

HEAVY VEHICLE BRAKING CODE FOR NEW ZEALAND
SITUATIONS AS AT AUGUST 1989

R LAMBERT M I R T E N Z A M I T R E

INTRODUCTION

The Heavy Vehicle Brake Committee, which consists of representations from the Transport Operators, Vehicle Manufactures (Truck and Trailers) Ministry of Transport, Institute of Road Transport Engineers and the D.S.I.R.. The committee is now in its fourth year of operation.

It is perhaps fair to say, the first two years was spent by the committee getting to grips with the complexity of the braking problem in this country. (See appendix 1.).

Without a Powered Vehicle Manufacturing Base our prime moves have arrived in the country with braking designed to a number of different codes. In many cases it has been left to the operator to modify the vehicles to reach simple Certificate Standards and a acceptable on road performance. The impasse reached between the Truck (local representatives) and the Trailers manufactures was to blame each other for the problems faced by the operator.

In committee it became clear, that the realisation of a good standard of braking throughout the industry requires:

- A design code which states minimum functional and performance requirements and which ensures compatibility between vehicles in the broadest sense.
- A training programme at various levels in the industry which ensures awareness of the code and its principals.
- An improvement in brake maintenance standards
- An effective enforcement machine, hopefully containing an element of random checking and realistic penalties which form an effective deterrent.

THE DESIGN CODE

Fundamentals Principals

From the point of view of road safety, the characteristics of good braking can be summarised as follows:

- High maximum retardation
- Improved stability

This should apply equally to all:

- States of loading
- Condition of pavement
- Vehicle combinations

In addition brake lining wear should be evenly distributed throughout the vehicle and as low as possible.

PRACTICAL PROBLEMS

In the simplest case of a two axle rigid truck and two axle drawbar trailer the problems associated with implementing these principals emerge immediately.

- The brake system needs to take account of the state of loading in each vehicle.
- On the truck, variation in the state of loading usually affects the rear axle load more than the front axle, which means that the relative brake force distribution needs to change with the vehicle load.
- On both vehicles the effect of weight transfer means, that the effective front axle increases with deceleration whereas the rear axle load decreases.

CODE CURRENT STATUS

The committee has addressed the fundamental principals and the practical problems, to come up with a design code which can be adopted by Powered Vehicle Manufactures with minimum modification to their base vehicles and by the local Trailer Manufactures. Thus for the first time Truck and Trailer braking in New Zealand will be derived from the same design base.

The emphasis of the code is placed on:

- New Zealand Axle Loadings (See appendix 2) thus reducing overbraking on our heavy vehicles.
- Brake Theshold Pressures to improve low pressure brake balance. (See appendix 3)
- Supply line and Coupling Head Pressures - to improve brake balance and performance of combinations. (See appendix 3)
- Upper and Lower decelerations limits - to improve bake balance and performance of combinations. (See appendix 3)
- Adhension Utilisation - to deal with weight transfers. (See appendix 4)
- Brake reponse timing - to improve brake balance.
- Individual Vehicles - each individual vehicle Trucks and Trailers to meet code requirements, which should ensure compatibility between vehicles when coupled together in combination.

The code only applies to vehicles in the LADEN STATE, these requirements can be met without load sensing values and/or anti-lock systems.

Whilst the committee recognize states of loading as an important fundamental, it believes it is not possible at this point in time to introduce load sensing as standard on our heavy vehicles. However the code does not prohibit their use.

Currently typical vehicles are being tested against the requirements of the code. It is anticipated the results of these tests will be available to the committee by early October 1989.

CERTIFICATION

The final format for certification of new and existing vehicles is still under consideration by the committee. However from dates yet to be established all vehicles will require a "Certificate of Compliance" to the brake code.

For new vehicles this will be the responsibility of the respective manufacturer.

The "Certificate of Compliance" will cover all aspects of the code from "Theshold Pressures" to "Coupling Head Pressures". This action will bring more professionalism into the Heavy Vehicle Supply Industry.

A manufacturer as defined by the brake code means "AN ORGANISATION ACCEPTABLE TO THE STATUTORY AUTHORITY ENGAGED IN MANUFACTURE, ASSEMBLY, MODIFICATION OR IMPORTATION OF HEAVY VEHICLES".

THE TRAINING PROGRAMME

This is already underway.

Perhaps the most significant move in this direction has been through the "The Heavy Vehicle Brake Specification". Introduced to allow vehicle combinations to operate beyond the 39 tonne gross weight limit.

"The Heavy Vehicle Brake Specification" call for vehicle combinations to demonstrate their ability to meet a required deceleration rate, without wheel lock up.

From the questions I have fielded over the telephone this has been a short sharp lesson in brake performance requirements for all sectors of the industry, from manufactures through to Testing Station staff.

Unfortunately the lessons learnt have produced a number of conflicting solutions. Indicating an urgent need for updating the training of maintenance and vehicle testing station staff.

A paper entitled "Heavy Motor Vehicle Braking Code and the Operator" was released at Transport '89 in March of this year. This informed the operator of the direction the "Brake Code" and has promoted discussion, thus assisting the committee with its work.

The future in this area has been taken care of by the appointment of a "Code Implementation Manager". His duties include:

- Preparation of supporting material for training and publicity.
- Conducting training sessions for all industry groups, these training sessions will cover code awareness and its principals.

The training sessions will be run on a user pay principal, details will be made available at a later date.

The "Code Implementation Manager", is a part time appointment and runs through to the end of 1990 when the code should be up and running.

With this now all in place the "Heavy Motor Vehicle Braking Code" should have an easy passage through to its introduction in June/July 1990.

IMPROVEMENT IN BRAKE MAINTENANCE AND EFFECTIVE ENFORCEMENT

The intention of the code is for operators to maintain vehicles up to the code standard, without effective enforcement this will not happen. Therefore the two issues "Maintenance and Enforcement" are closely related.

It is with some concern I find in the "Transport Law Reform Bill No. 2" currently before a Select Committee. A clause in Part X give the Secretary of Transport the authority to delegate the issuing of "Certificate of Fitness" to local authorities.

If vehicle standards are to be controlled by the Ministry of Transport, the related services must remain under the same control. In addition testing facilities for Certificates of Fitness must be upgraded to a high and uniform standard, if brake maintenance to the code requirements is to follow.

Will this be possible if the responsibility is delegated to Local Bodies?

In addition to the Certificate of Fitness my committee is of the opinion a system of roadside random checking on brake adjustment is also necessary.

Good brake maintenance is cheap insurance against the many road hazards encountered by trucking operators. Accident avoidance offer a greater saving in costs, downtime, life and injury, than being the innocent party in the accident.

As a responsible body this Institute has a duty to put pressure on the authorities for Effective Enforcement and the operator for Improved Brake Maintenance.

CONCLUSION

Despite what many people think, the Heavy Vehicle Brake Committee has not been sitting on their backsides since our 1987 seminar.

Much time travel and effort has been given freely by committee members.

Operators have assisted and are currently assisting by making vehicles available for testing.

Infact most of the work to date has been done without funding.

I am now happy to report, some funding to allow the committee to complete its work has now been made available by the Road Research Unit, which is to be administered by the Heavy Vehicle Research Co-ordinating Committee and the Heavy Vehicle Braking Committee.

This funding is allowing the committee to proceed in a number of areas which otherwise would have delayed the introduction of the code.

The Heavy Vehicle Braking Code is quickly becoming a reality. It is therefore in the interest of all Institute member to familiarise themselves with its content and requirements.

Any questions between now and the end of 1990 relating to the code should in the first instance be addressed to Mr G.D. Malcolm who has been appointed the "Code Implementation Manager".

He can be contacted at the following address:

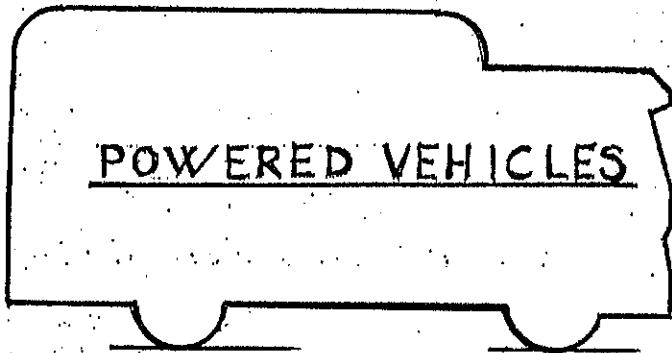
G.D.M. Consultants
P.O. Box 12-491
Penrose
AUCKLAND

Telephone: 596-874

Thank you for your attention.

Acknowledgement -

Mr Simon deCock - A.I.D.D., D.S.I.R. for use of parts of his final report on the Heavy Vehicle Brake Code before his departure to take up and appointment overseas.



U.S.A. - FMVSS 121

Europe - E.C.E. 13.

Australia - ADR 35

Japan - J.I.S. &
E.C.E 13 ?

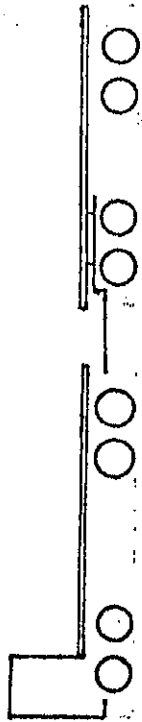


LOCAL MANUFACTURE

NO DESIGN RULES

ONLY REGULATIONS

**== POOR BRAKE PERFORMANCE
AND VEHICLE STABILITY**



①

TYPICAL MANUFACTURES

DESIGN RATINGS 12 20 20 20 = 72 TONNE

②

N.Z. REGULATIONS BY

AXLE OR AXLE SET 10.8 15 14.5 14.5 = 54.8 TONNE

③

TYPICAL ON ROAD

LOADED 8 14 11 11 = 44 TONNE

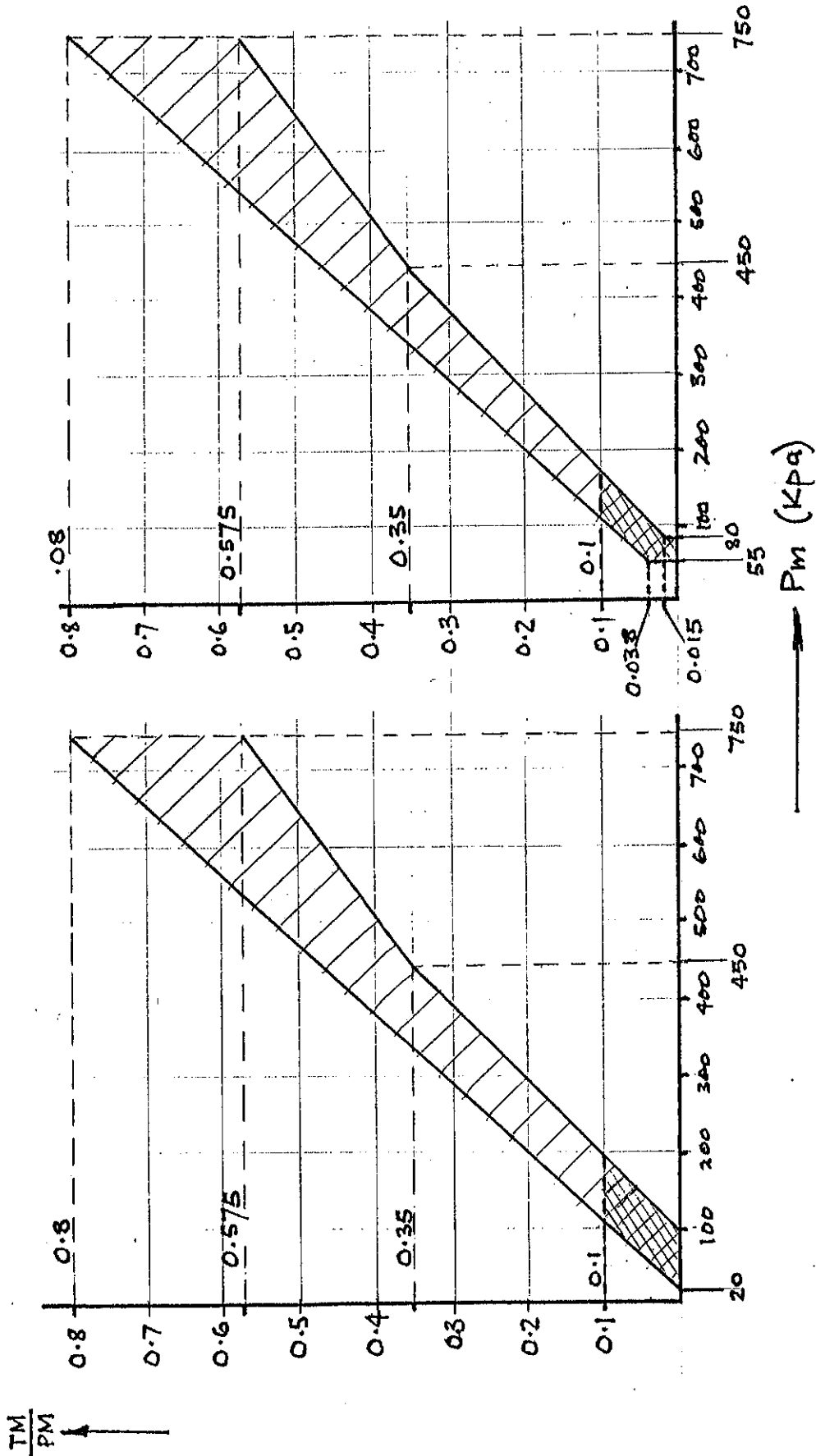
③ AS A PERCENTAGE OF ① 66% 70% 55% 55% = 61%

③ AS A PERCENTAGE OF ② 74% 93% 76% 76% = 80%

EXAMPLE — DRAWING VEHICLES & TRAILERS

1989

1987



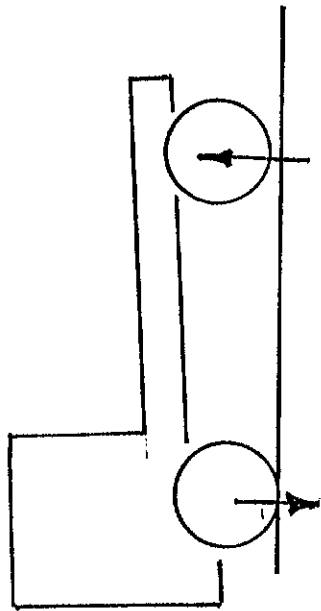
P_m = Pressure at coupling head

$T.M.$ = Sum of all brake forces

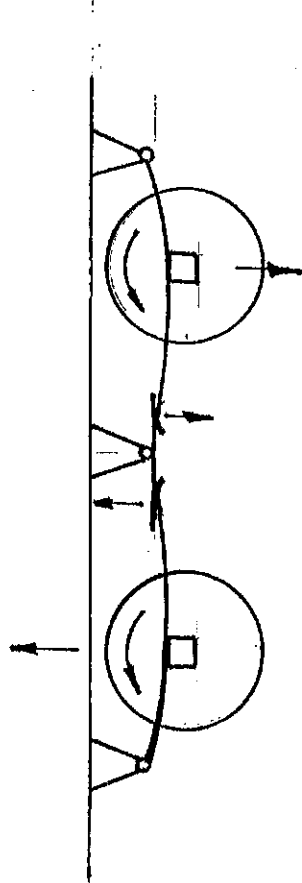
$P.M.$ = Weight of VEHICLE.

ADHESION UTILISATION = BRAKE FORCE / VERTICAL FORCE ON WHEEL

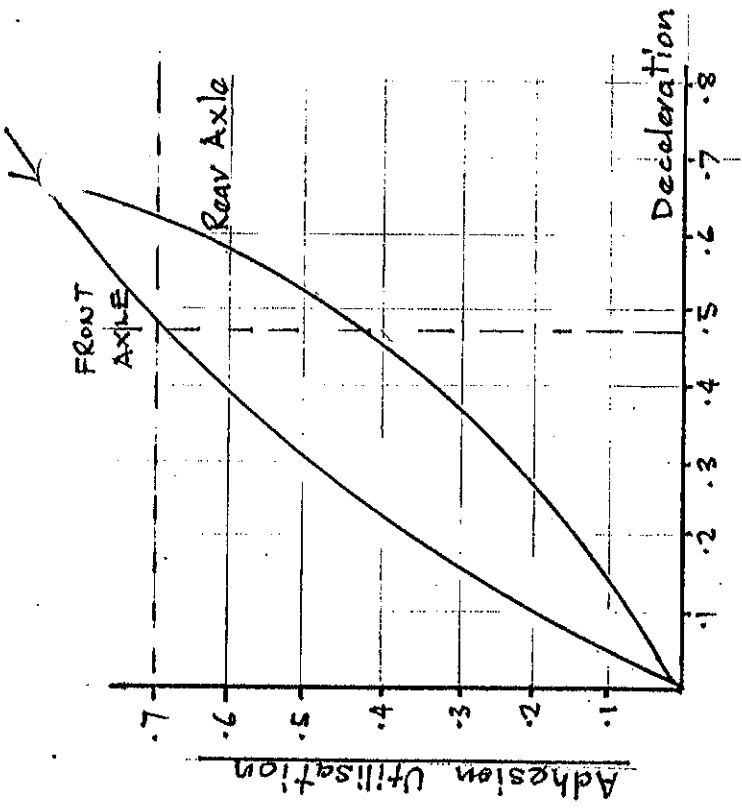
VERTICAL FORCE ON WHEEL
AFFECTED BY :-



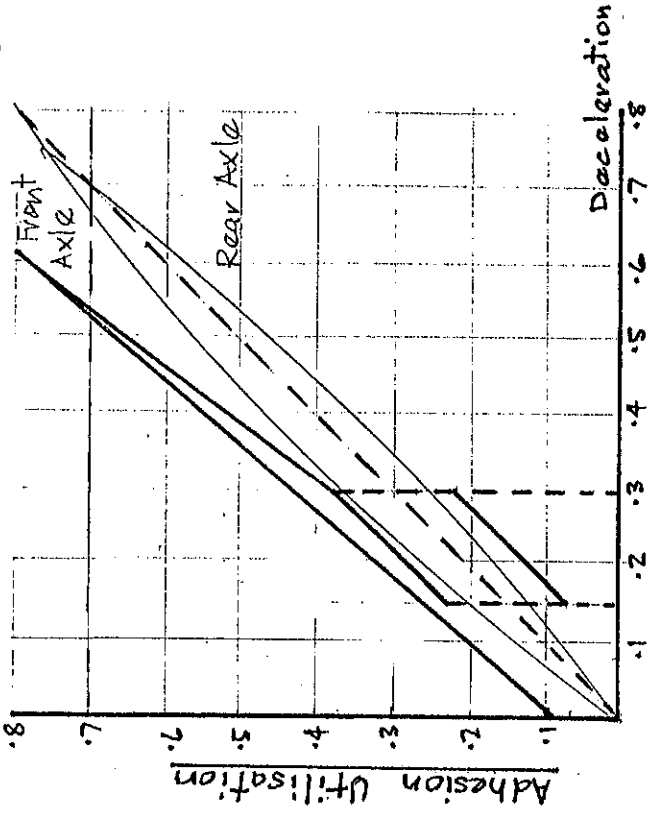
VEHICLE WEIGHT TRANSFER



BRAKE REACTIVE SUSPENSIONS



TYPICAL 2 AXLE TRACTOR
REAR AXLE UNDER BRAKED AT LOW BRAKE LEVELS



NZ CODE REQUIREMENTS