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Metal-frame houses of the Modern Movement in Los Angeles

Part 2: The Style that Nearly . . . [1]

by NEIL JACKSON

In 1950, the year California returned Richard Nixon to the United States Senate, *Arts and Architecture* put Raphael Soriano's Case Study House on display to the public (Fig. 1). This programme, promoted during the post-war years by John Entenza's adventurous magazine,[2] sought to provide exemplars for contemporary living.

Offered as the Case Study House for 1950, Soriano's design was intended to present 'a method of building within the means of reality'.[3] While not necessarily any less expensive than the Case Study House for 1949, the nearby Eames House (see Part 1, Figs 8, 9 and 10), it was appreciably closer to the original goals of the programme as first mooted in 1945: 'the house must be capable of duplication and in no sense be an individual "performance" '.[4] It is this idea of reproducibility, of mass-production potential, which separates Soriano's work, as it developed in the 1950s, from that of many of his contemporaries.[5] This was an attitude he maintained until he died nearly forty years later: 'My whole idea was to have [prefabrication] in housing . . . because we need housing for the public, and I was trying to pursue this in the assembly method, prefabricated'.[6]

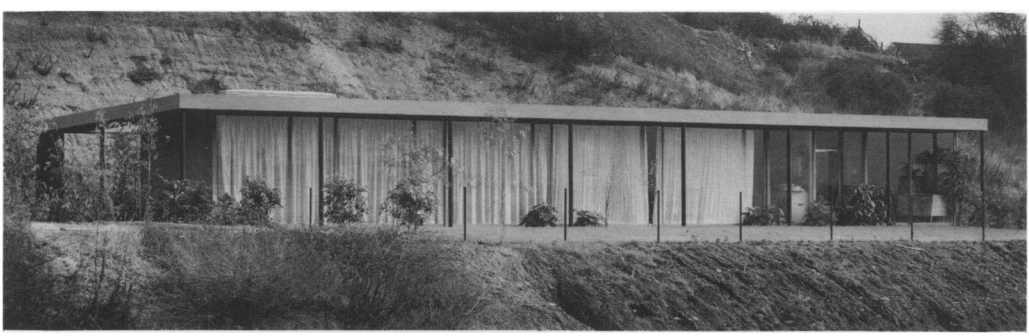

Fig. 1 *Raphael Soriano, Case Study House for 1950. Pacific Palisades* (photograph: Julius Shulman)

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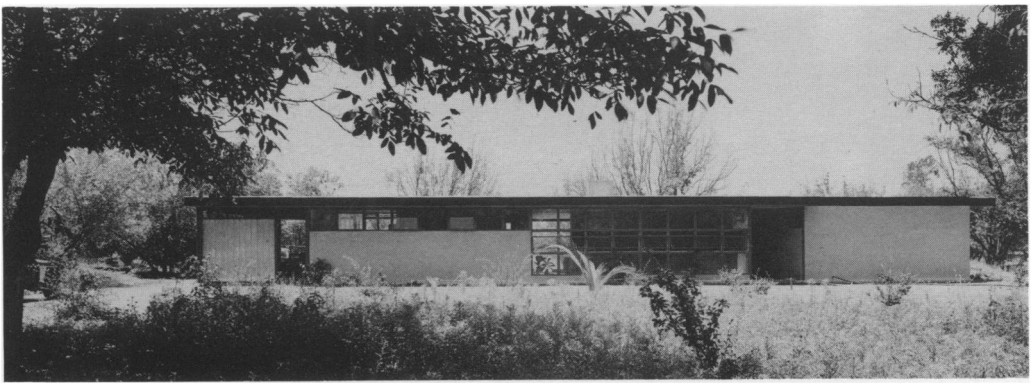

Fig. 2 *Raphael Soriano, The Katz House, Van Nuys* (photograph: Julius Shulman)

In the pre-war years Soriano had begun to experiment with metal construction but it was not until 1947 that he had built his first metal-frame house. This was the Katz (or Gato) house[7] in Van Nuys and, like his earlier steel-frame buildings,[8] its wall construction employed Lattisteel panels manufactured by Fritz Ruppell's Lattice Steel Corporation of America (Fig. 2). But when used in conjunction with pipe columns and steel trusses, in the context of domestic architecture, these heavy panels allowed little of the exploitation of open space which such a lightweight post-and-beam frame suggested. Thus Lattisteel panels seemed inappropriate to housing in much the same way as did the prefabricated steel wall-sections of Frank Lloyd Wright's hillside houses intended for Los Angeles in 1938.[9] Designed at the same time as Soriano's Jewish Community Center in Boyle Heights, Wright's houses were to be, similarly, all-steel, but were conceived in the fortress-like manner of his concrete-block houses of the 1920s. Anyway, after the Katz House Soriano did not use such solid construction again.

Soriano built three houses immediately prior to or contemporary with the Case Study House: the Shulman House (built for the photographer Julius Shulman and now designated as a Cultural Heritage Monument) and the Curtis (or Noyes) House in 1949 and then, in 1950, the Schrage House. The frame construction of these buildings was very similar — steel I-beams supported on three-inch or three-and-a-half-inch pipe columns (Fig. 3): this was the system he had used at the Jewish Community Center and then at the Katz House.

Although in the Shulman House he used conventional timber-stud wall-panel construction, at the Curtis House he introduced a new idea which was to be found again in the Case Study House. This was what he termed 'Experimental Unit Development' — the use of factory-built units to replace all internal partitions. In this way, interior on-site construction work was virtually done away with and prefabricated space dividers, incorporating shelves, cupboards and cabinets, were brought in from the factory and installed, supposedly, with little effort. The result was intended to be a shorter on-site construction time, a cleaner building process and a designed-to-fit accuracy which could be demanded by steel–frame construction but was rarely available in the confusion of a building site. But in the event the units, which required time-consuming and expensive detailing, were often difficult to install.

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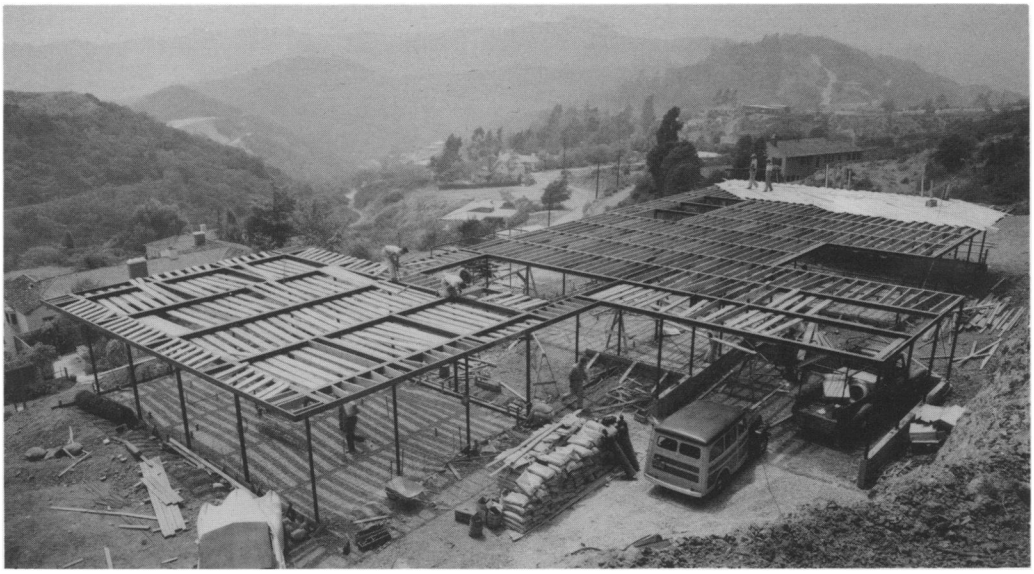

Fig. 3 *Raphael Soriano, The Shulman House, Hollywood* (photograph: Julius Shulman)

Like the Curtis House, the Case Study House was designed with a steel frame requiring no bearing walls and planned within 'an orderly system of modules'. 'The insistence on modular planning, particularly in steel,' Soriano pointed out, 'is of great importance. Planning with steel must be done logically and economically, for tricks are costly and hazardous . . . The planning within an orderly system of modules, and a restricted amount of square footage as a requirement, demands complete objectivity and disciplined integration in determining the relationships of required elements'.[10]

It took three days to erect the frame and to lay the metal roof deck for the Case Study House.[11] The three-and-a-half-inch pipe columns were placed on a modular grid measuring ten feet by twenty feet which was spanned by six-inch I-section steel beams in the longer direction and steel roof decking in the shorter. And, as *Arts and Architecture* was quick to point out, the 'first indication of the practical nature of the architect's planning and engineering was reflected in the fact that the framing cost was no more than it would have been had wood framing been used — probably less'.[12]

Soriano's interest in public housing, as opposed to one-off design, soon manifested itself through the operations of Joseph Eichler, the principal of the housing development company J. L. Eichler and Sons, whose base was in northern California — not the Los Angeles area — at Palo Alto. Soriano built only one house for Eichler yet it demonstrates well his understanding of the metal-frame house. Completed in 1955, this building was a prototype, not for sale, and as an advertisment for United States Steel explained, it was 'an experiment to gain cost and production experience in the use of steel for mass-production building. The finished job is promising evidence that sub-divisions [that is: housing tracts] of steel are both practical and imminent'.[13]

In the effort to promote the metal-frame home to a presumably sceptical public and no less sceptical building industry, much was made of the Eichler house. United States

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Steel, who had an obvious interest in the project, quoted public reaction — 'These rooms look immense yet the place is only 1040 square feet . . . this place could really take a beating and still last for ever! . . . no termite worries with steel'[14] — but they also echoed, perhaps in an effort to appear fair, what must have been a common complaint, 'these modern house just don't look homey'.[15] Soriano himself wrote a long polemic for the house in *Arts and Architecture* — longer, indeed, than anything this progressive magazine had published on metal-frame houses in the last decade. 'Home builders', he argued, 'have not yet fully discovered steel's tremendous flexibility and its time-saving potential. It is a medium in which the builder must have competent professional assistance to realize the greatest value. Here, we enter into a new phase of building industry in housing in which the details must be as meticulously planned as the details of a multi-story steel building, requiring not the haphazard concoction of timber and nails but a precise, well-detailed structure with a developed analysis of its component parts'.[16]

Soriano designed the Eichler house in the same way as the earlier Curtis and Case Study Houses: 'It was necessary to think in terms of mass production by efficient machinery, welding of columns and beams electrically, storage walls made and preassembled in the cabinet shop . . .'[17]

The spacial possibilities afforded by the Soriano/Eichler home were also a selling point:

> In comparing the conventional type of wood structure with our concept it will be found that every room in the wood structure is surrounded by parasitical walls. For example, a 10 × 12 foot room will be delineated by 6 inch walls. The roof also is supported by some of these walls, thus preventing the maximum utilization of the floor area . . . With steel a precise modular structural system remains — depending on no bearing walls — only on perimeter columns. The wasted 2-foot depth of wall space of the wood structure is now used for wardrobes or cabinets of other types.[18]

And much was made out of the constructional advantages:

> To achieve a long clearspan with timbers they must be at least twice as thick as steel beams and spaced at more frequent intervals. As an example, this house of 1000 square feet was achieved with seven beams and fourteen columns where it would be necessary to use fifteen to twenty-four beams in the wood structure. After wooden beams are up, the problem of finishing the shrunken and cracked beams becomes a costly one. With steel beams the problems of refinishing and readjustment are non-existent. Not counting the fact that the steel frame is erected square and plumb within a matter of three to four hours . . . less time than it would take the carpenters to readjust the wood frame.[19]

The other Los Angeles architects who became involved in building for Joseph Eichler was the firm of Jones and Emmons. Archibald Quincy Jones had gone into partnership with Frederick Emmons in 1951 and almost immediately began working with Eichler. One of the first fruits of this association was a model home built in the Research Village at Barrington Woods, Barrington, Illinois as part of a housing development sponsored by United States Gypsum. Completed in 1954, this house employed open steel trusses and exposed metal decking and, although it was not the only one of the six model houses to use steel construction, it was the only one which made an aesthetic virtue out of it. And thus, being 'designed around the use of

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incombustible materials that are suitable for shop or job prefabrication'[20] it reflected the ideas already promoted by Soriano.

At this time Jones was also building his own metal-frame house in Bel Air. Here he had the opporunity to develop a flexible, framed building system which would be equally applicable to one-off and speculative housing. Using four-inch steel columns and ten-inch steel beams supporting a steel roofing deck, Jones provided a wide expanse of flexible living space and even managed to retain some 15 per cent of the floor area for interior, open air planting.[21] Once again this effort might be compared to Soriano's work — both the Shulman and Case Study Houses had contained interior garden space. When the Jones house was finished in 1954 it was found that 'the steel construction cost-wise, proved comparable to timber construction and has provided a pleasant living space with the minimum of construction time'.[22] Incombustible materials or not, the house was burnt out in the Bel Air fire of 1963.

Following Soriano's Eichler House in Palo Alto, Jones and Emmons built a similar house the following year, 1956, in nearby San Mateo. Promoted, once again, as an experimental house and even a 'research laboratory',[23] this building was 'not offered as a production model but planned for the purpose of acquainting the public with previews of planning concepts and building ideas indicative of what can be expected in the merchant-built houses in a few years'.[24] This house, dubbed the X-100, used United States Steel's standard four-inch H-columns and eight- and ten-inch I-beams, beams which would have had to be at least sixteen inches deep if specified in timber. Thus 'the thin crisp lines of small steel members produce' as the United States Steel advertisement assured, 'a light elegant feeling and a "floating roof" '.[25] And the house also sought to blend interior and exterior space, as the Jones house had done, in order 'to provide year-around garden living'.[26]

Despite the efforts of Eichler, the advertisements of US Steel and the pioneering work of the Case Study House Program, the housing industry was slow to respond to their example. The industry had enjoyed a nation-wide boom in 1949 and the momentum had carried over into 1950. In 1949 some 35,000 prefabricated single family homes had been produced which, with a value of $280 million, accounted for about seven per cent of the housing market. In 1950, the target was set at 50,000 new prefabricated homes and, at the end of the first quarter, shipments were up by 200 per cent on the first quarter of the previous year.[27] But these prefabricated homes took no advantage of the potential of high-tolerance steel construction. Gunnison Homes Inc., for example, a subsidiary of US Steel, manufactured the Gunnison Homes Deluxe, Master and Champion series — all out of plywood.

The absurdity of this situation was recognized, in 1955, by a British architect Michael Brawne, now Professor of Architecture at the University of Bath. Brawne had done graduate work at the Massachusetts Institute of Technology — his investigation of building systems had been published in *Arts and Architecture*[28] — before migrating to the west coast.[29] Writing in *Arts and Architecture,* he drew attention to the 'gap between the quality of our refrigerators and of our towns . . . National Homes, Harnischfeger, US Steel, Cliff May', he noted, 'are all marketing the packaged house. Once it has been assembled on the site and tied to the utility lines, however, it is indistinguishable from its hand-made neighbor. In this way prefabrication achieved respectability at the

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expense of progress'.[30] To be fair, it was not altogether the fault of the house-building industry: it was often the developers of the tract homes who brought restrictive measures to bear on their sub-divisions.

Richard Neutra, whose Lovell House of 1929 had opened the way for metal-frame houses in southern California, railed aginst the conservatism of the tract developer during the early years of the 1950s. In 1951 he published an article in *Arts and Architecture*[31] on 'Restricted Architecture' and in 1954 developed these ideas in his book *Survival Through Design*:

> We have mentioned the incident of a speculative real-estate subdivider who, once having invested in a particular brand of aesthetics, tries to cut his worries. He institutes some sort of 'Architectural Tract Restrictions' in order to freeze design and arrest development to rigid unity and powerful permanence.

And then he adds, perhaps a little wistfully:

> Restrictions of a stylistic kind might in fact cause land sales and values to fall off. Tracts thus restricted may later collapse commercially unless property owners awaken and band together in revolt to lift the restrictive covenant that makes them early Californians or Cape Cod fishermen.

Ultimately, his observation is the same as Brawne's:

> While even laymen readily understand that, basically, construction must govern appearance, there is reasonable doubt that steel-built houses would sell well from the start if they actually looked like what they were.[32]

The problem, however, was well expressed in a report which appeared the same year in *Arts and Architecture*. It concerned the Kelton House, whose architect was Craig Ellwood. The building was metal-framed, and the walls were non-shear and non-bearing, the steel H-columns and I-beams being left exposed to become an integral part of the design. But, as the report said, 'unfortunately the house will not be built. The tract architectural committee rejected the preliminary drawings because the architecture "does not conform" '.[33]

Nevertheless, a few of the younger architects and designers turned to steel (as opposed, perhaps, to plywood) as the principal material for mass-production housing. In 1950 the firm of Bassetti and Morse published designs for 'Low Cost Multiple Dwellings' which were intended to satisfy 'the housing need of the smallest family groups, the portions of our society whose living requirements, in terms of physical space, are the simplest'.[34] Here the cost saving was not in the construction but in the purchase of a steep and, without steel, otherwise unbuildable site. Two years later Frederic Barienbrok and Eugene Memmler's design for 'A Modular System for the Small House' took advantage of the facilities already available within the industry:

> all component parts used in this house are produced by already existing manufacturers, and therefore, in normal times, the supply to the consumer would be unlimited. It is not necessary to set up any mass-production factory to produce this type of modular house.[35]

A development of this idea was published two years later by Memmler, now in association with Richard O. Spencer. Here the steel frame was used to extra advantage on a steep, hillside site.[36]

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It was the suitability of the steel frame to the unstable Los Angeles hillsides, as Neutra had demonstrated in the Lovell House, which encouraged its most frequent use throughout the 1950s and into the 1960s. Bassetti and Morse's project of 1950 had used a hillside site as did those of Greta Magnusson (1950), [37] Gene Loose and Kipp Stewart (1950, 1951 and 1953),[38] James Durden (1952),[39] William Alexander (1952),[40] Thornton Abell (1953),[41] Allyn Morris (1956 and 1962),[42] Bernard Zimmerman (1960 and *c.* 1962),[43] Neil Johnson (1961)[44] and Raul Garduno (1962).[45] But in seizing upon steel's structural capabilities and employing it in their individualized, hillside houses, these architects and designers failed to demonstrate an appreciation of the high-precision, industrial, reproducible quality of the material with which they were working in the way Soriano, and Neutra before him, had done. As Neutra himself commented:

> The concept of rarity or uniqueness is as foreign to this new type of precision as it is to this new type of quality . . . Precision, formerly a luxury, has turned into a prerequisite for economical production and maintenance, because the possible market, the scope of consumption, depends upon it.[46]

It must be a recognition of the continuing significance of *Arts and Architecture* that in the five steel-framed Case Study Houses which it promoted throughout the 1950s, reproducibility was a central issue — and none of the houses was built upon a sloping site. In this, the intent of Soriano's Case Study House 1950 was continued.

Case Study Houses 16, 17 and 18 were all built by Craig Ellwood: 21 and 22 were by Pierre Koenig. Both Ellwood and Koenig had been building in steel before John Entenza invited them to participate in the programme. Ellwood's career had started, in 1947, with the building firm of Lamport, Cofer, Salzman.[47] As he explained, 'Charles Eames and John Entenza had heard about Lamport, Cofer, Salzman and brought their Case Study Houses to us for bidding. I think we were the only bidders and I was cost estimator on both houses, the Eames House and the Entenza House'.[48] A few private commissions encouraged him to leave Lamport, Cofer, Salzman in 1948 and to set up on his own as a designer: he was not an architect, but some evening classes in engineering at the University of California, Los Angeles gave him an appreciation for steel. This had an immediate effect on his architecture and in the Hale House, the first building he did after attending UCLA, the architecture was a strong expression of the structure (Fig. 4). This building, published in *Arts and Architecture* in 1952, was a turning point for him:

> The plan was fitted among existing trees and paralleled to existing contours; an 8-foot modular structural scheme was selected . . . column to beam connections are designed to withstand all lateral forces (seismic and wind), allowing the elimination of standard shear walls . . . structural members, the beams, steel columns, and connecting straps and angles are exposed throughout to become part of the architectural expression . . . space is not bound by the perimeter of the room; and uninterrupted motion of the ceiling pattern and the interpenetration of house and garden through the transparency of glass result in a visual freedom that suggests unlimited expanses beyond.[49]

Koenig, on the other hand, had trained in architecture at the University of Southern California and had spent three months working in Soriano's office. 'Of course', he later recalled, 'it was terribly educational and a lot of fun and most interesting and it

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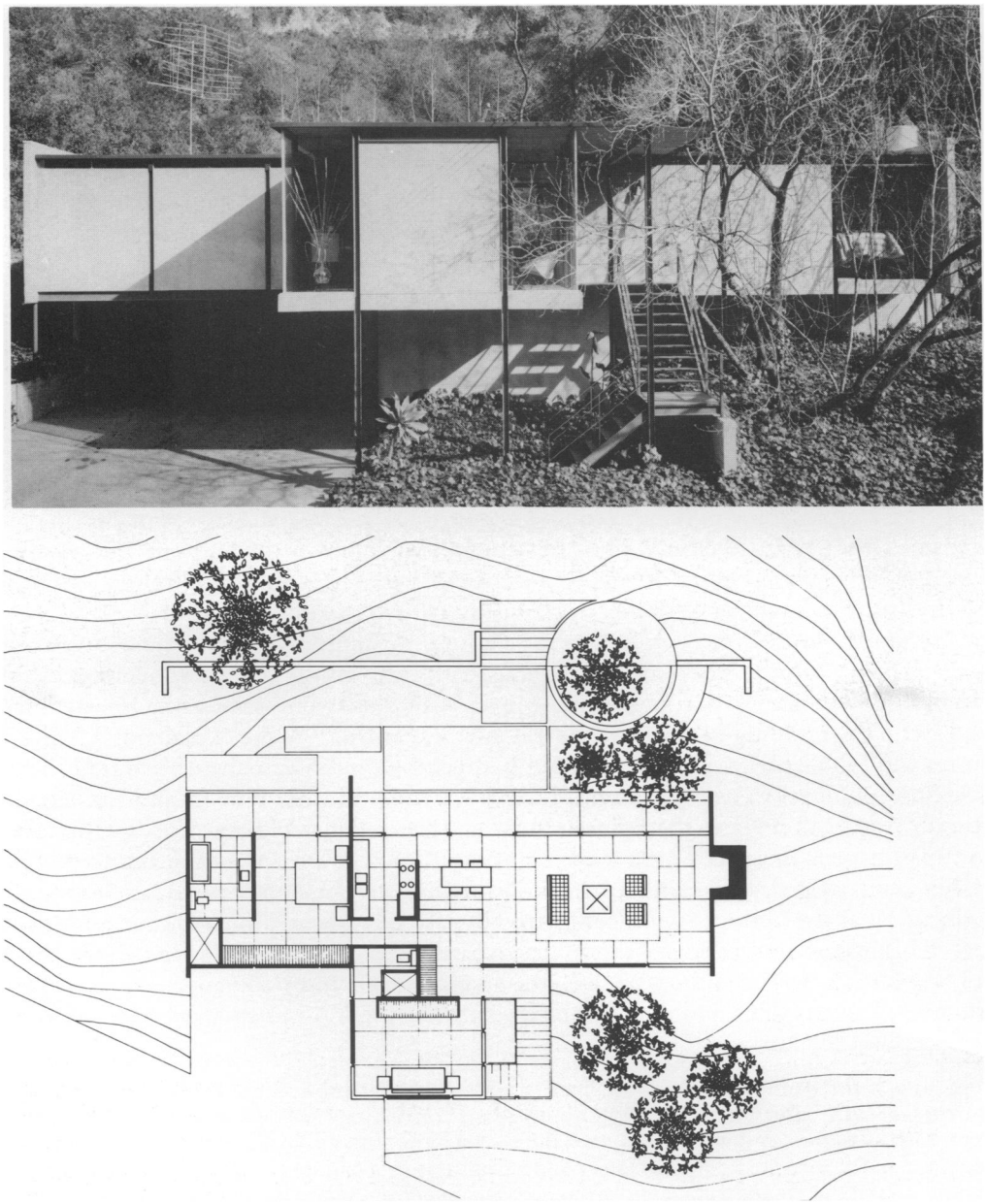

Fig. 4 *Craig Ellwood, The Hale House, Beverly Hills* a. *exterior*; b. *plan* (photograph: Jason Hailey)

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Fig. 5 *Pierre Koenig, The Koenig House, Glendale* (photograph: Julius Shulman)

contributed towards my apprenticeship. So I'm grateful [to] Soriano for giving me that time'.[50] In 1950, while he was still a student, he built, in Glendale, his first metal-frame house (Fig. 5). It was a small structure, about 1000 square feet and was for his own use. Built out of steel pipe columns, I-beams and exposed roof decking it cost $5000.[51] Through this early design, paid for out of his own pocket, Koenig 'learned how buildings really went together in an economical way'.[52] And this sense of economy translated itself into an understanding of the greater potential of metal-frame construction. As he later said:

> Yes, it was always my interest to do two things in life when I did a building. Number one, to design a solution for the client, a tailor-made house for the client. And number two, to design and build a prototype for possible mass production. And one didn't negate the other. I was able to do both.[53]

His interest was, and still is, in variation, in the use and reuse of repetitive parts. As he said, 'I believe this is the way . . . to solve housing problems for the mass of people'.[54]

After a number of metal-frame houses which capitalized upon the economy and flexibility which the structure offered, Koenig produced, in 1957, designs for a 'Low Cost Production House'. Here, in the attempt 'to combat today's high cost of building and to produce a competitive house with features not ordinarily found in mass-produced houses, every up-to-date building method will be used'.[55] Thus this design

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called for prefabricated steel frames, stock lengths of roof decking and sliding glass doors and window units which could be 'brought to the job with jambs, sills, and mullions integral'.[56]

Prefrabrication, or more exactly, 'complete mechanization' was central to Ellwood's Case Study House development during the 1950s. As *Arts and Architecture* noted in 1958:

> For some time it has been Craig Ellwood's contention that the increasing cost of labour and the decline of the craftsman will within not too many years force a complete mechanization of residential construction methods.[57]

In Case Study House 18 Ellwood sought to perfect a system of prefabrication which he had been working on since 1951 (Fig. 6). As he explained:

> The first use of square steel tubing in a modular frame, I believe, was in our Case Study House # 16. From this developed the idea for an all-tube pre-fab frame of 2″ square columns, 2″ × 5½″ rectangular beams. These sections seemed to be the form best suited to detail and connection specification and standardization . . . one connection, handles all wall conditions.[58]

The result was impressive. The steelwork for the house was prefabricated into sixteen 'bents' or units of beam and column. Once delivered, these bents were erected by four men in eight hours and required site-welding for only nineteen beam connections and forty column base-plate connections. For Ellwood, the lessons of Case Study House 18 were clear:

> To us, this is proof of the direction of residential construction. With the continual increase of on-site labour cost and the decrease of skilled craftsmanship, house production must go to the factory. And the question is not whether we, as architects, idealistically accept a product house. The product house is here now, and the problem is not how to combat it, but rather how to cope with it, and if possible, control it.[59]

Product utilization was the theme behind Koenig's first Case Study House, no. 21 (Fig. 7). It was, Entenza himself said, 'a very pristine, clean design. Two details, one north-south, one east-west. One material for the roof, same one for the walls. Minimal house, maximum space'.[60] And as *Arts and Architecture* noted, 'by utilizing readily available steel shapes and products in a carefully conceived manner, a finished product comparable to any other luxury home is achieved minus the excessive cost usually associated with quality and originality'.[61]

It was during these years that the Chicago architecture of Ludwig Mies van der Rohe was becoming well-known. His aesthetic, as seen at the Illinois Institute of Technology campus and in the house he built for Dr Edith Farnsworth at Plano, Illinois, was one of steel and glass, but it had a classical quality and pristine edge which was alien to the southern Californian metal-frame houses. Mies had never built in California and was not widely published. He probably first came to the notice of the Los Angeles architects when Charles Eames reviewed the New York Museum of Modern Art's Mies exhibit of 1947 for *Arts and Architecture*,[62] even if they did not see the book by Philip Johnson and the other articles which accompanied the show.[63] Ellwood recalled that he 'became really aware of Mies's work around '55 or '56 . . . but never having studied architecture wasn't really aware of many architects other than those in California, those working in Los Angeles'.[64] Koenig, despite being university trained, seemed to have almost

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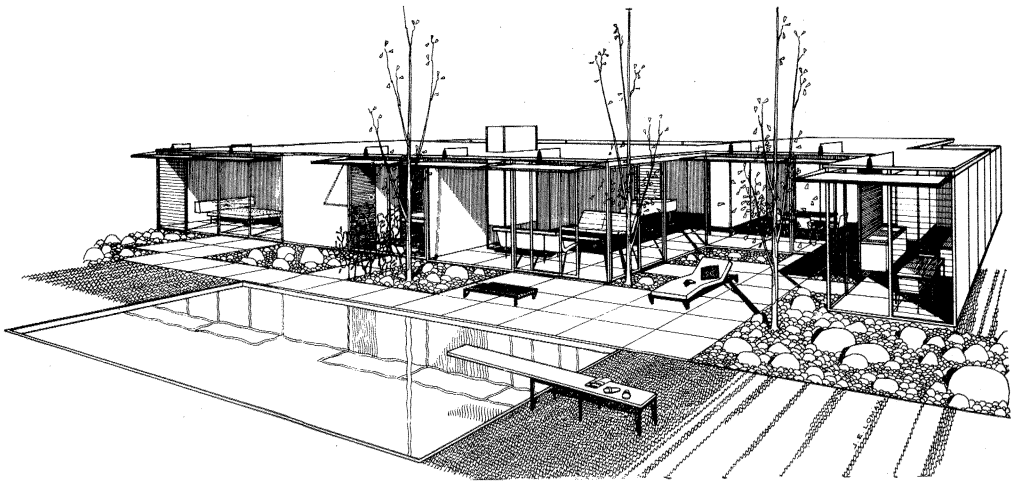

Fig. 6 *Craig Ellwood, Case Study House 18, Beverly Hills*

ignored Mies. 'Wright was the person to look up to in school when I was there', he said. 'Mies van der Rohe was just another something there, along with everyone else. It wasn't until later that I began to learn to appreciate his work'.[65]

Of all the Los Angeles architects it was only Ellwood who adopted anything of a Miesian aesthetic. 'Once I became aware of Mies's work and studied his designs', he later acknowledged, 'my work became more like Mies's in the fact that . . . I separated volumes as much as I could from the exterior walls, and I treated these volumes as separate factors of design within the total volume'.[66] The best example of this approach is his Rosen House, built in Brentwood in 1961 (Fig. 8). Framed in I-section steels and enclosed in brick panels and glass walls, the pristine quality of the building is emphasised by its sharp details and almost Palladian, nine-square plan: a plan which, however, was imbalanced in the realization by the omission of one set of steps. Nevertheless, as Ellwood insisted, 'the total volume was the important thing. And Mies, in his drawings, rarely allowed an interior partition to touch an exterior wall, and this is what I tried to achieve. I know that Mies had it easy with the Farnsworth House, because there was one person who lived in the house. Philip Johnson had it easy in his glass house because he was the sole occupant. But in my houses, I had a bit of trouble sometimes because I had to satisfy the needs of a family of four — for example, in the Rosen House. Even so, no partition touches the exterior wall'.[67] Although the Rosen House clearly was not a system-built or production house, it was, surprisingly, not an overly expensive building. As Ellwood said, 'it cost a lot less than it looks as if it cost'.[68]

In January 1961, the year Ellwood built the Rosen House, Koenig published designs for a tightly budgeted, no-frills 'Modern Production House'. For once this was not an experimental house, but a production model then being manufactured in Detroit and erected in Canada. It was, like the Detroit automobile, universal in its application. 'No attempt was made to make the house comply with any regional styles nor were any native materials used. The owner', *Arts and Architecture* explained, 'did not wish to

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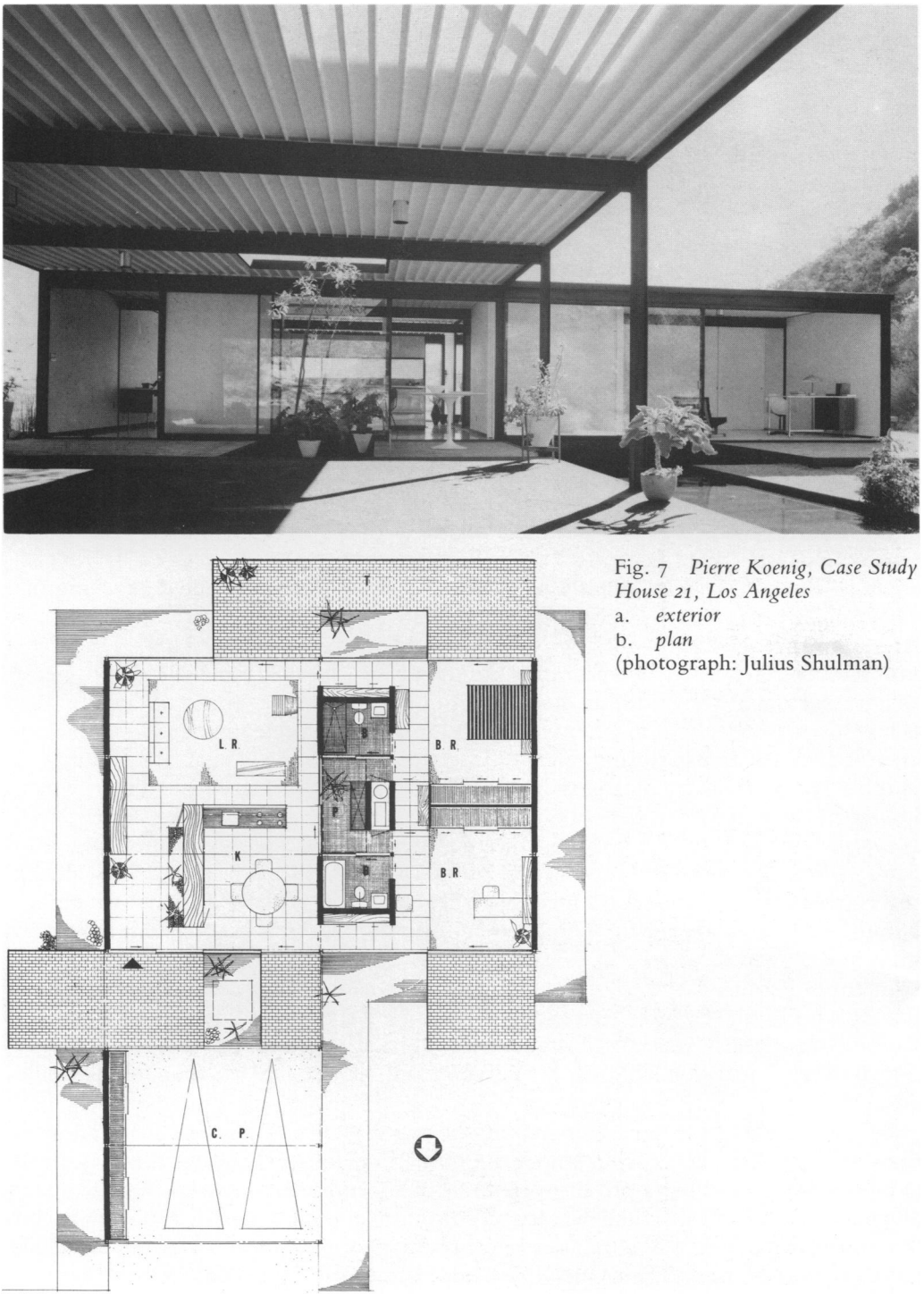

Fig. 7 *Pierre Koenig, Case Study House 21, Los Angeles*
a. *exterior*
b. *plan*
(photograph: Julius Shulman)

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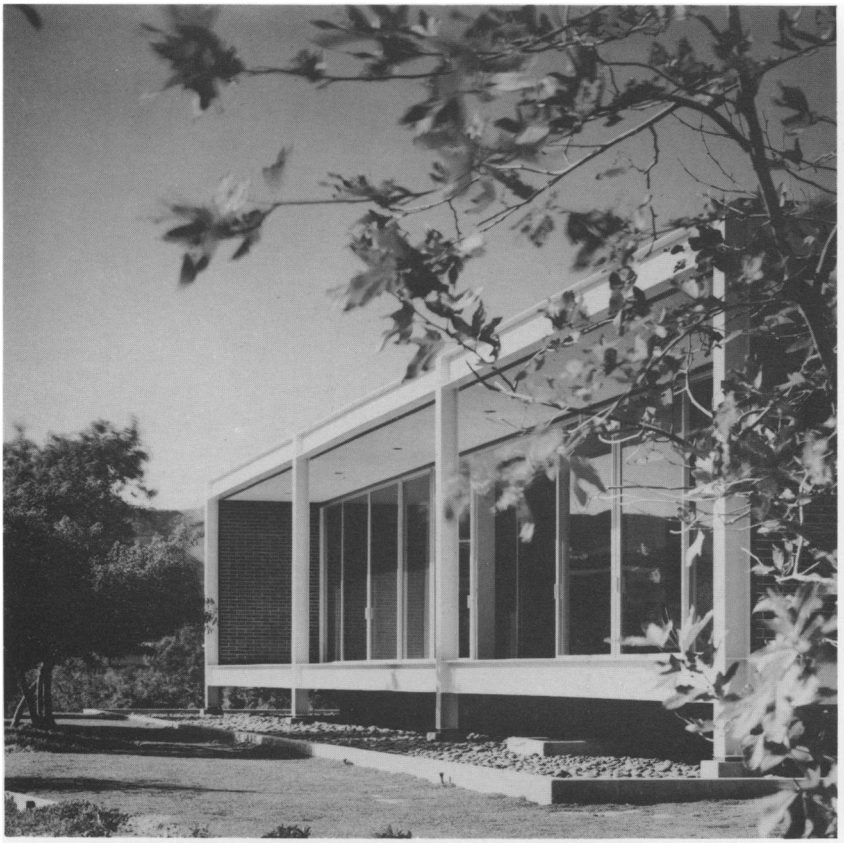

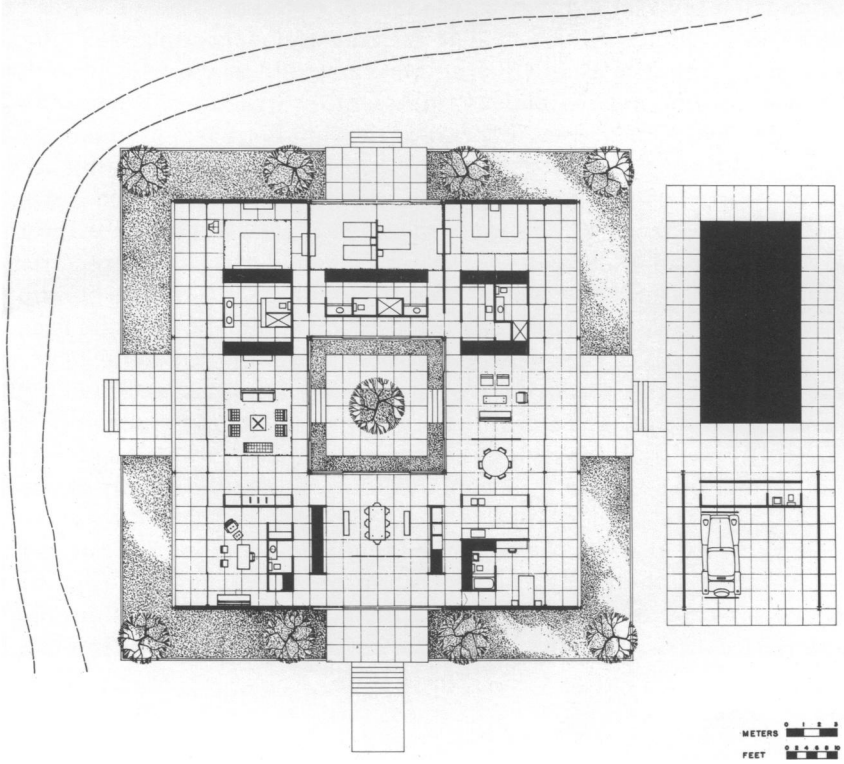

Fig. 8 *Craig Ellwood, The Rosen House, Brentwood*
a. *exterior*
b. *plan*
(photograph: Morley Baer)

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compromise on the basis of nebulous public acceptance theories'.[69] Like Henry Ford, it would seem, he would give the public any colour so long as it was black.

The one other metal-frame, mass-production scheme which did get off the ground in these years was, similarly, an 'out-of-state' venture. Although its architect, Raphael Soriano, was now living in Marin County, across the Golden Gate from San Francisco,[70] it is worth including for two reasons. Firstly, it was the final expression of a continual development on the architect's part and, secondly, it employed a different metal, aluminium.

Soriano's interest in aluminium went back to 1942 when he designed a mobile, folding house for the president of Consolidated Vaultec Aircraft Co. During these war years, a number of younger architects and designers were investigating the possibilities of this strong and extremely lightweight metal.[71] But few, it would seem, could see far beyond its high-technology appeal. Esther McCoy, a long-time recorder of southern Californian architecture, recalled the time:

> During the war, many architects and engineers in the aircraft plant (where I spent two years drawing little else but lightening holes in airplane wings) were preparing plans for a future house that was to be brilliantly engineered, furnished with gadgets and clothed in pastoral garb — a marriage between Walden Pond and Douglas Aircraft. It was the outwardness of the industrial message that appealed to them, not the inner compulsions.[72]

But it was the inner compulsions which drove Soriano. In 1950 he had been invited to attend the Aluminum Company of America (ALCOA) conference in Boca Raton, Florida during which the building potential of aluminium was discussed. The opportunity to employ aluminium presented itself four years later when Soriano was asked to build a large office building in Burbank for the Adolph Company. Here he employed the prefabrication, assembly method used at the Curtis and Case Study Houses but framed the building in aluminium and steel. The design was widely applauded but did not lead to any further commissions in which aluminium could play a role. So in 1960 Soriano started developing his own Modular Plan Assembly Structures. Referred to as Aluminum Series 500, 600, 700, etcetera (depending on their floor area in square feet), these structures ranged from two-bedroom to five-bedroom houses to double town houses, apartments, warehouses and even fast-food outlets and convenience stores.

A chance meeting with a Japanese developer (Tom Tagawa?) in Hawaii led to the building, in 1965, of eleven all-aluminium houses on the island of Maui. Here Soriano demonstrated, unequivocally, the usefulness of his Aluminium Series. The buildings were manufactured and pre-assembled in Los Angeles and shipped out to the islands where they were erected by unskilled sugar-cane workers. The lightness of the material and the accuracy afforded by the system ensured that the work was fast and uncomplicated: six men could erect a house in a day.[73] But despite the obvious success of this project, both in economic and constructional terms, Soriano never managed to persuade anybody to take up his system. Its only offshoot was one aluminium house in Los Angeles.

Erected in 1965, the Grossman House employed the same aluminium frame as the Maui houses — V-beam aluminium decking resting on two nine-inch U-section aluminium channels attached to either side of three-inch, square-section aluminium columns. Otherwise the house differed little from the modular, open-plan system

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Fig. 9 *Raphael Soriano, The Shulman House, Hollywood* (photograph: Julius Shulman)

which Soriano had introduced at the Curtis and Case Study Houses. Only the windows were no longer steel-framed: they were aluminium-framed Glide Windows, for the client was in the window business.

It is really with the Grossman house, built a quarter of a century ago, that the development of metal-frame houses in Los Angeles comes to an end. The lessons, by now, had all been learnt. The regional appropriateness of the style, as demonstrated so well at the Shulman House, could not be doubted (Fig. 9). The light, free-flowing, open nature of the architecture lent itself perfectly to the gentle Mediterranean climate. The slender, translucent quality of the structure allowed architects to soften the boundaries between indoor and outdoor space. The metal-frames facilitated building on otherwise insurmountable sites and offered an accuracy and precision which echoed the *zeitgeist* — NASA, Ford Thunderbirds and the television generation. But the metal-frame house was destined to remain 'The Style that Nearly . . . '.

It is ironical that the lessons which the metal-frame houses offered in terms of prefabrication and mass production were picked up, in California, not in housing but in

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school building. The School Construction Systems Development Program (SCSD) was set up, in the early 1960s, at Stanford University's Educational Facilities Laboratories, under a young architect Ezra Ehrenkrantz, to develop standardized building components intended specifically for school construction. Drawing as much on the inspiration of the Hertfordshire schools and Nottingham's CLASP programme as on the example of the metal-frame houses in California, the SCSD programme became, as *Arts and Architecture* noted, 'one of the most recent and successful large-scale efforts to overcome the forces, active and passive, which have worked singly and in concert to prevent the development of more efficient and rational construction techniques'.[74]

Yet these forces prevailed. As Allen Temko, architectural critic for the *San Francisco Chronicle,* wrote of the aluminium companies over twenty years ago, 'neither ALCOA nor Reynolds ... has put up buildings which any ordinary developer could not have done as well ... not to neglect their even less imaginative competitor, Kaiser Aluminum, I am bound to remark that the Kaiser House, which should have been a radical contribution to residential architecture ... cravenly simulated wood siding that was hung on a frame that was really wood'.[75] Today the freeways are full of automobiles which, like the Ford Country Squire[76] are decorated, no less, with cravenly simulated wood siding, now in laminated plastics. And they are still parked every night, as this writer has observed, 'outside timber-framed houses decorated in Spanish, Tudor or, increasingly, Post-Modern styles'.[77]

So one has to speculate as to why the metal-frame house remained 'The Style that Nearly ...'. Whereas a car is an appliance, a house is a place in which to live. The limited range of choice which Ford and other automotive manufacturers offered was manageable in such a context: the car could always be 'customized' with an increasing variety of accessories. But the metal-frame house as a prefabricated, factory-produced item lacked the personalizing quality which so many people need in their homes. The Eames House, as a container for objects — and so many objects! — did offer a solution but soon came to be regarded as an object or an artefact itself. Soriano's assembly-method homes allowed the owner very little, if any, flexibility and later attempts to personalize the buildings generally received the architect's scorn. For to these architects it was the structure or system which was primary: Koenig's own house, built in 1985, is today noticeably bare of pictures, hangings or any other decoration. The metal-frame system, as it developed, became a universal vehicle, as adaptable to filling stations, convenience stores, and poultry farms[78] as it was to housing. The problem, it seems, was endemic in the product for it suited everything and was specific to nothing. It was an architects' architecture: promoted by a profession collusive to its doctrinaire demands and unreceived by both manufacturers and consumers, each unappreciative of its enormous potential. Bethlehem Steel, for instance, anxious to utilize their plant after the spring rush for the automobile industry, thought of turning to house production but rejected Koenig's designs on the grounds that they appeared to be individualized solutions and therefore were not suited to a mass market:[79] and this included Case Study House 21 where product utilization had been the theme! Thus it surely was not, as Esther McCoy has suggested, that 'the steel frame was too strict to lend itself to mass production:'[80] Soriano's houses in Maui disprove this. But it was more the case that

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prejudice on the part of the public and even the leaders of the steel industry forced the market to turn to comfortably familiar solutions.

Even as the impetus dwindled within the housing movement in California, its effect was being felt increasingly abroad. Writing in the September 1966 'Eames Celebration' issue of *Architectural Design* Michael Brawne recalled wondering, in 1950, 'whether a system of factory-made parts could be devised in which the components were small and variable enough to make them equally useful and valid for all the buildings within the village, town, city'.[81] If the metal-frame houses of the 1950s and 1960s had failed in this hope — their concept was useful but, as has been shown, not valid — then the same could not be said of two housing developments which appeared in the canyons to the west of Hollywood during the 1970s. In intent they were different, but in inspiration they were the same.

The idea behind the first, the Willow Glen Houses built by Peter de Bretteville, was 'not so much to build modular housing or to create a prototype for modular housing, but to explore a more pragmatic way [to use] the materials that were available'.[82] As a result, the two adjacent houses are similar only in as much as they are both containers of space, utilizing one grid and one framed construction process. Both address and adjust to separate orientations and both are individually treated inside. Thus they remain as different as they could be within a common framework. For Helmut Schulitz, building above Coldwater Canyon, the intent was to develop a range of special linkages which could allow him to take ready-made products off the shelf and assemble them into a building system for mass production. As his partner Jurg Lang recalled, this 'was not just a building system which would stamp out identical elements ... the whole objective of the system [was] that with the different industrialized products one could assemble them in different ways'.[83] In these two developments, the architects seem to have acknowledged the shortcomings of the production house and, rather than force it upon the user as Soriano might have done, have allowed the user to adapt the componets to suit their own lifestyles. In this, perhaps, they are in the tradition of Charles Eames. For, as Michael Brawne noted:

> Where the Eames House, however, differs from its nearest predecessor, the steel-framed buildings of Soriano, and also its possible successors, the house of Koenig, Craig Ellwood and others in the Los Angeles area, is that its composition is wholly additive, with frame and cladding not separated, but working together, and that it possesses wit, a quality extremely rare in architecture. Its wit is, of course, largely the result of the additive process, of the seemingly casual juxtaposition of different images.[84]

And so, the present conundrum now can be readdressed: why was this 'The Style that Nearly ...'? The answer must lie in the realization that the metal-frame house was not, *ipso facto,* a style but a system. And as a system, a facilitator of the additive process and the seemingly casual justaposition of different images, it surely did succeed.

ACKNOWLEDGEMENTS

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Figs 1, 2, 3, 5, 7 and 9 are reproduced by courtesy of Julius Shulman; Fig. 4 is reproduced by courtesy of Jason Hailey; and Fig. 8 is reproduced by courtesy of Morley Baer.

NOTES

1 The first part of this article, subtitled 'Developing a regional tradition' appeared in *Architectural History*, 32 (1989), pp. 152–72. The present sub-title is borrowed from Reyner Banham's *Los Angeles: The Architecture of Four Ecologies* (London, 1971), p. 223.
2 For a discussion of *Arts and Architecture* and the Case Study House programme, see Part 1, p. 159 ff.
3 *Arts and Architecture*, December 1949, p. 22.
4 *Arts and Architecture*, January 1945, p. 38.
5 For a discussion of the profession's interest in prefabrication, see part 1, pp. 160–612. The one previous attempt to create a modern, mass-produced house had foundered. George Fred Keck had built the Crystal House at Chicago's Century of Progress International Exposition in 1934 and here, where 'glass and steel were chosen as the materials that go together rapidly and quickly' it was his stated intent 'to design a house of such qualities in such a manner and of such materials that lends itself to mass production'. See Thomas A. Slade, 'The Crystal House of 1934', *Journal of the Society of Architectural Historians*, XXIX, no. 4, December 1970, pp. 350–53.
6 Raphael Soriano, interviewed by Neil Jackson, 11 July 1988, Claremont, California.
7 Soriano claimed that he was never paid for the Katz house and so preferred to call it the Gato house: Raphael Soriano, interviewed by Neil Jackson, 11 July 1988, Claremont, California. For the Katz house, see *Architectural Forum* October 1947, pp. 108–10.
8 Before the war, Soriano had built the Lee and Cady Warehouse in Ferndale, Michigan (1938), the Jewish Community Center in Boyle Heights, Los Angeles (1938) and the Hallawell Nursery in San Francisco, California (1941). For a discussion of these buildings, see part 1, pp. 157–58.
9 For All Steel Houses, Los Angeles, 1938, see Yukio Futagawa (ed), *Frank Lloyd Wright Monograph, 1937–1941* (Tokyo, 1986), pp. 98–99.
10 *Arts and Architecture*, April 1950, p. 37. Although this passage is not actually attributed to Soriano, the tone and use of English would tend to suggest his authorship.
11 *Arts and Architecture*, September 1950, p. 37.
12 Ibid.
13 *Arts and Architecture*, December 1955, p. 8.
14 Ibid., p. 9.
15 ibid., p. 8.
16 *Arts and Architecture*, January 1956, p. 22.
17 Ibid.
18 Ibid. p. 30.
19 Ibid.
20 *Arts and Architecture*, April 1955, p. 22.
21 *Arts and Architecture*, May 1954, pp. 16–17; Herbert L. Smith (ed.) *25 Years of Record Houses* (New York, 1981), pp. 76–79; *Process Architecture*, no. 41 (1983), pp. 123–25.
22 *Arts and Architecture*, October 1956, p. 22.
23 *Sunset. The Magazine of Western Living*, October 1956, pp. 131–32.
24 *Arts and Architecture*, July 1956, p. 26.
25 *Arts and Architecture*, December 1956, p. 9.
26 *Arts and Architecture*, November 1956, p. 26.
27 *Arts and Architecture*, June 1950, pp. 40–44.
28 *Arts and Architecture*, September 1955, pp. 28–30 and January 1956, pp. 24–25.
29 Michael Brawne, in a letter to Neil Jackson, dated 22 January 1990.
30 *Arts and Architecture*, September 1955, p. 28.
31 *Arts and Architecture*, June 1951, pp. 26–27, 42.
32 Richard Neutra, *Survival Through Design* (New York, 1954), pp. 65–66.
33 *Arts and Architecture*, February 1954, p. 26.
34 *Arts and Architecture*, June 1950, p. 27.
35 *Arts and Architecture*, April 1952, p. 30.
36 *Arts and Architecture*, October 1954, p. 22.
37 *Arts and Architecture*, September 1950, pp. 32–33.

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38 *Arts and Architecture*, October 1950, pp. 36–37; *Arts and Architecture*, March 1951, pp. 26–27; *Arts and Architecture*, July 1953, pp. 24–25.
39 *Arts and Architecture*, September 1952, p. 26.
40 *Arts and Architecture*, December 1952, p. 32, 41.
41 *Arts and Architecture*, May 1953, pp. 30–31.
42 The Morris Studio residence (1956) and the Murakami residence (1962): surprisingly, Morris's innovative designs have not appeared, as these others have, in *Arts and Architecture*.
43 *Arts and Architecture*, May 1960, pp. 27–28 and August 1961, pp. 22–23, p. 28. Zimmerman's house of *c.* 1962 was intended to be Case Study House 28. Designed soon after David Travers assumed the editorship of *Arts and Architecture*, it combined a three-storey steel-frame structure on a steeply sloping site with a single-storey steel-frame pavilion on a flat site below. It was never built.
44 *Arts and Architecture*, July 1961, p. 25.
45 *Arts and Architecture*, July 1962, pp. 12–13.
46 Neutra, *Survival*, p. 76.
47 For Lamport, Cofer, Salzman, see part 1, p. 155, p. 168.
48 Craig Ellwood, interviewed by Neil Jackson, 1 March 1988, Pomona, California.
49 *Arts and Architecture*, October 1952, pp. 30–31.
50 Pierre Koenig, interviewed by Neil Jackson, 13 July 1988, Los Angeles, California.
51 Idem. and also *Arts and Architecture*, October 1953, pp. 24–25.
52 Pierre Koenig, interviewed by Neil Jackson, 13 July 1988, Los Angeles, California.
53 Idem.
54 Idem.
55 *Arts and Architecture*, March 1957, p. 25.
56 Ibid.
57 *Arts and Architecture*, June 1958, p. 20.
58 *Arts and Architecture*, November 1957, p. 19.
59 Ibid., pp. 19–35.
60 Pierre Koenig, interviewed by Neil Jackson, 13 July 1988, Los Angeles, California.
61 *Arts and Architecture*, February 1959, p. 19.
62 *Arts and Architecture*, December 1947, pp. 24–27.
63 Philip Johnson, *Mies van der Rohe* (New York, 1947) and also *Architectural Forum*, November 1947, p. 132; *Art Bulletin*, June 1948, 156–57; *Werk*, October 1948, pp. 142–43; *Art News*, September 1947, pp. 20–23, 42–43.
64 Craig Ellwood, interviewed by Neil Jackson, 1 March 1988, Pomona, California.
65 Pierre Koenig, interviewed by Neil Jackson, 13 July 1988, Los Angeles, California.
66 Craig Ellwood, interviewed by Neil Jackson, 1 March 1988, Pomona, California.
67 Idem.
68 Idem.
69 *Arts and Architecture*, January 1961, p. 20.
70 Soriano moved from Los Angeles to Mill Valley, California, in 1953.
71 See part 1, pp. 159–62.
72 *Arts and Architecture*, August 1965, pp. 22–23.
73 Raphael Soriano interviewed by Neil Jackson, 11 July 1988, Claremont, California.
74 *Arts and Architecture*, April 1967, p. 16.
75 Ibid., p. 10. An all-aluminium house was designed for ALCOA by John I. Matthias in 1960. Called the Triennale House, it was published in *Arts and Architecture*, December 1960, pp. 16–17, p. 29.
76 These are styled after 'Woodies' which were built during the War years with a timber frame, due to the shortage of steel. See Richard M. Langworth *et al.*, *Encyclopedia of American Cars 1940–1970* (New York, *c.* 1980).
77 Part 1, p. 170.
78 Designs by Soriano for a 7-Eleven store, a MacDonald's Hamburger outlet and a poultry farm, all in his Aluminium Series, are among the drawings retained in the archives at the College of Environmental Design, California State Polytechnic University, Pomona.
79 Pierre Koenig, in conversation with Neil Jackson, 23 February 1990, Los Angeles, California.
80 Esther McCoy, 'Arts and Architecture Case Study Houses'; Elizabeth A. T. Smith, *Blueprints for Modern Living: History and Legacy of the Case Study Houses* (1989), p. 33.
81 Michael Brawne, 'The Wit of Technology', *Architectural Design*, September 1966, p. 449.
82 Peter de Bretteville, interviewed by Neil Jackson, 7 July 1988, Los Angeles, California.
83 Jurg Lang, interviewed by Neil Jackson 6 July 1988, Los Angeles, California.
84 Brawne, 'The Wit of Technology', pp. 451–52.

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APPENDIX

A catalogue of metal-frame houses built in and around Los Angeles

* indicates Case Study Houses
† indicates demolished or extensively altered

Peter de Bretteville
8061–71 Willow Glen Road, Los Angeles. 1976

Charles Eames
*203 Chautauqua Boulevard, Pacific Palisades. 1949

Charles Eames and Eero Saarinen
*205 Chautauqua Boulevard, Pacific Palisades. 1950†

Craig Ellwood
400 North Carmelina Avenue, Brentwood. 1949
9618 Yoakum Drive, Beverly Hills. 1950
1036 Tigertail Road, Bel Air. 1950
*1811 Bel Air Road, Los Angeles. 1953
1455 Crestwood Hills, Bel Air. 1952
902 North Roxbury Drive, Beverly Hills. 1952
*9554 Hidden Valley Road, Los Angeles. 1955
1095 Kanter Avenue, Bel Air. 1955
*1129 Miradero Road, Beverly Hills. 1958
910 Oakmont Drive, Brentwood. 1961
32320 Pacific Coast Highway, Malibu. 1961, 1970

A. Quincy Jones
Jones House, Bel Air. 1954†
Nordlinger House 2, Bel Air. 1956
Steel and Glass House, Pasadena. 1976

Pierre Koenig
2002 Los Encinos, Glendale. 1950†
1884 Los Encinos, Glendale. 1952
5323 Palm Drive, La Cañada. 1953
10300 Haines Canyon Road, Tujunga. 1953
9520 Amoret Drive, Tujunga. 1957
*9038 Wonderland Park Avenue, Los Angeles. 1959
*1636 Woods Drive, Los Angeles. 1960
2727 Mandeville Canyon Road, Los Angeles. 1960, 1981
42560 Pacific Coast Highway, Malibu. 1961
1355 North Bundy Drive, Los Angeles. 1962
5200 Crestwind, Palos Verdes. 1962
912 Summit Place, Monterey Park. 1963
17446 Ravello Drive, Pacific Palisades. 1963
6431 La Punta, Hollywood. 1980
12221 Dorothy Street, Los Angeles. 1985

Allyn Morris
2390 Silver Ridge Avenue, Los Angeles. 1956
2378 Silver Lake, Los Angeles. 1962

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Richard Neutra
4616 Dundee Drive, Los Angeles. 1929
1981 Meadowbank Drive, Altadena. 1934
512 Ocean Front, Santa Monica. 1938

Helmut Schulitz
9356 Lloydcrest Drive, Los Angeles. 1977

Raphael Soriano
Katz House, Van Nuys. 1947
*1080 Ravoli Drive, Pacific Palisades. 1950
111 Stone Canyon Road, Bel Air. 1950†
7875 Woodrow Wilson Drive, Hollywood. 1950
2648 Commonwealth Avenue, Los Angeles. 1951
11468 Dona Cecelia Drive, Studio City. 1964

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