumed to be 4000 square feet of four teaching stations as called for SEF Document E1—'Educational specifications and user requirements for elementary schools' (K–6)—together with associated 'Common Area' comprising 10 zones of 400 sq. ft.—with a capacity to control two 200 sq. ft. areas individually.



Sub-system no. 3. Lighting-ceiling
The lighting-ceiling planning grid may be placed common with either of the co-ordinates of the primary planning grid.



Sub-system no. 4. Interior space division
This is to be possible at any or all of the angles shown

Bulk purchasing
Bulk purchasing simplifies inventories and takes advantage of the maximum size of order to reduce the cost of a given commodity.

Competitive system of tendering
It is proposed that in order to get the most versatile building system of the highest quality for the lowest possible cost, the building system must be submitted to a competitive tendering procedure. The possibility of obtaining the SEF bulk order might provide some incentive for organizational skill, technical competence, and inventiveness. Contracts will be awarded for the lowest, collective, acceptable tender.

Tendering procedure

The tendering procedure was selected to satisfy the functional, quality, aesthetic, and cost requirements of the Metropolitan Toronto School Board. Its major elements are:
Dual contract procedure.
Open systems approach to building system development.
Application of dimensional coordination to all proposals for the chosen building system.
Use of quality control procedures.
Establishment of an acceptable trading base.
Application of the interface tendering procedure.

Dual contract procedure
In the dual contract procedure, the first series of contracts selects the ten sub-systems[3] which will comprise the First SEF Building System. They will be unified through the interface tendering system. The second contract series applies this building system to individual school projects.

It has been estimated that the ten sub-systems will cost approximately 75 per cent of the installed and erected cost of any school. The remaining 25 per cent of the total building cost will be classified as non-systems items and will be drawn and specified by the project architects. These will be tendered and executed in the traditional manner by the general contractor.

Open systems approach to building system development
An open building system is one which has external interchangeability of its sub-systems. To be interchangeable, the sub-systems which comprise the First SEF Building System must have interface compatibility.[4] This means that they must be integrated both physically and functionally with other sub-systems to which they must abut in a finished building. The sub-systems and partial sub-systems are:

Sub-system No. 1	Structure
Sub-system No. 1A	Partial structure
Sub-system No. 2	Atmosphere
Sub-system No. 2A	Partial atmosphere
Sub-system No. 3	Lighting-ceiling
Sub-system No. 3A	Partial lighting-ceiling
Sub-system No. 4	Interior space division
Sub-system No. 4A	Partial interior space division
Sub-system No. 5	Vertical skin
Sub-system No. 5A	Partial vertical skin
Sub-system No. 6	Plumbing
Sub-system No. 6A	Partial plumbing
Sub-system No. 7	Electric-electronic
Sub-system No. 7A	Partial electric-electronic
Sub-system No. 8	Casework
Sub-system No. 8A	Partial casework
Sub-system No. 9	Roofing
Sub-system No. 9A	Partial roofing
Sub-system No. 10	Interior finishing
Sub-system No. 10A	Partial interior finishing

Partial sub-system listings are for information purposes only.

[3] A sub-system is an identifiable, complete, pre-designed, physically integrated, dimensionally coordinated installed series of parts which function as a unit within prescribed performance limits.
[4] Interface compatibility is the process of tying together cost and performance between adjoining sub-systems of different manufacturing origin.

Schedule of rates for the First SEF Building System

Sub-systems	Gross price per sq. ft. Oct. 1967 average $
Sub-system 1, structure	2.30
Sub-system 2, atmosphere	3.95
Sub-system 3, lighting-ceiling	1.60
Sub-system 4, interior space division	2.62
Sub-system 5, vertical skin	2.09
Sub-system 6, plumbing	1.37
Sub-system 7, electric-electronic	0.98
Sub-system 8, casework	0.87
Sub-system 9, roofing	0.87
Sub-system 10, interior finishing	0.94
Non-sub-systems	3.95

Summary of gross cost per sq. ft. for elementary school construction October 1967 average

Total	21.54
Building	20.85
Site works	0.69

Cost target
Gross cost per sq ft for elementary school construction in July 1969 on SEF schools will be a minimum of 10 per cent below the current rate for traditional elementary school construction of that date.

A cost per sq ft 10 per cent below current rate for July 1969 is also sought for the SEF intermediate schools.

Gross elementary and intermediate school construction prices will cover the following works specified under the 1967 school board ceiling cost formula.

The entire building cost including normal foundations. Abnormal foundations, or extensive site preparations are dealt with on an individual basis.

The following site development costs: catch basins, fencing, grading and grade separations, kindergarten play area, lines, markings, landscaping, lawn watering facilities, parking lot asphalt, playground asphalt, pre-cast curbs, bumpers, curb crossings, sodding, walkways, and track when acreage permits.

Built-in equipment and furniture listed under the Metropolitan Toronto School Board ceiling cost formula.

Aesthetic parameter
Although the primary concerns in evaluating the First SEF Building System will be functional and economic, the aesthetic qualities of the tendered sub-system will also be considered. The degree of importance of each area could be indicated as:
Functional—40 per cent: technical, operational and practical aspects of the sub-system.
Cost—35 per cent: capital, operational and maintenance cost aspects of the sub-system;
Aesthetic—25 per cent: aesthetic, overall quality, innovative, amenity and commodious qualities of the sub-system.

It is the wish of SEF and the Metropolitan Toronto School Board to seek sub-system proposals which are:
Extremely simple in the detailing.
Rugged in concept and construction.
Simple, with featureless surfaces.
Free of all applied or embodied modelling, surface treatment or finish which does not arise directly from the solution of the functional, cost, aesthetic problem posed.
Jointless in appearance as near as is practically possible when assembled.
Free of any specific architectural or other styling.
Anonymous as traditional building materials.

It is the policy of SEF to leave to the project architect for each school the task of architectural expression within the alphabet and grammar of the First SEF Building System.

Sculptural effects which have an architectural justification must arise from the project architect's handling of the anonymous sub-system components. Vertical skin, interior space division, lighting-ceiling or any other sub-system products which are 'sculptured' for their own sake or which have applied decorative treatment fot the purpose of presumed enhancement of their overall acceptability *will be rejected.* □

These programmes, together with some past school buildings and the present state

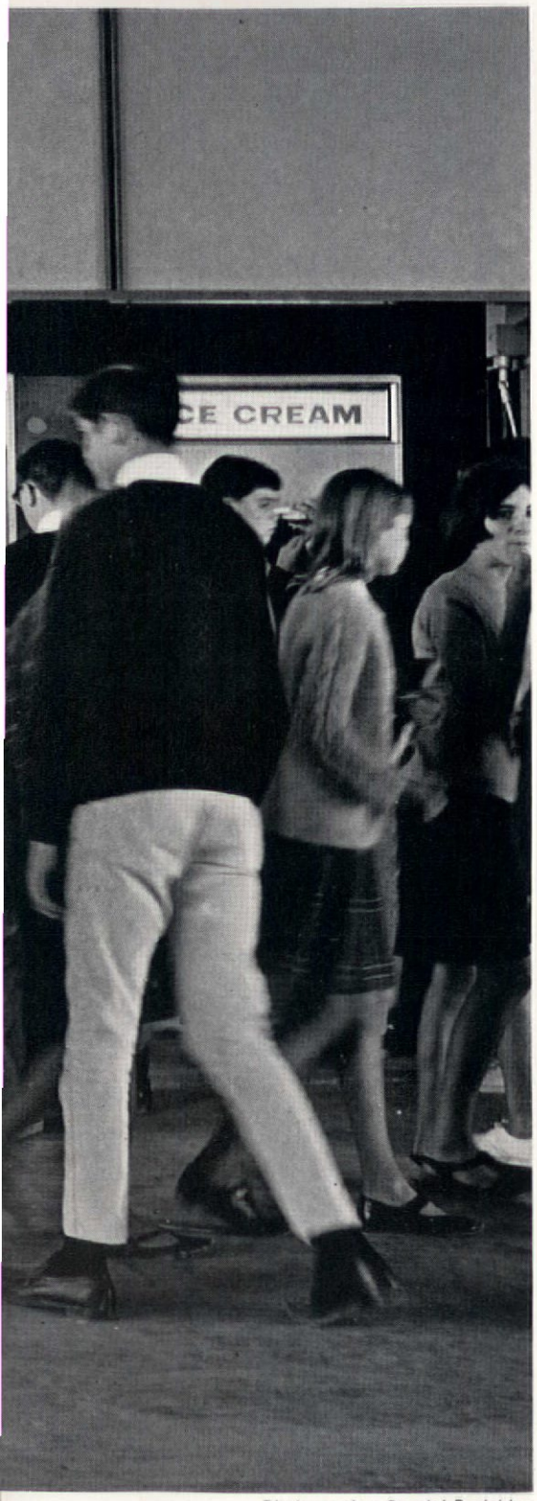
ENCLOSURES FOR LE

Snack area at the SCSD El Dorado High School, Placentia. W. E. Blurock and Associates.

:hnology, not necessarily related to education, have created a climate in the United

Michael Pearson

RNING



Photograghs: Rondal Partridge

Probably the most important developments in educational theory to affect the provisions of enclosure are the gradual changes of emphasis from teaching to learning. This, together with the many experiments in team and theme teaching, non-streaming, varied curricula and particularly the developments in educational technology have created an uncertainty in the nature of activities which few of our present schools will be able to accommodate with ease. In addition population is fluctuating and demands will be made for round-the-clock facilities as we move towards the prediction[1] of education becoming a socially acceptable, leisure pastime for many in the late seventies.

Most of our post-war schools have been developed as highly particularized solutions to very specific briefs based on traditional disciplines and organizations. Their building forms, which represent a financial and physical life of about 50 years, have been manipulated by architects solely to express and articulate their various static conditions. Plan arrangements and the location of circulation, structure and services usually allow little possibility for changing the interior after construction beyond the local removal of a partition to make two classrooms into one larger room or sub-division along some module line coinciding with a window mullion. The development of plan forms allowing for a greater range of internal potential change has been limited by the provision of a 2 per cent daylight factor at desk level in every working space[2] although, as the mid-fifties, San Francisco area schools by John Lyon Reid, and more recent deep plan proposals in Britain have shown, daylight can be adequately gained through the roof of single-storey buildings, if in fact one requires total daylight.[3] The reliance on sidewall glazing for daylighting has limited plans to varied configurations of teaching rooms, single or double banked along corridors, around courts and clustered around stair towers but never more than one room deep from the windows. The multi-function of windows providing view, daylighting and ventilation has raised minor, side effect technical problems of glare, solar gain, heat loss, draughts and easy transfer of sound when ventilation is adequate. It may eventually be more useful to avoid than to solve these problems.[5]

It is vital that our educational facilities not only permit pedagogic experiment but also encourage educationalists to develop and change and to exploit fully the wide range of media available to improve the quality of the service offered. And, to further this objective, A. M. Kean recently observed that 'the most urgent need at the moment is for the progressive de-institutionalization of education'.[4]

Experiments at both ends of the school age range have shown the benefits gained from working with various sizes of groups, and demands have grown for a wider range of spaces than the traditional classrooms and practical rooms offered; more large rooms for live or closed circuit TV presentations and many smaller rooms of differing sizes (for fifteens, sixes and particularly ones and twos, etc.).

Concurrent with these internal space requirements, schools are getting larger as the culmination of arguments for providing a wider range of choice in fields of study for the student, plus a greater variety of teaching skills and a more efficient, economic administrative condition. However, the comprehensive school, with up to 2000 students, is arriving in Britain at a time when developments in communications are making it no longer necessary to have all the educational facilities on one site. There are already several indications that some of the facilities which a community may not easily be able to afford can be shared with a school and be developed more fully than either could afford alone. At Dawley and West Bridgeford sporting facilities will be shared and at Egremont the library has also been enlarged for shared use. These gestures become easier to implement as the rigid class/time table structure ceases to be necessary and there are clear indications of the facilities becoming more closely integrated with the rest of the urban structure. Very large schools are in danger of restricting their capacity to accommodate change by the very nature of their size with its implied megastructure and increasingly complex centrally supplied services. This condition could be eased in the future by technological developments and miniaturization, as the use of packaged air handling units has shown, but the reassembly of internal spaces will always be limited by the original space allocation. There is a tendency when planning for potential change, to try to have major practical areas close to each other and to every other general area, to allow easy overlap as the traditional subject-based studies break down. The current emphasis on less specialized equipment for the middle years may avoid this competition and allow greater duplication of similar activities in many different places.

Whilst the financial life could be altered, the physical life of the foundations, structure and external skin, which accounts for less than 50 per cent of the total cost in current building techniques, remains with a life of about fifty years (i.e. 2020 for a 1970 structure). Mechanical services may have a life of 12–15 years, lighting 8–12 years, furnishings 5–6 years and decorations 2–3 years, with fashion capable of modifying the visible elements of any of these on a shorter time scale.

Thus beyond the need to extend, duplicate or remove, enclosures are required for general spaces which offer a wide range of internal change and whose potential must be demonstrable. To achieve this, the location of the fixes, the structure, external skin, circulation (particularly vertical) and services, has a critical strategic importance. For the highly particularized needs, especially of educational technology, with inevitably short life, we can more easily develop mobile, pneumatic and other temporary facilities which can be moved or removed as the need changes. In this way they can be very expensive individually, but cheaper on an overall cost benefit basis than trying to overprovide in longer life facilities for unpredictable eventualities which may never occur. Even the changes in food preparation and distribution are changing plant requirements as new means are sought to balance rising staff costs.

Hillsdale High School, USA (overleaf) demonstrates that it has been physically possible to change the general spaces internally from a predominantly classroom condition to a wider range of room sizes. Mill High School has a similar configuration but it has not yet been changed due to the cost involved in moving the standard metal office partitioning and the need for an allocation of capital rather than making changes as part of normal maintenance. In this case the operation is not much less complicated than moving a blockwork wall and demonstrates the myth of early demountable partitions. Both these schools designed by John Lyon Reid have many problems of inadequate environmental control and the occupants find their factory-like quality and bland colours (black/grey/white), dreary and unresponsive to their own immediate influence. But the real significance of the schools lies in the deep plan form, single-storey factory shed and roof space servicing. Curiously the Medds' *Schools in the U.S.A.*[5] ignores these aspects and refers only to classroom layout, roof-top daylighting and particularly lack of view. The importance of Hillsdale to the background of SCSD has been acknowledged by Christopher Arnold,[6] but SCSD has solved with greater sophistication the many environmental problems, and by using air-conditioning and high levels of artificial illumination it has enabled the wider range of room sizes to be provided and changeable in single- or multi-storey structures. ▷

States which seems to be less rigid than U.K. and more anxious to re-assess t

Even with SCSD the overall plan form selected by the architect can have a great influence on how much future change will be possible; but it is the time scale of changing on a terminal or annual basis which is proving inadequate for the fluctuations in educational needs which are now beginning to occur on a daily or hourly basis as the rigid timetable gives way to self-paced, self-directed learning. The big room for 120 at Dilworth showed the advantages of almost instant grouping and regrouping with furniture being moved as and when required. There have since been a series of experiments with large, open, carpeted spaces similar in characteristics to the development of *burolandschaft* which grew out of a demand for better communications and ease of change. Both have a very high quality of environmental control, as air-conditioning becomes essential to handle the cooling load produced with higher levels of illumination and the increased use of machines; giving the added advantage of limiting the interference from external noise on busy urban sites, and a view to the outside when walking around. The level of noise internally depends on the avoidance of vertical reflecting surfaces and exposure of carpet for sound absorption. The failure to achieve this may make the Rosebery School staff's worries about noise, and consequent partial partitioning, self-defeating in the small open areas. Another aspect of the large open space is the relationship between the shape and size of furniture and the minimum width of rooms. The large traditional desks in the offices of Wall's Icecream Ltd., at Gloucester, have shown they cannot easily form random groupings in a room only 50ft wide; and similarly the large rectangular seats and the study carrels at Rosebery School have these limitations.

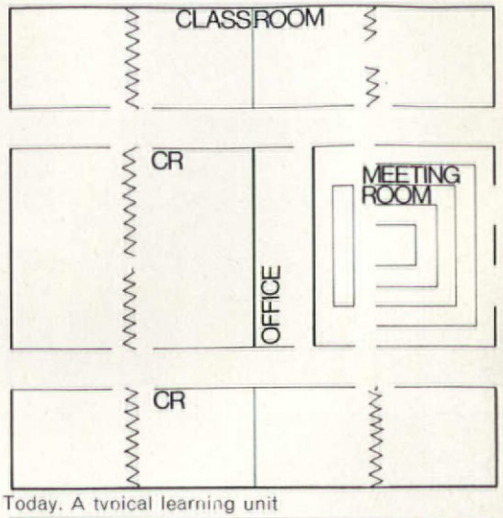
SCSD may fail in being unable to provide large open spaces, despite its economic spans up to 75ft, because the electrical services run vertically in partitions. But CLASP and its similar systems SCOLA and SEAC perpetuate our dilemma of plan forms which cannot easily change internally, although they have contributed to cost reductions with bulk purchasing and drawing office and site economies through repetition. ONWARD is little more than a system for structure and skin forming only about 30 per cent of the total cost and, being concrete, is uneconomical at one storey. None of these can handle air conditioning or high levels of illumination within their system.

After the confidence of the fifties this is the beginning of a period where the fundamental rethinking of the types of enclosures which will best suit our needs in the future is urgent and necessary, and our main sources of experience are the recent American experiments and devices outside the field of educational building. □

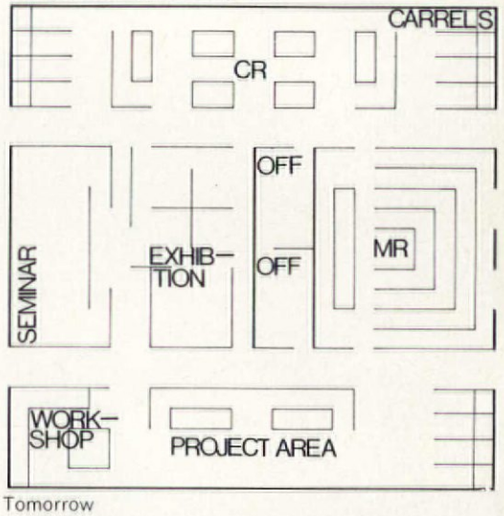
Paul Klapper school, Flushing, New York:
Architects: Caudill Rowlett Scott
An 80ft diameter learning space showing the free arrangement of activities.

Hospital kitchens
Eating arrangements are changing from mass dining to house dining and also free access cafeteria systems just as the receipt and preparation of food is influencing kitchen requirements.

The catering system at the Kaiser Hospital in the Bay Area has no main kitchen and no ward kitchens. Precooked frozen food is delivered 2–3 times per week to a refrigerated central storage room and then distributed three times per day to ward storage cabinets. Each meal is then heated in a small microwave oven on the ward. The choice on the menu is not reduced but this system and the use of disposable cutlery and crockery have altered space requirements.

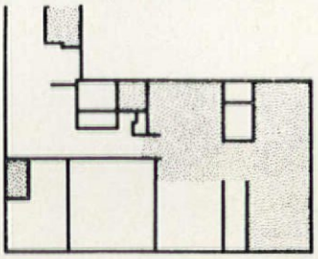


Today. A typical learning unit

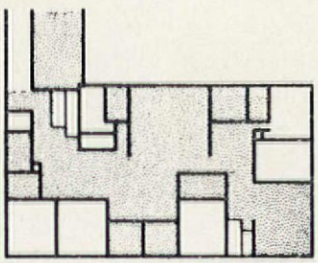


Tomorrow

Winston Churchill High School, Eugene, Oregon:
Architects: Lutes and Amundson
As built (top plan) the learning areas are basically classrooms with adjacent larger lecture halls arranged in a deep plan form following the precedent of Hillsdale. Rooftop daylighting has been omitted and replaced by artificial illumination and the peripheral walls, except for the offices and cafeteria and entrances, are windowless. The screeded corridors are noisy and monotonous, but teachers appear to like the high level of sound reduction between rooms and the large amount of pin-up space available This plan has been consciously developed to allow for internal changes to meet the predicted educational needs (bottom plan).



Rosebery County School for Girls, Epsom, Surrey
Development Group, Department of Education and Science



Diagrammatic plans of the sixth form study centre, first and ground floor levels showing the extent of partitioning and carpeted areas (tinted).

[3]Olaf Helmer: *Social Technology*. Basic Books. N.Y.

[2] 'In all teaching accommodation and kitchens, the lowest level of maintained illumination and the minimum daylight factor, on the appropriate plane in the area of normal use, shall be ten lumens per square foot and 2 per cent respectively.' *The Standards for School Premises Regulations*, 1959: Ministry of Education.
Other organizations suggest higher levels for artificial illumination. The IES Code, *Recommendations for Good Interior Lighting*, London, 1961, gives a minimum of 30 lumens per square foot and in current American practice levels up to 100 lumens per square foot are becoming more usual (SCSD called for an average of 70 lumens per square foot at the working plane).

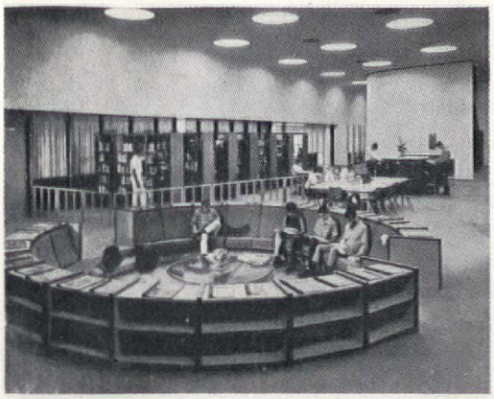
[3] David Croghan has argued in 'Daylight and the Form of Office Buildings,' *Architects' Journal*, December 22nd 1965, that if one equates artificial and natural light, '. . . it can be shown that a 1 per cent df will provide 30 lumens/sq. ft (the recommended level for artificial illumination in offices) for only 5 per cent of the working year of 2186 hours. To provide this illumination from natural sources for 80 per cent of working time (a reasonable target if windows are to pay their way as illuminants), a minimum of 5 per cent df is required.
'This level is virtually impossible to obtain over any useful proportion of a large single side-lit room, even where there are maximum areas of glazing and no external obstructions.'
The recent change to British Standard Time makes this situation worse.

[4] A. M. Kean: The Urban School. *Arena*, July/August, 1967.

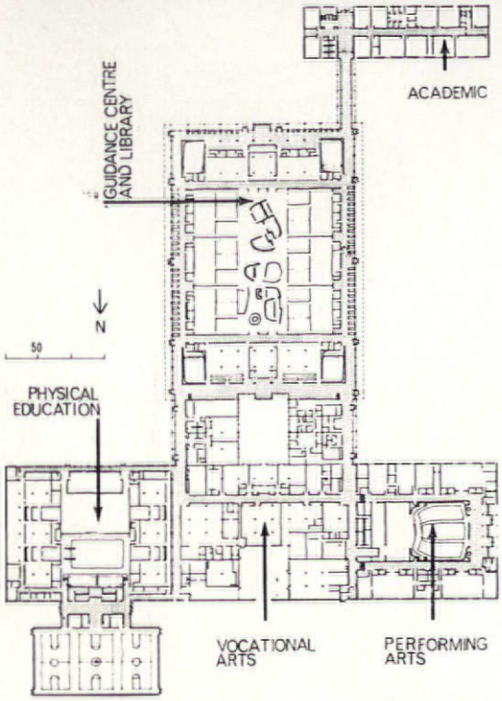
[5] Schools in the U.S.A. A Report: *Ministry of Education Bulletin 18*, 1961. The study was carried out in 1958–59.

[6] Christopher Arnold 'SCSD: The background.' *Arena*, July/August 1967; see also AD July 1965, November 1967.

ɔle of educational facilities in a society involved in major and serious re-thinking.



Library area

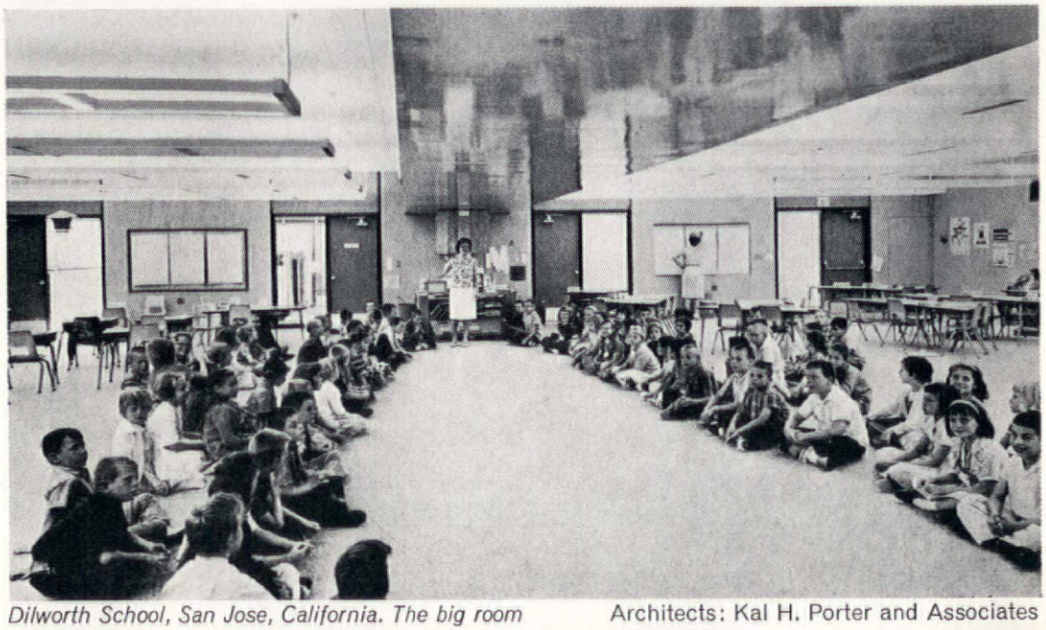


Maine Township High School South, Park Ridge, Ill.: Architects: Caudill Rowlett Scott
Deep plan form allowing for a variety of future spaces. House groups of 300 are clustered around a large freely organized library area (top) giving a good atmosphere for individual study.

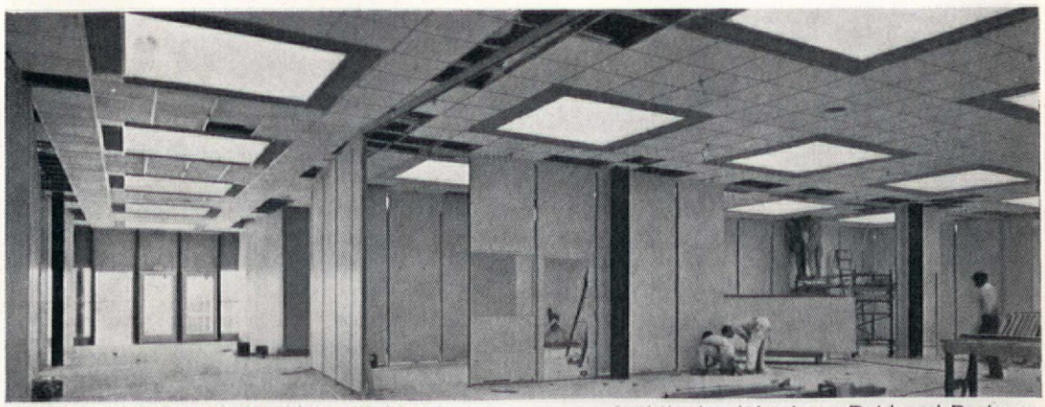
utility expendable inflatable

MUST (Medical Unit Self-contained Transportable)
Project for the US Army Medical Service. An expandable and an inflatable element served by a utility element which can be combined into virtually any size of field hospital which has mobility, short erection time, high reliability and efficiency and a controlled environment and can adapt to changing requirements by adding, removing or rearranging units. The utility element provides electrical power, refrigeration, air heating, water heating and compressed air and suction. See *AD* 4/68 p.189.

Burolandschaft, Osram offices, Munich Architect: Walter Henn
A typical office floor air-conditioned, artificially illuminated and carpeted. Screens, plants and larger furniture are used to provide visual privacy and form subjective spaces.

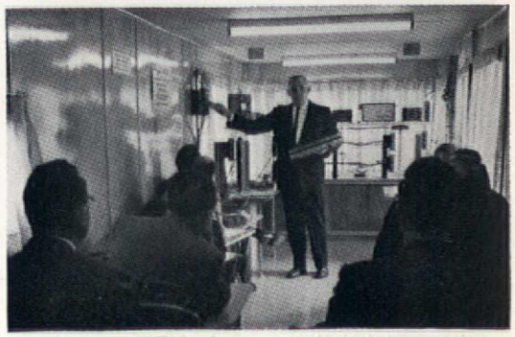


Dilworth School, San Jose, California. The big room Architects: Kal H. Porter and Associates



Hillsdale High School, San Mateo, California Architects: John Lyon Reid and Partners

Ecko-Alcoa mobile demonstration unit



Michigan Bell Telephone mobile training unit

Encouragingly, resources are being made available for wide-ranging studies in fiel

ATOM

Design for new learning for a new town

Cedric Price

The project was undertaken with the help of six US architectural students at the Rice Design Fete, June 1967, which was jointly sponsored by Rice School of Architecture, Houston, Texas, and Educational Facilities Laboratories Inc., New York.
The educational plan used as the basis for the design was drawn up by J. E. Tirrell and A. A. Canfield and was similar to that outlined in their article, Goodbye to the Classroom *on page 223.*

The concept of a finite town totally conceived at a single moment in time is intellectually derelict and socially irresponsible.

Such a concept in the past may well have produced a settlement capable of defence but in recent times has produced little more than medieval piles with power points—capable of only the most limited pre-ordained growth and change.

Increased individual mobility and personal independence enables an extension of the range of self-choice activities open to all.

Mobility of labour and the rapid spread of invisible servicing (e.g. water, National Health, TV, Mars Bars, gas, credit cards, wired power) are additional generators of an increasingly fragmented (both spatially and in time) humane society.

The built environment is likely to become an increasingly restrictive and abrasive element of total life if continuing attention is paid by the administrators and their consultants (architects, planners, and romantic social scientists) to its assumed permanence rather than to its diminishing socially relevant life.

Too often, the consultants grasp desperately at some acceptable activity that can be located in 'buildings' and thereby justify an urban structuring and communication theory based on the imbecilic assumption that 'growth' (i.e. socially healthy) activities are those most likely to provide a locationally static 'fix' around or alongside which the town can grow indicating in such growth physical infra-structuring caused by such healthy activities.

Fortunately, it is unlikely that education, now entering a period of mammoth expansion in scope and content, will wait around for such stultifying recognition.

However, the value of this programme at such a time is that it has enabled me to show that the built environment together with its integral artifactual kit of parts can help to increase the rate of fruitful fragmentation of educational servicing.

The provision of educational facilities, in physical terms, should not be tailored to any particular requirements made by any particular authority.

Rather, such provision should through its ambiguity enable a range of educational patterning to evolve wider than previously possible.

In architectural and planning terms, this requires an avoidance of the providing of a single or comprehensive physical dispenser unit.

However, the acceptance of educational servicing as continuous, essential feed to the total lifespan, does demand an acceptance of the fact that education together with other essential services must be made available in means and methods comparable with other forms of invisible servicing.

The resultant facilities must equate therefore to a total social servicing industry rather than one related largely to a particular age group under particular circumstances.

The operational plan and manufactured objects proposed here are sited and designed to enable their utilization to equate to both the likely initial operational demands, while at the same time enabling and encouraging an increasingly rapid rate of change of scope and scale of the educational plan.

No single set of buildings or mechanical facilities will suffice to the year 1980, let alone 2020. ▷234

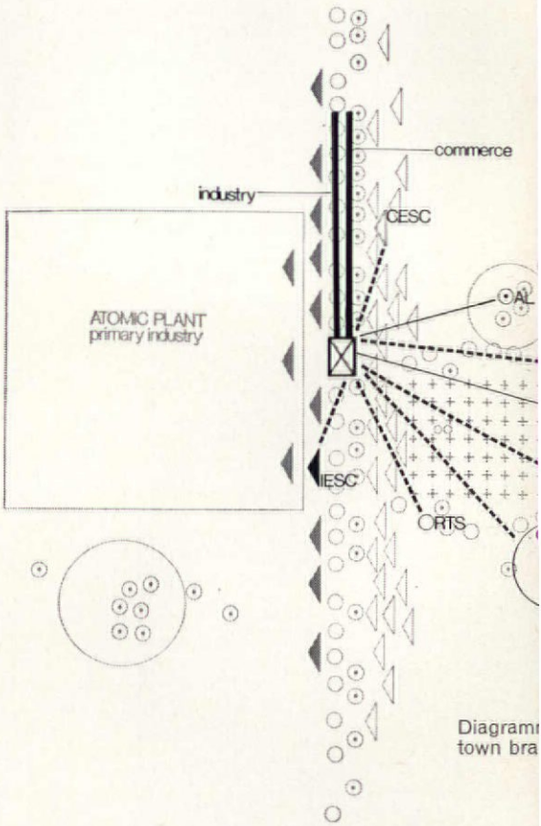
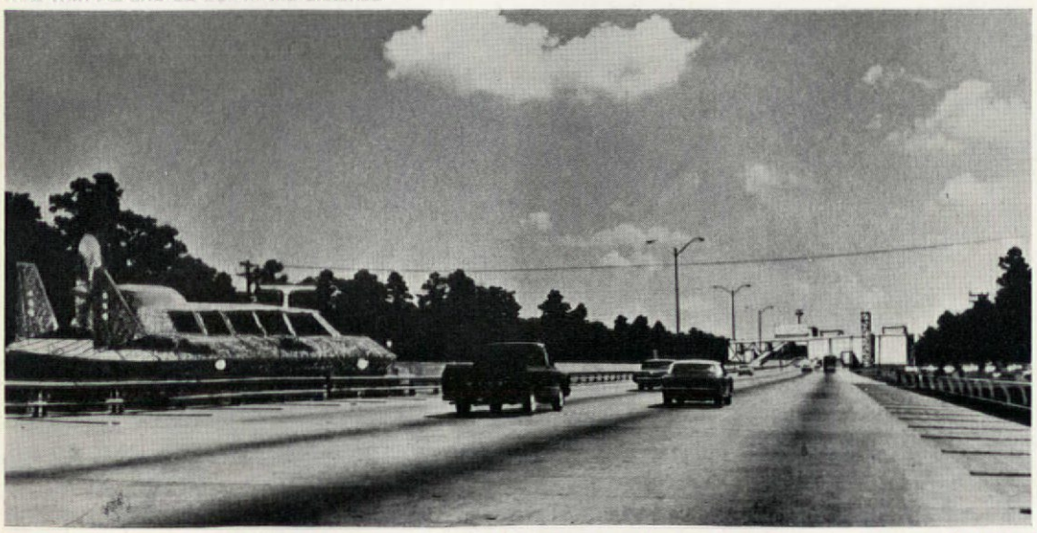


Diagram
town bra

Glossary of educational facilities

TB	Town Brain—central production and servicing for educational facilities (EF).
IESC	Industrial/Educational Show-case—part of general and particular industrial development; display, instruction and recruitment.
CESC	Commercial/Educational Show-case—display and information-related normal shopping facilities together with tuned-up post office, banking, etc., services often dispensed in self-serve machinery.
AL	Auto Link—EF made available to private cars—radio station, two-way telephone, charts —possible back seat monitors at later stage.
RTS	Rapid Transit Servicing—EFs in any current form of rapid transit—buses, trains, etc. Information panels—route maps, timetables for EF. Later stage work stations and also information on regional trains.
HSS	Home Study Station—major element likely to

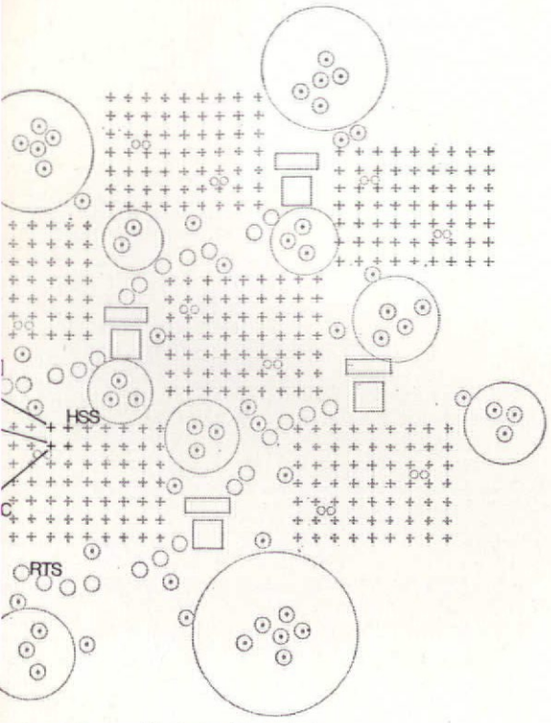
RTS with AL and LC box in the distance



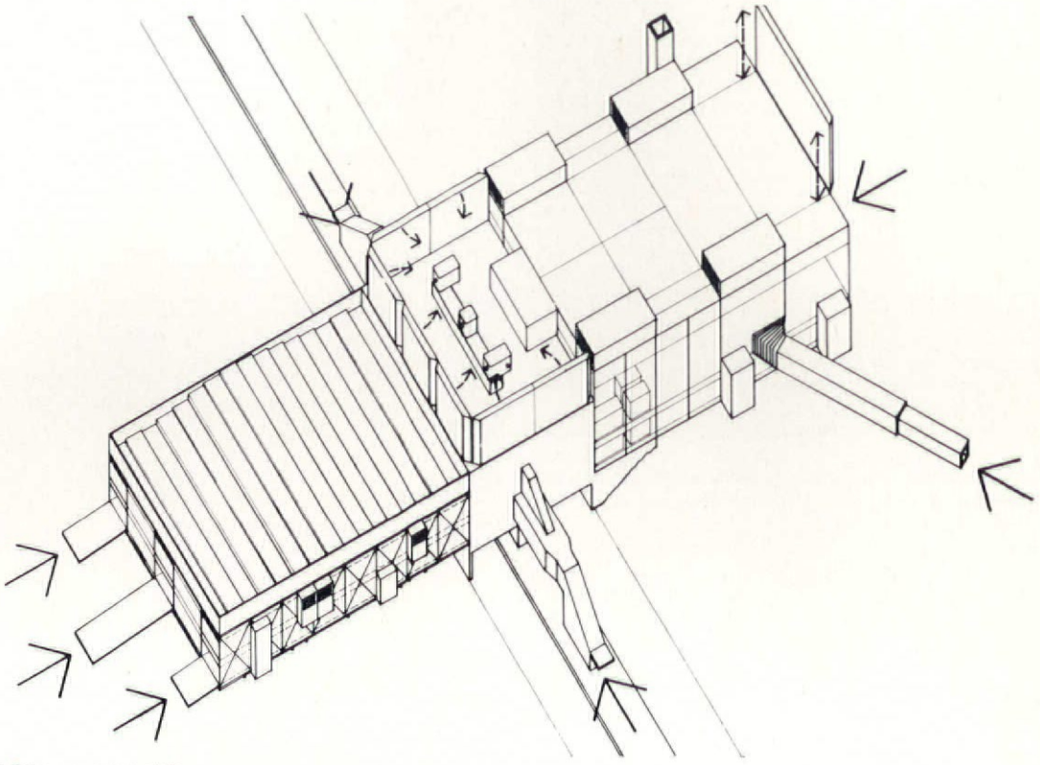
CESC

In general, machinery, equipment, enclosures and buildings have been designed in such a way that a high degree of well-serviced anonymity can be provided rapidl

ot normally associated with 'Education'. Educational planning must extend to



of new town with typical links between centre, and EF's shown in black



LC box axonometric

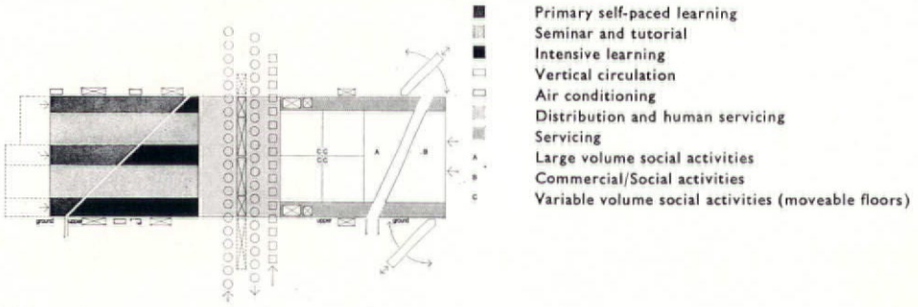
become even more important in later stage. It may be located within existing house or additional to it.

ITT Infant Teach Toy—easily relocatable to meet rapid age group alteration of patterning in 20,000 person housing areas.

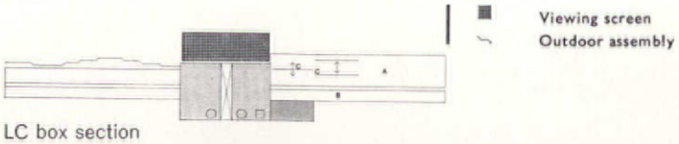
OAS Open Air Servicing—enabling additional educational feeds from conventional outside activities. A large growth element of the scheme.

LC Life Conditioner—two forms, box and tent. Box contains intensive teaching learning facilities and controlled medium-sized volumes food drink and CESC. Tent—workshops, laboratories, experimental buildings, etc. Boxes likely to be less frequent in Phase III because of growth of HSS, while tents likely to increase.

EAVET Electronic Audio-Visual Equipment and Techniques.



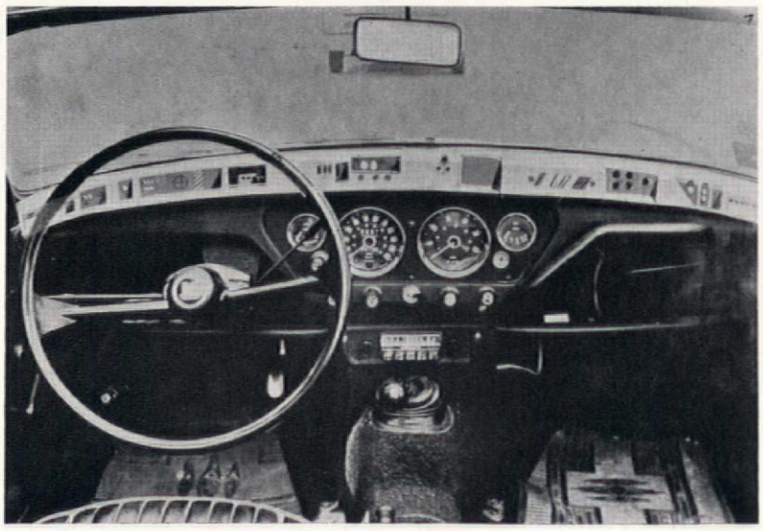
LC box plan



LC box section

AL

LESC



ich the educational plan can flourish.

free-range-self-pace learning. An existing tight network makes the addition

<1232

Thus this thesis postulates both a first set of tools (buildings, equipment, etc.) together with a development plan sufficiently indeterminate to encourage varied and possible diverse development modes.

The prime object of the thesis is to suggest methods whereby 'town' planning and individual, artifactual conditions can be so designed as to encourage an increased exploitation by society of the range of choice available at any one time.

Town growth

Domestic development with ITTs and LC starts at the furthest distance from the main regional feeds possible at present.

This enables (requires) the establishment of a major physical network at the first stage.

Also it enables total use of OAS facilities for any sized population.

'Shanty town' growth by the tracks would be similar to socio-civic development noted in the Potteries Thinkbelt scheme (*AD*, October 1966) and could contain unique minority service nodes such as a conventional theatre.

IESC

Equipment required additional to EAVET and existing industrial plant:

External projection screens with both independent means of support and methods of fixing to existing structures.
Large display panels with in-built cleaning and maintenance equipment.
External quality image projection equipment—with vandalproof fixings.
An agreed form of graphic symbols and visual coding—including colour—to be used on existing plant, equipment and buildings to provide instant visual recognition of size, process movement and products.

Methods and equipment whereby the production, management and products of the industry can be both displayed and explained:

Observation galleries, access ramps, guard rails—all portable.
Additional temporary loudspeaker systems.
Variable display panels and cases.
Temporary lavatories and rest areas.
Possible additional refreshment facilities.
Mobile information booths with employment statistics and vacancies.
Temporary exhibition stands, shelters and show cases for external siting.

CESC

Equipment required to tune up existing commercial properties:

Mechanical plant—lifts, jacks, small cranes, etc., capable of supporting and displaying goods not normally available for inspection.
Portable show cases, stands, etc.
System of lightweight variable shelters with localized heating and lighting capable of providing links between individual stores—a citizens' arcade.

EAVET equipment will include:

External housing and protection.
Fixing members on existing structures.
Large area mobile lighting plant.
Additional self-contained one-piece information booths.
Self-contained post-office, banking, social security and health 'vending' and information machines.
Some of these will have direct links to TB.

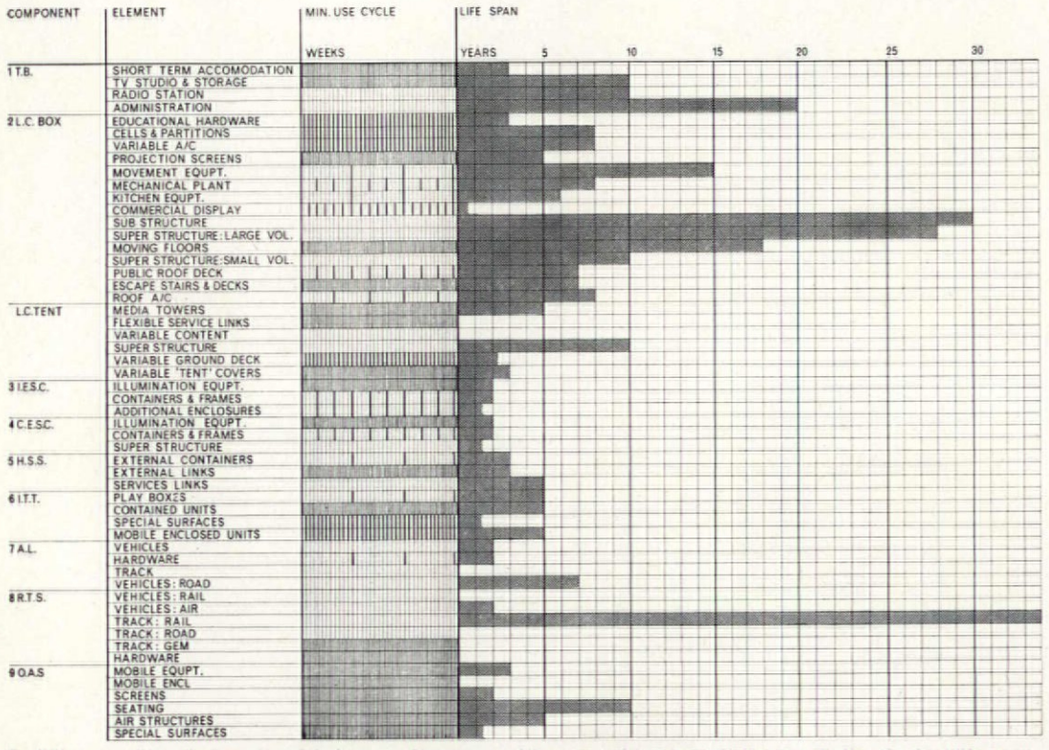
RT

Equipment and fittings are to be located in:
Rapid transit vehicles run by city and regional authorities.

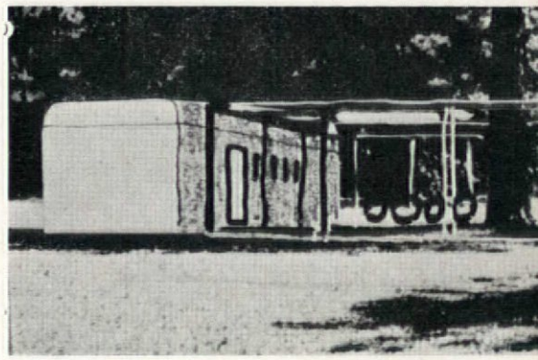
Phase I. Railroad vehicles.
In-city buses.
Phases II and III. Railroad vehicles or linear induction cars—regional
In-city buses, electric 'cars', GEMs, etc.

In principle each vehicle would be fitted with:

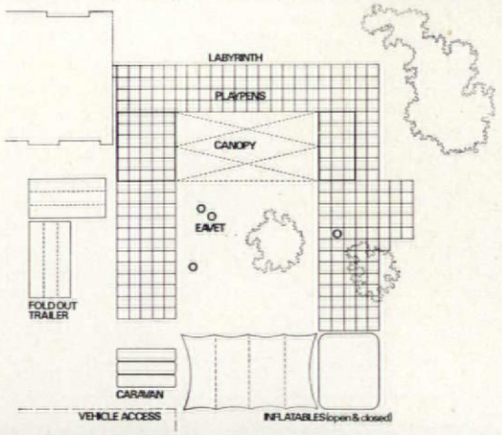
A single display progress chart—showing position of vehicle



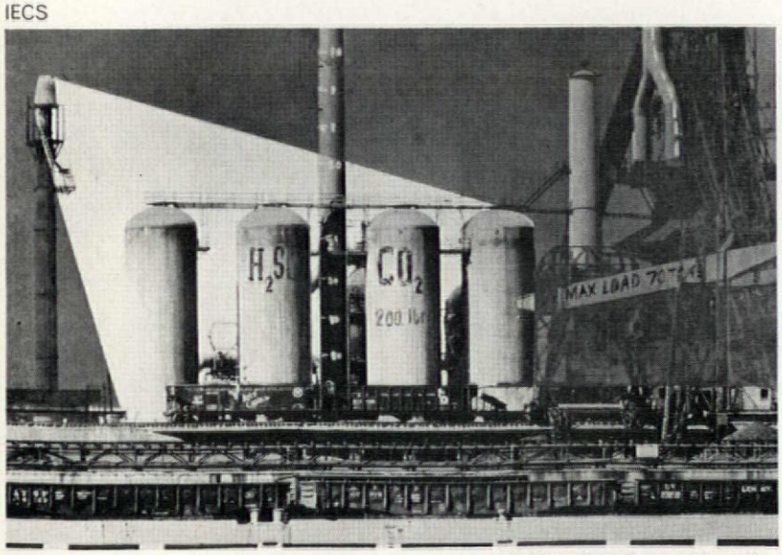
Facilities requiring the most rapid change of use or position are not necessarily those with the shortest life-span.



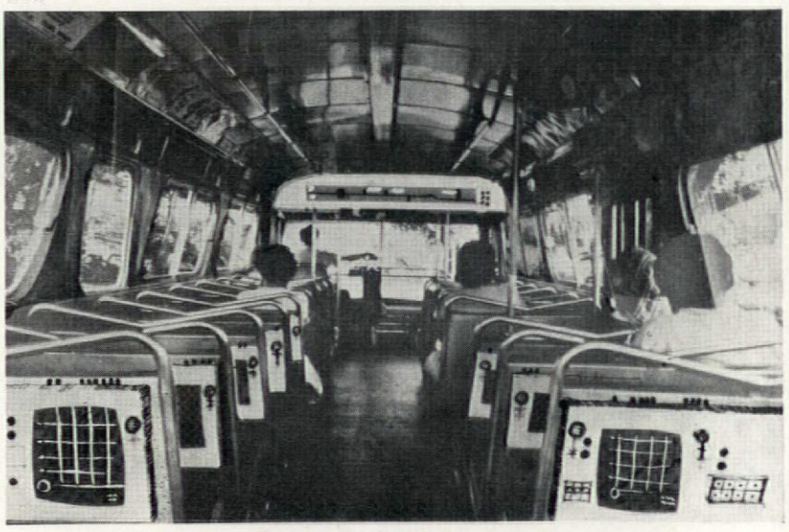
ITT mock-up and plan.



IECS



BTS



The prime objective is to indicate instances where a designed environment, static or mobile, can reinforce the particular educational plan.

mmunity learning difficult since the existing structures are a restrictive factor.

within the EF network and the proposed timetable and summary content of other facilities related to that route.
Work study stations for each passenger would consist of a working surface, display chart and various forms of EAVET depending on vehicles and available funds.

NOTE—Such requirements would, as soon as possible be incorporated in the specification of new vehicles.

AL

Auto links would consist of a range of equipment available for private hire or purchase from the educational authority.

While such equipment as tape decks, radio, radio-telephone readily available, their installation and use would be based on equating EF needs to safety.
Further, more elaborate equipment would be related to the passenger areas and to the provision of information retrieval while not in motion.

HSS

Physical control units required:

Containment and support for electronic equipment.
Adjustable worktop with facilities for draughting, map reading, etc.
Adjustable lighting—with focusing capacity.
Back and front projection screen for slides and film.
Display board.
Storage for work materials and equipment.
Storage for books, directories, etc.
Adjustable seating.
Acoustic baffles or hoods.
Anti-light screens, baffles or canopies.

Additional and alternative relocateable units:

External writing and reading equipment for use with portable relay equipment.
Bedroom equipment for invalids.
Group work equipment—capable of rapid small volume storage.

Fixed additional units providing:

Extension to existing room, house, balacony, etc., or self-contained cubicles for use adjacent to existing house.

ITT

Physical control units required:

Play pens and climbing frames.
Well-insulated rest area.
Staff rest area.
Lavatories—infants and staff.
Parents' waiting area.
Eating area—possibly same as rest area.
Storage—furniture, equipments, toys, etc.
Large projection screens for internal and external use.
Projection equipment housing (TV and tapes, slides, films).
Infant lockers.
Medium volume shelters—possibly inflatable.
Horizontal and vertical weather breaks.
Mobile food dispensers.

OAS

Physical control units required:

Horizontal or angled suspended deck capable of total or partial barrier.
Air supported structures of two types. Air-membrane and HP air-pressured structures.
Angled temporary seating.
Temporary platforms.
Temporary superimposed surfaces.
Boost power plant—possibly related to trucking vehicles.
Spot lighting from variable height sources.
Floodlighting from variable height sources.
Industrial-type warm air heaters.
Large-scale screens.
Projection—TV and film equipment.
Loudspeakers and mountings.

NOTE: Total OAS equipment kit listed—not all elements needed at all sites. Fixed facilities—e.g. sports fields, swimming pools, drag-race strips are not included in the scope of design proposals.

LC Tent

Consists of a 16ft × 16ft unit space frame 336ft × 336ft and is suspended by HTS straps from four steel posts giving a clear height of 60ft.
Partial foul weather protection is provided by means of 'sky' blinds fixed to the space deck.
Four service and media towers are sited one against each of the supporting posts.
The ground deck, as it carries little or no piped services can be at various levels.
Services from the towers are 'threaded' through the space deck as required by the short-medium life enclosures below.
Such enclosures would be built and demolished as required and would provide facilities for workshops, small experimental auditoria and the sort of anonymous well serviced volumes or areas that will become increasingly required by the local community (10–20,000) as the educational plan progresses.
At first it is envisaged that one LC box and one LC tent will be required by each group of 20,000 citizens. At later phases it is likely that the relative number of LC tents will increase.

LC Box

LC box will provide:

Three stage personal information, tutorial, instructional EFs.
Stage 1. Provides for all age groups—with controlled access and areas for young children.
Provision includes primary contact and interest conditions.
Rapid enquiry and feed-back facilities.
Stage 2. Personal interview, tutorial and programming conditions.
Group discussion and exploration with instant reference facilities.
Stage 3. Individual self-pace and programmed investigation and formulation and record.
All these areas enable congregation of 1–5, 15–30 persons.

Such facilities are located in three double-decker structural trusses and light-load spaces between them.

All are capable of longitudinal sectional extension and their structure enables uneven and practically unprepared site conditions to be accommodated.

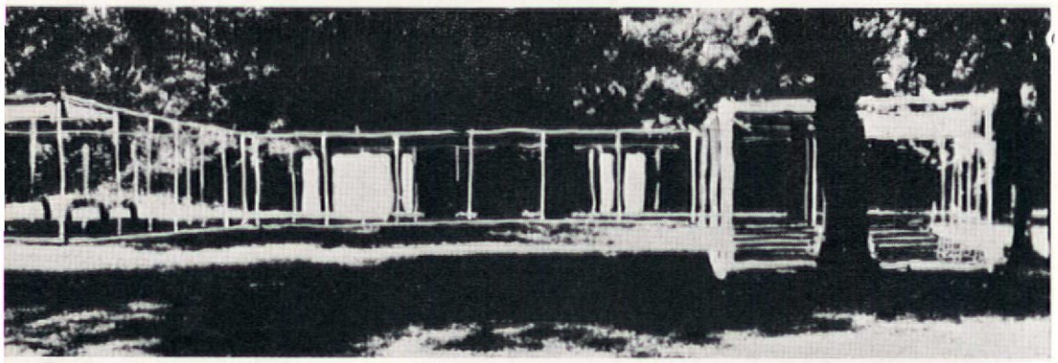
Variable escape-stair pods and packaged air conditioners enable internal educational programming to be matched by external movement and conditioning facilities.

The light-load volumes contained between the 'teach-trusses' have, through their form of lateral infill construction, a large capacity for rapid volumetric variation combined with the availability of variable vertical links (staircases).

A central access, exchange and human services area contains lifts, lavatories, escalators, information booths, etc. Its actual form is dependent on the siting of the particular box.

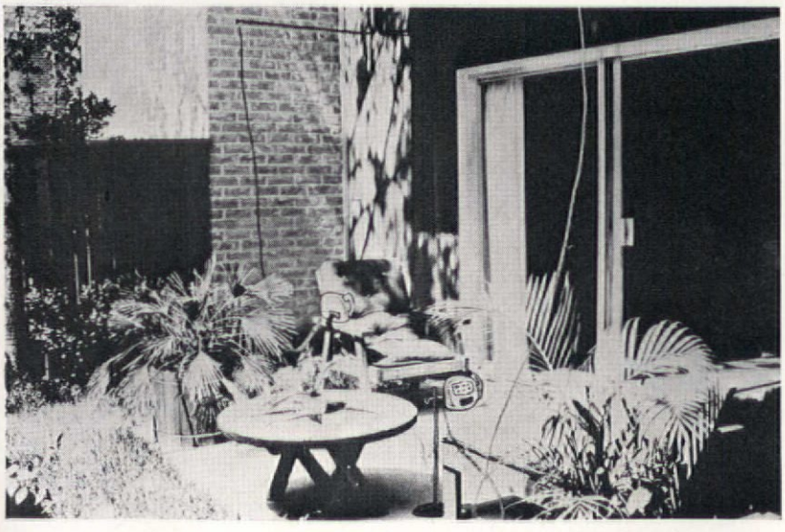
This area at ground level only, links the concentrated 'teach-trusses' with the large variable volume enclosure, the ground floor of which is devoted largely to GESC.

The variable volume section, enables meetings, lectures, concerts to be held adjacent to food and drink dispensing areas.



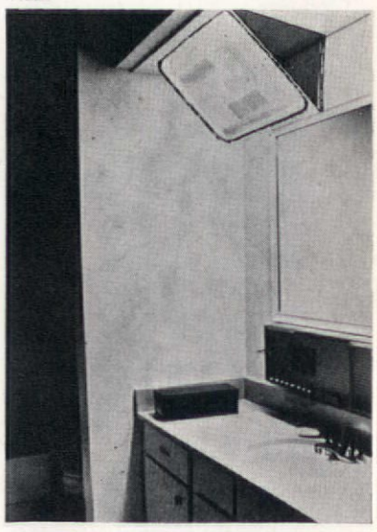
LC Tent

HSS



HSS

HSS



A likely way of avoiding, rather than overcoming this conflict is to design facilities th

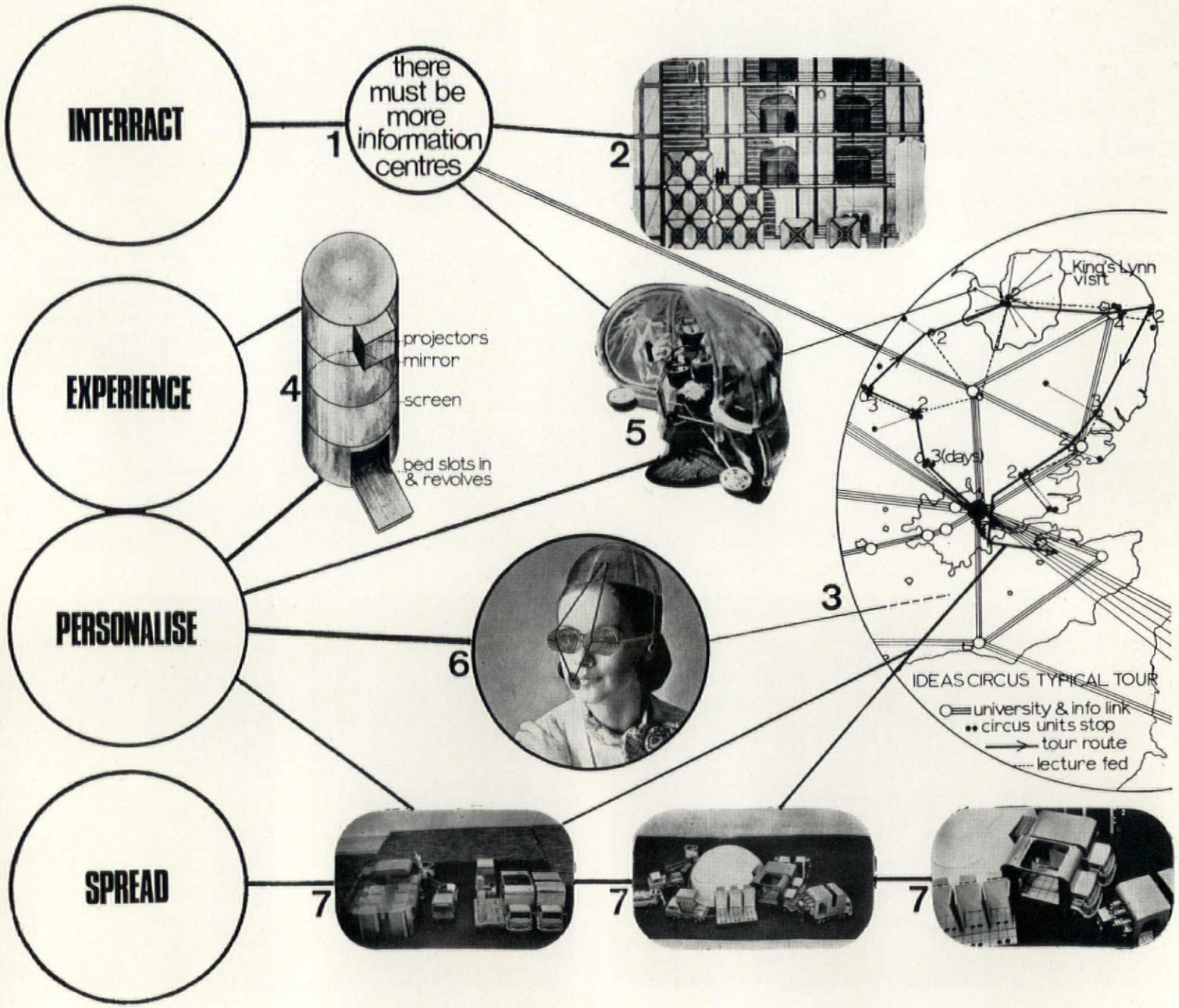
IDEAS CIRCUS

Peter Cook Archigram

An education information progress list

A proposal for a system of trucked units containing a power plant, printing press, library, teaching machines, various audio-visual assemblies and minimal transformable enclosures. The Circus is intended to circulate between existing educational centres as a boost to their activities, bringing exhibitions and stimuli. For the Circus to work, dissemination and storage of information needs to be improved. Specialized knowledge and special skills and abilities abound, but they are often isolated and uncommunicated **1**. The accumulated feed-back from the centres visited is an essential part of the working of the Circus.

The diagram below suggest ways in which the Circus may interact with other media for communication, learning and enjoyment. Direct (perceptual) experience and its reinforcement and intensification by audio-visual means is the essence of the programme. This experience may be stimulated either collectively and in conjunction with other people and institutions, as in the Ideas Circus itself **3**, **7**, or individually, in isolation, as in the Plug-In University **2** (Peter Cook, 1965), in which each student was given an 8ft×8ft×8ft metal box as a room, plaything, apparatus-house; the learning unit of the Living Pod **5** (David Greene, 1966); the Audio-Visual Information Drum **4** (James Meller, Peter Samson, Peter Cook—Hornsey College Advanced Studies, 1967) and the Info-Gonk **6** (Peter Cook, 1968).



rough their very nature, siting or commissioning, can integrate simply with physical

SELF-PACE PUBLIC SKILL AND INFORMATION HIVE

Cedric Price

Chief assistant: Stephen Mullin.

A feasibility study commissioned by J. Lyons and Co. Ltd. 1966.

This particular scheme shows the application of the findings to Oxford Circus Corner House, (OCH), London.

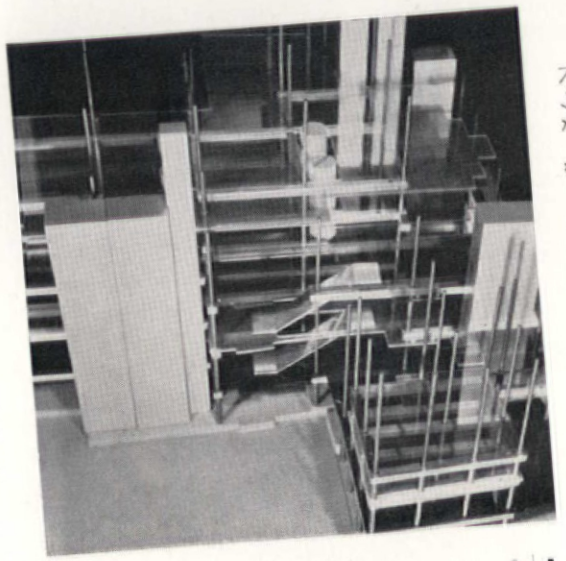
Communications consultant: Sol Cornberg, *Sol Cornberg Associates Inc.*

Quantity surveyor: Douglas Smith, *Baker, Wilkins and Smith.*

Consulting engineer: Frank Newby, *Felix J. Samuely and Partners.*

Information systems consultants: Keith Harrison, Raymond Spottiswoode.

Acoustics consultant: Sandy Brown.



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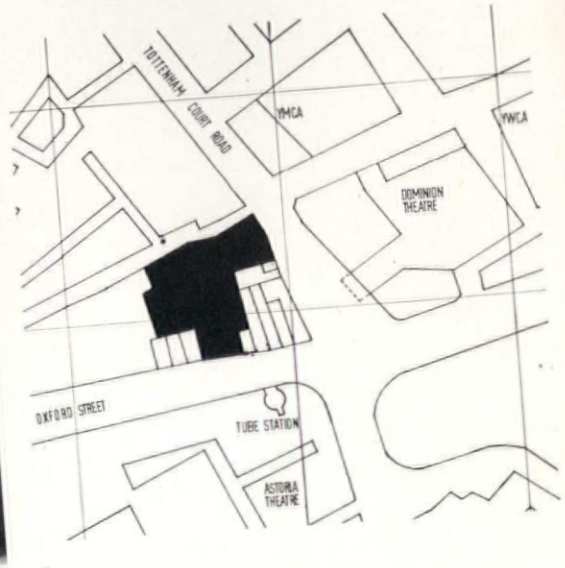

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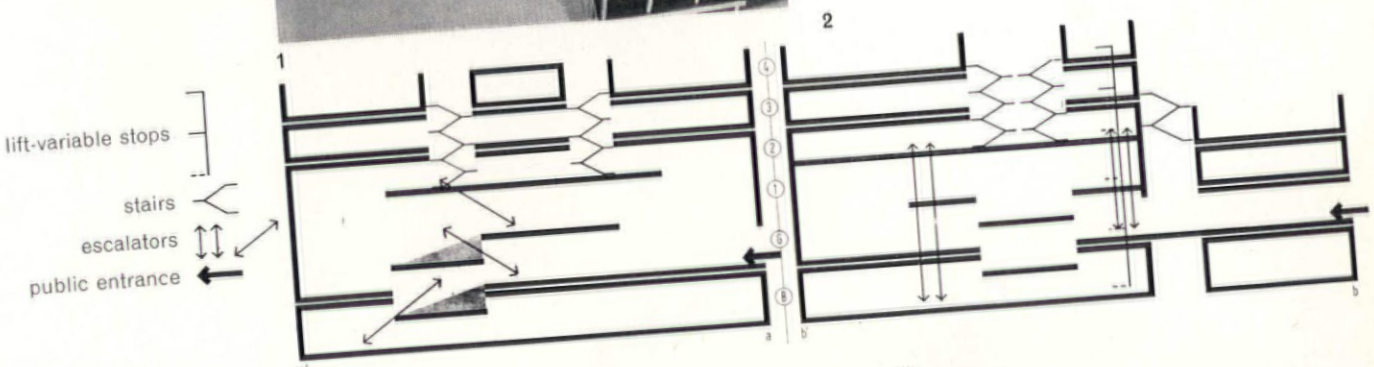

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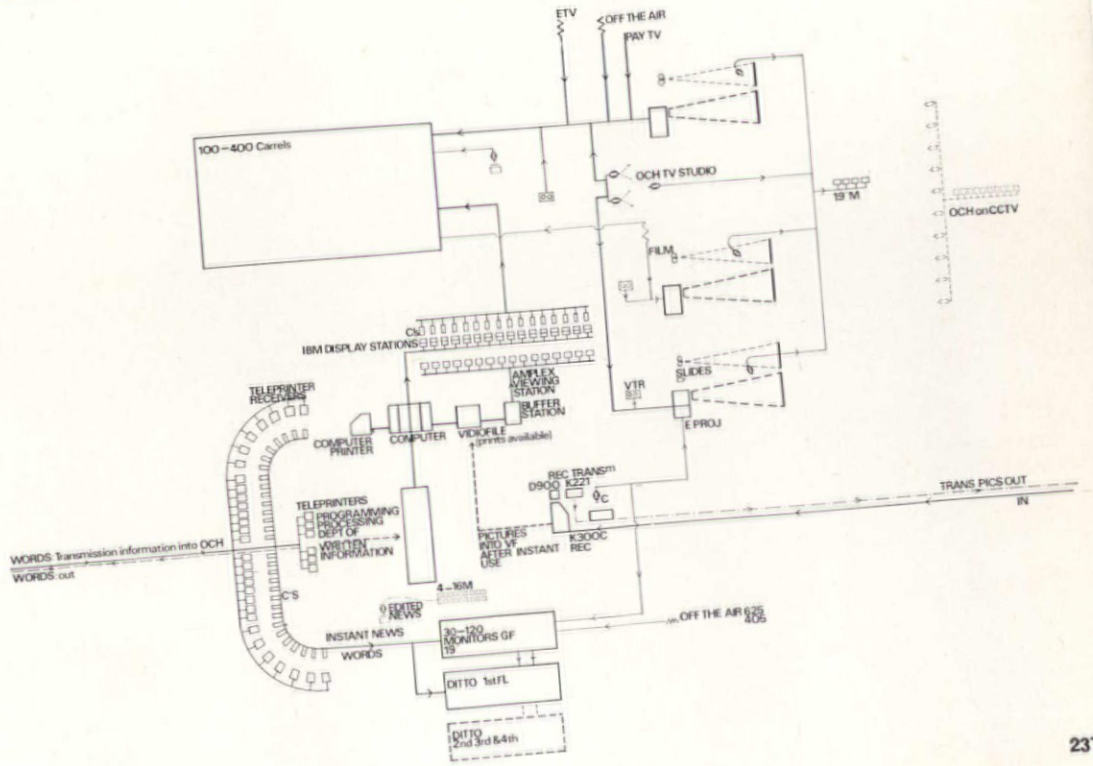


4

1
Working model enabling variation of vertical and horizontal structure together with adjustment to activity volumes and access

Colour coding of floors and activities enabled scale photographs to be used as 'progress drawings' of the continuous design investigations for which the model was used

Model by Magna Models Ltd.

2
Map showing location

3
Diagrammatic sections showing public access
a'–a north to south
b'–b west to east

4
Static communications network in the hive, providing audio, video and print-out information facilities

patterns as found, although their effect is likely to drastically alter society's attitu

OCH was to provide in central London facilities, systems, tools and equipment for the public to involve themselves in self-pace skills, techniques and information retrieval. The involvement can be passive, active or both. Visits can be single, regular or intermittent, while all age groups of any size can use the centre, although several activities are phased for particular age group usage during the 24-hour cycle.

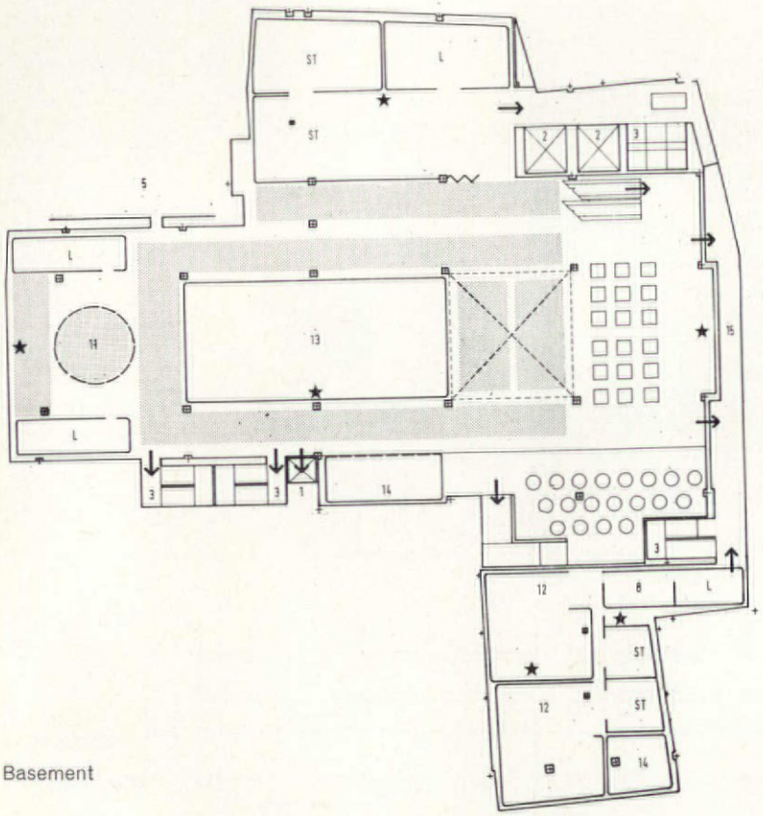
Unfettered by tradition, scholastic, economic, academic or class strictures, OCH permits and encourages self-pace exploration by the individual of his curiosity, skill and mental appetite.

In any large city a vast amount of information and assistance is ignored or underused due to its present inaccessibility caused by primitive administrative systems or merely physical inconvenience.

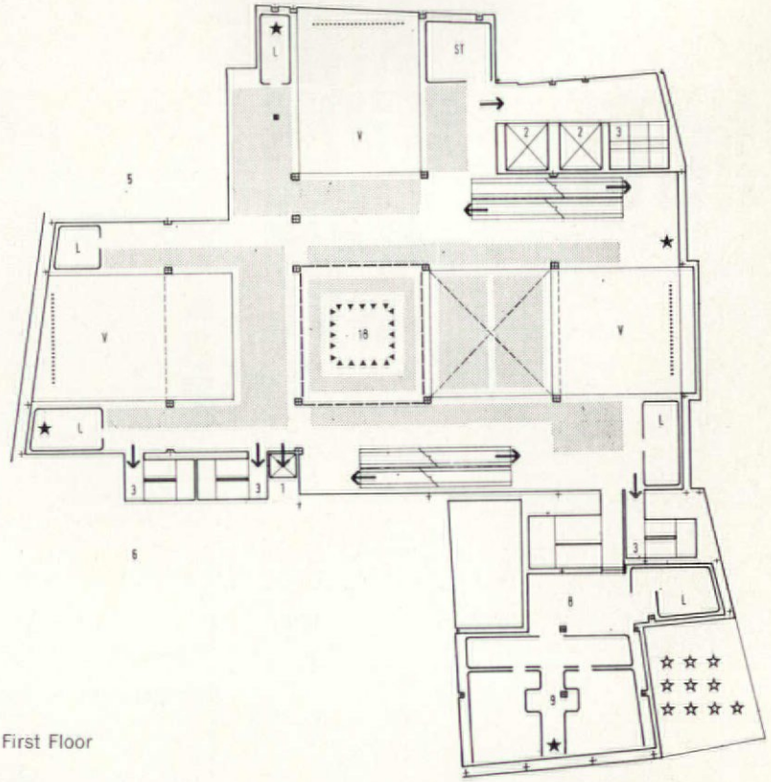
OCH would permit users to reach, use and research information, whether such information is generated, housed or processed within OCH or externally.

Electronic links with Central and Local Government, Commerce, Industry and Education are provided for since many of the functions of OCH correspond to those previously found in the town hall, the labour exchange or the official envelope through the letter box.

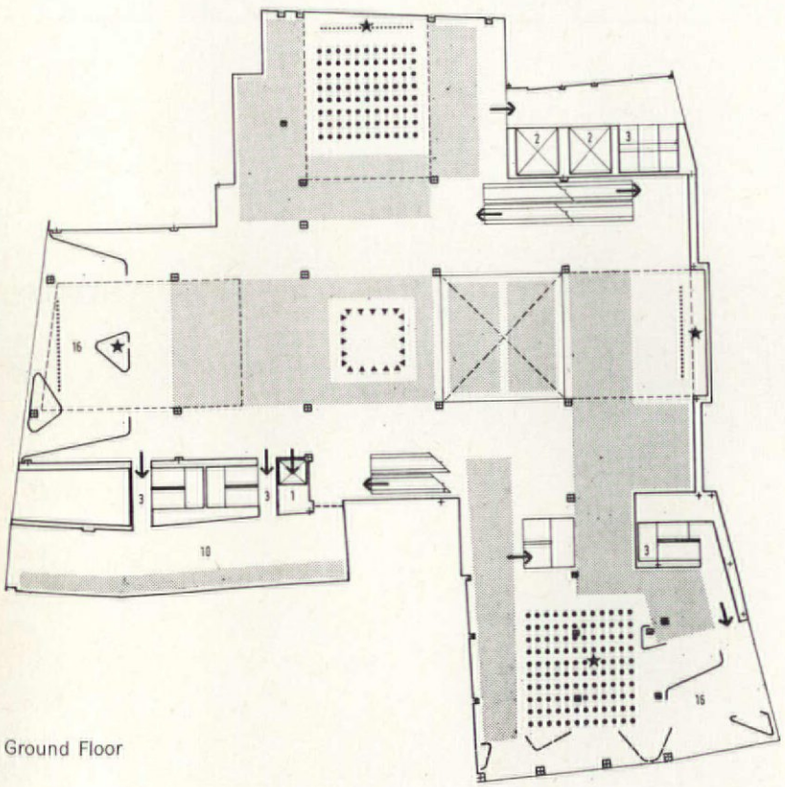
However, OCH is not to assume the guise or prerogatives of established information modes, such as library, exhibition hall, conference room, etc., since, if it did so, it would need to compete with such established modes and in so doing would destroy the potential of the vital and unique service it offers. No demands, financial or involvement, are made on newcomers; in fact the ground floor is so designed to



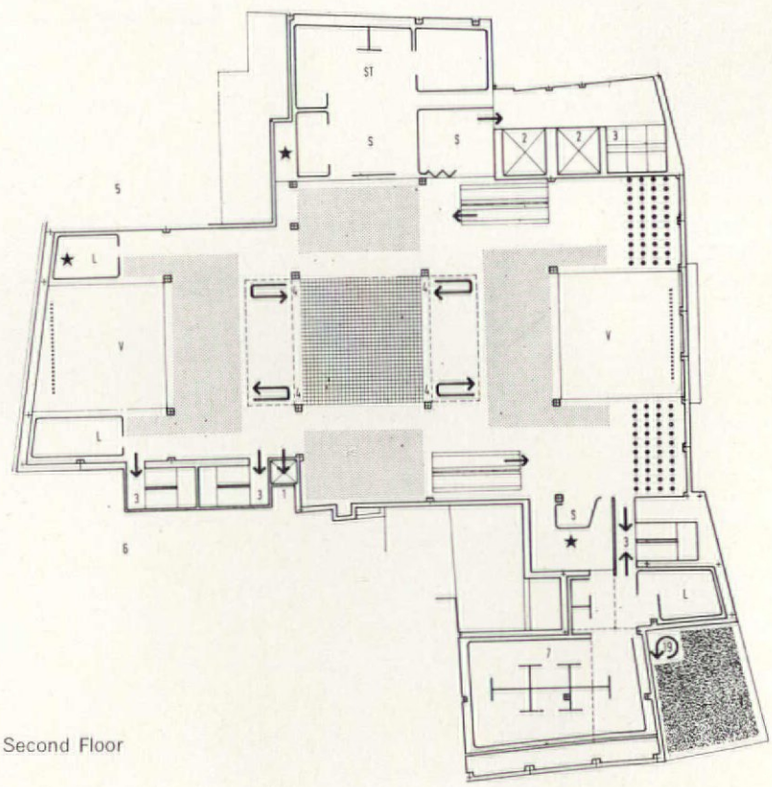
Basement



First Floor



Ground Floor



Second Floor

such patterns and the institutions which caused them.

provide a warm/dry/cool/quiet pedestrian 'short-cut' between two major centre city pedestrian routes.

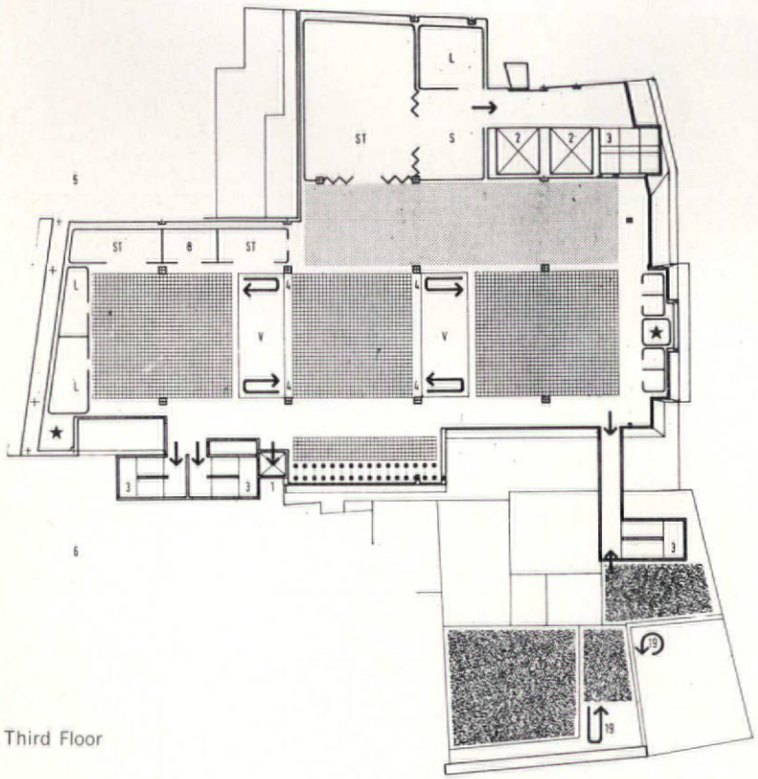
Thus an awareness, primarily visual and audio, of what is available in the hive is afforded those who take advantage of the building without any particular attention to its peculiar use. (More buildings should be designed with this in-built unconscious permissive usefulness factor.) In addition, the centre, in offering a wide variety of refreshment facilities, also provides a service increasingly required by centre city users. However, the physical environments throughout the building in which such a service is dispensed automatically give the newcomer an uncommitted insight of what is available to all. No-one need use the centre but all who enter are made immediately aware of what is available. Well-fed intellectual voyeurism is positively encouraged.

Basic to the layout and particular planning of OCH are the following activities: selection, display, distribution, storage, feed-back, retrieval, evaluation.

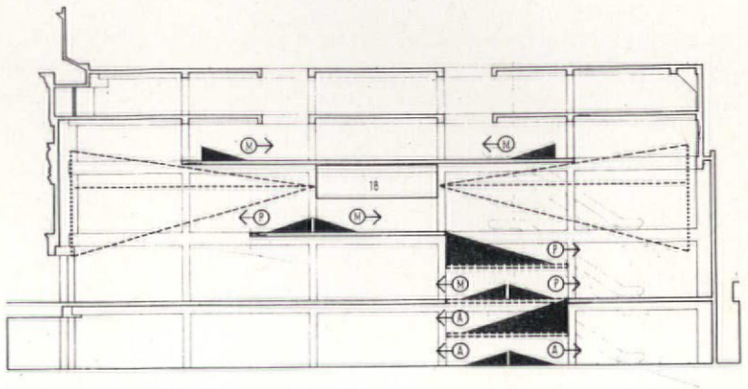
The use of spare storage capacity of a new computer at the company headquarters was planned. Use of other existing facilities both for input and storage of information would reduce the amount of on-site hardware and links.

User choice enables both competitive and non-competitive use of the 'games' with the additional availability of long and short term print-off personal aptitude and progress charts, cf. school reports.

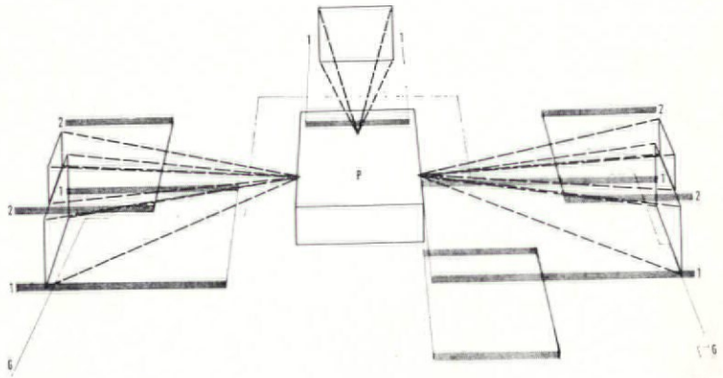
The voluntary self-paced life-long turning up of the individual that is enabled in OCH can assist in increasing the individual's capacity to manipulate his environment. □



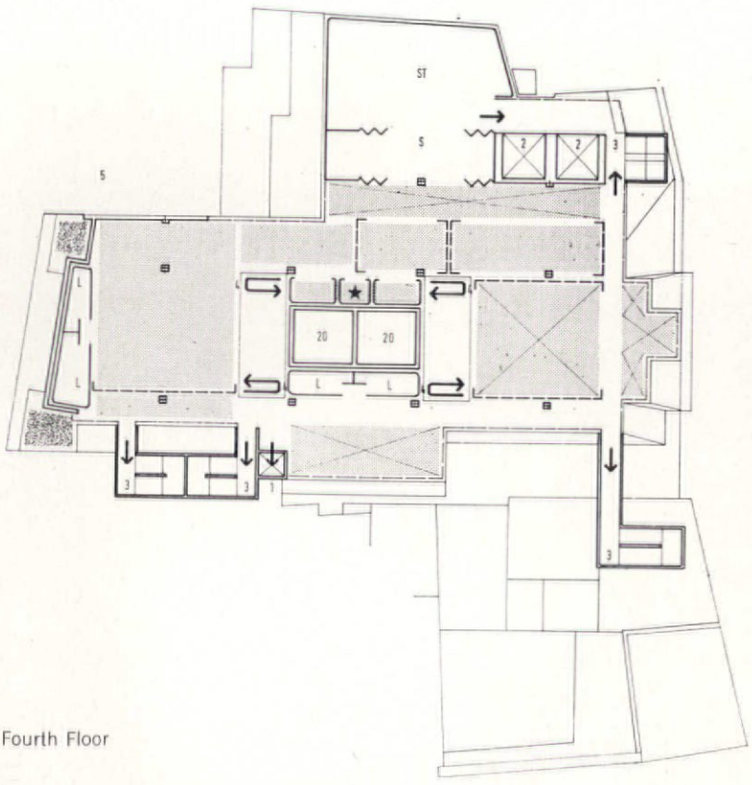
Third Floor



Potential banked seating positions



Triple projection system and moveable floors



Fourth Floor

Key

- variable cooking + eating / seating / viewing area
- 'open' public promenade
- area reserved for carrels or other information kiosks : medium / long term occupancy
- exhibition area
- air conditioning unit
- cooling elements for basement and ground floor a/c units
- t.v. monitors
- movable floor
- escalator arrival
- combined projection screens
- link trainers : 2 banks
- public information stations
- ST store
- S service
- L lavatories
- V void

1 public lift
2 goods lift
3 fire stair
4 public stair : variable positioning in open well
5 Wolf's building
6 no. 10 Oxford St.
7 administration
8 staff
9 staff dining and welfare
10 overflow arcade
11 planetarium
12 computer
13 t.v. studio
14 t.v. studio control
15 fire escape route
16 adjustable entry hoods
18 projection room over
19 'open' public access stair
20 tanks

- banked seating
- movable floor
- Ⓟ→ viewing : projection screens
- Ⓜ→ viewing : monitors
- Ⓐ→ viewing : activities

Thus demands now being made by such institutions must not be allowed to result in t

UK PROJECTS

Project by C. and J. Blencowe and Robert Vickery

Structural Engineer: Anthony Hunt
Services Consultant: Max Fordham

A recent school competition provided the basis for this project. The rigid and traditionalist brief, however, proved a source of frustration and a more flexible and realistic proposal was put forward.

The vast complexity of individual learning patterns in a school of this size (1700) cannot satisfactorily be parcelled into standard 30-child units. Similarly the traditional timetable composed of 40-minute classroom periods of discourse–questions–exercises–hiatus, represents the need to avoid bottlenecks in certain key specialist spaces, and is administratively convenient.

Administrative structures of this kind, allied to the pyramidal institutional structure devised long ago are now in total conflict with the type of educational structure currently demanded by the rapid growth and increasing complexity of knowledge.

The intention was to design a school building which could be 'switched-on' with the minimum of effort and imagination on the part of its users.

The house-dining rooms for example; required by the brief to relate directly to equal numbers of classrooms specifically for social occasions, could be regarded as the nuclei of new group-teaching areas. Ultimately an open area of approximately 5000 sq. ft which had previously been sub-divided as house-dining room, four classrooms, and one specialist room (History, Geography, Maths, etc.), would become the home-base of perhaps 150 pupils working on continuous projects in small mixed-ability groups. Staff, released from the restrictions of the traditional timetable, would assume more of a specialist, tutorial role.

If it is considered logical to serve large quantities of food from mobile heated trolleys (in this case lowered by hoist from an isolated kitchen on the roof), which are stationed temporarily at a strategic point in each house-room, then it should also be possible to concentrate the facilities of, for example, the geography-room, or the chemistry laboratory, in mobile trolleys. These would eliminate the possibility of bottlenecks, thereby permitting each group to spend such time as it requires in understanding a particular subject.

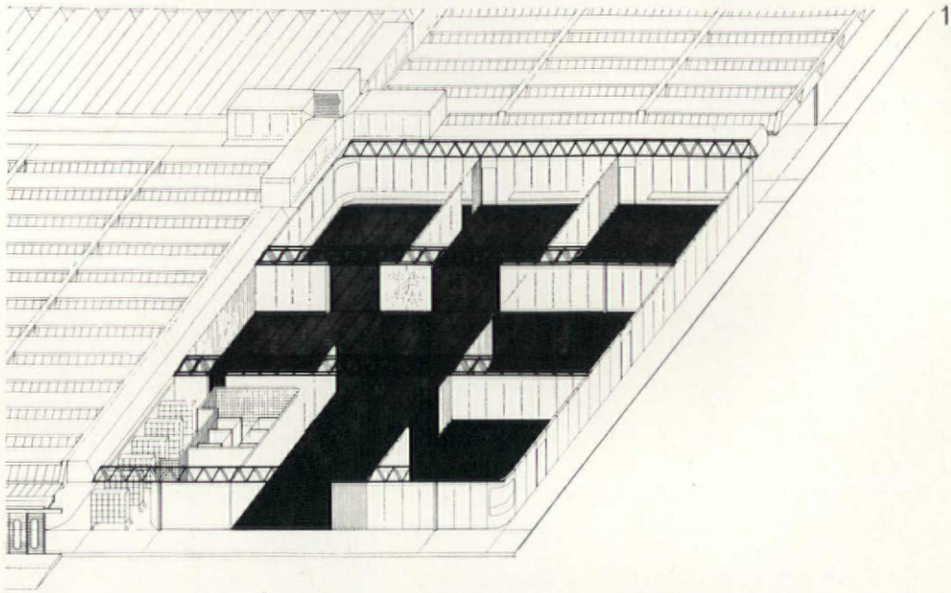
Although at present we are asked to design large schools where at least the sixth-form can grow, it is just as important to build schools which can contract, from components which can be reused elsewhere.

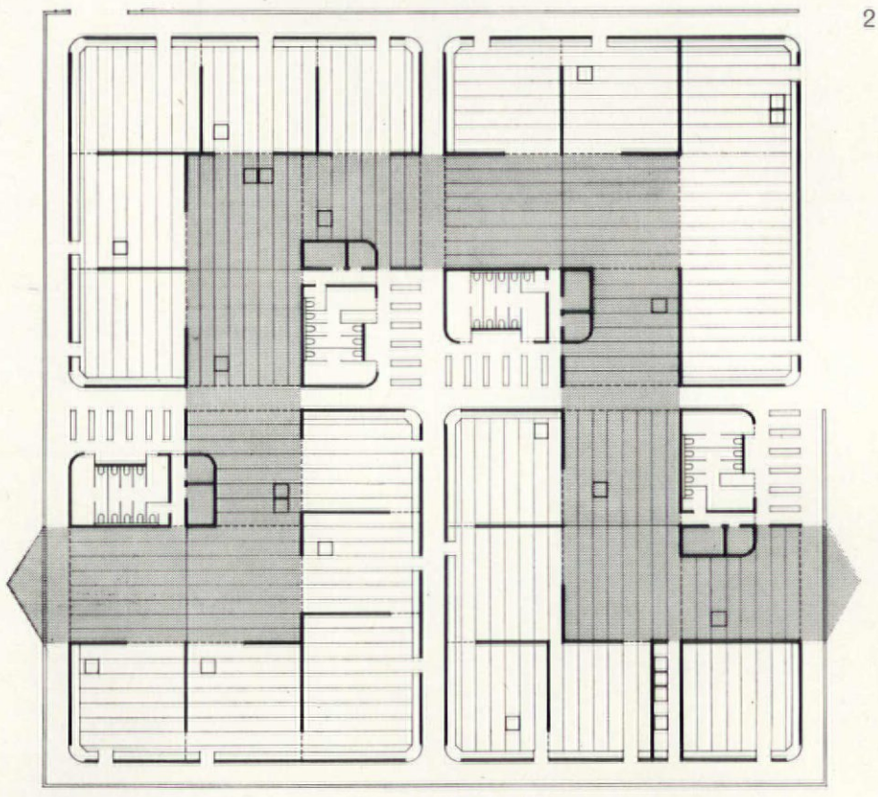
The building system proposed consists of 72ft square single-storey introverted units, each served by its own fixed service-zone containing toilet, hand-washing, coat-hanging and locker facilities for pupils and staff, plus storage for the mobile specialist teaching elements. The carpeted teaching area is divided by a combination of standard plastic-faced sheet steel demountable partitions, and accordion partitions.

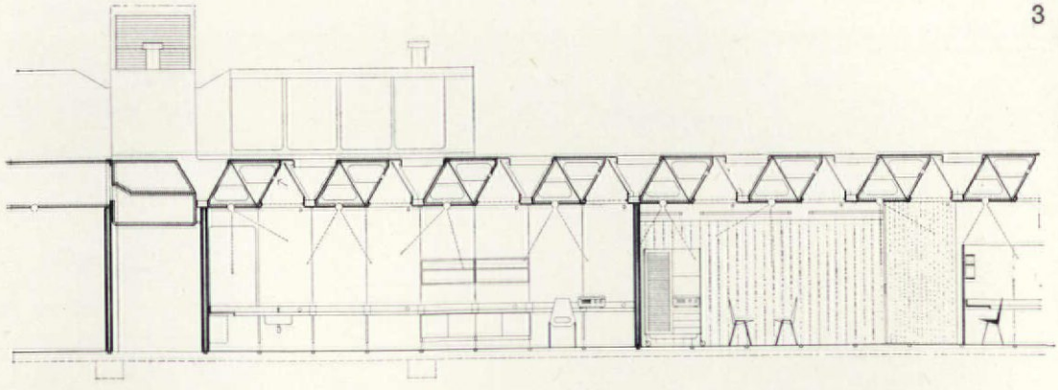
Natural daylight from north- and east-facing roof-glazing is designed to provide an even factor of at least 15 per cent, in line with good factory practice, as it is considered that conventional side-lighting with a steep gradient across the class-room down to a 2 per cent minimum is inadequate.

Each unit is heated and ventilated by an independent module of plant at roof level, supplying and extracting via structural folded rigidized sheet-steel ducts, each spanning 24ft between primary trusses. By delivering air to teaching spaces via a grid of individually-controllable punkah-louvres, the apparent temperature can be reduced by providing direct body-cooling.

We propose a building where the learning-process itself becomes the environment; where the walls are freed from their lighting function and become instead a total display/screen area, and an integral part of this process.

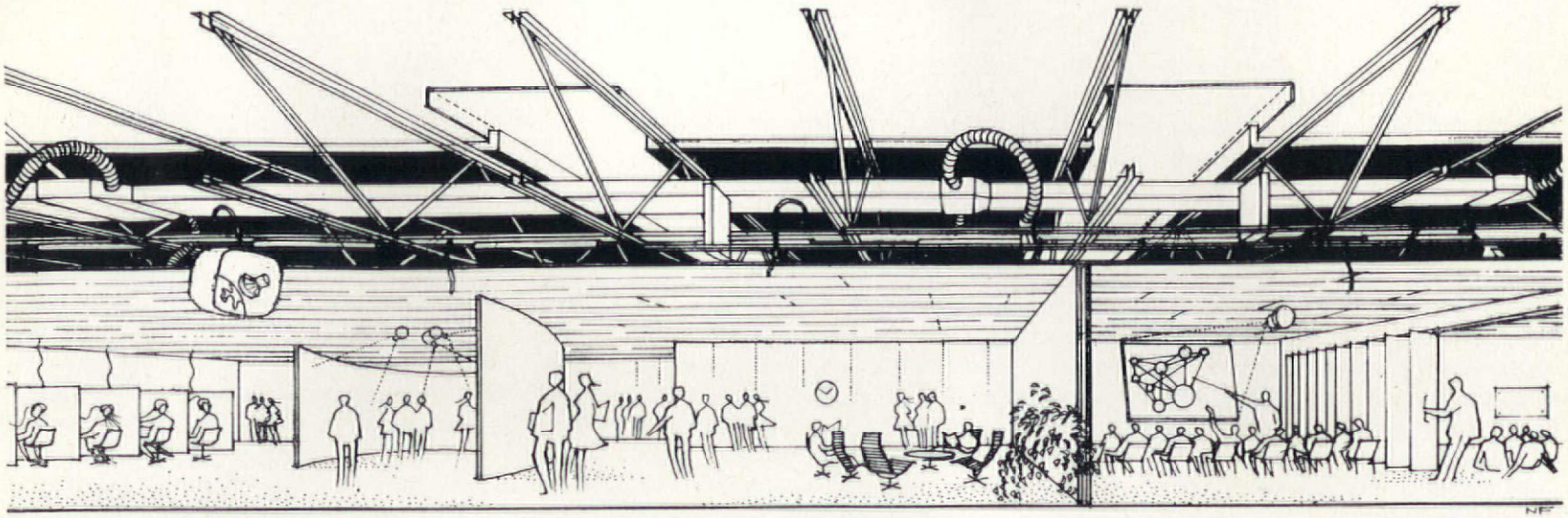




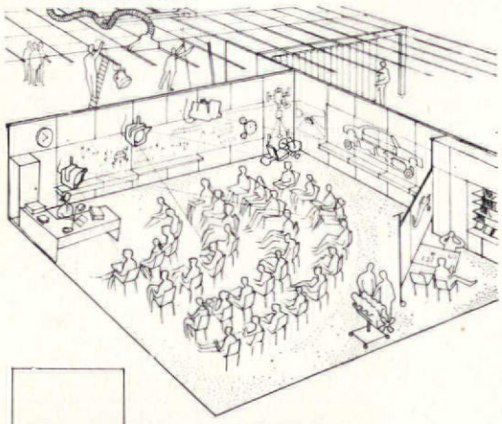


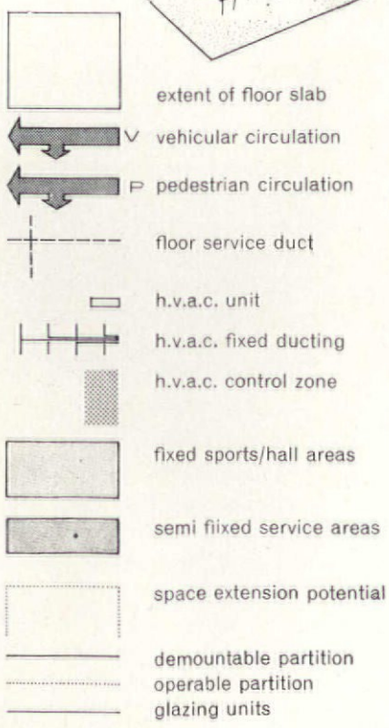
1
Axonometric of part of a four-unit cluster with plant at centre at roof-level
2
Plan of a cluster of four teaching-units for up to 600 pupils. The grid pattern of routes serves the traditional educational structure where each unit comprises four classrooms and one specialist room grouped around a house-dining area and service-zone. Out of normal school hours or under the new pattern of learning, circulation is in counterpoint to the grid, represented by the shaded area, and corridors become redundant
3
Typical section showing primary duct over corridor, trapezoidal structural ducts over teaching areas (extract over supply). Soffit at 8ft 0in with punkah-louvres at 6ft 0in centres. Continuous perimeter worktop containing sinks and cupboard units, mobile specialist teaching elements, carrel

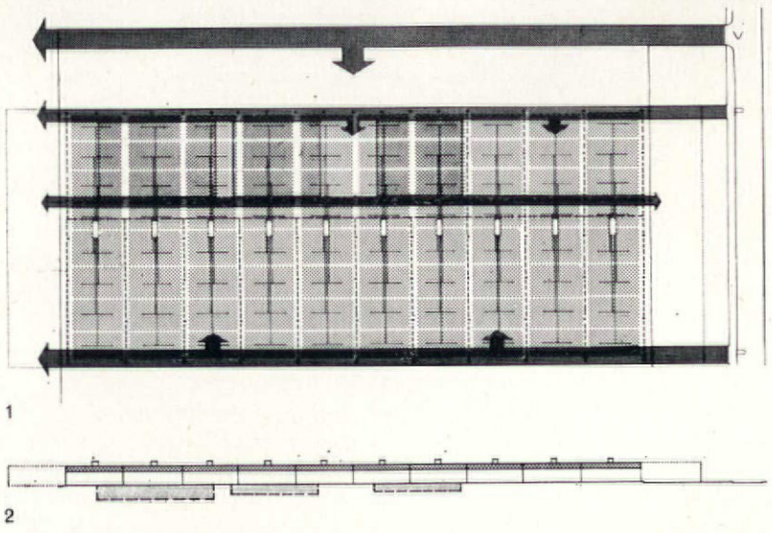
demand of buildings that merely meet such demands uncommitted space is needed



Project by Foster Associates
(Design group: N. & W. Foster, A. Stanton, M. Kuch)
Component consultant: M. Francis
Engineer: A. Hunt
Quantity surveyor: Hanscombs
Mech/Elect/Acoustic: D. Kut/P. Jay/A. Aldersley-Williams
School system developed by Foster Associates in conjunction with consultants and manufacturers. Applicable to a wide range of educational types ("primary" to "comprehensive" to "university"). Total flexibility for internal and external layout change. Costing within Dept. of Education and Science cost limits.

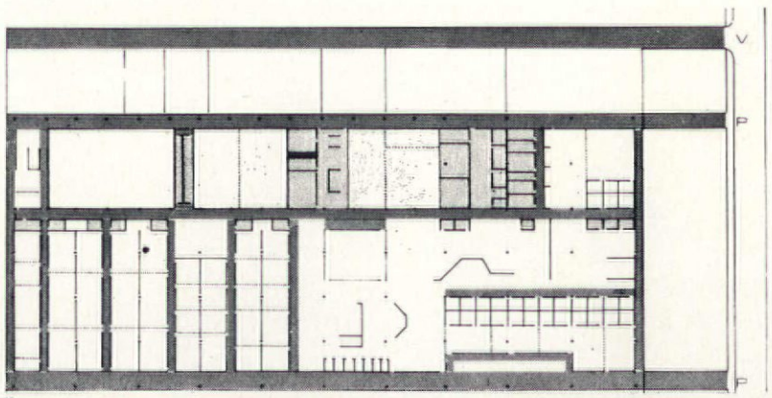




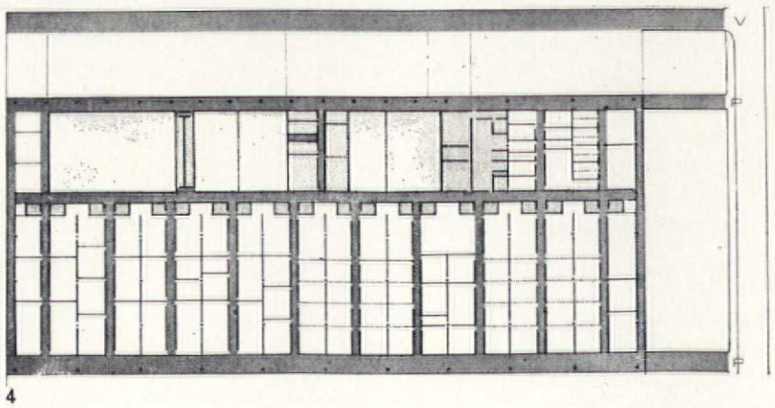


1

2



3



4

Plan and section of basic systems network **1, 2**

Structure
steel lattice beams and columns with steel roof decking. Concrete floor slab

Air conditioning
packaged roof mounted units with 8 control zones per unit
fixed ductwork system with flexible hose connectors to outlets
air returned via silencers to sealed plenum

Services
wet and waste services in floor duct network with plug-in fitting facility
power and communication in roof zone with flexible plug and socket facility
fluorescent lighting tubes in roof service zone

Infill
demountable plastic-coated steel partitions system and operable partitions
standard 4ft internal and external glazing units
rough cast glass panels to underside of roof service zone in steel sections
nylon carpet to most teaching areas

Plan arrangement based on new educational techniques **3**
Derived from:
group teaching
individual study programmes
live projects
servicing and use implications of new instructional media
changing role of the school within the community

Plan arrangement based on traditional classroom layout **4**
Derived from:
6th form
senior school—four houses, assembly hall, special teaching areas
junior school—four houses, assembly hall, special teaching areas
science department
arts and crafts department
library

continued from page 207

If the major concern is to increase the capacity of the individual to learn throughout life, then an entirely different attitude to the conditions (and buildings) under which such learning can best take place is needed. Many educationalists realize this (also all the contributors to this *AD* issue), but the majority are so closely involved with the accepted forms of education that, although they can eloquently suggest or demand improvements in the present provisions, they are in a difficult position to postulate new physical forms that will enable the extension of their activities. (It is interesting to note that the National Union of Teachers is, in end demands, one of the most reactionary of unions.)

For too long education has been seen as a service due to all—if only for limited periods—to be dispensed by the few. As an integral part of Western man's life it is seldom questioned except in detail. Learning has always taken place throughout life, independent of any particular educational structure; but in the last few decades opportunities for learning, such as the availability to all (in the Western world) of mass communication media, have increased so greatly that formal education as such now has to justify its effectiveness in comparison with self-pace learning. In some instances it has embraced self-pace learning (reinforcement theory and teaching machines) but what it has not sufficiently realized is that its very structuring and the teaching tools previously considered essential (the learning of languages, etc.) can now be questioned as never before.

Just as industrial and commercial automation is rendering various skills and operations obsolete, new methods of information storage, retrieval, comparison and computation enable the content of traditional education to be pruned.

The tradition of enabling such activities to flourish must be questioned. It may well be that formal education for the few will become even more particularized and compartmented. However, such particularization will increase the need for restructuring the remainder of the mental servicing of society.

This issue of *AD* puts particular emphasis on the latter, since it is in this field that architecture and planning has contributed so little and so late. In scope, size and individual requirements, the appetite for learning has received little attention from architects, and yet it is probable that their attention is exactly what is needed at the present to open up, expand and encourage the growth and change of presently available learning services, systems and goods.

Learning will soon become the major industry of every developing country, and those countries with established educational systems will have to restructure most drastically their existing facilities.

The continuous availability of learning facilities requires design recognition not merely in the classroom or the library but in the home, the car, the supermarket and the factory.

The school or university were built as educational servicing stations solely because the particular form of education dispensed and the nature of the dispensers required the protection, isolation and concentration that such finite structures provided.

The part-time professor is an example of the danger of such isolation today. There should be no need to have to leave one's work in order to tell others what one was doing.

If the factory and the living-room become tomorrow's classrooms, what should we do with those classrooms we have left—or should we, indeed, have any left? There is no doubt that with few exceptions, schools built before 1930 are even now a positive restriction on the activities they house; while those built since, still require a teacher–pupil relationship merely to operate.

It is interesting that in one of the first SCSD schools to be built (Barrington) the introduction of a method whereby responsibility was awarded, enabling the individual pupils to programme their own timetable, reduced the effectiveness of spatial flexibility inherent in the scheme, since capacity for physical interior alteration was not keyed in time and frequency to the speed at which an 8 to 11 year old changes his mind.

Thus the provision of flexible space as understood by the architect—who assumes that any such system he might design will be controlled by the staff and altered under their instructions—may not be as sensitive a solution as it seems.

Once the control of the learning process and its required trappings is under the control of the individual, who may or may not wish to group, then the design problem is one of providing individually operable space and this space may be required in many places for a full 24-hour learning day. Learning while dreaming, subliminal instruction and ESP may eventually help decrease the present urgency in providing new structures and equipment for learning; but in the meantime the size and immediacy of the demand is such that, even if a perfected think-box were designed, its production, however rapid and extensive, would not be sufficient, since its very sameness would limit its comprehensive application and use.

I consider that prior to a major architectural contribution to the enrichment of learning, architects, planners and administrators must group together educational and learning facilities and view them primarily as a means of creating an essential and lasting part of the individual's need, like fresh air. Then the provision of facilities and possible resultant structures will be an inherent part of every artificial undertaking which requires occupancy by people.

A useful start would be the recognition of the fact that in the house learning is available to all occupants and that such activities are often incompatible. Thus conditions of audio/visual privacy are as important as additional uncommitted space.

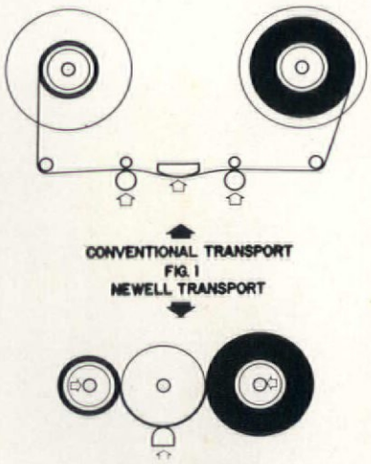
However, it is the provision of the latter that is probably the most urgent immediate requirement in the planning and design of urban areas and their constituent parts — whether mobile or static, communal or private, long-lifed or temporary, big or small.

While many of the articles in this issue of AD *refer to schools and school rooms, the common theme is that the buildings and fittings normally associated with the provision of educational facilities are not good enough, and that it is no longer a question of improvement but of re-think.*

Educationalists know this. It is hoped that some architects might realize it while Society still finds them palatable.

ALEXANDER PIKE DEVELOPMENTS

To obtain additional information about any of the items described below, circle their code numbers (G1, G2 . . . etc.) on the Readers' Service Card inserted in this magazine.



G1
New principle in magnetic tape handling
Newell Associates Inc., 795 Kifer Road, Sunnyvale, California 94086,
The Newell Tape Transport can achieve tape speeds of up to 1000 inches per second. The transport mechanism is unique in that there are only 3 moving parts; a capstan and 2 tape reels.

The tape is self-supporting and the tape spool requires no flanges. Extremely rigid flangeless tape reels can be built up to large diameters. The recording head only touches the tape over a short area, reducing wear on the head.

As many as sixteen tracks can be recorded on $\frac{1}{4}$-inch tape, 36 tracks on $\frac{1}{2}$-inch tape and 78 tracks on 1-inch tape.

The Newell principle is particularly applicable to automatic tape handling. The same firm produces an audio tape player which is claimed to combine the low cost and flexibility of records with the higher performance and permanence of magnetic tape. The tapes, less than 2 inches in diameter are loaded into a tray much like 35mm slides in a slide tray. The mechanism selects the tapes in any sequence desired. The tapes are self-threading, play up to 44 minutes, and have 8-track operation.

G2

G2
Closed circuit television system
Ampex Great Britain Ltd., 72 Berkeley Avenue, Reading, Berks.
It is claimed that the tremendous upsurge in the use of televised instruction in the USA in the past two or three years has been greatly influenced by the introduction of lower cost portable television recorders. Previously, the only types available were broadcast quality recorders, which at a cost of about £14,500, put them out of the reach of most educational users. Ampex can now offer a complete recording/playback system, with camera, recorder and monitor, for £2500. A basic closed circuit television recorder, the Ampex VR-7000, now costs £1300, less than one-tenth the price of broadcast equipment.

Although some authorities have certain reservations about the use of these systems, in view of the serious shortage of teaching staff in this country, the advantages claimed for them appear to be sound:

Recorded material can be played back precisely when needed, to match the teaching programme. The time and talents of teachers can be fully utilized, thus relieving classroom and teacher shortages.

Lessons can be rehearsed and corrected to improve the quality. New material can be inserted in a recording to bring lessons up to date or to accord with curriculum changes.

The system assumes a uniform quality and lesson coverage for all students and can use the best instruction to present the subject to a wide audience. Immediate playback of recorded material permits rapid evaluation of performance in sports, drama, dancing, etc.

G3
Television teaching machines
Sintra, 26 Rue Malakoff, 92-Asnieres, France
The MITSI teaching machine embodies a television screen and a keyboard for the student to operate when replying to questions shown on the screen. Questions take the form of visual and aural information which can be repeated by the pupil as often as necessary. In response to the keyboard replies, a green light is indicated for the correct answer, and a red light for the wrong answer. It is claimed to give a performance comparable with computer-linked teachers, as it contains comparable logic elements. Visual information is stored on 35mm film and sound is on magnetic tape. Capacity for visual images is equivalent to a lecture of 30 to 60 minutes. Price £2500.

G4

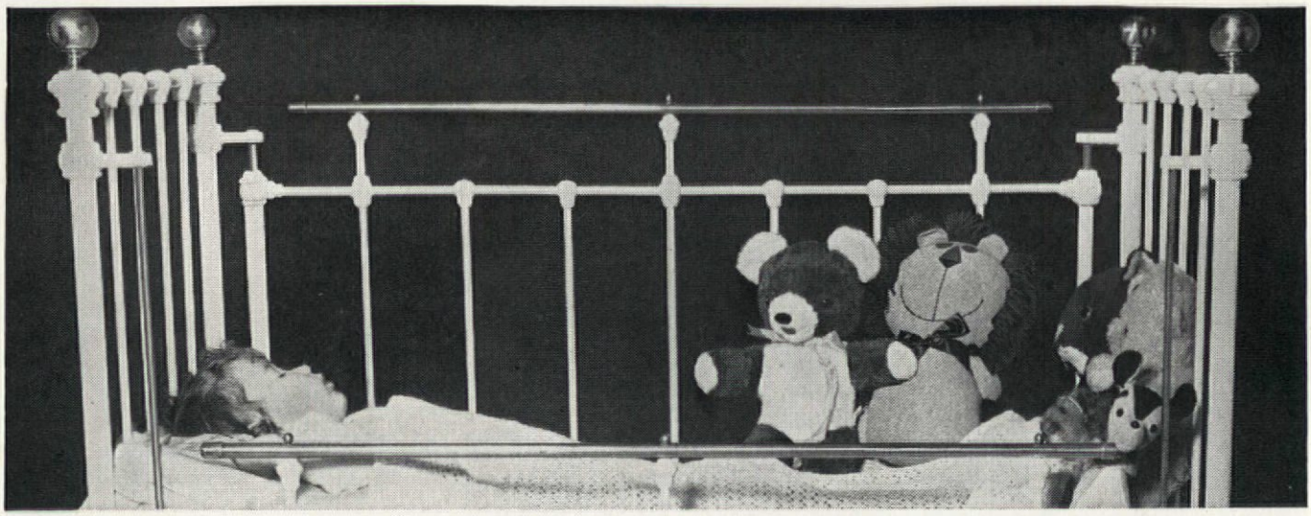
G4
Videophone system
The new Bell System's Model II Picturephone employs a 'graphics' mode of operation to display drawings or printed matter. The size of the field of view can be varied from close-up to wide-angle by zooming electronically. The camera can follow movements from side to side and is capable of changing focus to view larger scenes as far as 20 feet away. The equipment comprises a display unit, control unit and service unit. The telephone connection is made by a 12 push-button dial, and the controls regulate the height of the centre of the camera's field of view, the zoom, brightness of picture and volume of sound. The camera focus can be set to one foot for the graphics mode, three feet for normal conversation, or 20 feet for long views.

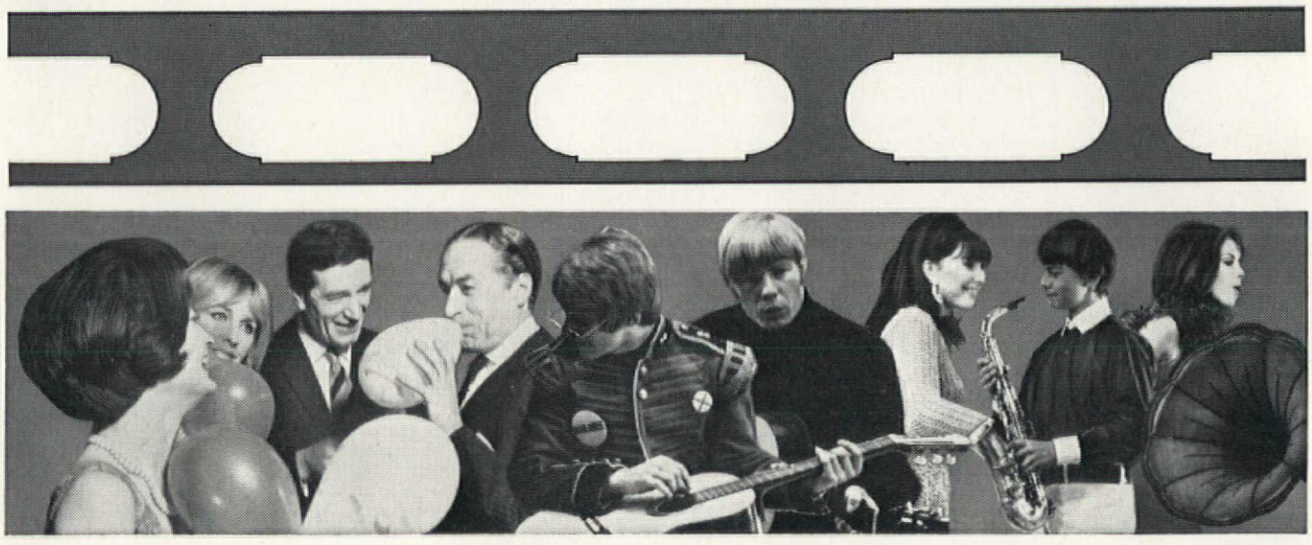
G5
Portable sound lectern
Lanier Electronic Laboratory, Inc., Atlanta Georgia, 1704 Chantilly Drive, 30324 USA
The basic elements of the Carrivoice lectern, the amplifier, control panel and lighting, are housed in a large aluminium extrusion. When closed, this forms the lid and carrying handle. When unlocked from the control housing the desk swings down and covers the input junction at the base.

G5

G5

G5





Bison meets the sound regulations in seven different ways

Noise travels in two different ways; by air—and by impact. Bison take care of both types with seven different kinds of floor and roof. Bison know all about the problems of meeting sound regulations and can advise architects on the type of floor that will provide the required degree of sound insulation—whatever the complications. When it's a case of keeping the peace between floors, Bison have the quietest answers imaginable.

Whether it's a question of fire regulations, sound or heat insulation, load-bearing, wide column-free spans or economical roofs—Bison can provide a ready-made answer, ready to be put into operation rapidly and economically anywhere in the United Kingdom.
There are Bison floor and roof experts ready to advise at planning stage on the most economical methods; there are Bison erection teams ready to apply their expertise to cut timing schedules; there are nine Bison factories strategically situated to ensure prompt and economical delivery to sites throughout the country.
If you have a question of floors or roofs, Bison have an answer . . . ready-made.

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The largest structural precast concrete specialists in the world.

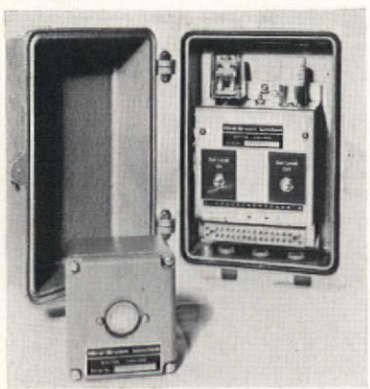
Concrete Limited,
399 The Strand,
London, W.C.2.
01-836 7171/8

DEVELOPMENTS

G6
PVC surfaced aluminium
BXL Plastics Materials Group Ltd., 12/18 Grosvenor Gardens, London, SW1
Bondene consists of half-hard NS3 aluminium alloy to which is permanently bonded a PVC film ·012in thick. It is available in a wide range of colours, patterns and surface textures. Sheet sizes, up to 25ft long and 4ft wide 10–24g thick. Double-sided to order.

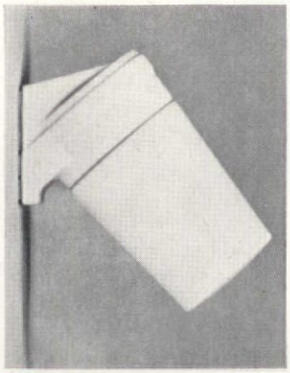
G7
Building control centre equipment
Honeywell Controls Ltd., Brentford, Middlx.
The increasing complexity of services installations in modern buildings makes the provision of control centre equipment a vital consideration. The System 6 Selectographic Data Centre is capable of monitoring and controlling up to 1000 address prints for the centralized control of building services. This compact data centre's basic standard functions include high-speed digital scanning; stop-start facilities, both on an automatic programmed and a manual basis; temperature, humidity, process pressure and dewpoint indication, with reset control and indication of remote temperatures and damper positions. Add-on modules accommodate a multi-point analyser for system trend recording. Also incorporated is an alarm and status printer which provides permanent records of alarm-actuated and demand-scanned alarms, and the on/of, day/night status of equipment throughout the building.

G8
Heat recovery from lighting fittings
Falks Ltd., 91 Farringdon Road, London, EC1
A range of lighting fittings is being developed and tested at Falks' Thermal Testing Laboratories from which the heat from lamps and gear is being recovered and used for air-conditioning purposes. Airflow passing over the lamps and gear is drawn out through specially sited louvres in the top of the housing to the air-conditioning plenum. The rate of airflow through the fitting governs the rate of heat transfer to air. Fittings can be equipped with supply air diffuser inlets to eliminate separate air-conditioning outlets, thus creating a far cleaner appearance to the ceiling. A useful side benefit is the improved efficiency from the lamps themselves, as the air drawn over them helps to keep them at a temperature suited to maximum light output.



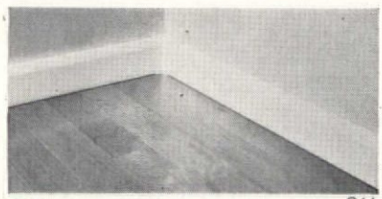
G9

G9
Automatic lighting controller
Hird-Brown Ltd., Bolton, Lancs.
The Hird-Brown Automatic Lighting Controller will control all forms of lighting, indoors or out, without any manual switching. Lights are automatically switched on as the sky darkens and switched off as conditions brighten, ensuring artificial light only when it is needed. The unit is totally enclosed in a waterproof die-cast aluminium enclosure, permitting installation either indoors or out, and can be set to precise limits. Price £39 15s 0*d*.



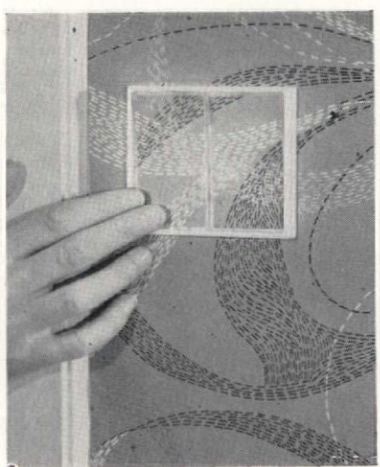
G10

G10
Porcelain light fittings
Frederick Thomas & Co. Ltd., Everton Buildings, Stanhope Street, London, NW1
A new range of porcelain light fittings suitable for use in hospitals, kitchens, bathrooms and toilets, has been designed to ensure ease, simplicity and safety of installation and maintenance. Each fitting is supplied with a detachable plate which can be fitted onto a standard 2in conduit box separately from the fitting, thus making wiring and fixing very easy. All units have rubber gaskets fitted between the glass and the porcelain to prevent the entry of dust, steam, etc. Prices, upright £2 3*s* 6*d* (white), £2 8*s* 4*d* (colour), splayed £2 1*s* 4*d* (white), £2 5*s* 1*d* (colour).



G11

G11
Skirting wiring system
IBIS Department, RTB House, 151 Gower Street, London, WC1
The IBIS system is formed from PVC-coated galvanized steel strip, and includes corner pieces and fixings in high-impact PVC. The profiled section is 3in high × ½in deep, with a sloping shoulder, and is available in lengths of 4, 8 and 12ft. The standard fixing-pieces act as galleries for wiring, and there are integral earthing devices and 13 amp outlet sockets.



G12

G12
New light switch
Allen West (Brighton) Ltd., Brighton, 7
The Tipswitch has no visible rocker arm, but incorporates a removable transparent front panel, into which can be slipped a cutting of wallpaper or other material to harmonize with the background. No fixing screws are visible and the switch can be operated by fingertip pressure. Available in single, double or triple assemblies, prices from 7*s* 11*d* to 15*s* 11*d*.

G13
Portable w.c.
Monogram Industries Inc., 10131 National Boulevard, Los Angeles, California, 90034., USA
The Monomatic w.c. may be used as a portable unit or alternatively installed in minutes as a permanent fixture. It is completely self-contained and uses the same 4 gallons of water with one charge of chemical for approximately 80 to 100 usages. It is electronically operated by a push button and has an automatic timer controlling an eight-second flush through a self-cleaning filter. A built-in drain valve at the base of the unit makes emptying and re-charging a simple procedure. The bowl and housing are formed in ABS plastic and all internal parts are either stainless steel or corrosion-proof plastic.

G14
GRP Bathroom Units
S.E.A.P.S., 25 Residence Elysee, 78 La Celle-Saint-Cloud, France
An addition to the PLASBA range of GRP Bathroom Units comprises a wash basin and miniature bath arranged as a corner unit. Suitable for use where space is restricted. The overall size of the unit is approximately 4ft 2in × 3ft 5in in plan. Price approximately £90.

G15
Concealed-cistern w.c.
Armitage Ware Ltd., Armitage, Near Rugeley, Staffs.
Made of vitreous china and designed to fit close to the wall to eliminate dirt and dust traps, the new Armitage w.c. employs a concealed cistern fitted in a duct behind the unit. Height 16in, depth from wall to rim of the pan 22¾in. Price approximately £24 14s 0*d* complete with cistern, seat and cover.

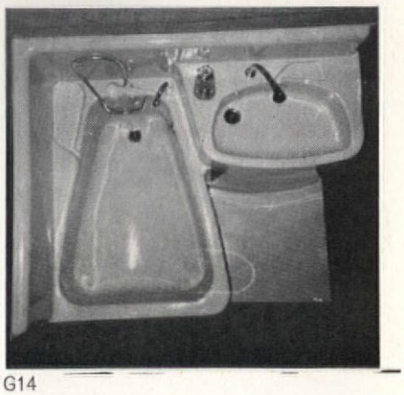
G16
New range of sanitary fittings
Shanks & Co. Ltd., Tubal Works, Barrhead, Scotland
Designed in cooperation with Cunard's own designers and intended for the *Queen Elizabeth II*, a new range of sanitary fittings, known as the Belgrave Suite is now available. The w.c. is bulkhead mounted and has a concealed flushing valve.

G17
Aluminium fascia cladding
Heywood Helliwell Ltd., Bayhall Works, Huddersfield
The newly introduced Slimline interlocking fascia cladding sections are extruded from HE 9 alloy, either anodized or with natural satin matt finish. There are five sections, the standard 6in wide profile, internal and external corners, a cleat and a trim section. Two standard lengths, 16ft and 20ft are produced; others to order.

G18
Flame-resistant polyester resin
BIP Chemicals Ltd., PO Box 6, Popes Lane, Oldbury, Warley, Worcs.
A new polyester resin system for the production of glass reinforced laminates has been developed to conform with Class 1 of BS 476; Part 1: 1953. It is claimed to be the first system of its kind in this country to comply with this specification relating to the surface spread of flame, and has potential for the construction of building panels.

G19
Polythene dampcourse
British Cellophane Ltd., Plastic Films Division, Bath Road, Bridgwater, Somerset
LD20-S is manufactured with a controlled melt flow index and contains carbon black filler. It conforms to British Standard 743 and is claimed to promote the adhesion of mortar to its surface to such an extent that it can be inclined to an angle of 80° before wet mortar will slide across it. It will not extrude under pressure, crack at low temperatures or soften on exposure to sunlight. Rotproof and immune to chemical attack, it has outstanding tear and puncture resistance. Available in widths of 4½, 6, 9, 12, 13½ and 18in.

G13



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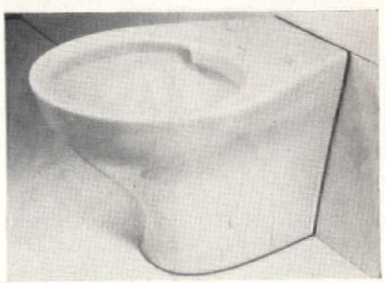

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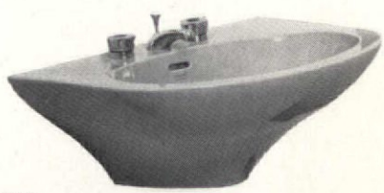

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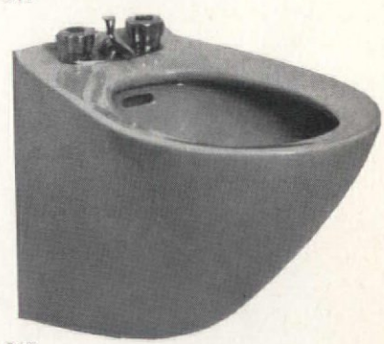
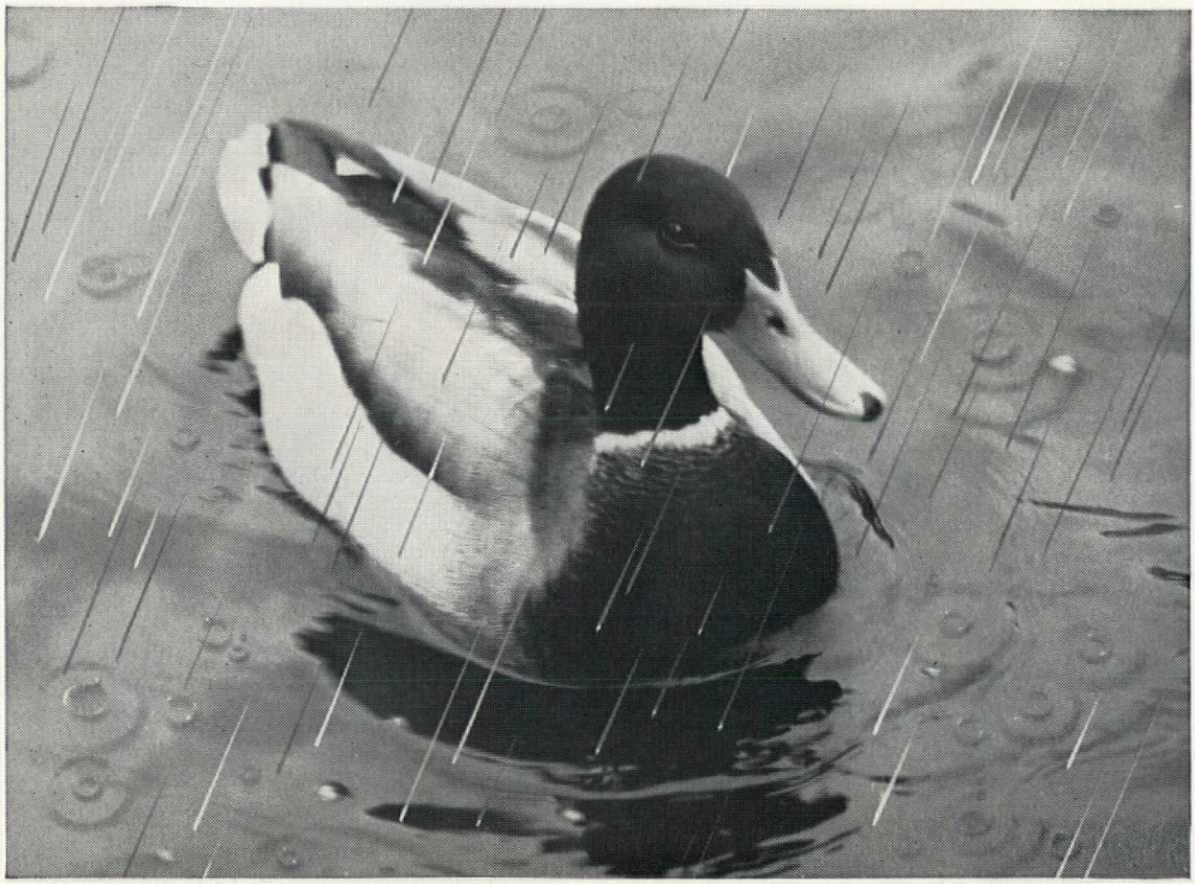


G16

G16

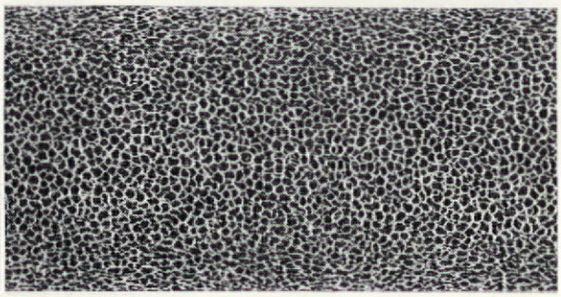
Try the Duck Test



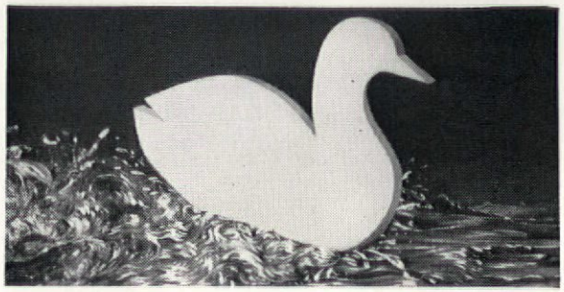
Prove Roofmate FR is really permanent roofing insulation–because it can't absorb water

Roofmate FR roof insulation is permanent. It's cost-saving. It's something you should know about.

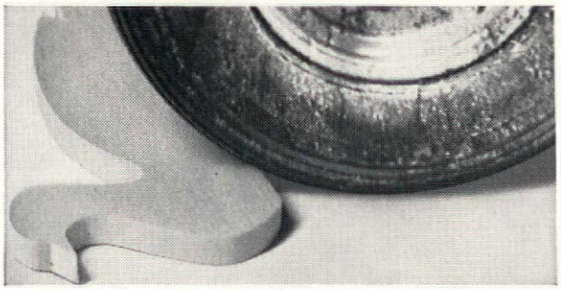
Roofmate* FR is a rigid plastic foam which gives a really permanent, insulated roof. The reason? It can't absorb water. Want proof? Try the duck test—with the sample we'll send you. Put it in water. Take it out—in five minutes or five weeks. Water just runs off. Cut it open: it's bone dry *right the way through.* It won't shrink, it can't warp, it won't rot. Ever. That's why you can install Roofmate—and forget it. For good. Roofmate is tough. It's easy to install: that's why it cuts labour and overall installation costs. Drastically.



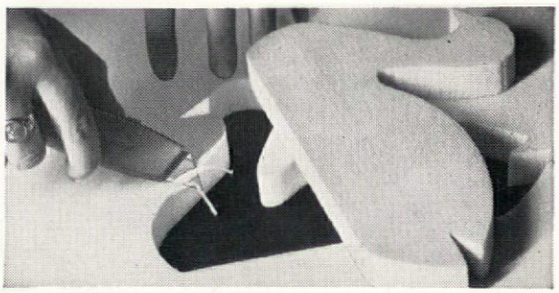
Closed cell structure Special extrusion process produces a rigid foam board with uniform closed cells and tough outer skins.



Can't absorb water Roofmate is unaffected by water from above—or water vapour from below. So it can be used without a vapour barrier.



Tough skin So tough it remains dimensionally stable throughout its life. So tough ice won't crack it, snow can't harm it. So tough it withstands all normal roof traffic during installation.



Easy to install Try cutting it: see how easy it is to shape. It's so easy to install that Roofmate gives a *cheaper finished job than any other system* providing an equivalent 'U' value.

Dow in Europe today

Dow—one of the largest international chemical organisations—develop and manufacture chemicals, plastics, metals, bio-products, packaging products and consumer goods for use in diverse industries and agriculture throughout the world.

DOW*

*Trademark of The Dow Chemical Company

Try the Duck Test-Now

Backed by Dow's 20 years' experience with rigid plastic foams, Roofmate is revolutionising roofing construction all over the world. Hadn't you better find out more about it?

Post to: Building Products Division, Dow Chemical Company (U.K.) Ltd., 105 Wigmore Street, London, W.1.

I'd like to try the test. Please send me a Roofmate duck.

Name .....

Position/Company .....

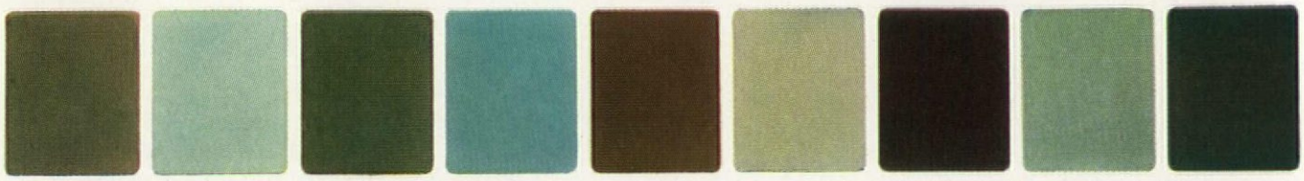
Address .....

.....

A.D. 4

Roofmate FR
permanent roof insulation

If you're an architect with an insatiable appetite for greens, try some of these.



Pale aqua green. Sprout green. Dusty olive. Leaf green. Yellow green. Wray green. Pea green. Glacier green. Wedgewood green. And that's just our range of nine plain greens. In all, Arborite have 52 plain colours—42 of them exact or close matches to BS colours.

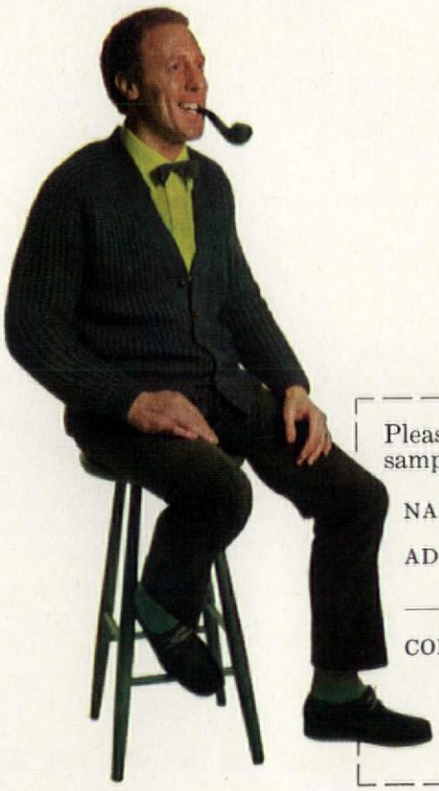
And we keep adding new ones.

But there's a lot more to Arborite than that. There are thicknesses and special grades to meet practically every kind of application. In addition to standard thicknesses of $\frac{1}{16}$″ and $\frac{1}{32}$″ Arborite manufacture solid plastic laminate from $\frac{1}{8}$″ to $1\frac{1}{4}$″ thick. Also Post-forming grade for finely contoured working surfaces. Bending grade for forming larger radii. Fire-retardant grade to comply with the surface spread of flame regulations. And there are over 150 plain colours, patterns, woodgrains and marbles, all available in Arborite's five grades. Standard sheet sizes are 10′ x 4′ and 8′ x 4′ with others, including 12′ x 5′, available. Arborite comes in three finishes: high gloss, furniture finish (semi matt) and texture finish.

If you need any kind of information or advice, please call our technical service. They'd be delighted to help.

ARBORITE®
DECORATIVE LAMINATE
DOMTAR

Arborite standard grade ($\frac{1}{16}$″) complies with the mechanical properties of BS.3794



Please send me Arborite literature and samples.

NAME_____

ADDRESS_____

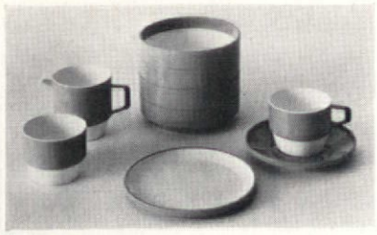
_____

COMPANY_____

To: Arborite Ltd., Bilton House, 54/58 Uxbridge Road, Ealing W.5. Tel: 01-567 0116

WCW10

DESIGN



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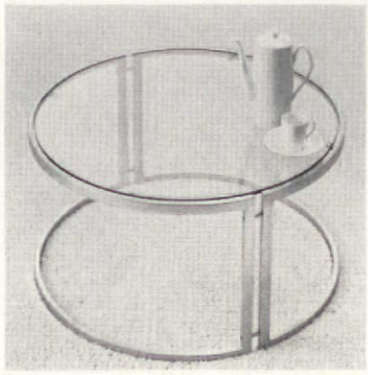

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COID awards

This year the Duke of Edinburgh's Prize for Elegant Design went to David Harman Powell, chief designer of Ekco Plastics Ltd, for their 'Nova' range of tableware in plastic (styrene-acrylonitrile co-polymer).

In the Consumer Goods section, awards went to:

'Clamcleat' range of rope cleats designed by Colin Cheetham and made by Clamcleats Limited, Welwyn Garden City.

Furnishing fabrics, 'Chevron', by Lucienne Day, 'Complex' and 'Extension', made by Heal Fabrics Limited, London.

'Kompas 1' occasional table designed by Alan Turville and made by S. Hille and Co. Ltd, Watford. (See *AD*, 1/68, p. 47.)

Furnishing fabrics, 'Simple Solar' and 'Five', designed by Shirley Craven and made by Hull Traders Limited, London and Colne, Lancashire.

'Trilateral' poster display unit **4** designed by Ronald Denton and made by London and Provincial Poster Group Limited, Birmingham.

'Trimline' ceiling or wall light designed by Paul Boissevain and made by Merchant Adventurers Limited, Feltham, Middlesex.

'Those Things' children's paper furniture designed by Peter Murdoch and made by Perspective Designs Limited, Fulham, London.

'Reigate' rocking chair **2** and 'Coulsdon' coffee table **3** designed and made by William Plunkett, Croydon.

'Silverspan' range of fluorescent light fittings designed by Robert Heritage and made by Rotaflex Concord, London.

'Sealmaster' range of door and window seals designed by Bernard Dixon, E. L. Brooks and R. F. Macdonald and made by Sealmaster Limited, London and Pampisford, Cambridgeshire.

'International' range of kitchen units designed by Nigel Walters and made by F. Wrighton and Sons Limited, Walthamstow, London.

In the Capital Goods section, awards went to:

'Hainsworth' worm gear reducer made by J. H. Fenner and Company Limited, Hull.

Range of flameproof motors made by Mather and Platt Limited, Manchester.

Colour television camera, Mark VII, made by The Marconi Company Limited, Chelmsford.

'Sentinel' diesel hydraulic shunting locomotive made by Oil Engine Division, Rolls-Royce Limited, Shrewsbury.

'Crimpspin' CS12-600 false twist crimping machine made by Ernest Scragg and Sons Limited, Macclesfield.

'DD2' dockside crane made by Stother and Pitt Limited, Bath.

Ministry units

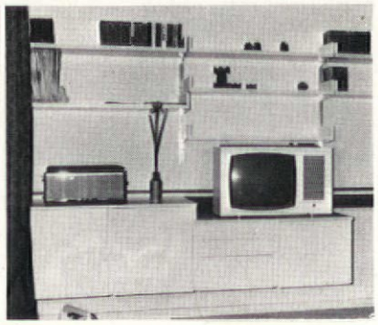
The Ministry of Public Buildings and Works' Supplies Division continues the good work (see *AD*, 3/68, p. 143): at the Ideal Home Exhibition they showed their excellent new prototype range of furniture and light fittings, for use in their future furnishing schemes for Servicemen overseas or in the UK, for the diplomatic service abroad, and possibly for local authorities, etc., to take advantage of.

All the furniture is in wood, finished with an acid catalyst lacquer, white or dark green.

The storage furniture—wall-hung cupboards and shelving—is designed by John Pound and is constructed from Nenk components (based on a 100 min. module) **5, 7**.

The easy chairs, designed by Alan Zoefty, convert to unit chairs with or without arms and assemble to make a settee or divan bed. The bases can be used for storage/tables **8–11**.

The beds, also by Zoefty, are all single size and identical, with large storage drawers under **6**. Each has a double thickness folding mattress, so when two beds are combined to make a double bed, each mattress opens out to form a double mattress without a join. The beds can also be stacked as bunk beds.



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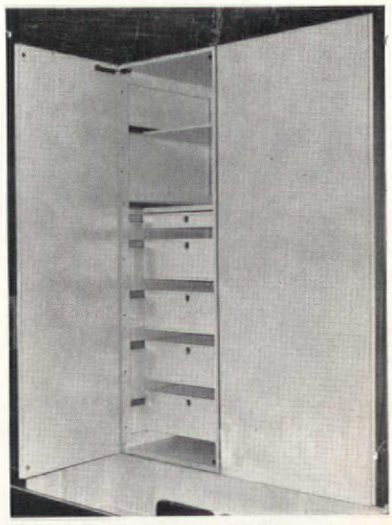

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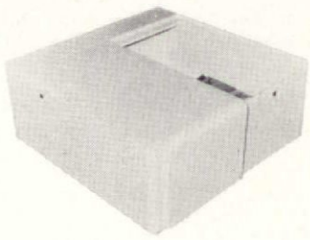

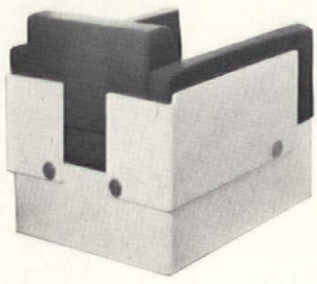

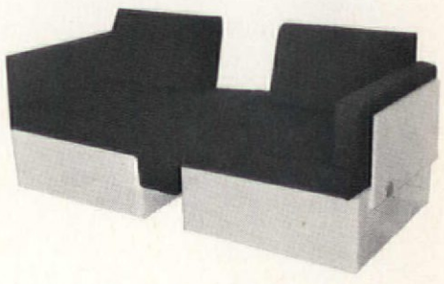

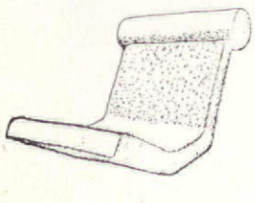

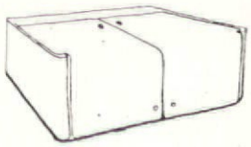

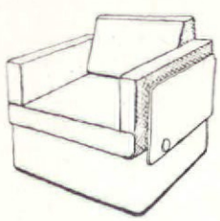

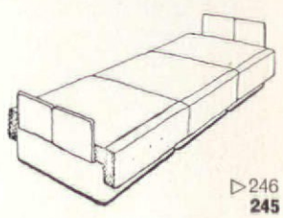

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"We're putting it up at Heal's. Miles of it. I think it's the best thing that's happened to lighting since Edison."

Christopher Heal: convert

'When we were discussing the refitting of the showrooms, our design department suggested that we used Lytespan. We were very dubious because although this equipment had been known to us, we felt that it might be a bit extravagant. However, we agreed to install it in one department. That was two years ago. We are now fitting Lytespan extensively because we see that it offers something that other systems don't—extreme flexibility—and that's vital in this shop. This track system can cope with our ever-changing floor plans and displays very competently. We have used it suspended from the ceiling. It's unobtrusive, safe and well made. There is no comparable system. Seeing's believing. Come and see for yourselves. Heal's have it.'

Lytespan Lighting Track by Rotaflex Concord

leading lights

Contact: Dept. 20, ROTAFLEX (Great Britain) LTD., ROTAFLEX HOUSE, CITY ROAD, E.C.1. TEL: 01-253 8371

Lytespan is a registered trade mark and is patented.

Kitchen thinking

There was evidence this spring of new thinking in kitchen design. First we had a circular kitchen/bathroom heat unit **3–6** devised by George Fejer and Frank Watkins at the Ideal Home Exhibition in the kitchensense section.* This consisted of a central bathroom encircled by kitchen/living fittings, the whole thing forming a single unit which could be delivered as a prefabricated package and hoisted into position by crane.

Then came the 'capsule' kitchens shown at London's Design Centre—Allied Ironfounders' storage kitchen wall **1** and Brooke Marine's kitchen-on-wheels **2**. The first of these, though seductively beautiful in shining white plastic with rounded corners and time clocks and dials and other gadgets, caters for a soulless future in which 'cuisine' and fresh food play no part and everything we eat must be frozen or dehydrated or pre-processed.

The kitchen-on-wheels is a realistic cooking trolley with built-in fridge, electrically powered and providing a certain amount of storage in cupboards and drawers.

The kitchen/bathroom **3–6** heart unit's microwave oven and cooking discs are controlled ordinarily or by instructions dictated into a microphone. Washing-up and laundry are also programmed. Doors and drawers are operated by foot control. In the bathroom, basin, bidet and bath are plastic moulded in one, warm air jets replace bath towels (but why not *all* towels?) and disposable hand towels go into the automatic conveyor rubbish chute. Closed circuit TV and other audio-visual transceiver equipment can be incorporated on the living room side.

The kitchen wall **1** was designed by John Rowley, head of A1's industrial design unit, the kitchen is still only in prototype form. Made in metal, glass and plastics on a steel frame, it is built to modular metric dimensions, and can be installed either free standing or incorporated into an exterior wall, so that the rear service doors fitted with a combination lock can be used for the delivery of foodstuffs. Incinerator ash and rubbish from the paper sack container is removed by refuse men in the same manner.

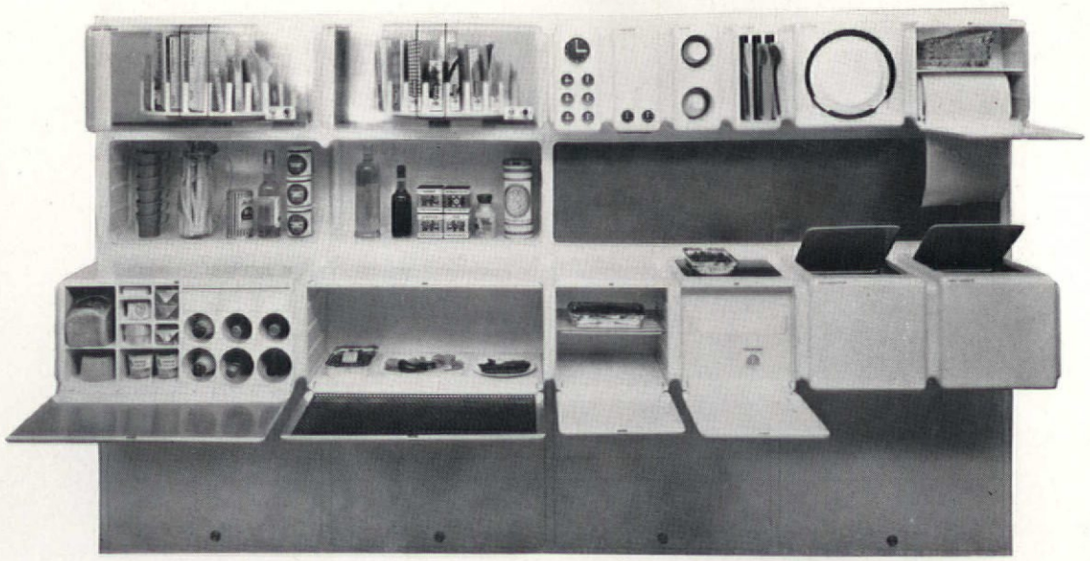
Deep frozen or AFD foods go into double or single skinned clear containers to preserve the correct temperatures; food packs slot into two carousels which rotate and eject the selected pack by push-button control; milk, butter, cheese and similar items go in the insulated chill store.

Most frozen foods will cook rapidly in the microwave oven, but the forced convection oven together with the large hob, toaster and grill cater for any combination of prepared foods. Water for reconstituting AFD foods is provided by the liquid dispenser in measured quantities from a teaspoon to a pint, at pre-dialled temperatures.

The ventilation system which operates over half the external wall area, and from inside the ovens, toaster and incinerator, switches on automatically when the unit is in use. The control panel includes the master clock, a temperature control for the forced convection oven and grill, and time controls for the microwave and forced convection ovens and hob. All these units are colour coded to the controls and can be automatically cycled. The toaster and grill are independently controlled and the incinerator operates automatically when waste is loaded in.

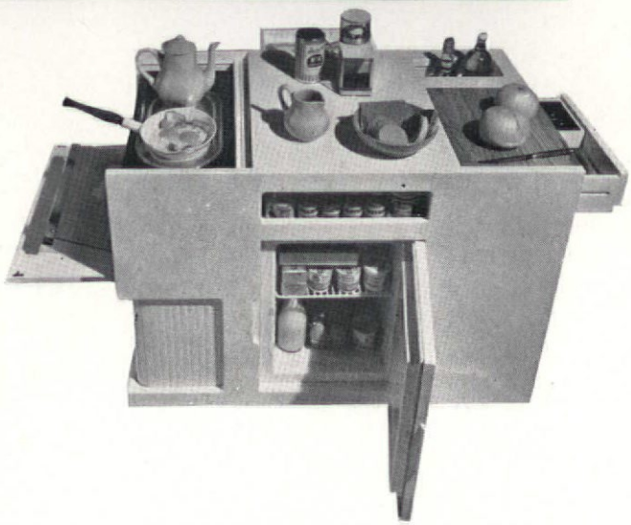
Cooking must be done in aluminium foil and card containers, and food served on glazed paper plates. Hot liquids are poured into cone-shaped plastics containers with holders, and cold liquids into translucent beakers. All utensils and cutlery are disposable and are housed in special dispensing units.

Fuse boxes and wiring and the rubbish sack are below the units



1

Brooke Marine's kitchen-on-wheels **2** incorporates a cooker (Baby Belling oven, hob and grill), with pull-out cover, a fridge (Electrolux Minilux), an inset chopping surface, a bottle rack, two drawers, and various cupboards. The unit which is finished in melamine-faced material, measures 3ft × 4ft × 2ft 10in, and has 4·4 cu. ft storage capacity, was designed by John Wright and Jean Schofield of Walker Wright Schofield Ltd. Brooke Marine, who are shipbuilders and engineers at Lowestoft, think their new unit will cost just under £100.



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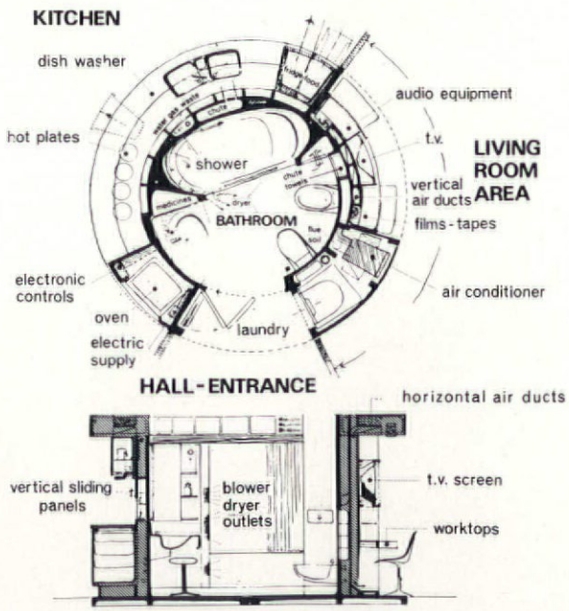
* *Presented by Hygena Limited, Formica Ltd, The Gas Council, The British Lighting Council, Armstrong Cork Co Ltd and twenty-one manufacturers of electrical appliances and bathroom fitments.*

Photos: Sam Lambert



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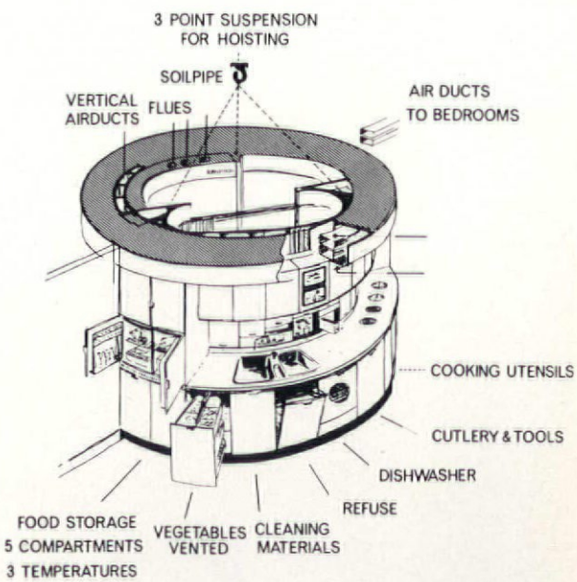

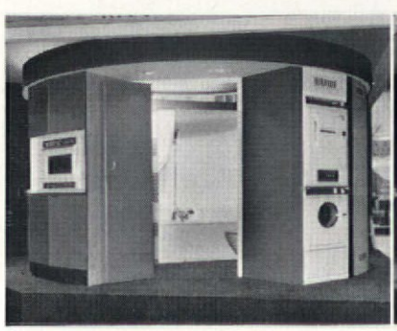

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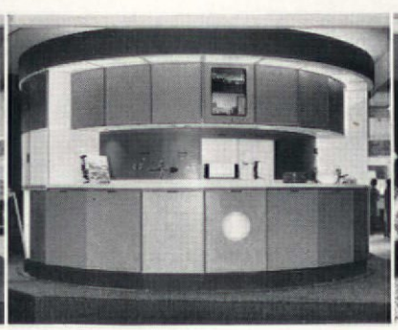

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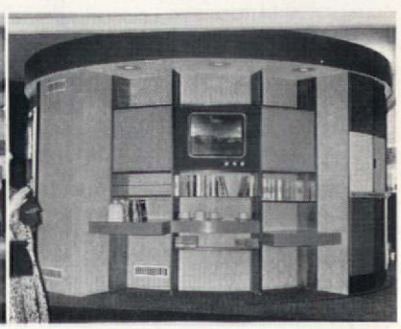


6

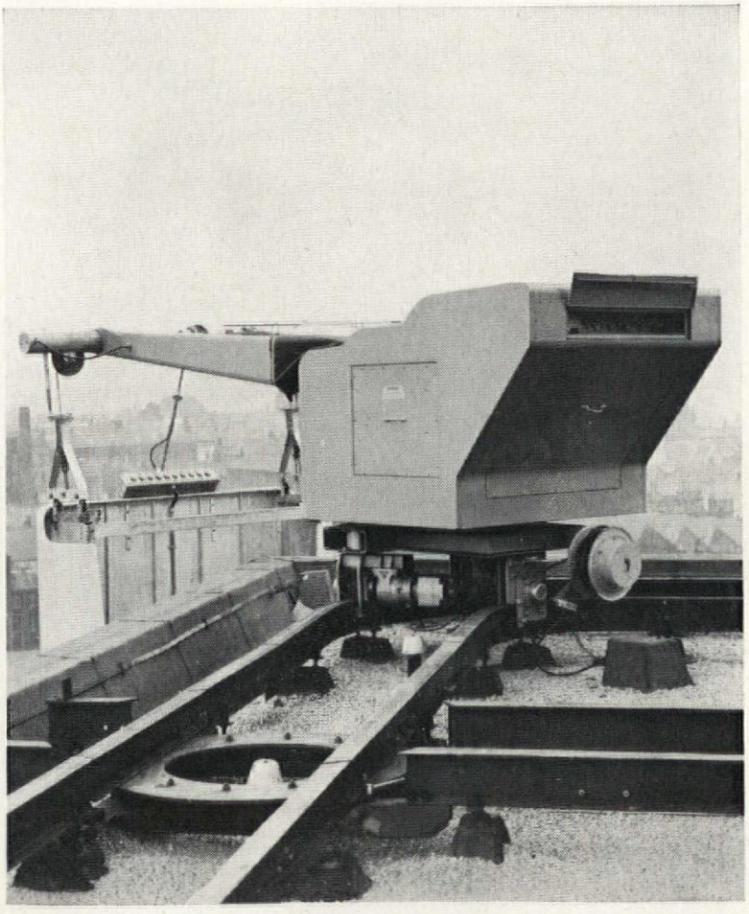
Palmatic

the most sophisticated maintenance cradle on the market

The Palmatic is fully automatic. A window, a strip of cladding, even an isolated rivet head can be reached quickly, smoothly, by fingertip control from the cradle.

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

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



PALMERS
ENGINEERING LIMITED
Ashmead Road, Keynsham, Bristol
Telephone: Keynsham 4281

Also offices at London, Manchester and Middlesbrough, in your Classified Telephone Directories.

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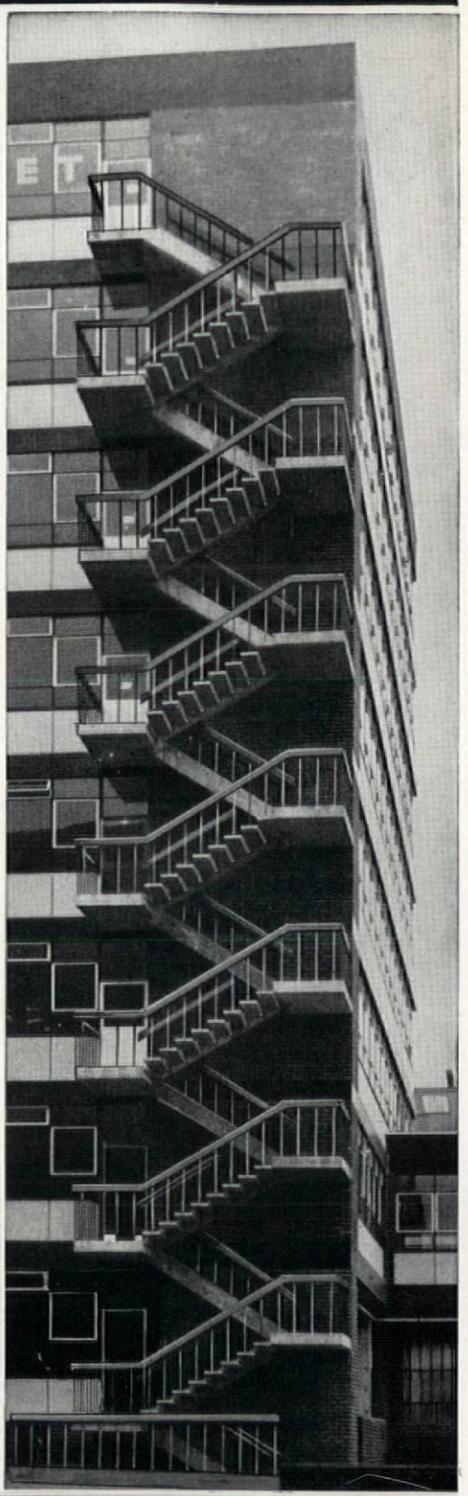

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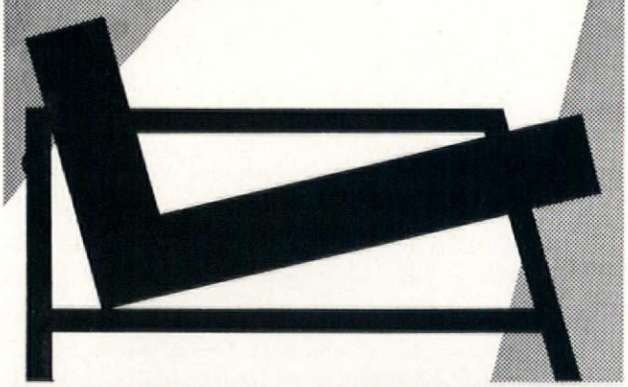

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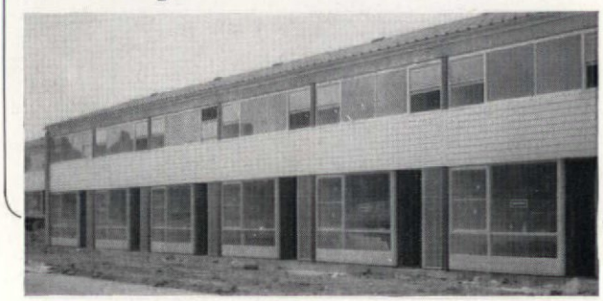

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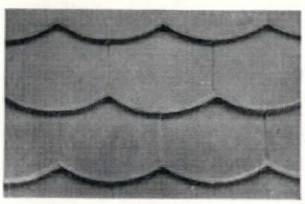

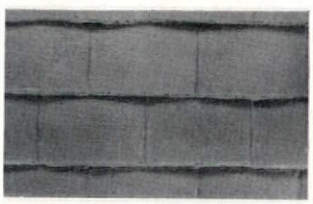

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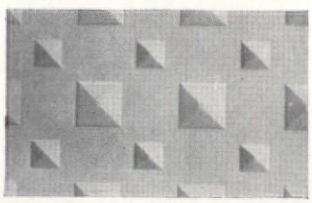

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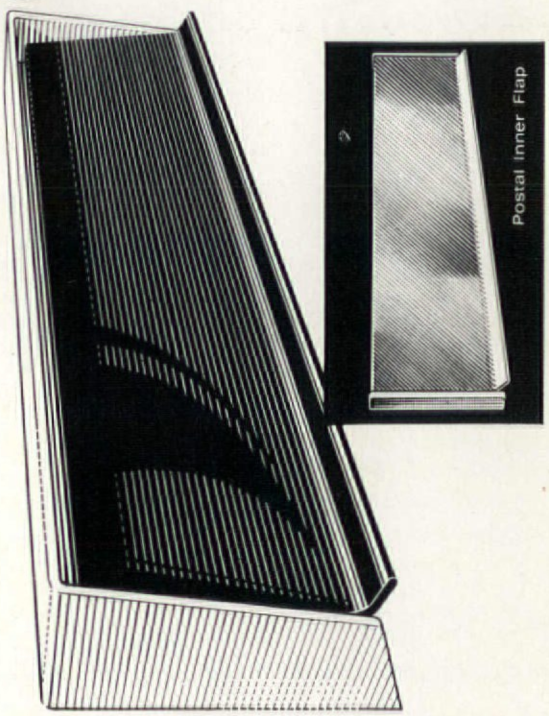

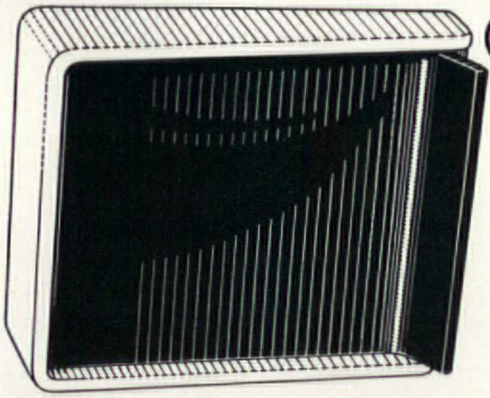

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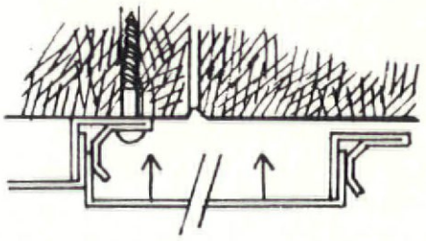

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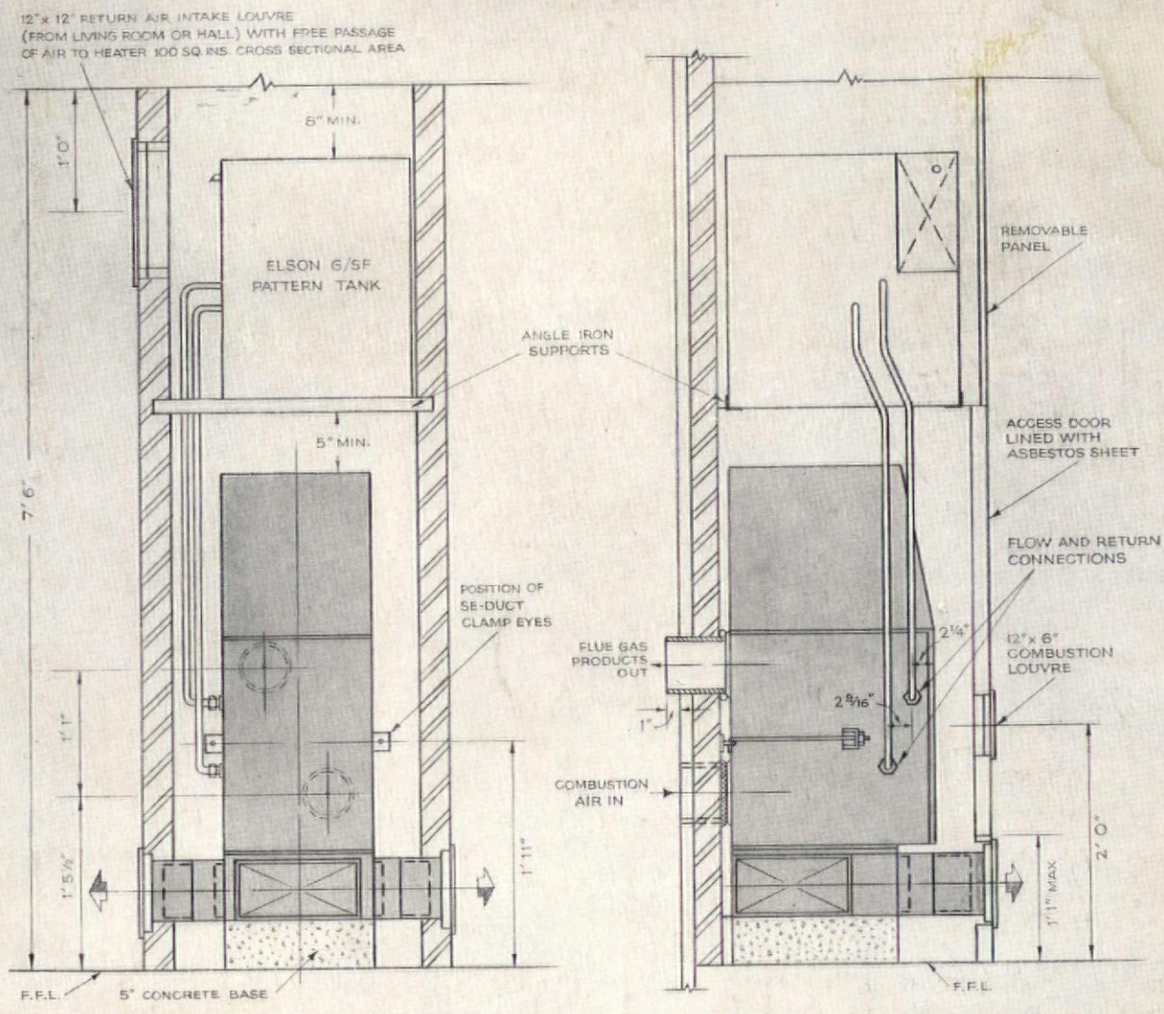

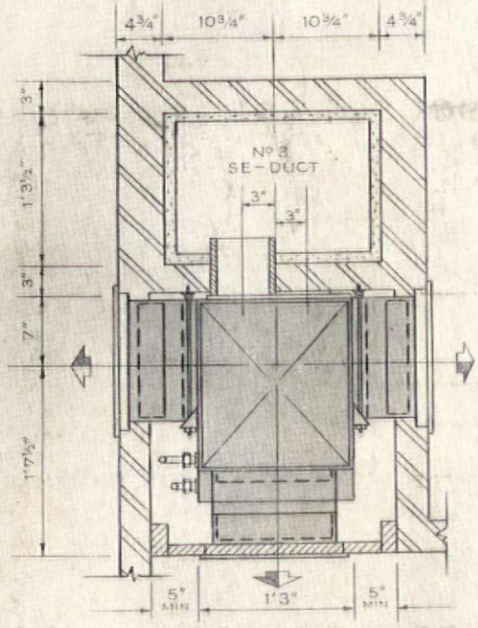

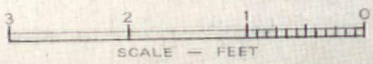

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