Metal-frame houses of the Modern Movement in Los Angeles

Part 1: Developing a regional tradition[1]

by NEIL JACKSON

Modern Movement metal-frame houses can be found across the United States of America from Connecticut to Hawaii. The most well known of these date from the late 1940s and 1950s, and they are often regarded as icons of twentieth-century architecture. On the whole they represented no cohesive effort or common goal, for they were usually one-off designs which neither drew from their context nor offered much towards the development of an industrial building process which the metal frame would suggest: in many ways they were 'art objects' and perhaps they should be appreciated for being just that. The few exceptions to this rule are to be found in Los Angeles, California.

Southern California[2] lends itself well to post- and beam-frame houses. Some forty-five fault lines underlie the area with the result that the Uniform Building Code demands seismically sound structures and this is generally interpreted, in domestic architecture, as framed construction of one sort or another.[3] Timber post and beam frames, such as Greene and Greene used in the Gamble House in Pasadena, had been, since the nineteenth century, an accepted method of frame construction in California. Thus the development of the metal-frame house in Los Angeles might appear to be none other than a modern interpretation of a traditional process. It was, however, rather more than this. It is widely thought that the first completely steel-frame house in America was built in Los Angeles in the late 1920s,[4] but this is untrue.[5] What was built was, in fact, the first Modern Movement steel house in America, and here lies the significance. For in changing from timber to metal, architects could achieve spans and cantilevers hitherto unavailable and, while working within the tradition of the post- and beam-frame house, could exploit space and form in a minimalist manner congruent with the aspirations of the Modern Movement. Thus the architecture moved from one where space was contained to one where space could be exploded: and this is what the architect Richard Neutra demonstrated so powerfully in that first Modern Movement steel house of 1929, the Lovell Health House (Fig. 1).

Fig. 1 *Richard Neutra, The Lovell Health House, Los Angeles (photograph: Julius Shulman)*

Dr Philip M. Lovell was a health and fitness fanatic who wrote a column entitled 'Care of the Body' in the *Los Angeles Times Sunday Magazine*. The clean-cut, modern appearance of his new house, located high in the Hollywood Hills, reflected in every way his own progressive ideas. Between advertisements offering patent cures for ruptures and sagging, flabby chins, Dr Lovell had told his readers of his own house in the hope that it would 'introduce a modern type of architecture and establish it firmly within California, where new and individualistic architecture is necessary'.[6] To this end he extended, on 15 December 1929, 'an invitation for all Care of the Body readers' to visit the house, the accompanying photograph of which was captioned 'Dr Lovell Home of Health'.[7] The house was to be open from 8 a.m. to 5 p.m. on Sunday 15 December and the next weekend, Saturday and Sunday 21 and 22 December. And Neutra was to speak to visitors and to lead tours at 3 p.m. each day. About 15,000 people came.[8]

Promotion such as this and continuous documentation has ensured that the Lovell House has remained a milestone of the Modern Movement for sixty years.[9] Yet it could be argued that its significance is rather different from that, especially in the context of southern California. For it was the progenitor of a series of houses in this genre, in much the same way that Neutra was always the elder statesman of the metal-frame-house architects, whatever they might think they owed to him. It is hard to imagine that without the Lovell House, or a similarly innovative building, that the architects of the 'second generation', Gregory Ain, Harwell Hamilton Harris and Raphael Soriano, would have worked in quite the free and, in Soriano's case, technically innovative, manner which they did: that John Entenza would have considered southern California a

fertile enough ground for his newly progressive publication of the 1940s, *Arts and Architecture*: and that Charles Eames would have responded so emphatically to demands of both context and construction as he did in the house he built at Santa Monica as the century reached its mid-point. Thus it will be seen that the Lovell House was but part of the continuing, generational development of post- and beam-frame house architecture in Los Angeles, an architecture not so much of 'art objects' but of Modern Movement responses within a regional tradition.

Beyond making Richard Neutra's reputation and bringing the European Modern Movement, uncompromisingly, to California, the house succeeded in developing the regional vernacular of frame construction. Indeed, it could be argued that the Lovell House employed a framing material more suited to the nature of southern California than the omnipresent timber frame, since constructional quality timber is hardly a southern Californian product. The natural terrain of the coastal plain which stretches inland from Santa Monica or Long Beach, is that of the desert: in the foothills of the San Gabriel Mountains to the north and throughout the Anaheim Hills to the south, it is high chaparral. In neither case is it forested like northern California, so single-storey, thick-walled adobe construction had once been the way of building. Thus Neutra's metal-frame house would seem to provide both a seismically acceptable and readily available contemporary response to construction. The metal frame would be designed to withstand the lateral forces so destructive in earthquakes and the use of steel would take advantage of a minimalist, industrial, building technique inherently suited to the openness of the hot, barren southland.

The Lovell House was, as much as anything, a rhetorical statement in the use of steel. It was manifestly over-designed: had it been designed with the economy which sound steel construction allows, the frame could have been erected in even less than the forty working hours which it took. The house was as much a demonstration of steel construction as it was an essay in European Modern Architecture. On an early elevational drawing, Neutra had actually named it the 'steel, glass, and shot-concrete residence in Los Angeles'.[10] Neutra had first been exposed to the steel tradition in American architecture while working on the richly classical Palmer House in Chicago with the firm of Holabird and Roche. He had secured a position in that office on coming to Chicago in March 1924, three months after his arrival in the United States from Austria. During his first month in Chicago he visited the ailing Louis Sullivan on a number of occasions and it was at Sullivan's funeral, in April that same year, that he first met Sullivan's 'pupil', Frank Lloyd Wright. By the autumn of that year Neutra was working for Wright at Taliesin.

It would be interesting to speculate what Sullivan's reaction to the Lovell House might have been: Wright's was enthusiastic. In August 1929 he wrote to Neutra, 'The boys tell me you are building a building in steel for residence — which is really good news. Ideas like that one are what this poor fool country needs to learn from Corbusier, Stevens, Oud, and Gropius I am glad you're the one to "teach" them'.[11]

Although Neutra's use of steel in domestic construction was not that original it should be recognized that it was suitably out of the ordinary to provide the architect with some potential problems on site. The building industry, then as now, approached house construction with a lackadaisical attitude easily accommodated by the tolerances

available in traditional timber construction. The 1/8-inch precision demanded in steel frame construction was more than the cowboys of this new range could cope with. At the Lovell House Neutra realized that he had to be his own contractor; he personally checked every one of the thousand pre-punched bolt holes and shop-cut coverplates of the steel frame.[12] His widow, Dione Neutra, recalls that he interviewed 'at least seventy of the craftsmen in order to enthuse them and make them interested — and I think he succeeded'.[13] It was not until after the Second World War and the emergence of specialist contracting firms such as Lamport, Cofer, Salzman, that architects could feel confident that their precision-building could be carried out.

Nobody, it would seem, was more surprised by the astounding success of the Lovell House than Neutra himself. Towards the end of 1929 he wrote to an old friend, Frances Toplitz, in New York, saying, 'That I succeeded in such short order with the steel-skeletoned Health House, which was, as a whole, in its philosophy and in many features, so highly unorthodox, seems almost incredible now. It was, in fact, a strange, unheard-of apparition to be conceived in the general scene of 1929. . . It was all a very novel "thoroughbred" of integrated design, a never-contracted-for type of construction. How could I have proceeded', he asked, 'from such obscurity and a starvation diet to something like a career?'.[14]

During the 1930s Neutra continued, on occasions, to explore the use of steel. The next major building he undertook was a house for himself and here, perhaps, would have been the opportunity to develop his ideas in steel further, for the building was conceived of as an experiment. It was built with materials donated by manufacturers in the expectation of some considerable publicity, and funded in part by a Dutch industrialist, C. H. Van der Leeuw. But the VDL Research House, as it came to be known, was, despite its Modern appearance, a timber-frame affair. This was probably simply a matter of cost. Neutra's budget here was some $10,000. The Lovell House had, by comparison, cost nearly $65,000[15] and would have cost 20% more had Neutra not been his own contractor.[16] And it must have been budgetary constraints which prevented him using steel in later situations. This was almost certainly the case with the house he built for the psychologist and modernist Galka Scheyer in 1934. Although a collector of Klee and Kandinsky, Scheyer had a minimal budget, so the house she got was timber-framed but it did cost under $3,000.[17] Although Neutra continued to use timber he was not dissuaded from the possibilities of steel. He treated the timber frame to the square section and proportions of steel and often, as in the house he built for Ernest and Bertha Mosk in Hollywood in 1934, painted the woodwork silver-grey so as to simulate metal construction. Meanwhile the young men in Neutra's office would joke behind their employer's back, 'Mr Neutra, what is the best material to build a steel house out of?'[18]

Steel construction necessarily demands prefabrication which in turn suggests industrialization. Neutra had always been fascinated with the idea of industrialization and its application to architecture. Following the completion of the Lovell House he travelled to Cleveland to help the White Motors Company redesign their buses together with the Aluminum Corporation of America. He had received this commission at the instigation of Homer H. Johnson, a major shareholder in ALCOA and, not coincidentally, the father of Philip Johnson, who was then engaged in preparing the New York

Museum of Modern Art's 'Modern Architecture' exhibition which was to include Neutra's Lovell House.[19] The connection, in Neutra's mind, between motor-vehicle design and house design becomes apparent on reading the description of a 35,000 cubic foot house which won him second place in an ideas competition sponsored by *Architectural Forum* in 1935. In this quotation substitute the word 'vehicle' for 'building': 'The building is designed with a regular chassis of thoroughly uniform elemental dimensions to be executed either in milled wood frame or light gauge steel'.[20] Harwell Hamilton Harris, one of Neutra's early students, later remarked that 'for Neutra, *Sweet's Catalogue* was the Holy Bible and Henry Ford the holy virgin'.[21]

Neutra's one industrialized metal house of these early years was built in 1934. It was built in Altadena, in Los Angeles county, for William Beard who taught engineering at the California Institute of Technology in Pasadena. Now this house was not only metal-framed, but clad with metal siding and done so in such a way that the convection of air through the hollow walls ensured against overheating. Although not the first of its type, this house nevertheless received the Gold Medal Award in the 'small homes' category of *Architectural Forum's* 'Better Homes in America' competition of the following year. Here it was recognized as 'a serious study in which structure and mechanical equipment admirably express the space composition conceived as a satisfactory environment for a given set of living conditions'.[22] In the same competition, the Mosk House received an honourable mention, as did his timber Koblick House in northern California. It was, perhaps, not surprising that all three were prize winners. It was certainly no coincidence that they were published on consecutive pages for, as the *Architectural Forum* thought, all three 'stand out pre-eminently as examples of a serious and informed effort to solve the problem of American life in a given locality and under given conditions'.[23] Thus, it would seem, Neutra provided, again, regional architecture for California.

Of the three young men whose names are most closely associated with Neutra's office in these early years — Gregory Ain, Harwell Hamilton Harris, and Raphael Soriano[24] — it is Soriano who developed most the idea of the metal frame and the industrialized house. Indeed, on one occasion, after lecturing in Los Angeles, he was approached by Neutra's youngest son, Raymond, who told him, 'Raphael, you did what my father wanted to do and never did'.[25] Soriano worked only briefly with Neutra, while studying architecture at the University of Southern California in 1931–32. As a student he was not paid and after a few months left to work for Rudolph Schindler who did, at least, pay him something. But Schindler's sculptural ways did not suit Soriano's scientific approach, so he returned to Neutra. While with Neutra he did not, as might be supposed, work on metal-frame houses. His responsibilities were with the vast Rush City project which occupied Neutra's mind at this time.'I never worked on any housing, on any details at all with Neutra', Soriano confided a few days before he died. 'I've never done anything except pochéing'.[26] It was not a building method which he learned from Neutra, but a clarity of approach. 'Neutra's steel was not an influence to me or any other material. The influence of Neutra was the assurance that Neutra gave me from a standpoint of planning logically. . . But yet Neutra was a great master and he had excellent sensitivity in materials and taste. And the steel that he used was a different type of steel. What I use in steel in my housing is different than

what Neutra did. . . I used industrially produced steel in modularly planned housing. Neutra didn't do that'.[27]

Although Soriano's very first house, designed for Manny and Helen Lipitz in Silver Lake, Los Angeles, in 1934, used junior I-beams throughout the floor construction, it was otherwise a timber-frame building. Indeed, his first eight houses, up to the time of the Second World War, all had timber frames. Soriano's first three steel buildings were all non-residential, but they are worth mentioning because they demonstrate three essential qualities of Soriano's later steel houses.

The Lee and Cady Warehouse in Ferndale, Michigan, was completed in 1938 and here Soriano worked, in the capacity of a design consultant, with Fritz Ruppell and another architect. Ruppell was president of Lattice Steel Corporation of America and had developed, at his plant in Pasadena, California, a prefabricated, woven or lattice wall construction process. This could be cast in concrete as lift-slabs or simply used naked as framing.[28] The opportunities which this material suggested to Soriano seemed boundless. Years later, he spoke of this enlightenment with typical passion: 'I right away went into steel, because I saw the potential of metallurgy, the potential of steel. Because with wood, you know, what do you do? . . . Well, the same old stuff, and all you do is just put those little sticks all over the place. And I said this is not the way to build. This is uneconomical, clumsy, costly, the labor, and then the result is wrong. You have four walls to hold a little room with these two-by-fours. In mine, I don't need that. I liberated right away. I went into complete freedom having just no obstacles. I said why not?'[29]

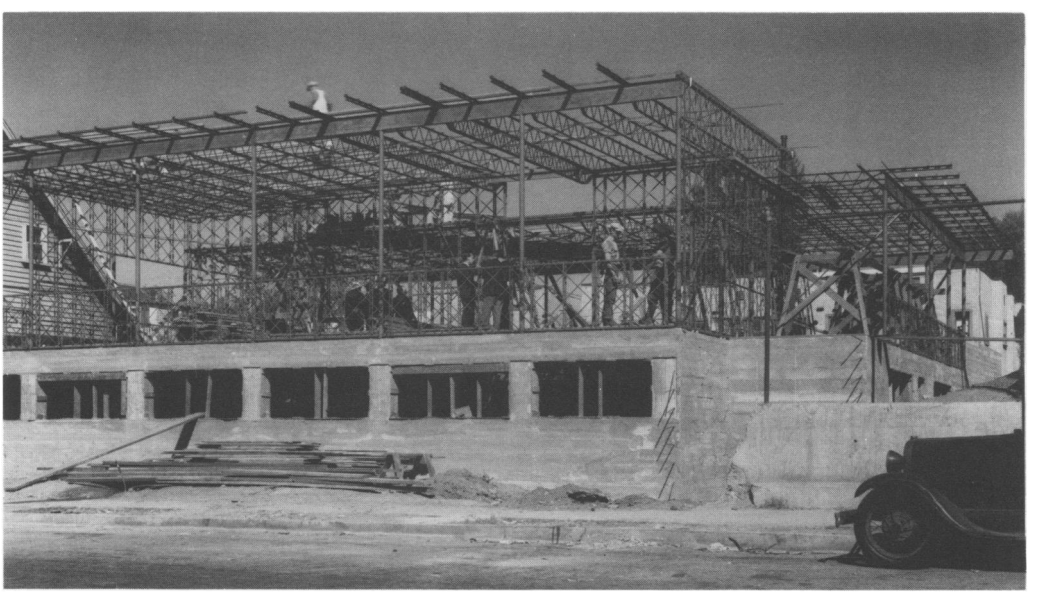

Fig. 2 *Raphael Soriano, The George and Ida Latz Memorial Jewish Community Center, Boyle Heights, Los Angeles (photograph: Julius Shulman)*

Fig. 3 *Raphael Soriano, The Hallawell Nursery, San Francisco (photograph: Julius Shulman)*

Lattice Steel Corporation was to provide the material for Soriano's next two steel buildings, the George and Ida Latz Memorial Jewish Community Center in Boyle Heights, Los Angeles, and the Hallawell Nursery and Garden Centre in San Francisco. The two-storey Community Center (Fig. 2), started in 1938, used three ½-inch pipe columns at twelve-foot centres rather than the six-inch (concrete-filled) 'Lally' columns demanded by the Code, a system Soriano was permitted to use only after going to Appeal. The victory, however, was all the more sweet for the next year the California Building Code was altered to accommodate such innovative designs.[30] Elsewhere the Community Center employed open-web steel trusses and lattice steel walls. Three years later, the Hallawell Nursery (Fig. 3), built on the edge of Golden Gate Park, demonstrated a process which had been implicit in Soriano's two previous steel buildings — prefabrication. Here, again, Ruppell's Lattice Steel Corporation proved equal to the task. Soriano had originally sought prices from San Francisco builders but worries about over-expenditure and perhaps even incomprehension as to why a nursery would be built in steel, the stuff of skyscrapers, had resulted in excessive quotations.[31] So Soriano had turned again to Ruppell. 'I talked to Fritz', he recalled. 'Fritz, this is what I have and they're being. . . Can we fabricate it and go there with two of your welders and fly over the weekend and erect that damn thing?' 'Oh, sure. Hell.' 'And that's what I did'.[32] So the whole building, the 1,200 square foot sales office and the 9,000 square foot lath houses, was manufactured in Pasadena and taken by road the 400 miles to San Francisco. It was built in less than a week.[33]

Even though Soriano did not build a single steel house before the Second World War, the experiences of lattice steel construction and prefabrication prepared him well for the post-War building boom, the War period allowing him and other younger designers time to formulate their thoughts and hone their ideas. For it was as design ideas that steel-frame housing next made its appearance.

Crucial to the development of the metal-frame house during the hiatus of the War years was the magazine *California Arts and Architecture*. In the 1930s the magazine had been anything but progressive in its contents. The thematic style was noticeably 'period' and Spanish and Colonial idioms seemed to predominate. This unlikely vehicle was bought in 1938 by John Entenza, a young and talented man with an intense interest in architecture, but it was only when he assumed the role of editor in February 1940 that the course of the magazine began to change.[34] After May 1940 the old publisher, Jere B. Johnson, was replaced by Western States Publishing Co. and as the new owner/editor gathered about him a new team, the magazine took on a new face. Over the next two years the 'period' pieces were quickly eliminated from its pages as was the parochial suggestion from its title, and the new *Arts and Architecture* began to demonstrate an overtly modernist attitude. The next sharp change in direction came in May 1942 when Charles Eames moved from the Editorial Advisory Board to a position as one of eight Editorial Associates. The previous issue, April 1942, was the last one for which Alvin Lustig was Art Editor and now, in the absence of a named Art Editor, this new issue sported a cover designed by Charles Eames's wife Ray, who also assumed a place on the Editorial Advisory Board. Such nepotistic tendencies, it would appear, were not unknown to *Arts and Architecture*: Eero Saarinen first appeared on the Editorial Advisory Board in the issue which carried at article on a forthcoming children's book entitled 'Who am I?' — authored by his wife Lily.[35]

The relationship which had been developing between John Entenza and Charles Eames in these early years[36] was to come into full evidence towards the end of the decade and it is not inappropriate to conjecture that Eames, the consummate designer, was the steering force behind the magazine's developing image in the early 1940s. The extent to which the magazine's design was ahead of its time can be quickly gauged when comparing it to contemporary issues of *The Architectural Review*. It is, in fact, much closer in appearance to the format taken by *Architectural Design* in the later 1960s, some twenty-five years later. The make-up of the Editorial Advisory Board of *Arts and Architecture* gave further indication of the modernist direction in which John Entenza was intent upon steering the magazine. Architects Harwell Hamilton Harris, William Wurster, Gregory Ain, Richard Neutra, Eero Saarinen and Raphael Soriano were all to be found there.[37]

As the United States's involvement in the Second World War developed following Pearl Harbour in December 1941, so the domestic building industry slowed down, thus providing Entenza with less material for his pages. Yet this was to work to his advantage, for not only did the dearth of new buildings leave him with more space for editorial comment and architectural ideas, but the changes which the War was bringing about offered a springboard for the promotion of new and radical concepts. As early as November 1942 *Arts and Architecture* was addressing the post-war situation. 'In 1939', wrote Mario Corbett of his own design, 'this house would have been a $4,000 house,

but some day, when the wars are over, it will cost around $2,000. Its walls are prefabricated light metal sections with stressed-skin coverings on the outside, similar to airplane-wing construction, and plastics, composition boards or light wood veneers on the inside. Alternating metal wall and roof sections are bolted together and can be unbolted for expansion as the family grows, or dismantled if it wants to move'.[38]

Then in the next issue, December 1942, *Arts and Architecture* published designs for a house based on ideas directly derived from the war effort — Whitney R. Smith's Plyluminum House.[39] 'Plywood and aluminum', Smith argued, 'are certain to be two of the most interesting materials following the duration. The amounts of these materials that are now being produced are certain to make them economical for all types of building'.[40] Although this house did respond directly to the impetus and opportunities provided by the war effort, it reflected attitudes and technologies familiar from before the war. 'The prefabricated house line has been predicted for years and has been compared with the automobile and the assembly line. The big chance for prefabrication came with defense housing'.[41]

During 1943, *Arts and Architecture* began actively looking forward to the post-War years. In May, under the title 'Planning Postwar Fabrication', it published designs by Richard Neutra for an apparently prefabricated, metal-framed house for Dr and Mrs Grant Beckstrand at Palos Verdes, near Los Angeles.[42] The fact that this house had actually been built in 1940 does not seem important here;[43] Neutra's dedication to the metal frame had long since been demonstrated and *Arts and Architecture*'s use of the Beckstrand House as a model for the future is really more indicative of the polemical stance then being taken by the magazine than an assertion of the importance of this one house. Three months later *Arts and Architecture* announced the winners of their 'Design for Post-war Living Competition'.[44] Eero Saarinen and Oliver Lenquist were placed first, I. M. Pei and E. H. Duhart were second and Raphael Soriano was third. The selection of these designers demonstrates how the magazine served as a catalyst rather than the presence of any unpalatable nepotism. Saarinen had worked in successful association with Charles Eames at the Cranbrook Academy of Art in Michigan in the late 1930s and Soriano, as already noted, was on the Editorial Advisory Board to the magazine.

References to the war effort and the resulting industrialization and prefabrication punctuate the commentary on the selected designs. 'Using the techniques offered by post-war industry', argued Pei and Duhart, 'we try to organize an economic space with one aim: to vitalize the family as the most important cell of democracy.' Having recognized the importance of the post-war family, Pei and Duhart then drew attention to the building process (Fig. 4). 'With a well organized building industry and through mass production, prices will go down. The house now available to the worker will be interesting, so he will no longer prefer the cinema or his car'.[45] In much the same way Don Saxon Palmer and Doris Palmer's design, published but not placed, maximized the materials and prefabrication processes offered by the war effort (Fig. 5). 'During these war years', they wrote, 'a tremendous impetus is found in the use of a new lightweight structural material in the aircraft industry, namely aluminum. It is our contention that due to this abnormal expansion in the use of aluminum, there will be in the post-war world a fresh structural material available to the building industry and due

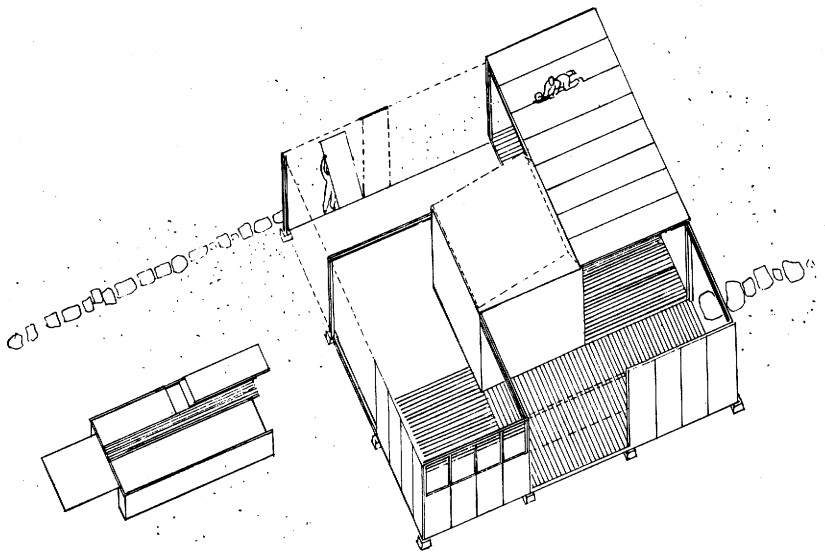

Fig. 4 *I. M. Pei and E. H. Duhart, second placed entry in Design for Post-War Living Competition, 1943*

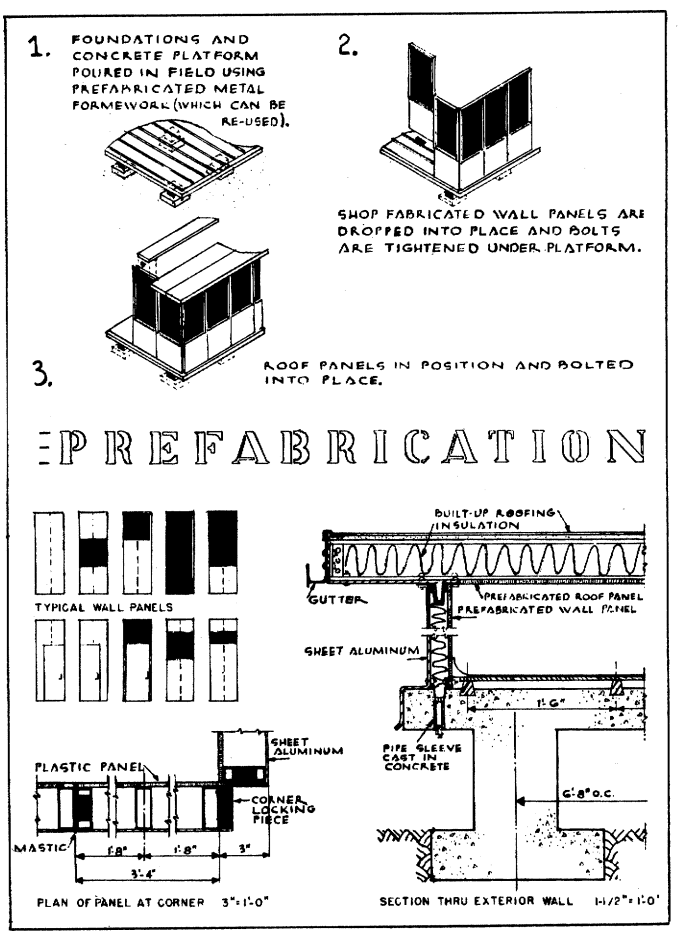

Fig. 5 *Don Saxon Palmer and Doris Palmer, unplaced entry in Design for Post-War Living Competition, 1943*

to the fact that the facilities for producing this material have become so greatly enlarged, we believe that it will be accessible to the postwar economic standard of a worker's community. Therefore, we propose an architecture of shop fabricated aluminum frame panels as a module for the postwar community pattern.'[46]

In what might be seen as an attempt to give credence to these statements, the July 1944 special issue of *Arts and Architecture* was devoted to prefabrication. Charles and Ray Eames, Eero Saarinen, Richard Buckminster Fuller and Herbert Matter were guest editors and the magazine displayed a noticeably crusading attitude. 'Prefabrication in the truly industrialized sense', they explained, 'is a very special approach to the problem of the "house" — an approach made possible *now*, for the first time, when industry, research and material exist in the right relationship to one another, making possible an intelligent application of these resources to the needs of housing'.[47] 'The architects of the prefabricated house', so it followed, 'must be. . .

1. The Student of Human Behavior
2. The Scientist
3. The Economist
4. The Industrial Engineer'[48]

In the same way that Pei and Duhart had focused on the importance of the family, Charles Eames — himself, presumably, a student of human behaviour — saw the family as the ultimate benefactor of industrialization. He demonstrated his concept in a chart:[49]

AN UNDERSTANDING OF FAMILY BEHAVIOR
and
A VOCABULARY OF MATERIALS AND TECHNIQUES
correlated through
a logical approach to
ECONOMICS
and adapted to
AN INDUSTRIALIZED SYSTEM OF MASS PRODUCTION
supported by
AN INTELLIGENT PROGRAM FOR DISTRIBUTION TO
|
THE FAMILY
whose burden will be further lightened by
FINANCING
and
SERVICING

Three months later Neill Davis, executive vice-president of the California Savings and Loan League, forecast 'the greatest home building and buying activity on record' as a result of Title III of the newly passed Servicemen's Readjustment Act of 1944: the 'G I Bill of Rights'.[50] An architecture to meet this demand clearly was required.

What this was all leading up to, whether consciously or not, was the Case Study House Program. John Entenza announced it in the first issue of 1945. 'Because most opinion,' he said, 'both profound and light-headed, in terms of post war housing is

nothing but speculation in the form of talk and reams of paper, it occurs to us that it might be a good idea to get down to cases and at least make a beginning in gathering of that mass of material that must eventually result in what we know as "house — post war" '.[51] The intention was to build a series of houses, the magazine acting as facilitator, and the houses being put on display to the public. Construction would start as soon as practical following the lifting of war restrictions. 'It is to be understood', continued Entenza in his editorial, 'that every consideration will be given to new materials and new techniques in house construction. And we must repeat again that these materials will be selected on purely merit basis by the architects themselves. . . The house must be capable of duplication and in no sense be an individual "performance" '.[52]

Opinions vary as to the real intention of Entenza's proposal. Ray Eames, who with her husband Charles built the Case Study House for 1949, only remembered the wonderful opportunity which Entenza opened up. 'He was terribly interested in architecture, terribly interested in young people and wanting them to have an opportunity, and tried to do something good'.[53] Soriano, who built the next Case Study House, was more caustic in his recollection. 'There are all the other things behind the stuff which was not exactly that altruism or knowledge. It was business! Money. Money-maker'.[54] Although Soriano is possibly correct in his assessment — 'I think John Entenza was quite an opportunist, you know'[55] — his attitude does suggest ingratitude, for his Case Study House for 1950 was written-up in every issue but one of *Arts and Architecture* between December 1949 and December 1950.

Despite the rhetoric of *Arts and Architecture* during the war years, the first Case Study Houses to be designed and published demonstrated little industrial or prefabricated work. When they were eventually built, sometimes not for two or three years, such preferred methods seemed even less attainable. A specification chart for Case Study Houses 1 to 14 was published in 1946.[56] Only four houses used metal framing at all: Case Study House 5 was to be of Lattisteel, 8 and 9 were to have steel frames by Republic and 10 was to have one by Milcor. In the event, Case Study House 10 was built the next year with, apparently, a timber frame.[57] Ralph Rapson's Case Study House 4 was specified in either steel or wood, with light metal deck panels for the roof.[58] But it was never built. Neutra's Case Study House 6 was clearly not intended to be a metal-frame house.[59] It was not built either.

One design which did become more industrial in the building was Case Study House 3 by William Wurster and Theodore Bernardi. Originally described in 1945 as a timber-frame building with tongue-and-groove timber siding, albeit coated with Caladium paint,[60] this house was eventually realized, four years later, with painted aluminium siding. Considering the house was still framed in timber, this does not represent, perhaps, such a significant change. But what is of interest is the almost over-enthusiastic write-up which this metallic siding received. It is worth quoting in full.

Kaiser Aluminum Clipboard Siding, a product of the Permanente [sic] Metals Corporations, Oakland, Calif., used on the exterior of CSHouse Number 3, is comparable in cost to wood clapboard siding . . . Available in standard lengths cut by photoelectric eye to maintain close tolerances, the siding comes prime coated, with pre-punched nail holes and requires just half as

many nails as wood siding. Further construction economies are possible due to the light weight of the material. No special tools are required.
Of special interest are the maintenance economies this siding provides. Aluminum is fireproof, rustproof, weatherproof, termite and ratproof. A coat of paint will not blister, scale or crack on aluminum and, according to estimates, will last three to five times as long as paint on wood.[61]

Here the architect-reader is reminded, in no uncertain terms, of the stuff of industrialization — standard lengths; photoelectric eyes; close tolerances; pre-punched nail holes — all adding up to construction and maintenance economies. Yet Wurster and Bernardi's house still appeared rather conventional with its flat, overhanging roof and timber frame proportions. But that could never be said of the Case Study House for 1949 which shared these same pages — the Eames House.

Following the rather haphazard designing and building of the first few Case Study Houses,[62] the choice of Eames's House as the Case Study House for 1949 introduced a new policy in *Arts and Architecture*. The designing and building of the house was to be chronicled over the months and a detailed and updated Merit Specification would be published regularly. Again the influence of Charles Eames might be detected here: it was, after all, his house. Soriano remembered the tight relationship between Eames and Entenza. 'At the time they were absolutely chummy', he said. 'Entenza and Charlie were just like that: friends. And there was not a word that came from Entenza's mouth that wasn't uttered by Charlie. Everything was Charlie's decisions and sayings. I know that'.[63]

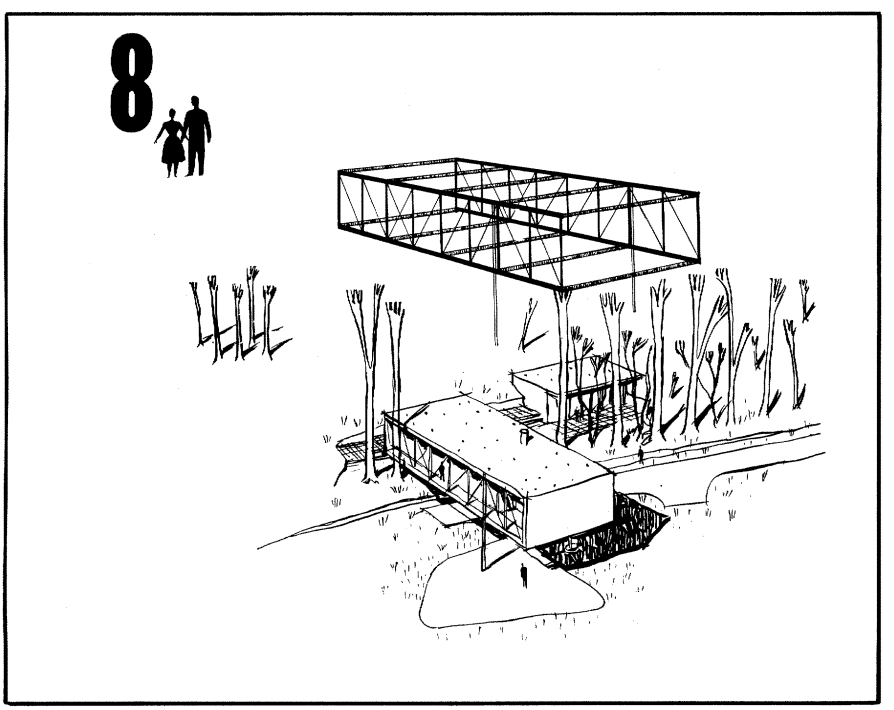

Fig. 6 *Charles Eames and Eero Saarinen, Case Study House 8, The Eames House, 1945 design*

Like Case Study House 3, the built version of the Eames House was different from the first published designs, known as 'the bridge house'; but unlike Case Study House 3, the Eames house maintained its original, intended site — a crucial factor in the final design — sharing its cliff-top situation with a house designed by Eames and Saarinen for Entenza himself. 'The two houses were done together', Ray Eames later recalled, while sitting amid her busy garden not long before she died. 'John Entenza's house and this house. We worked on a house called the bridge house. . . It was cantilevered between these two trees. We had lived in an apartment so it would seem nice to have it raised from the ground. We liked that, and looking out to sea. It took so long to develop and by the time we were ready to build, you know, we had got to know the property pretty well. At the last moment, it seemed overnight, it was changed'. Charles had said 'You know . . . this is the smallest volume with the greatest amount of material. Let's see what the largest volume could be with the same amount of material'. That was like a game to him. And almost overnight it was changed from the previous house, because we'd got to love the meadow and the idea of putting a house in the middle of it seemed terrible at that moment. And that gave John much more freedom also to work. So that's how that happened. Very different'.[64]

When Case Study Houses 8 and 9 had been first published in 1945, the designs had been accredited to both Eames and Saarinen.[65] Described as 'two houses for people of

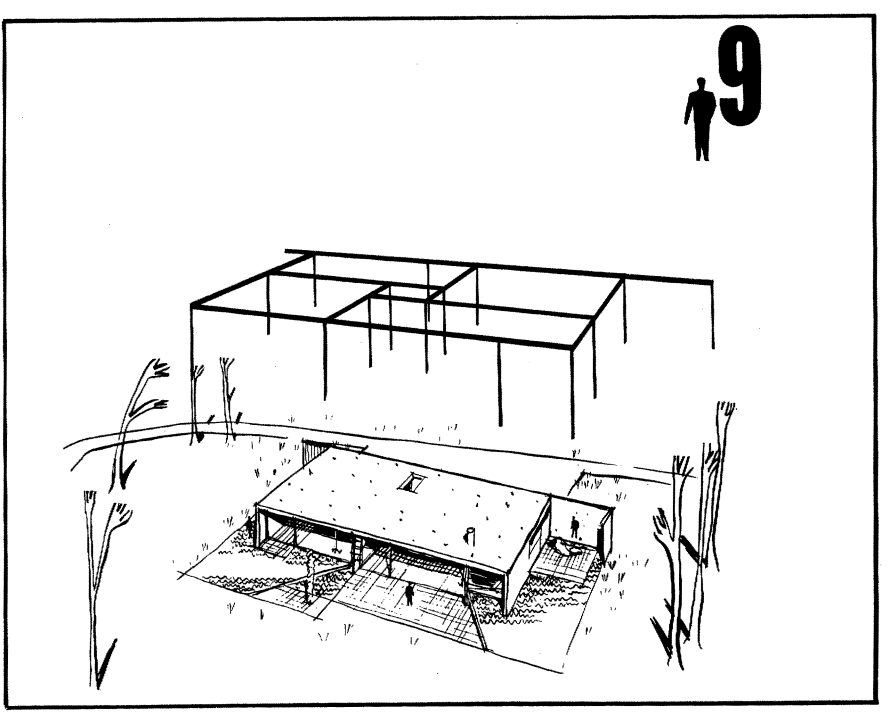

Fig. 7 *Charles Eames and Eero Saarinen, Case Study House 9, The Entenza House, 1945 design*

Fig. 8 *Charles Eames, Case Study House 8, The Eames House, Santa Monica, 1949 design (photograph: Julius Shulman)*

different occupations but parallel interests',[66] they were clearly intended, as the cartoon figures on the drawings illustrated, for Ray and Charles Eames, and John Entenza, respectively. Case Study House 8, the 'bridge house', was conceived of as a trussed, steel and glass box cantilevering out, at one end, from two cross-braced steel supports (Fig. 6). Case Study House 9 was designed with the 'object to enclose as much space as possible within a fairly simple construction'[67] — a low, rectangular box (Fig. 7). It was an elaboration on these first designs which was published in March 1948, in the same issue of *Arts and Architecture*, incidentally, which carried a review of Saarinen's winning entry for the Jefferson National Expansion Memorial Competition for St Louis, Missouri.[68] Both buildings were shown to be steel-framed with open web steel joists, steel sash windows and metal lath walls. Here Edgardo Conti was listed as Consulting Engineer and, later, Kenneth Acker became Consulting Architect for the Eames House. These 1948 designs showed little change from the December 1945 version, save for some small internal adjustments to living spaces and some realignment of the landscape patterns.

It was the flexibility which steel afforded which allowed such a late and radical rethinking of the arrangement of the Eames House (Fig. 8). A new war, now in Korea, had reduced, once again, the availability of steel so Eames had to work with what had previously been ordered. As the two steel-frame houses grew in the early months of 1949, and an inconvenience was made into a virtue, the readers of *Arts and Architecture*

Fig. 9 *Charles Eames, Case Study House 8, The Eames House, Santa Monica, 1949 design (photograph: Julius Shulman)*

Fig. 10 *Charles Eames and Eero Saarinen, Case Study House 9, The Entenza House, Santa Monica, 1949 design, with the Eames House beyond (photograph: Julius Shulman)*

were constantly reminded of the constructional, aesthetic and economic benefits of the steel frame:

> Here is case study house 9 under construction. A steel frame building that in the early stage reflects clearly the structural system embodied in it. As is often the case it has, in this state an esthetic quality one would like to preserve.[69]

The 11½-ton steel frame for the Eames House was erected in a day and a half by the firm of Lamport, Cofer, Salzman, with a total of ninety man-hours. Two rows of four-inch H-columns, placed on seven feet four inch centres, framed a space twenty feet wide and eighteen feet high. Twelve-inch open web joists spanned the roof, supporting the Ferro-bord [sic] steel decking, and also an intermediate floor which extended about half the length of the building.[70] The magazine hailed the building as 'a natural and unaffected development of a modern building idiom'[71] — 'truly a study of logical use of materials and integration of spaces' (Fig. 9).[72]

The choice of steel, Ray Eames maintained, had been left to the designers. Even though the use of steel clearly was of interest to Entenza and perhaps swayed his decision to select Soriano, Craig Ellwood and Pierre Koenig — all steel users — to build six of the later Case Study Houses,[73] the material's employment here was not at his suggestion. 'No, he had nothing to do with it', she said, 'Nothing was specified. There were just these people given an opportunity — they did what they wanted. He didn't say this should be a metal house and this should . . . Not at all'.[74] But the magazine was not slow to recognize and promote the benefits of the material. 'Materials long used in common practice, by the very directness of their application here, take on a new freshness. The results will be provocative to many and, for all we know, might be one

of the small steps toward the development of a building idiom of our time'.[75] Eames himself was to comment, 'Most materials and techniques which have been used here are standard to the building industry, but in many cases not standard to residential architecture . . . Case study wise, it is interesting to consider how the rigidity of the system was responsible for the free use of space and to see how the most matter-of-fact structure resulted in pattern and texture' (Fig. 10).[76]

The importance of the Eames House to later twentieth-century architecture has been widely recognized. When the office of Charles and Ray Eames was awarded the Royal Gold Medal for Architecture thirty years later, the citation read:

> The Santa Monica house of 1949 was a seminal building that appealed and pointed the way at so many levels simultaneously. From light-hearted California 'House and Garden' pop, a domestic fun palace of toytown images, through a working demonstration of systems thinking. Most exercises, executed with such style and elegance, are traditionally one-offs. Not this one. For the first time (and not bettered since) this house demonstrated the true potential of so many possibilities usually articulated by theorists, academics and critics — industrialisation, prefabrication, adhocism, catalogue buildings: all that and 20th Century Victoriana as well. A beautiful object at one with its landscape and a considered response to the Californian climate.[77]

In view of the accolades which the Eames House has since received, John Entenza's contemporary comment seems surprisingly muted. 'This house', he wrote, 'presents an attempt to state an idea rather than a fixed architectural pattern, and it is as an attitude towards living that we wish to present it'[78] In this, the house was surely successful. It was, as Reyner Banham here infers, one of those special occasions, as in Periclean Athens or early Georgian England, when everything just seemed to come together at the right time. 'The Program, the magazine, Entenza, and a handful of architects made it appear that Los Angeles was about to contribute to the world not merely odd works of architectural genius but a whole consistent style'.[79]

Yet it might be appropriate to question, in conclusion, the truth of this rather polemical statement. Certainly there was something happening in southern Californian architecture. But to what extent was it original: to what extent was it the product of its own promotional vehicle, *Arts and Architecture*? In the later 1940s, California had by no means the prerogative on metal-frame houses, despite the suitability of the climate and terrain. In Illinois, Mies van der Rohe had built the Farnsworth House at Plano as well as developing a steel-frame aesthetic on the campus of the Armour Institute, now the Illinois Institute of Technology. In New Canaan, Connecticut, Philip Johnson had built a steel-frame house for himself and in Florida, Ralph Twitchell and Paul Rudolph had built a steel-frame guest-house at Sarasota. Elsewhere Carl Koch, a former Harvard student of Walter Gropius and Marcel Breuer was developing a prefabricated, mass-produced housing system in the modernist vein: perhaps the influence here was Gropius's prefabricated house at the 1926-27 Werkbund Exhibition at the Weissenhofsiedlung, in Stuttgart, Germany. But these developments seem to be largely unrelated, even though Mies's friendship with Johnson explains, to some extent, the similarity between their two houses. More to the point, these developments were to be found at great distances from California and any direct influence they might have had would have been largely the result of the occasional note or article in the architectural journals. The fact is, whatever was going on in California did so in isolation.[80]

The role of *Arts and Architecture* in the promotion of prefabricated architecture and metal-house construction was certainly important but hardly unique. *Architectural Forum* had been discussing the idea of prefabrication almost ten years earlier[81] and had also been promoting buildings by Neutra, as has been demonstrated. And the fact that some of *Arts and Architecture*'s own Case Study Houses — 8 and 9 for instance — were not built until almost five years after they were published, suggests that the ideas, once they were realized, were hardly new.

It is hard to accept that the reason for the slow development of steel-frame construction in domestic architecture was solely the result of the demands made by the Second World War and then the Korean War. The Eames had, after all, built their house despite these restrictions. It is much more likely that the labour force were unaccustomed to working in steel and thus shied away from it; that the cost of steel was still prohibitive, so small was the demand for it in domestic work; and that the majority of houses were simply not dependent upon the use of steel for their success. It is in this last that the Lovell House is significant, for had it not been built of steel it is likely that it could not have been built at all. For steel-frame construction really comes into its own when the conditions of the site prohibit conventional timber framing — either through practicality or cost. Steel frames, which can be shop-prepared and even shop-assembled, allow the builder to control the steepest sloping site. The frame requires only that footings are prepared before it is swung into place: and if the slope is steep, rough and crumbly, a steel frame makes the building process considerably easier.

It is because of no one of these individual reasons that the metal-frame houses of Los Angeles are remembered but, as Banham suggests, it is because of a combination of them all. And moreover, it was in the continuation of a regional tradition and the attempt, over the generations, to pursue and develop frame construction in answer to the demands of a Modern and industrialized society that the houses achieved their significance. That they were not more widely imitated is probably more a reflection of the scepticism of the public, as consumers or financiers, than a comment on their suitability as housing types. It is indicative of the inherently conservative attitude of the Los Angeleno that even today, what is perhaps the world's most automobile-orientated society park their eight million metal-framed vehicles every night outside timber-framed houses decorated in Spanish, Tudor or, increasingly, Post-Modern styles.

ACKNOWLEDGEMENTS

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Figs 1, 2, 3, 8, 9 and 10 reproduced by courtesy of Julius Shulman.

NOTES

1 The second half of this two-part article, to be subtitled 'The Style that Nearly . . .', will discuss the metal-frame house from 1950 onwards and will also contain a list of the principal works in this genre. This subtitle is borrowed from the book which opened Los Angeles to many Britons, Reyner Banham's *Los Angeles: The Architecture of Four Ecologies* (London, 1971) p. 223. It is in memory of Peter Reyner Banham (1922–88) that this article is written.

2 Southern California generally refers to the heavily populated coastal area between Santa Barbara and San Diego and runs as far inland as Riverside. In this context it is taken to mean, more specifically, the counties of Los Angeles, Orange, San Bernadino and Ventura.
3 See *The Uniform Building Code*, 1988, chap. 23. Framed buildings are usually of balloon, platform or post- and beam-frame construction.
4 This statement can be attributed to Neutra's biographer Thomas Hines, writing in *Richard Neutra and the Search for Modern Architecture* (New York and Oxford, 1982), p. 81.
5 David Gebhard, in a letter to Neil Jackson dated 9 January 1989, advises that the first all steel-frame house in America was built at the turn of the century near New York and that the first one in California was built near San Francisco in the 'teens.
6 Philip Lovell, 'Care of the Body', *Los Angeles Times Sunday Magazine*, 15 December 1929, p. 26.
7 Ibid.
8 Dione Neutra, interviewed by Neil Jackson, 11 July 1988, Los Angeles, California.
9 For contemporary opinion on the Lovell House and for further biographical discussion of the events surrounding its building, see 1. Hines, *Richard Neutra*, pp. 75–91 and Appendix A; Philip Johnson and Henry-Russell Hitchcock, *The International Style* (New York, 1932); Richard Neutra *Amerika: Die Stilbildung des Neuen Bauens in der Vereinigten Staaten* (Vienna, 1930); Richard Neutra, *Life and Shape* (New York, 1962); Esther McCoy, *Two Journeys: Vienna to Los Angeles* (Santa Monica, 1979).
10 This point is made in Hines, *Richard Neutra*, p. 84. The majority of Neutra's drawings are retained, uncatalogued, in the Richard J. Neutra Archive, Special Collections in the University Research Library at the University of California, Los Angeles.
11 Dione Neutra, *Richard Neutra, Promise and Fulfillment, 1919–1932; Selections from the Letters and Diaries of Richard and Dione Neutra* (Carbondale and Edwardsville, 1985), p. 178. This letter is also quoted in Hines, *Richard Neutra*, p. 81.
12 Richard Neutra, *Life and Shape*, p. 224.
13 Dione Neutra, interviewed by Neil Jackson, 11 July 1988, Los Angeles, California.
14 Dione Neutra, *Promise and Fulfillment*, p. 179. An almost identical statement appears in Richard Neutra, *Life and Shape*, p. 222, written over thirty years later, but here the second sentence refers to 'the general scene of 1927'
15 These figures are from Hines, *Richard Neutra*, pp. 86 and 114.
16 Dione Neutra, interviewed by Neil Jackson, 11 July 1988, Los Angeles, California.
17 *Architectural Forum*, October 1935, pp. 236–37.
18 Hines, *Richard Neutra*, p. 183.
19 Richard Neutra, *Life and Shape*, pp. 259–61; see also Hines, *Richard Neutra*, p. 99.
20 *Architectural Forum,* April 1935, p. 303.
21 McCoy, *Vienna to Los Angeles*, p. 8. *Sweet's Catalogue* is a catalogue of building components.
22 *Architectural Forum*, April 1935, p. 399; Hines, *Richard Neutra*, p. 120, draws this quotation from: 'Los Angeles Architect Wins Awards on Three Homes in Competition', *Southwest Builder and Contractor*, 7 June 1935, p. 11.
23 Full coverage was given to these three houses in *Architectural Forum*, April 1935: The Beard House, pp. 400–03, The Koblick House, pp. 404–05, The Mosk House, pp. 406–07.
24 For a summary of their work, see Esther McCoy, *The Second Generation* (Salt Lake City, 1984). The fourth architect included in this book is J. R. Davidson, a friend but never a pupil, of Neutra.
25 Raphael Soriano, interviewed by Marlene Laskey, 19 July 1985, Tiburon, California. Raphael Soriano, *Substance and Function in Architecture* (Los Angeles, 1988), p. 77. Laskey's interviews were completed and published under the auspices of the Oral History Program, Department of Special Collections, University Research Library, University of California Los Angeles.
26 Raphael Soriano, interviewed by Neil Jackson, 11 July 1988, Claremont, California.
27 Raphael Soriano, interviewed by Marlene Laskey, 19 July 1985, Tiburon, California. Soriano, *Substance*, pp. 107–08.
28 See Soriano, *Substance*, pp. 133–34.
29 Raphael Soriano, interviewed by Marlene Laskey, 20 July 1985, Tiburon, California. Soriano, *Substance*, p. 144.
30 See Soriano, *Substance*, pp. 128–30.
31 See Soriano, *Substance*, pp. 152–53.
32 Raphael Soriano, interviewed by Marlene Laskey, 20 July 1985, Tiburon, California. Soriano, *Substance*, p. 153.
33 McCoy, *Second Generation*, p. 155.
34 For John Entenza and *California Arts and Architecture*, see Esther McCoy, *Case Study Houses*, 1945–62, 2nd edn (Los Angeles, 1977) p. 3.
35 Lily Saarinen, 'Who am I?', *Arts and Architecture*, December 1945, pp. 36–37.
36 In McCoy, *Case Study Houses*, p. 4, the author states that 'during the war Eames formed a company with John Entenza to produce molded plywood furniture and airplane parts'.

37 These names first appeared on the Editorial Advisory Board in: Harris — October 1939 (last appears April 1946); Wurster — September 1940; Ain — March 1941; Neutra — February 1942; Saarinen — December 1945; Soriano — January 1947. Julius Shulman, whose camera captured so many of these early buildings, first appeared as one of three Staff Photographers in December 1942. His photographs accompany this article.
38 Mario Corbett, 'Note for Tomorrow', *Arts and Architecture*, November 1942, pp. 30–21.
39 Witney R. Smith, 'Plyluminium House', *Arts and Architecture*, December 1942, pp. 28–29.
40 Ibid., p. 28.
41 Ibid., p. 28.
42 Richard Neutra, 'Planning Postwar Fabrication', *Arts and Architecture*, May 1943, pp. 23–25.
43 The Beckstrand House is dated as 1940 in Hines, *Richard Neutra*, p. 311.
44 *Arts and Architecture*, August 1943, p. 23 f.
45 *Arts and Architecture*, January 1944, pp. 32–33.
46 *Arts and Architecture*, June 1944, pp. 22–23.
47 *Arts and Architecture*, July 1944, p. 29.
48 Ibid., p. 33.
49 Ibid., p. 32.
50 *Arts and Architecture*, October 1944, p. 33. Title III provided for loans for the purchase of residential property or for the construction of a dwelling to be offered as a home.
51 *Arts and Architecture*, January 1945, p. 37.
52 *Arts and Architecture*, January 1945, p. 38.
53 Ray Eames, interviewed by Neil Jackson, 25 June 1988, Santa Monica, California.
54 Raphael Soriano, interviewed by Marlene Laskey, 20 July 1985, Tiburon, California. Soriano, *Substance*, p. 205.
55 Raphael Soriano, interviewed by Neil Jackson, 11 July 1988, Claremont, California.
56 *Arts and Architecture*, January 1946, pp. 46–47.
57 *Arts and Architecture*, October 1947, pp. 37–42. Although first designed by Whitney Smith, the built version of Case Study House 10 was by Kemper Nomland. This possibly accounts for the change of materials.
58 *Arts and Architecture*, August 1945, pp. 30–34 and September 1945, pp. 33–37. Photographs of a model in the September issue do suggest steel pipe-columns.
59 *Arts and Architecture*, October 1945, pp. 33–39 and 49–50.
60 *Arts and Architecture*, June 1945, pp. 26–30 and 39–40 and July 1945, pp. 35–38.
61 *Arts and Architecture*, March 1949, p. 44.
62 With the opening of Case Study House 11, the first one to be built, *Arts and Architecture* had announced that 'The choice of houses going into construction will necessarily be made on the basis of the material lists and price factors involved', *Arts and Architecture*, July 1946, p. 44.
63 Raphael Soriano, interviewed by Marlene Laskey, 20 July 1985, Tiburon, California. Soriano, *Substance*, p. 207.
64 Ray Eames, interviewed by Neil Jackson, 25 June 1988, Santa Monica, California.
65 *Arts and Architecture*, December 1945, pp. 43–51.
66 Ibid., p. 43.
67 Ibid., p. 51.
68 *Arts and Architecture*, March 1948, pp. 39–41 for Case Study Houses 8 and 9; pp. 30–31 for the Jefferson National Expansion Memorial Competition.
69 *Arts and Architecture*, January 1949, p. 33.
70 *Arts and Architecture*, March 1949, p. 30.
71 Ibid.
72 *Arts and Architecture*, April 1949, p. 40.
73 Soriano, as has been noted, built the Case Study House for 1950. Craig Ellwood built Case Study Houses 16 (1951), 17 (1955) and 18 (1957) and Pierre Koenig built Case Study Houses 21 (1958) and 22 (1959). These houses will be discussed in the second part of this article.
74 Ray Eames, interviewed by Neil Jackson, 25 June 1988, Santa Monica, California.
75 *Arts and Architecture*, April 1949, p. 40
76 *Arts and Architecture*, December 1949, p. 29.
77 'The Office of Charles and Ray Eames get Royal Gold Medal', *RIBA Journal*, April 1979, p. 143.
78 *Arts and Architecture*, December 1949, p. 27.
79 Banham, *Los Angeles*, p. 225.
80 The extent to which Mies's contemporary work was known to the Californians will be discussed in the second part of this article.
81 'Prefabricated Units for the Home', *Architectural Forum*, December 1935, pp. 544–76.