

NASA Technology Utilization House

A "house of the future"
is ready today.

Langley Research Center, Hampton, Virginia

The NASA Technology Utilization House (Tech House), constructed at Langley Research Center, was designed and built to demonstrate how the application of aerospace technology could advance the building industry in residential construction. Tech House is a single level structure of contemporary design which is comprised of two square modules connected by a hallway and contains approximately 140 m² (1,500 ft²) of living space. One module consists of a living room, dining area, and kitchen; the other, three bedrooms and two baths. The connecting hallway has an entry vestibule and a laundry room. In developing Tech House, NASA incorporated the latest technology and used special features when either the initial cost could be recovered in energy savings over the useful life of the feature or if it provided a specific benefit such as personal or structural safety. The one other criterion for application of advanced technology was that the feature was projected to be commercially available within five years.

It is forecast that within five years the house with all its special features can be built commercially for approximately \$45,000 (based on 1976 costs). With the incorporation of solar energy, energy efficient appliances, and the water reuse system, it is predicted the homeowner would save approximately \$20,000 in utility costs over a period of twenty years, after recovering the additional cost of these special features. (This forecast is based on a ten-percent annual increase in utility costs.)

The following special systems and features, most of which are an outgrowth of NASA's aerospace technology, have been incorporated into Tech House:

Heating and Cooling System

- Solar collectors on the roof are

used, together with nighttime radiators, two wells, and a heat pump, to supply major heating and cooling requirements.

- Additionally, the fireplace is outfitted with a duct system to bring in combustion air from the outside, and fire grate water coil, enabling the accumulation and storage of heat for later distribution.
- Exterior retractable shutters provide energy savings when closed by preventing heat loss during the winter and heat gain during the summer and, at the same time, function as a security measure.
- A nonflammable, nonpetroleum based foam provides highly efficient insulation, supplemented by metal exterior doors which have a thermal break, polystyrene core and magnetic weather stripping.

Water Recycling System

- A 50-percent reduction in water consumption is attained through use of low-profile water fixtures and a water reuse system which collects waste water from the

shower, bathtub, bathroom sinks, and laundry in a holding tank where it is chlorinated, filtered, and recycled for toilet flushing.

Hot Water System

- Solar energy heats the water used in the domestic hot water system.

Security System

- Interior security is provided by detectors at doors, windows, and under carpets which set off an alarm when an intrusion occurs.
- An exterior security system uses a seismic device to sound an alarm when an intruder approaches within 80 m of the house.
- A smoke detector is used to sense the presence of combustion products and sound an alarm.
- A battery charged by a solar cell provides power for a driveway spotlight and emergency lighting. The smoke detector and security system may also be powered by the solar-charged battery.
- A tornado detector is attached to the television screen and sounds an alarm upon the appearance of a



NASA's **Tech House** at Langley Research Center incorporates solar heating, cooling, and hot water. A security system includes intruder and fire alarms, a tornado detector, and emergency lighting. A water recycling system and energy-saving lighting fixtures help reduce the homeowner's costs.

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tornado within a radius of 18 mi.

Additional

- Thermistors installed in lamp sockets significantly increase the life of the light bulbs by a minimum of 300 percent.
- Seat cushions are made of an advanced foam rubber that contours to a body shape, thereby distributing weight evenly over the contact surface.
- Flat conductor electrical wiring, covered with plastic baseboard, which has greater current capacity was installed after the building was

completed and the carpet installed.

These features are all examples of the innovations utilized in the construction of the Tech House to demonstrate the application of advanced technology to minimize energy and water consumption and provide for the comfort and safety of the homeowner and his family.

This work was done by the Technology Utilization Office of
Langley Research Center.

While no patent action is contemplated by NASA on the Technology Utilization Home as such, many of the components and systems included in the house are covered by patents. Some components were developed by private industry and industry owns those patents. Inquiries regarding which items are patented and concerning rights for the commercial use of these inventions may be directed to the Patent Counsel, Langley Research Center, Mail Stop 279, Hampton, VA 23665. Refer to LAR-12134.



Figure 1 - The Tech House

NASA
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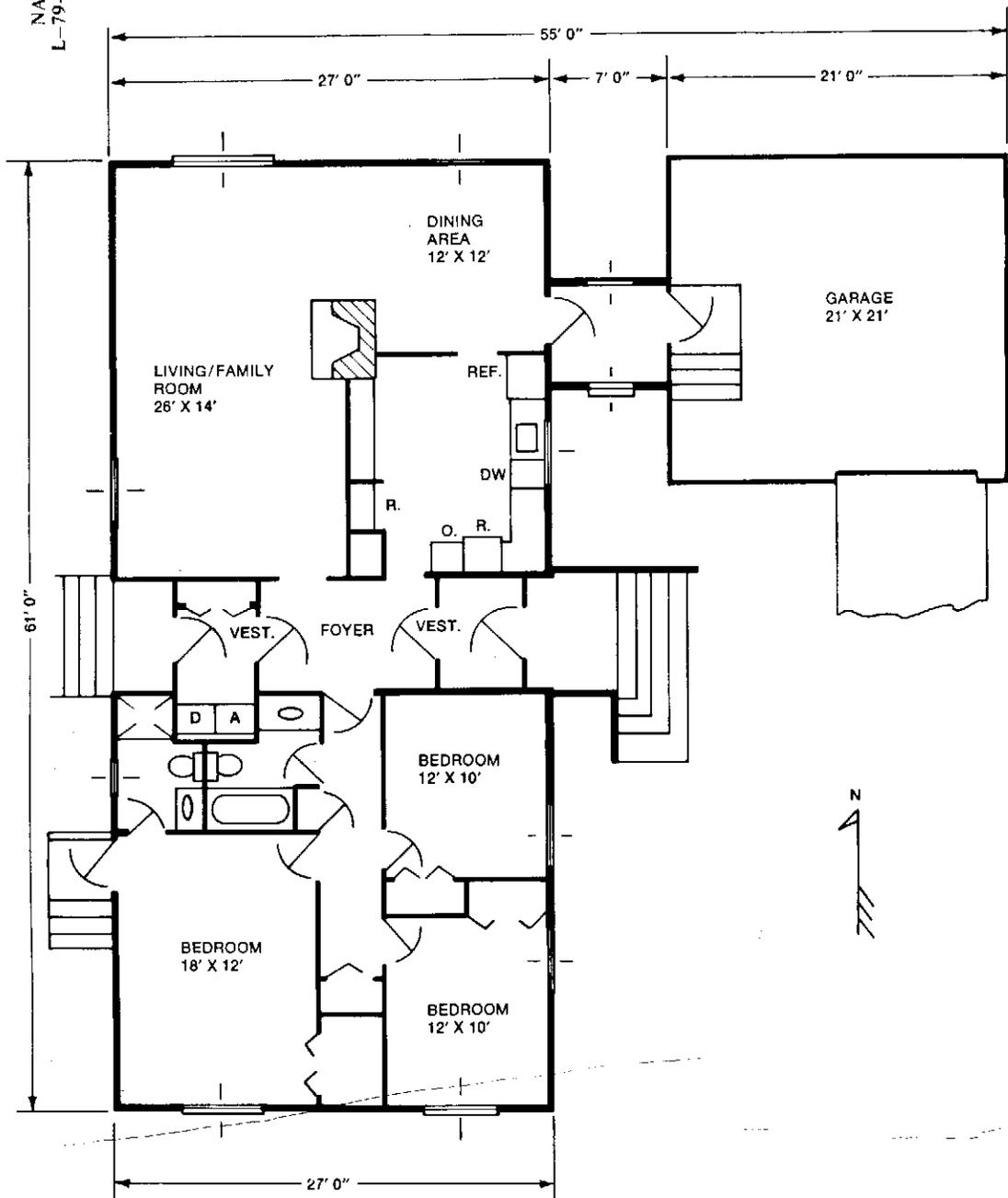


Figure 2 - Tech House Floor Plan