LEVX™
A MAGNA FORCE TECHNOLOGY

Alan Wallace, Professor of Engineering at Oregon State University (OSU) since 1984, and currently on sabbatical leave at the University of Manchester Institute of Science and Technology in Manchester, England, offers the following endorsement of the LEVX™ system:

*"The straightforward inventiveness, that is Jerry Lamb's hallmark, surprised me yet again... The LEVX™ system provides passive, non-energy-consuming suspension and guidance for vehicles."*

*- Alan Wallace*

PERPETUAL DEFIANCE OF GRAVITY.

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To Whom It May Concern:

**The LEVX System of Mr. Karl (Jerry) Lamb**

This letter has been written as an appraisal and a projection of the potential of the permanent-magnet suspension/guidance system, LEVX, which is currently under development by Jerry lamb in Port Angeles, WA.

I am Alan Wallace, Professor of electrical engineering at Oregon State University (OSU) since 1984 and Director of the Motor Systems Resource Facility (MSRF). The MSRF is a testing and research laboratory created by Bonneville Power Administration (BPA) and the Electric Power Research Institute (EPRI) in 1994 to serve NW regional industries (due to its facilities and reputation, it now serves more of a national function). Prior to my current appointments in OSU and MSRF, I worked for ten years in the urban transportation industry in Canada (more details are available in the attached CV). In this latter capacity I became very familiar with electromagnetic propulsion and suspension systems for mass-transit and high-speed vehicles. I am still engaged, from time to time, as a consultant to the Transit Authority of British Columbia (where equipment that I designed, developed and tested has been in passenger carrying service since 1985).

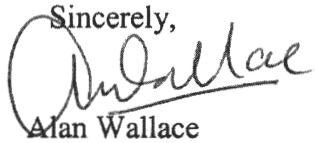
I have known Jerry Lamb for several years, during which my laboratory has evaluated several of his permanent-magnet coupling devices in both experimental and preproduction prototype forms. The results of these tests programs have appeared as reports for BPA/USDoE and the Northwest Energy Efficiency Alliance (NEEA) as well as in several technical papers in conferences sponsored by the Institution of Electrical and Electronic Engineers (IEEE) and the Institute of Electrical Engineers (IEE—London). As a result of my previous association with Jerry Lamb, I was intrigued when he invited me to inspect the results of his experiments into magnetic suspension in October 2001. Having previously worked in this technical area, I thought that I was aware of the possible configurations that could be employed. However, the straightforward inventiveness, that is Jerry Lamb's hallmark, surprised me yet again.

The LEVX system, that Jerry is developing, employs permanent magnets in a continuous array of the same polarity in both rails of the track. These serve to repel other permanent magnets, also of the same polarity, located on each of the four corners of the suspended platforms (or vehicles). This natural repulsive force between magnets in the track and the platform provides the vehicle suspension: the sum of the upward forces, on the four corners of the platform, supports the weight of the platform and its payload. To a reasonable approximation, the force is inversely proportional to the square of the airgap (i.e. the distance) between the magnets in the platform and track. Thus, for low payloads,

the airgap is long and the resulting suspension is "soft". Conversely, for large payloads the airgap will be shorter and the suspension "stiffer".
Although it is well known that guidance forces for levitated vehicles also can be produced magnetically, it has been demonstrated experimentally that improved stability is obtained if these are augmented by mechanical systems such a spring-applied, low-friction rollers.
Hence the LEVX configuration provides both suspension and guidance by completely passive means: i.e. the magnets and springs work in accordance with their natural physical properties and do *not* require position sensors, energizing power control or computer regulated feedback of any sort. It is this passive nature of the LEVX system that differentiates it from the magnetic suspension methods that have been developed elsewhere. For example: the German attractive electromagnetic system requires very precise and rapid control as it is inherently unstable, becoming more attractive as the airgaps become shorter. A constant supply of energy is required to maintain the suspension. The Japanese repulsive electrodynamic system is inherently stable but does not become effective until the vehicle is moving at a considerable speed. Therefore it is unsuitable for low speed operation that occurs in the regions close to the stations where the vehicles resort to operation on wheels. Also the electromagnets require constant energy input or expensive and complex cryogenic cooling. In contrast LEVX, as demonstrated, will remain suspended indefinitely without energy dissipation resulting in a much more efficient system.

*In Conclusion:*
1. The LEVX system provides passive, non-energy consuming suspension and guidance for vehicles due to two novel features:
   (a) continuous track magnet of the same polarity;
   (b) platform magnets augmented by low-friction spring-applied rollers.
2. The LEVX system appears to be applicable over a wide range of vehicle sizes from low payloads (for personal rapid transit) to very high payloads (for heavy freight) applications
3. The LEVX system has been demonstrated to be satisfactory in static and very low speed operation, but now requires investigation in dynamic operations and at appreciable speeds.
4. Having demonstrated the practicality of LEVX suspension, the most appropriate propulsion system must now be developed and demonstrated to complete the integrated transportation concept.
5. When then the features in 3. and 4. above have been validated the LEVX system should have considerable commercial applications potential.

Sincerely,



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