

**Portfolio**

**Unimog Expedition Truck**

**U2450 L38**



# 1. Introduction

This portfolio is meant to give a closer look at the design and ability of our expedition truck 'PocoLoco', meaning 'a little bit crazy', on the base of a Mercedes-Benz Unimog U-2450 military/utility vehicle chassis. This chassis type is known as the most versatile off-road vehicle available.

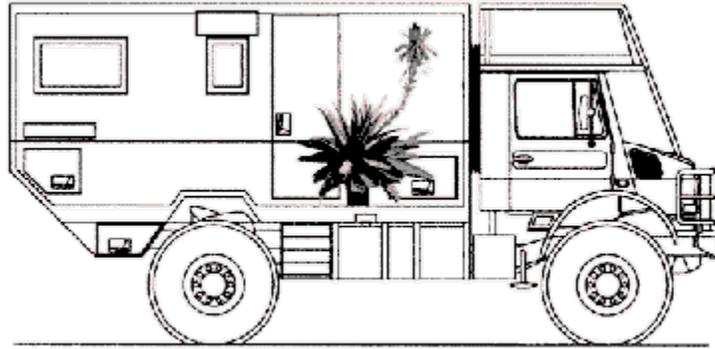
On the base of this chassis we had a house-part/living space custom-built by UNICAT in Germany to make traveling more comfortable. During a trip in Central Australia in the early 1990s we had seen a similar vehicle and were instantaneously intrigued by the possibilities such a vehicle could provide a serious traveler with. It is like traveling with your own hotel room, able to park wherever it comes to mind, enjoying nature wherever it might be, far away from other people.

For eight years we have traveled full-time in this truck and we have never been disappointed by its abilities and strengths.

A funny detail: this vehicle has been the base of a Unimog model in 1:86 scale (H0), made by the German company Kibri - a real 'cult' vehicle.



## 2. Technical Features



The chosen Unimog chassis U-2150/2450 is the biggest/heaviest chassis frame available at that time. The vehicle dimensions are roughly 7 m long, 2.50 m wide and 3.50 m high.

It is equipped with a 6-cylinder Mercedes-Benz engine with 240 PS (horse power), which has been moderately upgraded with another turbo charger to 330 PS, giving it enough power to move the vehicle in very complicated terrain.

The Mercedes-Benz transmission is an eight gear transmission switchable from forward to reverse, so there are also eight gears available in reverse. In addition, a low gear transmission allows driving very slowly and doubles the traction power, adding an additional eight gears. The total gears are 32, 16 in forward drive and 16 in reverse drive.

Furthermore the vehicle can be switched from 2-wheel drive to 4-wheel drive (even when moving) and it has a special blocking section for the differential of the rear and the front axle.

Both axles are so-called 'portal axles' with built-in gears which give a ground clearance of approximately 60 cm! The four standard springs have been replaced by custom-built and especially calculated springs better designed for the weight of the vehicle and for better stability in complicated terrain.

The vehicle has a built-in central tire inflation system which allows the driver to lower or raise air pressure in every single tire while driving. This is a big advantage when changing from one type of terrain to another. Each tire's pressure is shown on a digital display in the cabin above the driver's seat.

The vehicle is based on truck technology and can only be moved if under pressure.

The electrical system is split into 24V chassis part and 12V house circuits. Starter batteries are completely separated from the house utility circuitry. Two alternators charge both battery systems while driving. A solar panel system can be switched from 24V to 12V battery banks,

whichever might be necessary. The solar panel system is designed to keep up the daily battery charge. A diesel generator is built-in to bridge power needs if necessary. All important data is shown on a big panel above the driver's and copilot's seats and on the main panel in the house part.



There is a land-line connection for use of electric power and 110V or 220V can be fed. Normally 110V will get transformed into 220V. There is also a 12V to 220V transformer built-in for low consumption or no landline. If you want to strictly use 110V this has to be redone (which we think is fairly easy to do).

For travels in cold areas there are two diesel heater units built in which can work independently or together. They heat the cooling water circuitry which is prolonged into the house part to serve as a heater/furnace. This same circuit can also be used to preheat the engine in very cold regions.

#### List Chassis

- Mercedes-Benz UNIMOG
- UNIMOG heavy duty chassis
- Wheel base 3850 mm (12'8")
- GVWR: 11900 kg (26000 lbs)
- U-section frame
- Torsional flexible load carrying frame
- Cross country ratio transmission
- Additional gearbox with crawler gears for hill climbing capacity over 100% grade
- All gears usable both forward and reverse
- Four wheel drive can be selected while driving
- Differential locks for both front and rear axle, can be selected while driving
- Fully protected drive train using torque tube technology

High mounted gear transmission  
High ramp break-over angle  
Portal axels for high axle ground clearance  
Front and rear tires follow same track  
Enhanced driving safety using coil springs, shock absorbers and stabilizers both front and rear  
Four wheel disk brakes  
Enhanced water fording capacity with raised engine air intake and vent openings  
Torsion free drivers cab mounting using 3 point kinematic mount  
Soundproofed and vibration isolated drivers cab  
Raised drivers cab ceiling for additional equipment space and spare tire storage  
Hydraulic power steering  
Air brakes and power assisted clutch  
Engine compartment easily serviced from exterior hood  
Manual hydraulic drivers cab tilt  
Low emission turbo diesel engine  
Engine oil lubrication system designed for extreme tilt and slope  
Engine enclosure for lower noise emission

#### List Body

##### Frame assembly

Mercedes-Benz approved, low 3 point kinematic attachment with main and flex mounts for stress free body coupling to the torsion elastic chassis frame

##### Body unit construction

Self-supporting UNICAT sandwich plate panels of fiberglass composite (corrosion free)  
Panel connections made by adhesive bond to custom extrusions eliminates metallic heat conduction paths  
Matched thermal coefficients of expansion prevent distortion with changes in temperature  
Wall thickness 60 mm (2,36'') with polyurethane foam insulation, 3 mm (0,12'') FRP outer surface, 2 mm (0,08'') FRP inner surface  
Ins. rating 0,44 W/m<sup>2</sup> K (0,078 btu/ft<sup>2</sup> h deg F)  
Bottom panel at 95 mm (3,7'') thickness. Compound construction of plywood bottom, foam body, integrated welded steel frame and surfaces of FRP

##### Access to drivers cab

Highly flexible waterproof bellows coupling

##### Doors and hatches

UNICAT door and storage hatches constructed of fiberglass composite plates and frames  
Thickness of door 60 mm (2,36'')  
Double sealed doors and panels  
Heavy duty locks with seal compression  
Stainless steel hinges throughout  
Additional retractable bolts at top and bottom of doors

Safety cylinder locks all keyed alike

Windows and skylights

UNICAT burglarproof, scratchproof sidelights and skylights

UNICAT window frame made of extrusions, cold-spot and corrosion free

Double insulated thermal security window glass

### 3. Exterior Design



The exterior form of the vehicle has been designed with the functionality in the field in mind. The back of the house part has been diagonally cut-off to leave enough space for ground clearance in the back if you need to drive up a steep ramp. The front part is designed to drive up and down a 100% ramp (45 degrees), which is very rare in daily life, but at least possible.

To lower the top weight (move down the center of gravity) it has been designed with a slightly conical top part (narrower on top than at the base). Equally important was the storage weight of diesel fuel and water, so both tanks were built in as low as possible. In tests the vehicle has proven to be stable up to 32 degrees tilt on a concrete base (which a normal driver won't even come close to - as it feels terrible).

The house part has been designed with a stainless steel frame and with special and durable fiberglass parts, glued together with a special type of glue. It is very stable and close to indestructible. Although it looks like it and people believe it, the vehicle is not bullet-proof.

The compartment above the driver's cabin can be opened. It contains a crane and winch to lower the spare tire. It also contains the jack, the spare tire and other bulkier, rarely used spare parts.

Outside storage compartments are located in the rear of the house part. They can be used for storing a camping table and chairs, a foldable BBQ, towropes, spare parts, power cables, and much more. Many of the spare parts and tools are stored in sturdy, stackable boxes to make the most of the available room in these storage compartments.

The house part is very well sealed and has especially designed flip-open windows with double sandwich security glass and a built-in plastic foil which makes it hard to get in for uninvited visitors. A color video camera in the back gives the driver the ability to see where she/he drives when in reverse. On both sides of the house part there are flaps with floodlights which open when the light gets switched on.

The diesel fuel tanks hold 640 liters of diesel in total which give an approximate travel range of 2000-2500 km before having to refuel. The fresh water tanks hold 440 liters of water for drinking, cooking, washing, and showering.

The grey and black water tanks are located above the rear axle and can be opened and drained by a button in the driver's cabin (while driving).

Access to the air-hose connections between the central tire inflation system and the tire connectors is hidden/protected behind a stable steel cover avoiding easy access for other people.

## 4. Interior Design

A lot of thought had been given to the interior design of the vehicle

In the cabin the main features are (besides the common Unimog features) pressurized adjustable seats, leather tapestry and a big display panel above the driver's and copilot's seats with all the data necessary to operate the vehicle.

The house part is divided into 4 main parts:

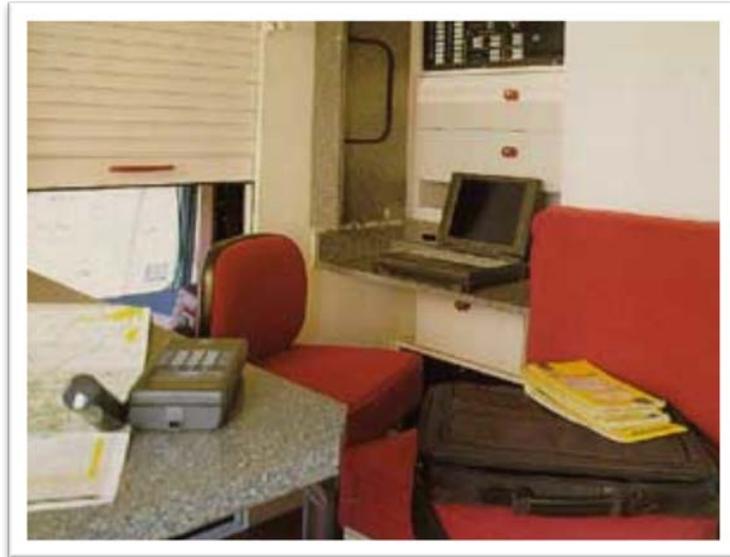
### 4.1 Entrance on the copilot's side



The entrance is equipped with a motorized out-folding stair (which can be replaced by a standard ladder if wished). The entrance also serves as the shower, which makes sense especially in bad weather because you can get rid of wet or dirty clothes before entering the living space. A sink with a special outlet connected to a water filter enables the traveler to clean his teeth without any risk if the water is contaminated. Above the sink there is a compartment with a big mirror. Below the sink there is a washing "machine" which has no moving part, but works fine if used while driving on bad tracks. There is also a connection for an exterior shower head.

Behind a side door there is a pressurized toilet with water flush connection. A heater rack connected to the water cooling system of the truck lets you dry wet clothes while driving or using the heater systems. The floors are covered with heavy-duty airport floor material, easily cleanable and practically not destroyable.

#### 4.2 Front part



The front part of the interior allows to move from the house part into the driver's cabin without having to leave the vehicle. This passageway can be sealed by a lockable roll-down door. The "dining room" consists of a swing-out table with room for four people. One of the seats can be turned around and gives an "office"-like space which we have been using with a laptop etc. Above the computer space is the main tech panel with the controls of the main house parts (circuit breakers, heaters, displays for the charge of the battery banks, control of the generator and more). Under the seat next to the office space is a hidden compartment with a small safe and a subwoofer for the sound system.

### 4.3 Center part



The center part is designed to be the "kitchen" area. It consists of many drawers with all the kitchen/cooking utensils, with drawers specifically designed to hold plates, cups, and glasses safely even when driving on very rough tracks. There are also some overhead compartments for storing groceries. There is a microwave/oven unit built in which can be used with the generator or when connected to a landline. A diesel stove which proved to be unreliable during traveling had to be removed and the area was redesigned to hold a gas stove with two flames (gas tank accessible from an outside compartment door). Next to the stove there is a big sink. On the other side of the stove and under one bed is a refrigerator. Three additional cooling boxes, one of them usable as a freezer, are hidden under the same bed.

#### 4.4 Rear part



The rear part of the vehicle has been designed to be more practical than most other RV type vehicles. It has NO queen/king size bed, but two single beds instead which is a real advantage if one is sick or would like to relax, read without bothering the other sleeping person or simply wants some room for himself/herself. Both beds are equipped with the best Swiss bed technology we know, a very comfortable bed frame which adapts to the outlines of the body. Above the beds are storage compartments for clothes, lights and so on. Different technical units are built in below the beds, and there are more drawers for clothes and so on. Some large hidden compartments including another safe give you the possibility to transport things that you do not want to show to customs officials or at military checkpoints. A built-in vacuum cleaner is used to clean the floor etc. A built-in A/C can be used if connected to a land-line. The center aisle gives access to a rear closet for hanging clothes and more drawers to store stuff.

With our experience in the field with this vehicle, we would not like to have it any bigger! There are much bigger vehicles out there, but they are impractical for expedition type of travel. They are better suited for easy street/highway travel and getting parked in RV parks or between other RVs near a beach. It was never our intention to travel like that.

## List Interior Layout

### Seating Unit

Seating unit mounted on pedestal

### Office Place

Desk with integrated PC and printer

Swivel chair for office place or seating unit

### Beds

2 single beds in the back fitted with comfortable mattresses and duckboards

Size: 80 x 206 / 181 cm (2'7'' x 6'7'' / 5'11'')

### Shower and Washroom

Shower in entrance way with combined door, to separate either from toilette or living room

Table with integrated sink

### Toilet

Separated toilet room

Also usable as dry-storage due to its own radiator

### Kitchen

Gas stove

Conventional/microwave oven

Household size stainless steel sink with single handle faucet

100 l (22 gallons) fridge

40 l (8,8 gallons) deep freezer box

Two 40 l (8.8 gallons) fridge boxes

Kitchen closet with drawers

Hanger closets with halogen lamps

### Storage

Storage space at the office place

Hanger clothing closet with pull-out hanger bar

Storage cabinet with drawers under the bed

Hanger closets over the beds

Outside storage cabinets under the two beds

A Microfiche reader comes with our vehicle with the entire technical documentation in German, English, Spanish, and French. This makes it easier to have people in other countries doing more complicated repair work according to Mercedes-Benz's instructions.

### Workmanship

All furniture is custom built to the highest cabinetmaking standard out of wood core plywood using heavy duty locks and hinges

Materials and finishes are individual choices

#### Layout

Design and color of floor, walls, ceiling and upholstery can be changed easily

Walls and ceiling are painted with multiple coats

#### Technical equipment

##### Electrical equipment

Custom control panel to control power management and liquid storage tanks

Battery main switch, safety cutout, fault current breaker

DC power supply by battery bank, automatic I-U regulated alternator and AC automatic I-U shore charger with cell temperature sensing

Inverter for 120/240 V

Power plugs for 12 V, 120/240 V and 400 V

Wiring for solar system

Wiring for TV, video and music system possible

#### Generator

Water-cooled diesel generator, remote controlled

Raised exhaust and air intake system

Water fording capacity due to overpressure system

AC and rotary current , power 4 kVA

#### Lighting

Integrated low voltage quartz halogen lights over the table, office place, kitchen, hall way, shower, toilet and storage area

#### Water Supply

440 l (97 gallons) freeze proof drinking water tanks

22 l (5 gallons) hot water-heat exchanger

Stainless steel freeze proof waste water tank

Water faucets in both bath and kitchen have removable sprayers

All components are built due to highest household quality standards

All plumbing is insulated to prevent freezing

#### Toilet

Porcelain-vacuum toilet with water flushing

Stainless steel, freeze proof sewage holding tank

#### Heating System

4 stage diesel/electric-motor lost heat powered warm-water central heating (2 x 5 kW) with engine and diesel preheating system

Waste and sewage holding tank heating

Radiators in living and bath area

Antifreeze system

## 5. Costs and Price Frame

The vehicle was custom-built according to our design and special wishes for a price of US\$ 960'000. In addition to that we had to buy a lot of spare parts and the total cost was well over US\$ 1 million.

Engine and transmission (if well maintained) are designed to work for at least two million kilometers. Our odometer today shows roughly 160'000 kilometers which means in Unimog language that it was not heavily used.

An important fact is that this Unimog is one of the last of the series of 100% mechanically working vehicles! Which means: no electronic black box you have no idea about what it is doing or why it is failing. It can be repaired in the remotest areas of this planet and with the most basic tools (or the special toolset you carry with you).

With the unique vehicle number every spare part can be ordered directly with Mercedes-Benz.

The base for the actual selling price we think is fair would be Euro 199'999.00. This would be the basis for a serious discussion. If you are interested in this vehicle, make us an offer!



