There seemed to be no limit to defence spending and it was a period of many ingenious designs in the field of military automotive and other motorized equipment, from tiny to huge. Many examples have appeared in Wheels & Tracks over the years and this time we will have a closer look at the remarkable Italian Tre-per-Tre Autoveicolo de Montagna (three-by-three motor vehicle for mountainous use) but more commonly known as Mulo Meccanico (mechanical mule).

In the late 1950s came an initiative from General Garbati of the Italian Army to replace the traditional mule which for donkey’s years had been the workhorse (pun intended) for the Alpini — the Alpine soldiers — by a mechanical substitute. Whether this substitution had anything to do with animal rights was not recorded, but the old four-leggers would prove to be hard to replace.

This is how we first saw the 3×3 trike — still in prototype form — at the Geneva Motor Show in March 1960.
Pilot models — recognisable by different steering column and other details — under test. Upper left picture shows reduced rear track; this narrowing down (and vice versa) could be accomplished on the move, within 25 metres travelling distance.

The manufacturer of the legendary Moto Guzzi motorcycles was approached for a solution and the firm's gifted designer Giulio Carcano was charged with the project. He envisaged a compact, highly manoeuvrable three-wheeler with all-wheel drive. Our notes of around 1960 indicate that the original intention had been to use a 500-cc single-cylinder engine based on the one that had proved itself in such machines as the Guzzi 500U 3x2 Motocarro Militare, a robust high-torque slogger. This, however, proved not powerful enough and Carcano then set out to create an entirely new V-twin engine which he placed transversally in the frame so that the crankshaft was in line with the chassis and under such an angle that the drive in both directions was parallel, reducing the need for additional gearing to a minimum.

The preliminary end result was exhibited at the Geneva Motor Show in March 1960. The highly unorthodox machine was described as 'a motorised mountain-goat, with hydraulically reducible rear track to let it pass through narrow spaces, with a complicated layout of permanent drive to all wheels'. Tracks could be added to the rear wheels aided by auxiliary rollers which could be lowered and the machine was claimed 'to let you drive quite a long way up the side of a house'.

Following tests and detail modifications an order was placed for 500 units and quantity production of the final model commenced in 1961. In practice the machine was disappointing, though, 'due to the extreme cost and to problems associated with the excessive skills required by soldiers to operate it in the very tough conditions in which the mule had to perform', according to owner Antonio Allegranzani who preserves one. Another problem was that of driver safety, several drivers reportedly being killed when the vehicle inadvertently left the mountain track, rolling over and taking the operator with it. As a result production was discontinued in 1963. The vehicles remained in service until well into the 1970s, when a more practical 4WD replacement in the form of a 'pedestrian-controlled' platform carrier
By lowering the rollers and installing the overall tracks the Mulo becomes a half-track. Driver's back rest is in fuel tank recess. The machine was an overkill, expensive and unsafe.

was introduced. This was configured like the US Mechanical Mule and built by Fresia as the F18 Mountain Utility Vehicle.

Not that everything had been a waste of effort, at least not for Moto Guzzi. The transverse V-twin engine, in several derivatives up to 1000 cc, was used in a succession of motorcycles beginning with the famed V7 model, which was sold for police work — including military — in a number of countries. The Mulo gradually disappeared from service, to emerge again as a very desirable collector's item.

Of the surviving 3WDs, the majority have remained on their home turf.

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**Technical Characteristics**

**Type:** Mountain Vehicle, 3x3

**Make and model:** Moto Guzzi Mulo Meccanico (1961-83)

**Manufacturer:** Società Esercizio Industri Moto Meccaniche (SEIMM) SpA, Mandello del Lario (Co), Italy

**ENGINE**

- **Type:** transverse 2-cyl. in Vee (90°), ohv, petrol, air-cooled, dry-sump
- **Make, model:** Own Moto Guzzi 750
- **Piston displacement:** 764 cc
- **Bore and stroke:** 80 x 75 mm
- **Power output:** 20 bhp at 4,000 rpm
- **Compression ratio:** 6.5:1
- **Fuel pump:** Weber PM15 or PM15/M
- **Carburettor:** Weber 26iM1B1 or IMB4
- **Ignition distributor:** Marelli S89A

**CLUTCH**

- **Type:** single dry plate, pedal actuated

**GEARBOX**

- **Type:** 6-speed and reverse, in unit with lockable central differential with torque proportioning (80% to rear, 20% to front)
- **Ratios:** 1st 12.92, 2nd 5.97, 3rd 3.10, 4th 1.93, 5th 1.31, 6th 1.00, reverse 13.7:1

**FRONT WHEEL DRIVE**

- **Type:** shaft drive with reductions of 2.153 and 1.27:1 plus final drive ratio 3.416:1

**REAR WHEEL DRIVE**

- **Type:** shaft drive to each rear wheel through suspension arms, final drive ratio 3.715:1; lockable differential
- **Overall ratio:** 10.2:1

**SUSPENSION**

- **Type:** telescopic with helical springing at front; rear trailing arms with rubber springing; variable track width

**CHASSIS**

- **Type:** composite, tubular/welded plate

**STEERING**

- **Type:** steering wheel; reduction gearing

**BRAKES**

- **Type, main:** hydraulic on rear wheels, mechanical on front wheel; parking: mechanical on rear wheels

**WHEELS**

- **Wheel type:** steel disc, 4½x15K, 5-stud
- **Tyres:** 6.00-15
- **Tyre pressures:** front 1.75, rear 2.5 atm

**ELECTRICAL SYSTEM**

- **Make:** Marelli; waterproof
- **Voltage:** 12 V (1 battery, 45-Ah, negative-grounded
- **Generator:** DN60A/180/12/2100D, 180 W
- **Starter motor:** MT46A-07/12D6, 0.7 hp

**BODYWORK**

- **Type:** open, single seat, rear platform
- **Other body styles:** none

**DIMENSIONS**

- **Wheelbase:** 2050 mm
- **Track, front, rear:** 1300-850 mm
- **Overall length:** 3000, width: 1570-1100, height: 1420 mm

**CAPACITIES**

- **Engine oil reservoir:** 6 lit
- **Gearbox/differential:** 6 lit
- **Fuel tank:** 53 lit

**WEIGHTS**

- **Kerb:** 1000 kg
- **Gross:** 1575 kg

**PERFORMANCE**

- **Max. speed:** 50 km/h
- **Cruising range:** 350 km
- **Gradiability:** 42 per cent (in 2nd gear)
- **Turning circle:** 4.4 m