



Since 1981, on the order of the New Zealand Railway, GANZ-MAVAG has been supplying 44 electric multiple-unit trains, as commuter trains for Wellington. The propulsion equipment is manufactured by the British General Electric Company (GEC) and assembled by GANZ-MÁVAG. The trains are provided with cam control.

The trains consist of one motor car and a trailer with driver's cab, and run as married pairs. Two or three 2-unit trains can be connected together and remote controlled from the lead car. Car bodies are made of corten steel according to the British Standards and special care is taken of the inflammability of interior materials. In order to increase passenger comfort and ensure constant floor height GANZ-MÁVAG introduced air suspension between the trucks and car body, as a most advanced solution in the truck development program.

Main technical data:	
Gauge	: 1,067 mm
Catenary voltage	: 1,500 V DC
Max. speed	: 100 km/h
Min. curve radius	: 70 m
Continuous output	: 400 kW
Overall length	: 43,060 mm
Seated passenger capacity	: 148 persons
Weight in running order	: 69,7 t

### GANZ-MÁVAG fabricated truck for the New York City Subway

In August 1980 the New York City Transit Authority requested proposal for the design and manufacture of fabricated (welded) trucks. The GANZ-MÁVAG bid proposal was accepted on the basis of its characteristics and performance in other applications and the contract was signed in July, 1981 for the delivery of two prototype trucks to be tested thoroughly and to be followed by eight production type trucks.

The fabricated truck frame and the bolster beam of the two prototype trucks as well as the parts of the suspension were manufactured in the Budapest plant of GANZ-MÁVAG then they were shipped to the United States in a container. Final assembly took place in an assembly shop which was leased by GANZ-MÁVAG in Brooklyn, New York. At this facility GANZ-MÁVAG performed the assembly of the GANZ-MÁVAG parts with the wheelsets, traction motors and gears provided by NYCTA as well as the US manufactured brake units. The first two trucks were delivered to the New York City Transit Authority on November 30, 1981.

The interface between the truck and the car body is similar to that of the NYCTA's existing truck/car equipment so the trucks are interchangeable. The wheel and axle assembly, the elements of the propulsion and brake and many of the parts of the current collector are also identical with the existing trucks.

The GANZ-MÁVAG truck has a primary and a second-



ary suspension which is a combination of steel coil springs and rubber springs. The suspension system does not contain parts which are subject to wear and tear and is easily maintained.

The two prototype trucks will be evaluated partly on the basis of the results of road testing on the NYCTA, partly on the basis of the results of the laboratory static and fatigue tests conducted also in the United States, and the NYCTA's evaluation of these prototypes.

Authorization to proceed with the manufacture and delivery of the eight production type trucks will be based on the results of the evaluation of the prototype truck tests. Fabricated trucks will then enter a long term reliability and maintainability test operation on the NYCTA for several years, before being certified by the NYCTA as acceptable for future new rapid transit car orders.

# GANZ-MÁVAG



The GANZ-MÁVAG Locomotive and Railway Carriage Manufacturers, Mechanical Engineers employing nearly 15,000 workers, is one of the oldest and biggest industrial plants in Hungary and now it looks back upon a past of 136 years. It was established by the fusion of the GANZ and MÁVAG factories in 1959. Today the enterprise plays a very important role in the industrial and export activity of the country.

The most significant production line of GANZ-MÁVAG is the manufacture of railway vehicles. Diesel and electric multiple-unit trains and locomotives satisfying the highest requirements are in the traditional production range of the factory. The manufacture of railway carriages and wagons started in 1867, while that of locomotives in 1873. Since that time nearly 15,000 passenger coaches, 76,000 freight cars and more than 10,000 locomotives left the factory for customers of five continents.

GANZ-MÁVAG is also involved in urban public transport by manufacturing light rail vehicles, subway cars for both Hungarian and foreign customers and commuter multiple-unit trains. The manufacture of LRVs at GANZ-MÁVAG has also quite a long tradition. The first trolley car was built in 1885 and since that time more than 1,600 cars and trailers had been produced by the factory.

In order to establish closer market relations with North America, later this year GANZ-MÁVAG will form an American subsidiary, known as GANZ North American Corporation, with its headquarters based in New York.

80 per cent of the GANZ-MÁVAG railway vehicles are produced for export, and in the last decade among the major customers of the company apart from the Hungarian State Railways and the Budapest Transit Authority were the railway companies of Brazil, Syria, Egypt, Greece, Uruguay, Tunisia, the Soviet Union, Yugoslavia, Bangladesh, and New Zealand.

The present annual turnover is 150 car units, which will come to a total of 250 car units by 1983, with the introduction of a new automatic car body production line, to be put into operation within the framework of a 400 million dollar, 10 year reconstruction schedule.

GANZ-MÁVAG has always devoted much care to the passenger comfort and easy maintenance of its vehicles. This led to the development of a standardized truck range. More than 1,000 pieces from the different variations of this truck type have been manufactured and the truck licence was purchased by Swiss and Spanish rolling stock manufacturers. In the following some of GANZ-MÁVAG's mass transit vehicles of latest design are presented:

## 8-axle bidirectional articulated light rail vehicle ordered by the Budapest Transit Authority



As many as 200 vehicles of this type, introduced by GANZ-MÁVAG 14 years ago, have been procured for the Budapest Transit Authority. The cars are of all electric type and of high reliability feature. The efficiency of the articulated light rail vehicle is represented by the fact that a train of two remote controlled articulated cars with one driver can take as many as 524 passengers.

The propulsion equipment is manufactured by GANZ Electric Works and the vehicle is assembled by GANZ-MÁVAG.

The articulation and the rubber sprung wheels of the car is a Hungarian patent.

Main technical data:	
Max. capacity	: 262 persons
Max. speed	: 60 km/h
Gauge	: 1,435 mm
Min. curve radius	: 16 m
Continuous output	: 4 x 61 kW
Overall length of car body	: 26 m
Weight in running order	: 34 t

## 8-axle bidirectional articulated subway light rail vehicle ordered by the Budapest Transit Authority



Ten years ago GANZ-MÁVAG supplied 22 pieces of this vehicle for the first line of the Budapest subway system to replace the original, 75-year old cars. The cars of exceptionally low profile construction necessitated by the height of the tunnel, which is altogether 2.7 m from the top of the rail to the catenary. Floor height is 470 mm from railhead, providing easy access from the 350 mm high platforms. The electrical equipment, manufactured by GANZ Electric Works, are located inside the articulated sections. The vehicle is assembled by GANZ-MÁVAG.

Main technical data:	
Max. capacity	: 246 persons
Max. speed	: 60 km/h
Gauge	: 1,435 mm
Min. curve radius	: 37 m
Continuous output	: 4 x 61 kW
Overall length of car body	: 29,560 mm
Weight in running order	: 37,6 t

## Commuter multiple-unit trains

Since 1976 GANZ-MÁVAG has supplied 46 three-car electric trains for the Yugoslav Railways. 34 trains are used for commuter service, and 12 for long-distance intercity transport. These trains run with the same propulsion system designed by GANZ Electric Works and highly standardized mechanical parts designed and manufactured by GANZ-MÁVAG.



The three-car electric train set consists of two trailers with driver's cab and a motor car in the middle. Two or three sets can be connected into one train by means of automatic couplers so that 6 or 9 cars can run together.

All the four axles of the motor car are driven. The propulsion equipment provided with thyristor rectifier, allow fully automatic speed control.

Main technical data:	
Gauge	: 1,435 mm
Catenary voltage	: 25 kV, 50 Hz AC
Max. speed	: 120 km/h
Min. curve radius	: 80 m
Continuous output	: 1,200 kW
Overall length	: 72,410 mm
Number of passenger seats	
in the commuter train	: 236
in intercity train	: 150
Weight of both types in running order	: 145 t