Jean Prouvé and the Demountable House

Peter Lobner, 15 June 2020

1. Introduction

Jean Prouvé was a prolific French metal worker, designer and self-taught architect who has become recognized for his diverse furniture and building designs that fuse art, engineering and architecture.

Prouvé began development of his “axial portal frame” structural system in 1939 and patented a "demountable metal-frame structure" based on an 8 x 8 meter (26.2 x 26.2 foot) module, which provided a total open floor space of about 64 m² (689 ft²) per module. The basic structure is evident in the following diagram. Note that an axial steel beam and the roof structure are supported by steel portal frames (in this case, two “H”-shaped portal frames are visible). This structure looks a bit like a gantry crane. Standard size exterior panels are attached to the perimeter of the structure. The open floor space can be configured with interior partitions to meet user needs.

Basic structure of an axial portal frame demountable house (Maison à Portiques). Source: Ateliers Jean Prouvé via MaxBorka.com
Bare portal frame structure for a demountable house.
(Similar to an 8 x 12 meter Métropole Standard House)

Some exterior panels are installed on an 8 x 8 meter
demountable house frame. Source, both photos: Dwell.com
To demonstrate the ease with which a Prouvé’s demountable house can be assembled onsite, several exhibitions, like the Art Basel Miami 2013 exhibition, have included a house that is taken apart or rebuilt by a small crew each day.

Twelve hour reconstruction sequence for Prouvé’s 8 x 8 Demountable House. Source: Patrick Seguin Gallery

In this article, we’ll take a look at the following post-WW II buildings, mostly residential, designed by Jean Prouvé. All make use of steel in their load-bearing structure and several use aluminum for part or all of their exterior panels and roof.

Portal frame buildings

- Société Centrale des Alliages Léger (SCAL) Barracks (1940)
- Early 6 x 6 and 6 x 9 Demountable Houses (1944)
- Ferembal House (1948)
- Métropole Standard House (1949 - 1952)
- Maisons Tropicale (1949 – 1951)
- Bouqueval and Vantoux schools (1950)

Other types of structural systems

- Maison coques (Shell House, 1950 – 1952)
- Habitat Tropical du Cameroun (1958)
2. Société Centrale des Alliages Léger (SCAL) Barracks (1940)

The first application of the axial portal frame structural system occurred in 1940, when Prouvé, working in collaboration with architect Pierre Jeanneret, designed and built an 8 x 12 meter (26.3 x 40 feet) engineer’s pavilion (a barracks) in Saint Auban, France.

3. Early 6 x 6 and 6 x 9 Demountable Houses (1944)

Immediately after the war, Prouvé designed temporary houses based on his axial portal frame structure. He received a contract from the Ministry of Reconstruction and Town Planning for 800 temporary houses (later changed to 400) for displaced people in Lorraine and Franche-Comté. House dimensions were set at 6 x 6 meters (19.6 x 19.6 feet) and later enlarged to 6 x 9 meters (19.6 x 29.5 feet). Built from light, prefabricated components of metal and wood, these temporary houses were designed for rapid assembly on the sites of destroyed homes. Because of strict post-war quotas, the use of steel was limited to the load-bearing bent steel portal frame, into which were inserted simple, standardized, 1-meter (3.3-foot) wide panels for
the exterior walls, doors and windows. The house could be partitioned into three rooms and was immediately habitable. These temporary houses could be demounted and moved elsewhere if needed. About 20 of these houses have survived.

Exterior view of a 1944 6 x 9 meter demountable house.

Source, both photos: Galerie Patrick Seguin

Interior view of a 1944 6 x 9 meter demountable house.
The structural skeleton of a 6 x 6 demountable house, showing the location of a single steel portal frame. 
Source: Eric Touchaleaume, Galerie 54

4. Ferembal House (1948)

In 1948, Prouvé designed the Ferembal House, which is a large building measuring 23 x 8 meters (75.4 x 26.2 feet, 1,975 ft²). It has five axial steel portal frames, aluminum roof slabs, a pressed steel floor, and prefabricated double-sided wood panels for the exterior walls. Originally, this building was installed as a second-floor structure on a masonry base to expand the Ferembal offices in Nancy, France. It was saved from demolition in 1983 when it was acquired by gallery owner Patrick Seguin and “demounted” from its original installation.

From 2007 to 2010, architect Jean Nouvel undertook a thorough “adaptation” of the structure, resulting in an updated configuration as a detached house. It was unveiled in 2010 in the Tuileries Garden in Paris, in connection with the Paris Design and Architecture Festival.
Exterior view of the Ferembal House after “adaptation”. Source: Galerie Patrick Seguin

Ferembal House interior showing the several portal frames in this long demountable house. Source: Galerie Patrick Seguin
5. Métropole Standard House (1949)

Prouvé continued to develop the design of his demountable house and, in 1949, produced the Métropole House, which was the prototype for a house intended for large scale production, primarily for French overseas colonies. The house was entirely prefabricated and would be partially assembly in the factory prior to shipment. It had a steel portal frame structure with aluminum roof and standard-width 1-meter (3.3-foot) wide exterior panels for solid walls, windows and doors. The prototype measured 8 x 12 meters (26.2 x 39.4 feet).
In this endeavor, Prouvé had the support of Aluminium Français and its commercial subsidiary, Studal, which was intended to have exclusive sales rights for the Métropole House in the construction sector.

The French government only ordered 12 Métropole houses. Prouvé’s firm, Ateliers Jean Prouvé in Maxéville, produced 25 of these units, with commercial customers taking the units not delivered to the government. The production versions were produced in two sizes: 8 x 8 meters (26.2 x 26.2 feet, 686 ft²) with a single, welded steel portal frame, and 8 x 12 meters (26.2 x 39.4 feet, 1,040 ft²) with two portal frames.

Ten Métropole Standard house units were erected on masonry foundations on uneven ground in a small residential development in the Meudon suburbs of Paris. This small development, known as Cité “Sans souci,” also includes four of Prouvé’s Maison coques-style “Shell” houses.

8 x 12 Métropole Standard houses, circa1951. Source: http://astudejaoublie.blogspot.com/2012/05/meudon-les-maisons-jean-prouve.html
Floor plans of the 8 x 8 and 8 x 12 Métropole Standard houses in Meudon, France. Source, both floor plans: Modernist Estates, https://blog.modernistestates.com/post/176656977805/journal-stay-in-a-jean-prouvé-house-in-meudon
Two Métropole Standard houses at Muedon. Source, above: http://astudejaoublie.blogspot.com/2012/05/meudon-les-maisons-jean-prouve.html

Source: https://www.telerama.fr/sortir/a-meudon-les-lotissements-sont-signes-jean-prouve.n6597531.php
In spite of its many attractive features (lightness, comfort and transformability), further government and commercial market demand for the Métropole Standard house did not develop. One important factor may have been that the house cost about 40% more to produce than a traditionally constructed house. Prouvé was not able to transition from “artisanal” production to factory mass production as a means to reduce the cost of the Métropole Standard house.


To help address the shortage of housing and civic buildings in France’s West African colonies, Prouvé designed and manufactured three lightweight, transportable, portal frame houses that were flat-packed and shipped in cargo airplanes to sites in tropical West Africa. The three prototype houses, known as Maisons Tropicale, were built from 1949 to 1951. The first was commissioned by Paul Herbé, architect-planner of the Niger colony, and erected in Niamey where it served as his office.

![Niamey House in Niger. Photo circa 1949.](image)

Source: Centre Georges Pompidou, Paris, via Kathleen O’Day

The other two prototypes were erected together in Brazzaville, French Congo (now Republic of the Congo) where they served as the residence and office for Jacques Piaget, the Aluminium Français commercial director. A bridge connects the two units.

The larger residence measures 10 x 18 meters (32.8 x 59 ft, 1,935 ft²); the smaller office measures 10 x 14 meters (32.8 x 46 ft, 1,509 ft²).

The Maison Tropicale buildings are supported by a steel axial portal frame and are sheathed in aluminum. To help control interior temperatures in the tropical environment, Prouvé implemented a double roof design with a ventilation path flowing between the roof layers and out through raised vents in the peak of the roof. Movable exterior wall panels with many blue glass portholes provide lighting and ventilation during the day. Louvered aluminum sunscreens provide shade on the verandas.

La Maison Tropicale cross-section showing the portal frame and floor structural elements (blue), the double roof structure and central roof vent and the louvered aluminum veranda sun shades.

Source: [https://slideplayer.com/slide/15521835/](https://slideplayer.com/slide/15521835/)

The Maison Tropical houses proved to be more expensive than expected. No additional units were ordered.

All three Maisons Tropicale were retrieved from their original sites in Africa in 2000 by French collector Éric Touchaleaume and exist today as restored buildings. Robert Rubin acquired the smaller Brazzaville house for about $1 million and subsequently restored and donated it to the Pompidou Center in Paris where it is on display on the roof. Hotelier/developer Andre Balazs purchased the restored larger house from Brazzaville for $5 million at an auction by Christies New York in June 2007.

Reportedly, Touchaleaume is restoring the Niamey Maison Tropicale for possible inclusion in his private cultural park, at Friche l'Escalette, near Marseilles.

7. Bouqueval and Vantoux schools (1950)

In the decade after WW II, Jean Prouvé also designed several metal portal frame infrastructure buildings that shared features with the demountable house.

Two prominent examples in France are the Bouqueval and Vantoux schools, which were developed in response to a Ministry of Education’s 1949 competition for "a mass-producible, one-room rural school with teacher accommodations." Prouvé was among the winners of the competition, which called for buildings that were easy to assembly quickly on any kind of site. The two prefabricated 24 × 8 meter (78.7 x 26.2 feet, 2,062 ft²) steel and aluminum school buildings were delivered in 1950.
The Vantoux School and its furnishings have been classified as Historical Monuments since 2001. Patrick Seguin acquired the Bouqueval School for his gallery.
8. *Maison coques* (Shell houses, 1950 – 1952)

Departing from his characteristic portal frame structure, Jean Prouvé developed several building designs with a self-supporting, one-piece parabolic shell with a steel frame and aluminum skin. This design was suitable for a variety of buildings ranging from small sheds to homes and larger buildings. Prouvé displayed two designs of a residential *Maison coques* units in 1951 at the Exposition de l’Habitation in Paris.

![Prototype double shell house](source)

*Prototype double shell house (small shell left of “central” load-bearing wall & bigger shell to the right), 1951, Paris.*

*Source: residences-decoration.com*

![Basic forms of a Maison coques shell / shed structure.](source)

*Basic forms of a Maison coques shell / shed structure.*

*Source: SlideShare, “Referat Maison démontables Jean Prouvé,”*
Prouvée’s Maison coques-style applied to a small residence or office.  
Source. Ateliers Jean Prouvé via Pinterest

Prouvée’s Maison coques-style applied to a larger residence.  
Source: http://www.beaudouin-architectes.fr/1984/06/entretien-avec-jean-prouve/
An attempt to interest the French automotive firm Citroën in one- and two-story Maison coques-style apartments for employees failed to gain traction when management assessed the designs as “too modern.”

General arrangement of a two-story Maison coques-style house designed for Citroën in 1951. Source: Pinterest

One standard module for a Maison coques-type structure, on display at Vitra Design Museum, Germany. Source: Kathleen O’Day, 2009
In 1952, four less-radical, single story Maison coques-style apartments were erected in the Cité Sans Souci development in Meudon, which also includes 10 of Prouvé Métropole Standard houses. Two of the Maison coques-style houses have a single shell and two have double shells that form a relatively flat roof, lacking the pronounced arch in some of Prouvé’s earlier designs.

In the houses with two shell sections, the thinner “tails” of each shell are supported by a central load-bearing masonry wall, and the thicker “leading edge” of each shell is supported by load-bearing walls at the opposite ends of the house. This configuration can be seen in the following photo. The exterior panels on the sides of the house are Prouvé’s typical 1 meter (3.3-foot)-wide panels that can be solid or fitted with a door or window.

The housing crisis continued in France into the mid-1950s. A well-known priest, Abbé Pierre, raised an appeal to address the housing crisis by providing 200 homes, known as Les Jours Meilleurs (Better Days House) for poor families. Funding was to come from donations.

At Abbé Pierre request, Prouvé developed the small Les Jours Meilleurs (Better Days House) in 1956. This was a prototype for a low-budget, 57 m² (614 ft²) house with a living area, kitchen, bath and two bedrooms. The rectangular house measured 6.5 x 9 meters (21 x 29.5 feet).

The structural design of the Better Days house is notably different than Prouvé’s typical demountable house, as described by Galerie Patrick Seguin:
“The construction approach was based on a concept devised with architect Maurice Silvy at Prouvé’s factory in Maxéville in 1952. On a dished concrete base, a prefabricated steel central unit housing the kitchen, bathroom and toilet was placed; the unit supported a pressed steel beam and constituted the substructure. The shell was made of thermoformed wood sandwich panels, and the roof of aluminum slabs that also extended out to cover the porch.”
On 21 February 1956, the prototype was erected by two workers in more than the scheduled seven hours, with the delay primarily caused by the large number of onlookers. The event raised significant funds for Abbé Pierre’s charity.

In spite of its compact size and novel features, the Better Days house failed to get the approval of housing authorities and additional units were not produced.
10. *Habitat Tropical du Cameroun* (Tropical Habitat for Cameroon, 1958)

Éric Touchaleaume discovered the prototype lightweight Tropical Habitat along with four follow-on structures while travelling through Cameroon, Africa. These structures do not use Prouvé’s typical axial portal frame construction. Instead, support for an aluminum parasol roof is provided by bearing posts at the perimeter of the building, joined by lattice girders spanning the interior space. In the prototype, the bearing posts and lattice beams were made of folded sheet steel. In the follow-on structures, steel was replace with a locally sourced dense teak known as okan, which is insect and rot resistant.

The overhanging parasol roof provided protection from the sun and monsoon rains, while the space between the roof and a dropped ceiling combined with louvered wall vents were effective in controlling interior temperature in a tropical environment.

*Exterior view of the restored prototype Habitat Tropical du Cameroun on display in 2016. Source: C. Baraja and É. Touchaleaume, Galerie 54, Paris,*
Interior view of the restored prototype Habitat Tropical du Cameroun.  
Source: C. Baraja and É. Touchaleaume, Galerie 54, Paris,

The dropped ceiling is not present in above photos of the prototype, but it would have been attached to the bottoms of the lattice beams.

A wooden version of the Habitat Tropical du Cameroun, with an aluminum parasol roof and louvered exterior panels, is shown in the following photo.

Source: C. Baraja and É. Touchaleaume, Galerie 54, Paris,
11. For additional information:

Following is a list of resources you can consult for more information on Jean Prouvé’s prefabricated demountable houses and his other buildings, furniture and metalwork.

**Musée des Beaux-Arts de Nancy**

Jean Prouvé’s life is closely associated with the history of Nancy, in northeastern France (formerly Lorraine, now part of Grand Est) where he grew up, and in nearby Maxéville, where he operated his business, *Ateliers Jean Prouvé*, for many years. Since 2012, the museum has presented one of the largest public collections of objects made by Prouvé. The museum website is here: [https://musee-des-beaux-arts.nancy.fr/en-2689.html](https://musee-des-beaux-arts.nancy.fr/en-2689.html)

**Jean Prouvé’s house and workshop**

Prouvé’s personal residence is in Nancy, on a hillside above the city. This iconic home was built in 1954.

*Prouvé’s Residence. Source: IconicHouses.com*
His workshop office, originally built in Maxéville in 1946, is a lightweight, steel portal frame pavilion measuring 8 x 8 meters (26.2 x 26.2 feet). After Prouvé left Maxéville, his workshop was moved to Nancy and re-assembled in 1957 on the property below his house.

Prouvé workshop office. Source: Musée des Beaux-Arts de Nancy

Prouvé’s house and workshop have been listed as Historic Monuments since 1987. You can take an online tour of the house and workshop on the Iconic Houses website here: https://www.iconichouses.org/specials/maison-jean-prouve

The house and workshop are open to visitors from the first weekend in June to the last weekend in September. You’ll find information for visiting the house and workshop on the Musée des Beaux-Arts website here: https://musee-des-beaux-arts.nancy.fr/en/the-prouve-house-3206.html

**Patrick Seguin’s Galerie Patrick Seguin:**

Patrick Seguin has collected, restored and displayed many examples of Prouvé’s demountable homes and similar structures. You’ll find extensive resources on Jean Prouvé on the Galerie Patrick Seguin website. Resources include photographic and text descriptions of
many structures, a chronology of work, videos, and more. The link to the Jean Prouvé main page on the Galerie Patrick Seguin website is here: https://www.patrickseguin.com/en/designers/architect-jean-prouve/available-houses-jean-prouve/

**Éric Touchaleaume’s Galerie 54 and la Friche l’Escalette:**

Éric Touchaleaume is a collector specializing in 20th century avant-garde art and architecture, including the work of Jean Prouvé. You’ll find many resources on Touchaleaume’s Architecture + Design XXE Galerie 54 website at the following link: http://galerie54.com/en/jean-prouve-architecture

In 2011, Touchaleaume bought la Friche l’Escalette, a disused lead mine in the National Parc des Calanques south of Marseille, France, for use as a private cultural park to share his passion for contemporary sculpture and Jean Prouvé’s lightweight architecture. Several restored Prouvé structures are on display. You can visit the exhibit online here: http://friche-escalette.com/en

**Articles:**

- **General:**
  - “Referat Maison démontables Jean Prouvé,” SlideShare, 10 August 2013: https://de.slideshare.net/neuwerk/referat-maison-demontables-jean-prouv

- **6 x 6 Demountable House**
  - “Richard Rogers Updates Jean Prouvé’s 6×6 Demountable House For Design Miami/Basel,” decor10blog, 11 June 2015: https://decor10blog.com/design-decorate/decorating-ideas/richard-rogers-updates-jean-prouves-6x6-
**demountable-house-for-design-miamibasel.html**

- **Meudon houses**
    [http://astudejaoubie.blogspot.com/2012/05/meudon-les-maisons-jean-prouve.html](http://astudejaoubie.blogspot.com/2012/05/meudon-les-maisons-jean-prouve.html)
  - Pierre Pineiil, “À Meudon, les lotissements sont signés Jean Prouvé !” Télérama, 6 June 2020 (updated):

- **Maison des Jours Meilleurs**

- **Maison Tropicale**
  - Kathleen O'Day, “Tropical or colonial?: a reception history of Jean Prouve's prefabricated houses for Africa,” Louisiana State University, LSU Master's Theses 3295, 2009:
    [https://pdfs.semanticscholar.org/2802/6a7f92cab6cf81110257ecbcb4fb3c78ae57.pdf?_ga=2.177480805.1589173516.1591994996-2048731417.1591994996](https://pdfs.semanticscholar.org/2802/6a7f92cab6cf81110257ecbcb4fb3c78ae57.pdf?_ga=2.177480805.1589173516.1591994996-2048731417.1591994996)
  - D. J. Huppatz, “Jean Prouvé’s *Maison Tropicale* in New York,” 31 May 2007:
  - D. J. Huppatz, “Jean Prouvé’s *Maison Tropicale* in New York: Update,” 7 December 2007:
tropicale-in-new.html

- Tropical Habitat for Cameroun
  o Jean Grogan, “Jean Prouvé’s ’Tropical Habitat for Cameroun’ moves to Marseille,” Wallpaper.com, 1 July 2016: https://www.wallpaper.com/architecture/jean-prouve-tropical-habitat-for-cameroun-comes-to-marseille

Books:

There are many books on Jean Prouvé’s houses, other buildings, furniture and metalwork. Here are just a few of what you’ll find if you search online.

- Galerie Patrick Seguin has published a series of very detailed books on individual Prouvé houses in the gallery’s extensive collection.

Videos:

- “Jean Prouvé - Maison démontable 6x6” (3:49 minutes), Galerie Patrick Seguin, 2 February 2016: https://www.youtube.com/watch?v=EklOhsNJH8o
• “Jean Prouvé “6 x 9” demountable house, 1944-1945” (2:34 minutes), Phillips, 14 September 2015: https://www.youtube.com/watch?v=Y88Q8_JXvmw
• “Jean Prouvé: Demountable House Installation at Gagosian Le Bourget, Paris” (1:49 minutes), Gagosian, 10 June 2013: https://www.youtube.com/watch?v=bTGnqDEIBiE
• “Jean Prouvé - Bureau d'études Maxéville, 1948” (3:29 minutes), Galerie Patrick Seguin video of Prouvé’s Maxéville Design Office, 22 June 2016: https://www.youtube.com/watch?v=uWefCORND8Y
• “Jean Prouvé - Maison Ferembal 1948” (5:37 minutes), Galerie Patrick Seguin, 2 February 2016: https://www.youtube.com/watch?v=b8fZpsOB81U
• “TimeLapse: La Maison tropicale de Jean Prouvé's installe au Musée de l'Histoire du Fer” (2:43 minutes), Métropole Grand Nancy, 24 June 2014: https://www.youtube.com/watch?v=ARgo_zAs0Y8
• “Maison Tropicale, Jean Prouvé” (6:57 minutes), this is a 3D CAD animation by João Antônio Augusto showing the construction sequence, 2 September 2010: https://www.youtube.com/watch?v=0-fjQRw0zZ4
• “The House of Jean Prouvé” (23:25 minutes), Ni Co, 14 November 2014: https://www.youtube.com/watch?v=ndez6kJEabl
• “Jean Prouvé: A Tropical House” (11:15 minutes), FloatingFilms, 11 April 2011: https://www.youtube.com/watch?v=sKV7U3Mff6w