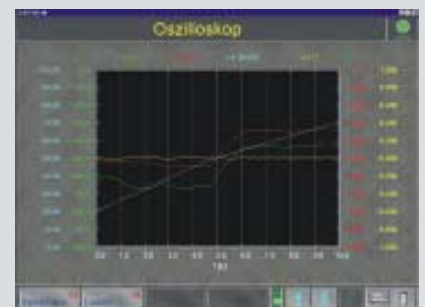


# Emission Chassis Dyno

## AIP-ECDM-48L / 4x4



- **Accurate, reproducible mass simulation**
  - electrical mass simulation 1.000 ... 6.000 lbs
- **Excellent 4WD synchronization**
  - high dynamic regulation
  - max. speed deviation front- to rear-axle = 0,02 km/h
  - max. angle deviation roller set front- to rear-axle = 0,2°
- **No test stand 'warm-up' required**
  - => fast availability, even in climate chambers
- **Accuracy exceeds EPA requirements**
  
- **Modular test stand concept**
  - for various applications and budgets
- **Simple operation and data evaluation (Windows NT)**
  - => clearly structured, menu-driven user software
- **Extrem compact design**
  - AC-motor in-the-middle principle, easy accessible
  - => slim pit dimensions
- **High efficiency**
  - => very low maintenance



## Competent Measurements

The MAHA AIP-ECDM-48L emission chassis dynamometer for cars and motorcycles allows exact simulation of defined driving conditions on the test stand. The rolling relationship between tire and roller simulates real road conditions very closely due to the large roller radius.

For this reason the standard regulatory guidelines for determining pollutant emission call for a test stand with a roller diameter of 48" as test resource.

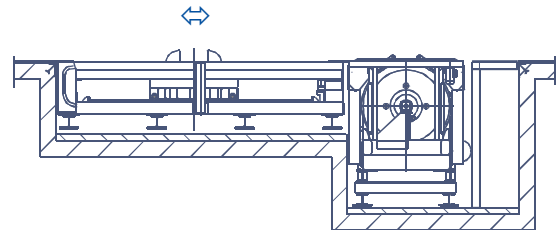
Designed for emissions analysis, fuel consumption tests, and production checks, the AIP-ECDM-48L dynamometer line includes both 2WD and 4WD models.

The MAHA chassis dynamometer AIP-ECDM-48L was developed to conform e.g. with US Specification EPA RFP C100081 T1 and also the valid Japanese and European guidelines and standards.



## Applications

- R&D Centres of car manufacturers and the automotive sub-suppliers (2WD and 4WD applications) e.g.:
  - Emission tests
  - Temperature tests (climate chambers)
  - Fuel consumption measurements
- Pre-Conditioning
- End-of-Line Quality Checks
- FTP 75 / SFTP (US06)
- EPA
- ECE + EUDC
- Japan 10 ... 15 Mode
- Mileage Accumulation



## 48"-Roller Set

The compact test stand design assures very good accessibility for maintenance and service work:

- slim pit dimensions
- reduced construction costs
- accurate, reproducible measurements

■ rollers attached directly to the motor shaft

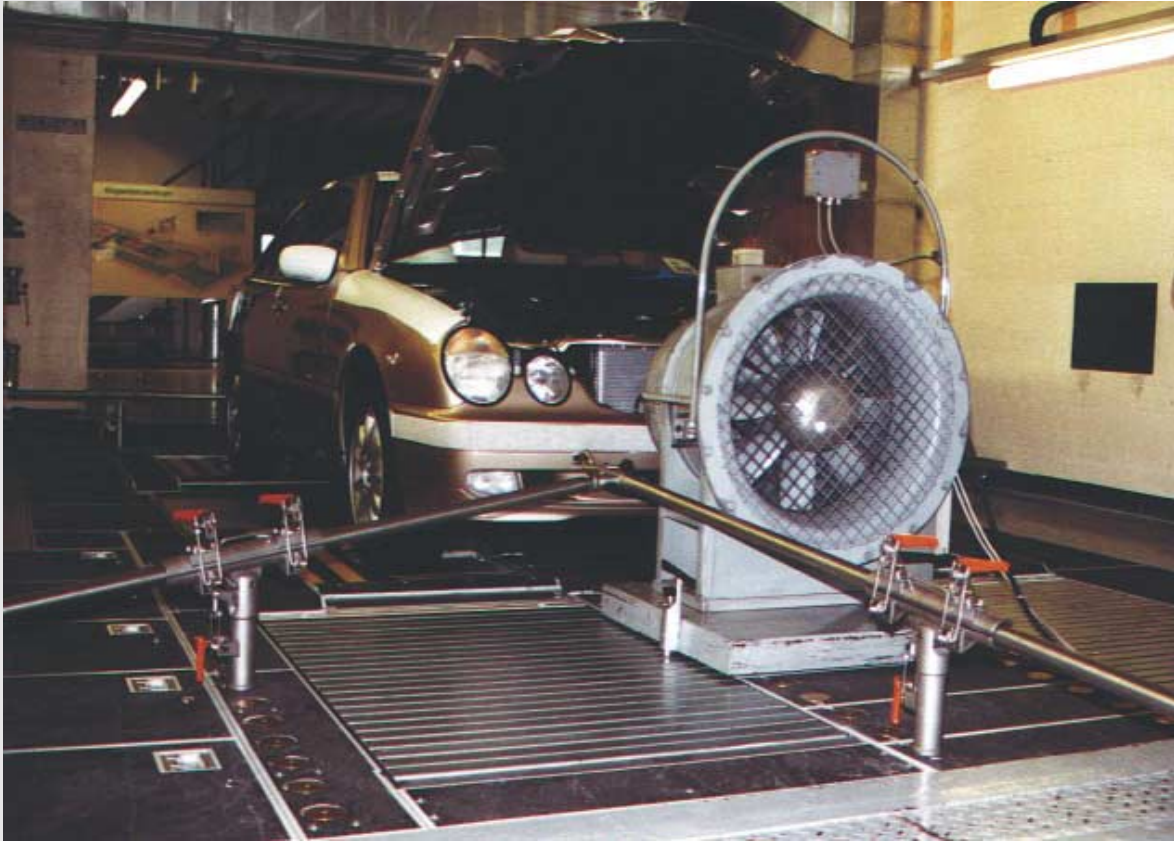
■ hysteresis-free measurement via pendulum bearing of the asynchronous machine with double, concentric arranged bearings which are driven in opposing directions.

Using this bearing arrangement the test stand losses are absolute constant over the total operating temperature range!

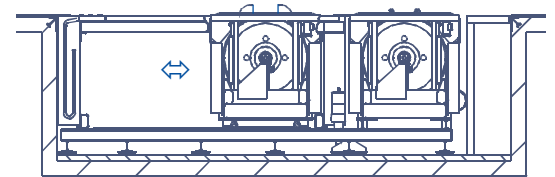
- no 'warm up' required!

the test stand is ready-for-operation at any time, also with measurements in the climate chamber

- electrical isolated motor bearings
- robust pneumatic disc brakes using low wear brake shoes
- chrome plated or CrMo flame coated roller surface at choice
- optional performance- and temperature range extension packages
- Alu-calibration device (accessories)
  - exact calibration of the system from top in only a few minutes by one operator
  - certified weight discs 10 kg ea. (8 pieces)
- interface to common emissions analyse systems e.g. HORIBA
- roller width 90" (EPA standard = 86")



4WD Test Stand incl. mechanical 4WD vehicle restraint system



## 4WD Synchronization (applied for patent)

The absolute synchronisation of both roller sets reached here for the first time is necessary for application with vehicles of the current and most importantly for future generations.

Very precise and highly dynamic functioning vehicle drive systems equipped with tractioncontrol (ASR, TCS, ...) or stability systems which react to the smallest discrepancy (different wheel rotations) in msec-range.

Their automatic intervention in the drive system cause an incorrect load condition during the cycle drive. The highly precise angle synchronisation control system developed by MAHA prevents different roller rotations and guarantees driving conditions absolutely similar to road conditions.

**The max. angle deviation between roller set of front- and rear-axle during a FTP75-cycle drive is 0,2°. This corresponds with a max. speed difference of 0.02 km/h !**

The highly dynamic phase regulation system is defined by a very precise, angle synchronization which is maintained during a cycle drive under all load conditions.

The angle synchronization is independent from:

- **Driving dynamic during a cycle drive**
  - constant drives, accelerations, delays (vehicle mass simulation)
  - driving resistance simulation
- **Type of vehicle drive**
  - front- and/or rear driven vehicle in 4 wheel drive mode
  - permanent 4 wheel drive vehicle, e.g.:
    - distributor gear
    - Visco clutch
    - Torsen-Differential
    - rigid 4 wheel drive coupling
    - electrical switch on 4 wheel drive system

**Important:**

No information about vehicle-specific load division, e.g. of the the distributor gear, is necessary!

## Test Stand Components

### ■ Automatic Roller Cover

**Highest possible safety for personnel and vehicle** with a stable roller covering. Before the driving operation the covering is positioned near the tires by pressing a button. The separation to the tires is continuously controlled, and, if necessary, lateral vehicle movements are corrected.

During the test stand calibration e.g.:  
The rollers are completely covered automatically during coast down measurements or test stand loss verification:

- **no tripping edges**
- **reliable accident protection**
- **reduced dirt**
- **optional with side protection grills**  
(additional personnel protection).

Alternatively, a mechanical roller covering can be supplied.



### ■ Automatic Vehicle Centering Device

The automatic vehicle centering device is an indispensable support for exact positioning of 4-wheel drive vehicles on the test stand.

Once the vehicle has been driven onto the test stand, the centering rollers are driven out automatically and the vehicle is positioned on the apex of the rollers using toggle operation.



### ■ Automatic Vehicle Fixing Flaps

to assure accurate vehicle position on the apex of the rollers (driven axle) and to absorb transverse- and longitudinal forces during 2WD-test operation:

- **easy and safety vehicle fixing**
- **setup time approx. 10 s via infrared remote control.**

Alternative:  
Mechanical wheel tie down device  
Various version available.



## ■ Automatic Wheelbase Adjustment

The motorized movable wheelbase adjustment device can either be equipped with an automatic vehicle fixing device or a second roller set. (for 4 wheel drive operation - min. 2.000 mm pit depth recommended)

**Adjustment range min. 2.000 to max. 4.200 mm (1.800 mm upon request)**

- worm drive ( $\pm 2$  mm positioning accuracy)
- pneumatic fixing brake
- manual emergency operation possible.

**The robust movable covers roll out as a sliding shutter, hereby creating a completely flat, easy-to-clean surface without tripping edges**  
-> high safety feature for operator staff and vehicle!

Alternative:

Manual wheelbase adjustment in combination with mechanical wheel tie down device.



## ■ 4WD Vehicle Restraint System

**for safe, exact vehicle fixing on both roller sets of the 4 wheel drive test operation:**

- modular set up, very stiff
- simple, quick installation by operating personnel.

Various versions available!

## ■ Service / Accessories

**As a competent partner in the field of testing** technology for motor vehicles, MAHA offers extensive accessories as well as reliable aftersale-service, e.g.:

- test stand planning
- training for operating- and maintenance staff
- maintenance contracts / spare parts packages
- repair- and maintenance service by trained specialists
  
- driving robots e.g. for mileage accumulation
- driving fans with fixed and/or variable blowing speed
- vehicle components- and tire cooling fans.



# System Diagram AIP-ECMD-48L / 4WD

## Power Control Cabinet

for the test stand power supply

- Central Feeder- and Reverse Feeder Unit
- IGBT-Technology
- Frequency Converter

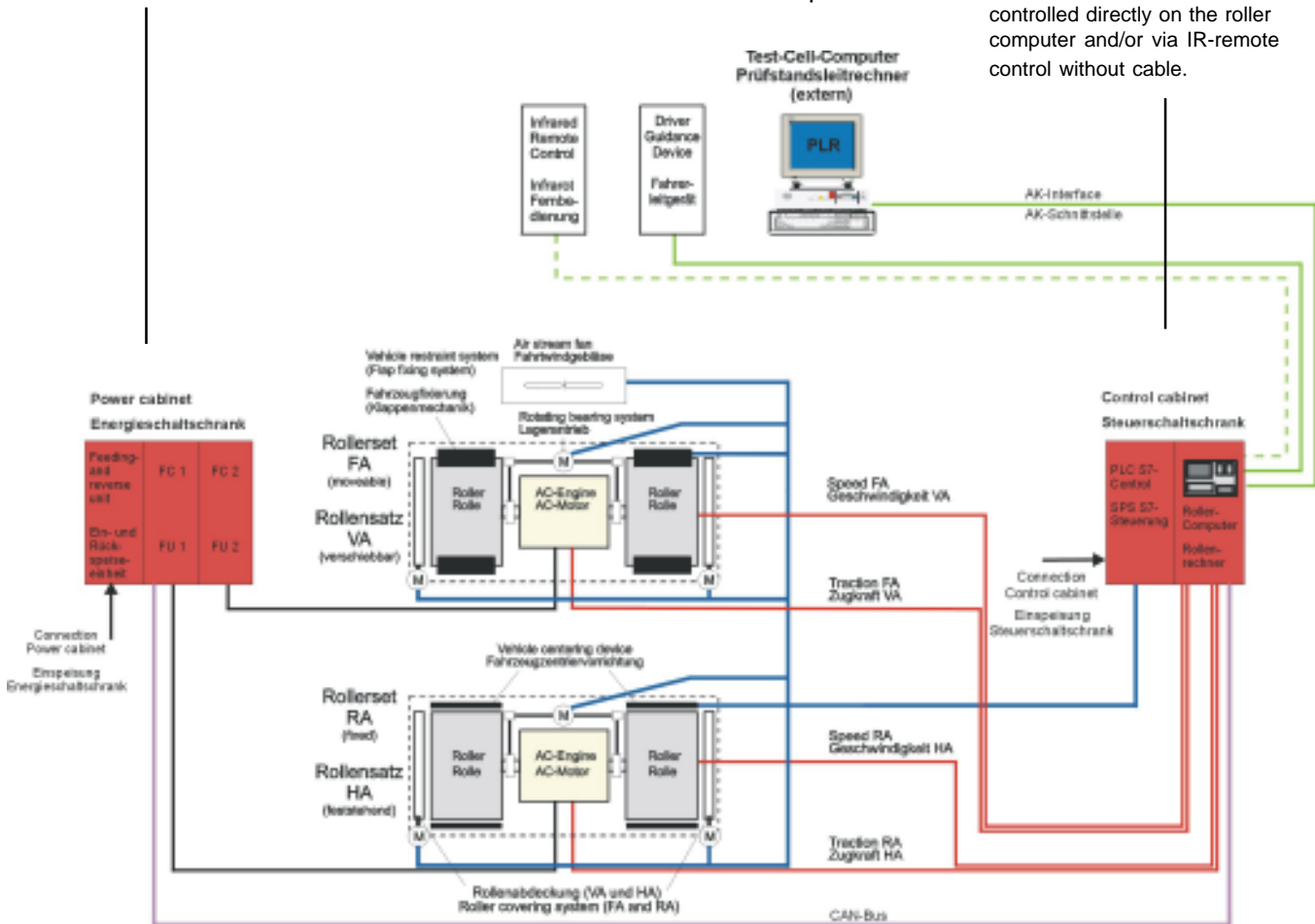
## Test Stand Master Computer

2nd user surface(external) in addition to the roller computer connected via AK-Interface (V24 / RS232).

## Test Stand Control Cabinet

incl. Roller Computer to operate the test stand (Windows NT 4.0). Here the test programs are initialized, test procedures evaluated and documented as well as results visualized and stored.

During the test operation the test stand functions are controlled directly on the roller computer and/or via IR-remote control without cable.



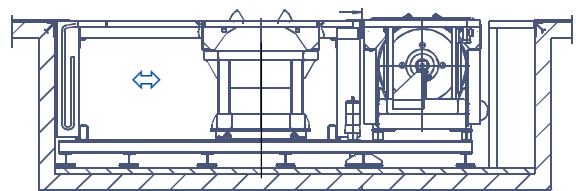
## AIP-ECMD-48L 4WD Extension

The 2WD test stand can be upgraded step by step for the 4 wheel drive operation at a later stage.

The pit dimensions (pit depth min. 2.000 mm) are already set down for 4 wheel drive at the beginning of the project.

➔ no pit construction modification is necessary!

Various packages, depending on customers budget and time schedule, are available upon request!



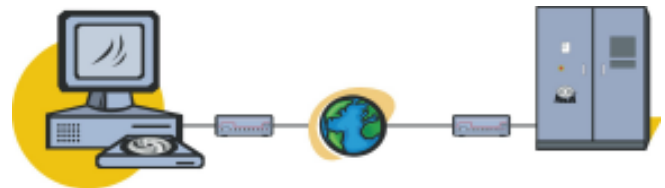
Movable Adapting Frame (Dummy)

# Automatisation / Test Stand Software (Windows / NT)

32-Bit Windows application, runs on IBM-compatible PCs under Windows 9x and NT 4.0.

The comfortable user software is user-friendly and easily learned due to the ergonomic menu structure. Erroneous operation are almost completely excluded.

- Accurate, fast and easy test stand calibration
- Integrated oscilloscope (standard)
- Clearly structured 'Drivers Aid'
- Automatic malfunction check
- Selectable Language
- Vehicle Data Base  
for the fast vehicle test setup
- Password protected communication via serial modem
  - easy 'software update'
  - fast real time diagnosis and system check.



## Test- and Diagnosis Mode

Automatic, semi-automatic or manual dialog via ergonomical, easy to operate menu structure.



## Status-Display

Information about malfunctions or defects that may have occurred. The red marked faulty components or malfunctions will be indicated green after they have been corrected.



## Integrated Oszilloscope (standard)

With a frequency rate of up to 1 kHz very short incidents can be recorded for documentation, error diagnosis and service work.



## Integrated Drivers Aid

The test stand software provides an easy-to-operate, clearly structured driver guidance system. Driving cycles for the most important certification regulations are supplied, but these can also be created by the user with an easy procedure.

## Technical Data (LDV)

## Accuracy

Maximum Test Speed (extended version upon request - e.g. 300 km/h)	200 km/h	Response Time (EPA requirements <100ms)	approx. 35 ms
Maximum drive- / brake power (extended version upon request - e.g. 200 KW)	150 kW	Accuracy of - speed measurement (0...124 mph)	0,01 km/h
Overload briefly	225 kW	- time measurement (total 1,000 s) Resolution	+/- 0,1 % full scale 1 ms
Traction/brake force	5.900 N	- torque measurement Repeatability	+/- 0,05 % ** 0.02 % **
Overload briefly	8.800 N	- acceleration measurement	+/- 0,002 m/s <sup>2</sup>
Ambient temperature (standard)	+ 5 °C ... + 40 °C	- distance measurement Resolution	1 m +/- 1 m
Extended temperature range optional e.g.	- 40 °C ... + 60 °C	- speed constant controlling	0,05 km/h
Humidity	95% non condensed	- torque constant controlling	0,2% **
Basic inertia	1.360 kg	- inertia simulation	0,5% **
Simulated vehicle mass: Minimum	450 kg (1.000 lbs)	- parasitic loss compensation	< 2,5 N @100 km/h
Maximum	2.720 kg (6.000 lbs)	- 4WD-roll synchronization during all operating conditions (applied for patent)	+/- 0,02 km/h
Adjustable interval vehicle mass simulation	0,45 kg		
<b>Dimension / weight (standard) of roller set</b>		<b>Electrical Connection</b>	
Roller diameter	1.219,2 mm	<b>2WD Test Stand (AIP-ECDM-48L)</b>	
Roller width	700 mm	Mains Power:	min. 160 kVA
Separation roller inner edge	900 mm	Mains Current:	3 x 400 V
Separation outer edge	2.300 mm	Mains Frequency:	50 Hz
Balance quality	Q 2,5	Transformer type:	mains transformer
Permissible axle load	2.000 kg	- short cut current ( $u_k$ ):	6 %
Total weight of roller set	approx. 7.000 kg	- harmonic distortion:	approx. 1 %
<b>Dimensions of Pit</b>		<b>4WD-Test Stand (AIP-ECDM-48L/4x4)</b>	
Pit depth (min.) 2WD	1.600 mm	Mains Power:	min. 200 kVA
4WD	2.000 mm	Mains Current:	3 x 400 V
Recommended pit width minimum	4.200 mm 3.100 mm	Mains Frequency:	(max. 460 V + 5%) 50 Hz
<b>Pit length depends upon the test stand equipment configuration</b> - please ask for our standard dimensional pit drawings		Transformer type:	mains transformer
		- short cut current ( $u_k$ ):	6 %
		- harmonic distortion:	approx. 1 %
		Compressed air supply:	min. 5 bar (73 psi) max. 10 bar (145 psi)
		Remote controlled communication via serial modem	<b>upon request</b>

### Competent Testing Technology for Cars, Trucks, Motorcycles, Tractors, Forklifts, etc.

- Performance Roller Test Stands
- Function Roller Test Stands
- End-of-Line Test Stands (DVT)
- Air Stream Fans
- Heavy Duty Mobile Vehicle Lifts
- Test Stand Design

**Your competent partner -  
in more than 100 countries worldwide !!!**



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