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MOTOR VEHICLE REGULATIONS AND THEIR SIGNIFICANCE ON THE EVOLUTION OF THE MOTOR INDUSTRY IN COUNTRIES UNDERGOING DEVELOPMENT 1/

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Table of Contents

Chapter 1st. - Present trends of Road Transport

1. - Influential factors

1.1. Higher power
1.2. Better quality of materials
1.3. Variations in maintenance and servicing costs
1.4. Heavier loads
1.5. Better roads and longer distances

2. - Road Transport demand

Chapter 2nd. - Factors conditioning the implanting of motor industries in countries undergoing development.

1. - Market capacity

2. - Minimum diversification of groups and types

3. - Integration at international level

4. - Vehicle type characteristics

Chapter 3rd. - Influence played by the Motor Vehicle national regulations on the possibilities of industrialization in countries undergoing development.

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MOTOR VEHICLE REGULATIONS AND THEIR REPERCUSSION ON THE EVOLUTION OF MOTOR INDUSTRY IN UNDER-DEVELOPED COUNTRIES .-

The present study intends to diclose a few points of view upon several factors falling into the development of motor industries, bringing out their repercussion within the national territory where industries are developed as well as their significance at an international level. Particular attention has been paid to the latter, since as a result of this expansion it is the springing source of all the problems dealt with in this brief study and for which a number of solutions will be suggested. The problems presented will be displayed on a general basis. However, and to substantiate the argumentation, mention will be made in each particular case of certain underdeveloped countries from which recent experiences have been gathered.

This work does not seek bringing to light already layed-out problems but rather to relate them with other factors into which they may direct- or indirectly fall and which hinder an effective development in a country of the motor industry. The fact, for instance, that a certain country regulates certain dimensions of motor vehicles, in accordance with their various characteristics, does not create in principle more difficulties than those derived from variation of the vehicles revenue - as a result of the loan limitations that certain regulations may carry along. Nevertheless, if we reegard the fact simultaneously from other angles, -e.g. influence upon type diversification in a short-series manufacture, compensated exchange of teams or groups with other countries (which in turn will have their own regulations), scarce home markets for evolutive industries within under-developed countries, etc. -, we then have to face a considerably increased problem very liable to present serious difficulties when the motor industries can be effectively developed.

The problems reached by diversification of reglamentations induce to cast a glance on the whole of the arguments to be next explained in this work. First of all, reasons leading to a higher use of Road Transport -Freight & Passengers- are reviewed both at international and national levels. Next, some facts will be brought up that force in those countries with a springing fast-growing motor industry to product integration in collaboration with other countries. Then, as a result of the latter, certain problems are presented which hinder strongly the normal development of Motor - - Vehicle Manufacturers.

To end with, and following some comments on the real situation of reglamentations both in developed and developing countries, a -- display is made of the pros and cons carried along by a national standardization which would after all contribute to a faster industrial development.

And so, after this general commentary, let us go through the above mentioned subjects.

1.- PRESENT TRENDS OF ROAD TRANSPORT

1.- Influential Factors

1.1. Higher Power. - There is a clear trend at present for all Motor Vehicle Manufacturers to increase the ratio power/weight; the needs for a more fluid traffic force to improve the services and to get higher accelerations. In the near future the consumer will rather have a turbocharged Diesel engine than a suction one. The reason for this attitude is directly linked whith the profit that can be obtained from the vehicle, the said profit depending in turn of the capacity and load of vehicle.

The progress reached in the design of turbochargers has increased their effectiveness and safety to an acceptable level for the consumer. Should the engine, gear box and transmission be properly designed, considerable savings are obtained in consumption with an approximate torque and horsepower increase of 30%.

From the manufacturer's standpoint, and with equal horsepower, the use of the turbocharged engine instead of the classic one bears clear advantages as regards installation services. At the same time its weight on the front axle is reduced and leaves more room for the truck body.

Since we are talking about heavy vehicles subject to regulations on fume and noise levels, it must also be stressed that the turbocharged engine brings down noise level with the use of an almost fume-free exhaust.

On the other side we have something like the studies conducted on gas turbines; and altough their use is not envisaged for the near future they can nevertheless prove to be competitive against diesel engines as far as high horsepowers is concerned. According to experts the gas turbine cannot be wholly fitted onto standard vehicles before ten years; this being mainly due to the poor economical output and a slow answer in the vehicle acceleration.

The mechanical development of the engines will proceed. However, the future for diesel and turbocharged engines has never been so brilliant. Needs for higher power will arise and developments will speed up the opportunities to meet them.

Coming back to the beginning of this clause, the more developed countries in the Motor Industry have a clear tendency towards reducing the rate weight/power. This is so stated by the studies conducted by SAE (Society of Automotive Engineers, Inc.). In fig. 1 the variation in vehicle gross weight is related to the horsepower. For instance, the rate weight/power for a single semi-trailer and two-axle tractor has decreased in latter years to a 60% roughly. Fig. 2 shows the change of speed limits and indicates the aerodynamic strength factors with influence on the vehicle horsepower. A rough 22% increase of speed in latter years can also be seen in this diagram.

Another point to be considered when designing the power of a vehicle is its gross-weight. The trend towards gross-weights is shown in fig. 4, where a weight combination ban has been drafted for all - heavy vehicles except for some very special transports. Finally, fig. 5 shows horsepower trends from 1950 up to 1975. It seems from this diagram that engines horsepower in tractor/trailer combinations will come in the region of 250 to 475 HP.

As a finishing touch on this point, ~~fig.~~ Table No. 1 shows horsepower limits presently used by some Motor Manufacturers. Therein can be noticed that the maximum horsepower figures used last year for transport vehicles follow perfectly the trends pointed above. To end with, and due to the special place occupied by the Spanish Motor Industry in developing countries, stress is made on the evolution of same as regards some heavy vehicle manufacturers. Horsepower of the various models under manufacture can be seen on Table No. 2.

1.2. Better Quality of Materials.- This subject is considered to be directly linked to the abovementioned topic about higher engine horsepower, since thanks to better and lighter materials a more solid service is attained.

The combination of engines future needs for higher efficiency engines and reduced weight and capacity require an ample Testing and Designing Program, in order to use properly each weigh unit of material intervening in the engine. It is necessary to test in detail the progress of the single parts by means of modern techniques of experimental analysis, so as to determine not only the spot where additional strength is required but also where it can be eliminated. The latter could be called "design surplus". There is an endless battle involved in the use of light materials and casting techniques of thin walls into non-critical parts, as well as selection of better materials and moresuitable technical processes.

On the other hand there are nowadays better experimenting means available that allow a thorough testing in the work of a great amount of parts. New products and materials have been introduced and a great step has been taken towards the utilization of plastics. Also, and as a further attempt to trim costing of finished products, new techniques such as value analysis and reliability have been introduced in the Motor Industry. These techniques allow a more effective use of the materials not diminishing their safety and life, leading to a more rational utilization of the designs at lower costs and longer life. Besides, the warranty periods granted to vehicles is a well-known fact mainly motivated by the greater security offered by their elements. At the same time, and as seen further on, it has not been necessary to increase maintenance costs at the same rate in which other economical factors - have been growing.

TABLE No. 1

ALPHABETICAL TABLE OF MAIN WORLD PRODUCERS OF INDUSTRIAL VEHICLES, WITH SIGNIFICANCE OF BASIC HORSEPOWER OF TRACTOR DIESEL ENGINES, APPLIED TO VEHICLE MANUFACTURING .-

Developed Countries	Manufacture	Diesel engines horsepower
1.- United States	ALLIS-Chalmers Manufacturing Co.....	49 to 435
	Caterpillar Tractor Co., Industrial Division	115 to 405
	Cummins Engine Co., Inc.	130 to 190
	Dainler Benz of North America Inc.	40 to 350
	Ford Industrial Products Autolite Ford Parts Div.	43 to 276
	GMC Truck Coach Div, General Motor Corp.....	100 to 220
	International Harester Co.	70 to 420
	Murphy Diesel Co.	155 to 4.[illegible]
	Sterling Engine Co., Inc.	20 to 230
2.- Germany	Deutz Diesel Corp. - Deutz AG. Henschel - Hanomag ..	90 to 425 20 to 260
	Kaelble Carl GmbH Maschinenfabrik	60 to 430
	MAN Maschinenfabrik Augsburg - Nuenberg AG.	63 to 246
3.- Great Britain	W.H. Allen Sons Company Ltd.	60 to 256
	Leyland Motor Corp.	36 to 404
	Perkins Ltd. (Perkins Engines Inc.)	36 to 190
4.- Japan	Isuzu Motor Ltd.	18 to 150
	Yanmar Diesel Engine Co. .	12 to 150

5.- Italy	A.I.F.U. FIAT	23 to 315
6.- Sweden	AB Scania Vabis	95 to 260
	Volvo Penta AB	110 to 185
Developing Countries		
7.- Spain	Barreiros Diesel S.A. ...	45 to 190
	PEGASO-Empresa Nacional de Autocamiones, S.A.	90 to 260

TABLE OF MAIN INDUSTRIAL VEHICLE MANUFACTURERS, WITH SPECIFICATION OF MAIN CHARACTERISTICS OF DIESEL ENGINES AS WELL AS THEIR MANUFACTURE AND APPLICATIONS.

PEGASO - Empresa Nacional de Autocamiones, S.A.

Model	No. of cylinders	Cylinder cap. cm³	Brake horsepower	Torque in kg	Weight in kgs.	Applications
9020	6	6,500	125 to 2400	41,5/1600	516	trucks, buses & tractors.
9020/10	6	6,550	135 to 2400	43 /1600	540	trucks & motor buses
9034/1	6	10,170	150 to 1700	65 /1300	670	railbuses
9040/10	4	4,370	90 to 2600	30 /1200	420	trucks & buses
9100	6	10,170	170 to 2000	65.5/1300	720	
9101	6	10,170	170 to 2000	65.5/1300	720	buses & motor buses
9105	6	10,518	200 to 2000	75,5 1100	780	trucks, motor buses and tractors
9109/1	6	10,518	260 to 1500	110 /1500	975	trucks

Barreiros - Diesel, S.A.

A - 24	4	3,340	60 to 2400	20/1300	339	trucks
A - 26	6	5,010	90 to 2400	31/1300	418	trucks
B - 24	4	6,786	115 to 2200	43/1200	678	trucks, motor buses
B - 26	6	10,179	170 to 2200	64/1200	896	trucks
B - 23	6	11,946	216 to 2200	76/1200	1060	trucks, motor buses
BVI- 26	6	10,179	170 to 2200	64/1200	920	motor buses
BVI- 38	8	15,928	290 to 2200	102/1200	1290	trucks, buses
D - 24	4	3,770	90 to 3000	24/1400	380	trucks
D - 26	6	5,685	135 to 3000	36/1400	483	buses, trucks

TABLE No. 2

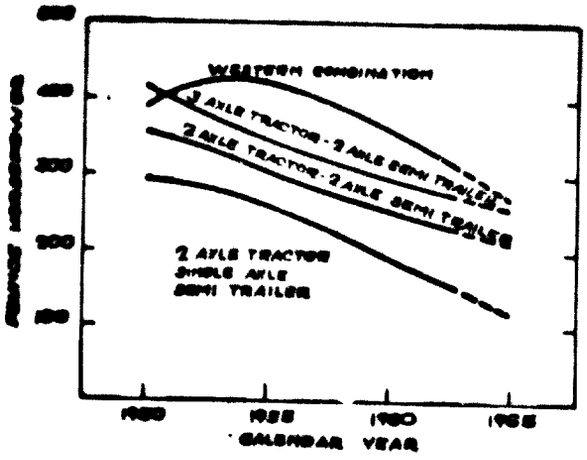

Fig. 1.- Vehicle gross weight/horsepower.

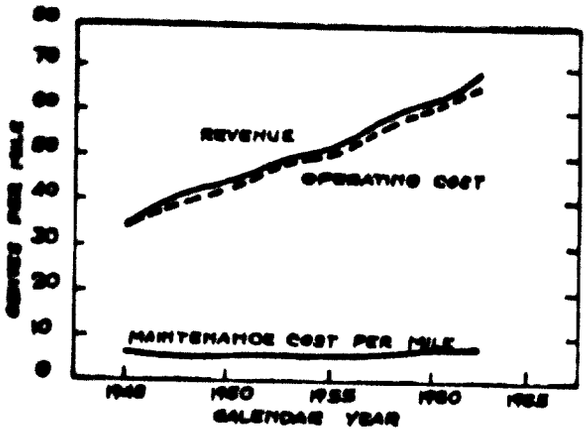

Fig. 3.- Operating costs carriers

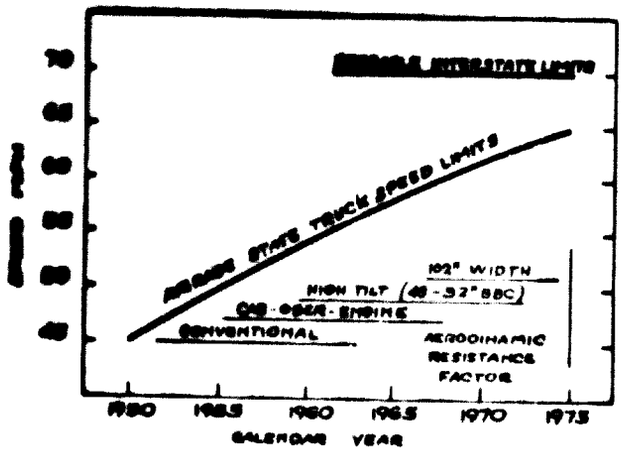

Fig.2.- Factors influencing vehicle horsepower

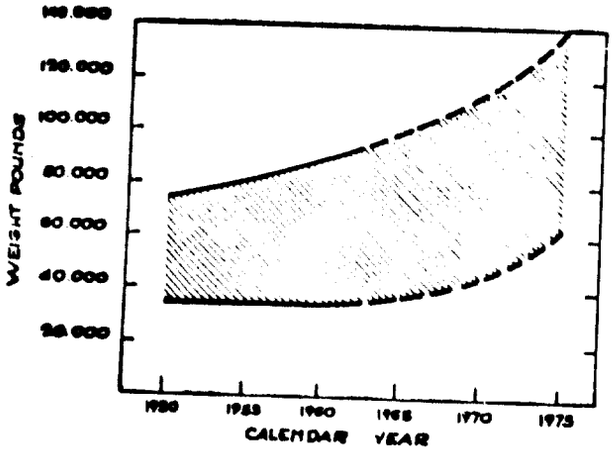

Fig.4.- Trends of gross combination weight

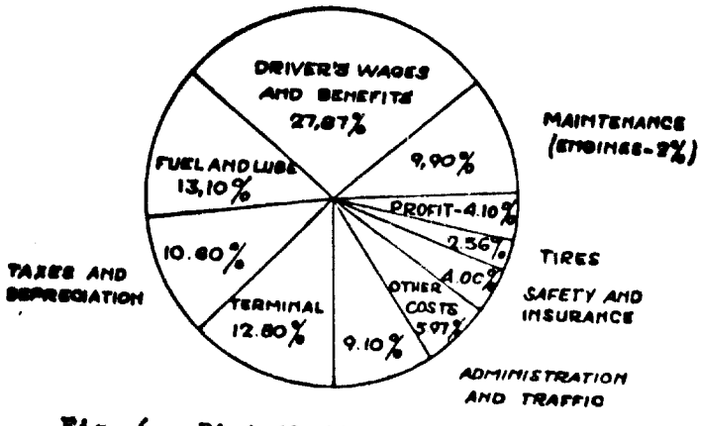

Fig. 6.- Distribution of revenue carriers
(total revenue — 68.4 ¢ per mile)

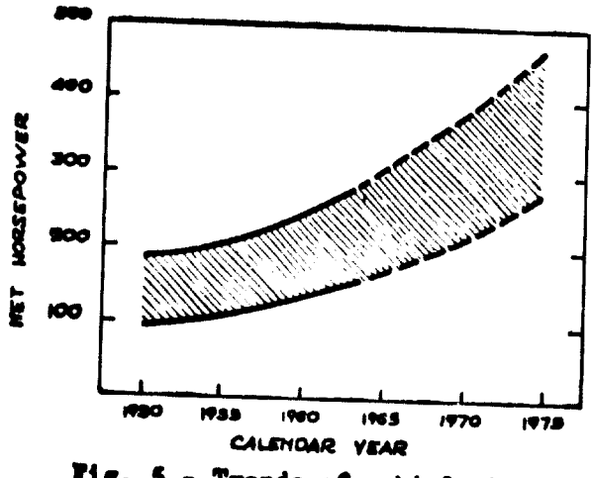

Fig. 5.- Trends of vehicle horsepower

1.3. Variations of maintenance and servicing costs

This another point deserving special attention due to its importance within the cost of transport services. Information about some 250.000 vehicles employed in Interstate Commercial Services has been compiled, based on a survey conducted by the AMERICAN TRUCKING ASSOCIATION and gathered up by SAE. This data can be used to determine acceptable projections of future exploitation costs.

Variation of average exploitation costs of carriers classified in the above-mentioned Statistic can be seen in fig. 3. The diagram shows the trend of costs experimented since 1945. Costs and revenue have actually grown up.

More factors still have contributed to this increase. Diesel fuels costs have gone up by approximately 50%, regardless of tax. During this time labour and drivers costs have been doubled up. Total maintenance costs as revenue percentage have gone down. The average of total maintenance costs per mile have gone up by 22% from 1945 to 1962, whereas the revenue has gone up by 12% in the same period. This proves the important — progress reached with the improvement of all vehicle parts; a great part of this progress being due to the proper utilization of a preventive maintenance.

It is feasible that the future transport vehicle can match and even improve the above mentioned maintenance costs reached in latter years. Doubtless to say that the percentage of revenue assigned to maintenance and motor repairs must not go up. In other words, future engines developed through the improvement of the actual ones or some of new design must necessarily stick to the line or else bring down the required maintenance.

By analyzing the distribution of revenue in the Statement on Carriers issued by the AMERICAN TRUCKING ASSOCIATION we get fig. 6, showing the relative importance of the various factors integrating the vehicle exploitation.

It can be clearly seen in this figure the three zones of importance wherein the designer can work effectively with his improvements.

Fuel and lubrication costs at the statement's time were up to the 1% of revenue; the greater fuel economy in the normal available engines having been attained -- through a strict but gradual maintenance during the last years. In the area given to the engines maintenance it can be seen that all costs imputed to this concept -including revisions- make up 2% of the revenue. The reliability and life level verified in present vehicles makes it obvious to point out that substantial improvements will appear in future. A third zone with the initial costs can be taken in consideration by the designers when thinking that greater initial investements can be broadly compensated by longer life when including the exploitation cost in the vehicle.

To end with the subject, let us point out that in spite of their small part in the vehicle's profit the repercussion of of maintenance and servicing costs will decrease in relation with the increase of the carried loads; this being due to the existence of various economic factors independent of the load capacity.

1.4. <u>Heavier loads</u>.- As a result of what has been previously stated, e.g. the trend towards increasing horsepower in engines and the improvement in the quality of materials, it has been technically possible to get vehicles able to carry ever increasing loads along longer distances.

Besides, we have just seen that transport costs go down as load capacity of vehicles is increased.

Consequently road transport has a trend towards great loading capacity units, not only for single vehicles but also for combinations of tractor and trailer or semi-trailer.

There are however certain limitations for the development of loading possibilities in transport vehicles, mainly consisting of the various regulamentations regulating in each country the maximum weight for axle as well as total weight of vehicles. Prior to getting into detail let us state at this point that the improvements worked on the roads are allowing a clear trend to gradually rise the load limits for axle in many countries; this resulting highly profitable for Freight Supply Transportation.

As an example here is some extracted data from the french publication "Quelques reflexions sur un project de code Europeen de la Route" that shows how transport costs go down when passing from 10 T. of permissible load for — axle onto 13 T.

- For 2-axle vehicle	- 5.4%	cheaper the T/Km.
- For 3-axle vehicle	- 5.7%	" " "
- For tractor & semi-trail.	- 2.5%	" " "
- For vehicle & trailer	- 2.6%	" " "

1.5. <u>Better roads and longer distances</u>. - We are living a time when everything seem to be directed towards an — opening of frontiers and a busier commercial exchange among the countries. Industrial progress spreads quickly around all fields and larger markets must be opened for the production. These circumstances have a direct influence on transportation means, particularly on road transport. Here a considerable evolution has been experienced in latter years, and there is a clear tendency to keep on growing.

There is something else that has had a great contribution to improvement and development of Road Networks: Tourism. We are all aware nowadays of the everincreasing touristic flows both national and international. This fact has stirred the preocupation for an improvement of these networks, which also means a greater flexibility in road transportation and easier means of communication with other countries.

Consequently all countries have very clear plans concerning the creation and improvement of their Road and Highway Networks. Closely linked to these circumstances is the fact of the possible joining of several countries by means of first-class highways, thus allowing a traffic of goods and passengers vehicles. Technical improvements in the vehicle parts, higher horsepower and better engine outputs have contributed to reach better speed averages and greater safety in long journeys.

All this has meant to travel long distances and study carefully the exploitation costs of the units assigned to these journeys. Evidently, the greater the loading capacity is the lower the standard expenses will be, and the vehicle revenue will be consequently increased.

2.- Road transport demand

We have just analyzed the factors acting at present upon Road Transportation. The result is an ever-increasing demand of these means of transportation.

On one side we have the technical improvements in the vehicles that allow the transportation of heavier loads along longer distances and at excellent speeds. With all these features road transportation becomes indispensable. Let us add onto it its flexibility that enables a door-to-door service needless of intermediate transfers, even crossing international frontiers.

On the other side, the development and growth of the countries lead to a greater production; a greater tourism demand; the construction of public works, housing, roads, etc.., All this calls for ever-more-effective means of transportation.

Let us also point out that the nations have a tendency at present towards grouping themselves in Commercial and Economic Associations. The result is a gradual elimination of frontiers and a goods and passenger traffic running even through a whole continent.

As an example we have the TIR System in Europe, the regular Road Service for passengers among France, Germany and Spain and touristic excursions in several countries.

Something similar happens in America. A Carriers Convention has been recently held in Lima to organize a Road Service linking that town and Buenos Aires. Actually there is already a service between Ciudad del Plata and San Paulo (Brasil).

We could go on listing countless examples of international road transportation, both for goods and passengers. Therefore we can safely state that there will be an ever-increasing demand of heavy commercial vehicles, spreading more and more their range of activities.

CHAPTER 2nd.

Factors conditioning the implanting of motor industries in countries undergoing development.

Following the needs for all means of transportation, mentioned in previous paragraphs, we state hereafter the consequences of this need in under-developed or developing countries.

As a result of their insignificant or non-existing industrialization these countries do not produce their own means of transportation; this meaning that all vehicles required for the country must be imported. These imports usually represent the most important chapter of foreign currency expenditure in these countries.

Then the possibility of manufacturing vehicles with a higher or lower percentage of local production is envisaged right away; on one side to avoid or reduce imports and corresponding foreign currency expenditure involved, and secondly as a natural desire of any underdeveloped country to become quickly industrialized.

It is noticeable that the first kind of undertaking encountered in countries undergoing industrilization be the motor industry. A very normal phenomenan since means of transportation are utterly indispensable in any country and cannot be possibly substituted.

Thus, it is very difficult to balance the issue of foreign currency in these countries, no matter how rich in other kind of measures the country is. And so we can see that countries with good natural resources and a high exports figure are compelled to limit vehicle imports from time to time in order to keep a commercial balance.

There is something else to be pointed out. A great deal of productive labor is generated by the motor industry, running from the basic manufactures to all kinds of fitting and equipment. The consequent fast development of all these small industries and the corresponding increase of employment add greatly to the fast progress of a country.

It is therefore clear that any developing country places the motor industry as its first undertaking. The starting point is usually the installation of assembly plants to be followed by a gradual production of several parts of the vehicles, until ever-higher integration percentages are reached.

However, factors exist that condition and limit the possible growth of a motor industry with economic costs and satisfactory integration rates. In this chapter we shall review these factors as well as the possible solutions being tried to clear them away. Following the general line of this work we shall only refer to industrial vehicles. As a sample we are to take the policy followed by South American Countries, since our recent experiences gathered in them furnish us with a practical knowledge of the problems concerned.

1.- Market capacity

Let us point out first that the countries we are refering to have a reduced population as compared with the total area of the territory. Besides, the distribution of this population is strongly unbalanced according to certain zones in every country.

Therefore, and as regards our present study, we can draw the following conclusion: In spite of their needs for means of road transportation the demand of same cannot be the same as in more developed countries whith a much higher density of population.

Here we encounter the main obstacle to implanting a vehicles manufacture. The capacity of that country's home market would turn the national production unprofitable, unless prices entirely out of the consumer's reach are established.

Some data on future provisions for manufacture and assembly of trucks and motor buses has been extracted from statistics of some countries. The figures thus obtained are sufficiently low as to confirm our previous issues.

These circumstances are being seriously regarded by the various countries, and the agreements already established for a better solution of the problem represent a great step onto motor industry development.

Although the present study is fundamentally directed towards Heavy Vehicle Industry, let us not forget the progress experienced at the same time by Automobile Industry, since both heavy and light motor industry progress are a push to the auxiliary industry that often works jointly for both of them. Furthermore, it is a fact that any kind of industrial progress creates in turn an increase of market requirements in goods transport.

Therefore we can resume by saying that market capacity is an important problem to be solved within the economy field, and stays as one of the solid bases upon which this type of industry must be erected in order to equal the progress achieved in more developed countries.

2.- Minimum diversification of groups and types

The ideas next displayed on this subject are a consequence of our previous statements, basically inasmuch as the potential market of the countries is concerned. No doubt that a vast capacity-range of commercial vehicles can perfectly cope with market requirements. However, this sort of production can only be kept profitable in those countries where the strong industrial progress offers a large market. Otherwise, the only way to maintain this variety of types is with imports; this being an obvious hinderance to the development of the national motor industry.

It is a well known fact that by manufacturing large series of a product we arrive to a quality-improvement of same thorugh the chances of a more acute technical survey. But above all, the use of economical production methods adequated for the large

series contribute to a considerable reduction of costs.

Consequently it is important to state that any country with a smallselling market must, when trying to develop its motor — industry, use the best systems available to ensure a good industrial progress. By a rational choice of groups and parts of a vehicle these can be reduced and thus production can be attained of a vehicle type and small-variation vehicles derived from it. This system allows at least to partially staisfy (satisfy) market demand; meanwhile a strong basic industry can be created that can supply in future the market with a broader range of -- vehicles.

3.- Integration at international level

As we have just seen, one of the factors limiting the possible creation of a motor industry in a less-developed country is the small capacity of its home market. It is also a fact that the policy observed in countries with a full-developed motor industry is that of amalgamation and concentration of enterprises; the -- only way to reach large-series production at competitive prices.

To that effect many countries undergoing development have foreseen the chance of joining the potential markets of some of them in -- order to achieve production figures permitting to reach certain economic levels. The method would be to distribute accordingly in each country the production of the different mechanical groups, and so ensemble in one the requirements of all the other countries.

A strong fight in this respect is being held out in the merican Continent, where language and background expedite an international understanding.

Attempts have been made in this sense within the ALAC countries that have only resulted so far in bilateral agreements.

Recently though, the Andine Subzone -within that Association and embracing countries with more similar economic and industrial levels- is trying to reach improtant agreements leading to a true international integration.

There are of course many problems involved in this side of the question. The lack of a home technique compells these countries to tourn to foreign firms, with the corresponding sharing of interests due to the granting of licenses. Nevertheless, this possibility of integration is actually being considered.

4.- Characteristics of vehicle type

Various factors have been analyzed in chapter 1 that show the channel along which modern road transport runs. There is an increasing trend towards heavier loads for which higher horsepower is required. At the same time, an effective maintenance together with a better quality of materials and bewader trafficways permit a longer-distance run. On the other hand road transport costs are competing more and more with other means of transportation, since the chances of transporting heavier loads at larger distances — put down the cost per T/Km.

In the previos paragraph we have considered the necessity of — uniting the types of vehicles and minimizing the groups to be manufactured, when dealing with the implanting of an industry of this kind. Furthermore, comments have been passed on the various possibilities offered by the market capacity, pointing out the strong economic significance of this factor.

We must add onto it that the selection of vehicle type and its features is part of a safe program when the time comes to define and implant such an industry.

The orography of a country should also be taken in consideration when carrying out the selection, for sometimes the existing long distances or high heights force to choose high horsepower engines.

To conclude with, it seems that the common feature according to modern transport trends and the particular features of each — country points towards a base vehicle good for maximum load capacity and length of service. All this, providing of course that it conforms with weight and size regulations established in the country undergoing industrialization. This latter aspect will be reviewed further on.

CHAPTER 3rd. - Influence played by the Motor Vehicle national regulations on the possibilities of industrialization in countries undergoing development.

We have explained in previous chapters the present trends of road transport. On one side we have just seen how the revenue goes up with the load transported; on the other side it has been clearly explained how any technical improvement introduced in the vehicle facilitates a wider range in transportation, to the point of even overtaking national limits.

Counter-standing these factors is the barrier of weight and size limitations existing in every country.

The reasons for which almost all countries have imposed their own criteria on the matter are many and complex. Although they all —— practically agree on the definitions of characteristics to be regulated, they disagree when determining the limits of said characteristics.

Due to the importance of the problem many attempts have been made at international level to to reach a standardization according to modern development of transport means.

Europe had a first attempt at the Geneva Convention in 1949, where among other things it was established for the first time the axle-load and the weights allowed in the different combinations of vehicles in international traffic. This 1949 legislation demanded for the —— more loaded axle a maximum load of 8000 Kg. However, and as can be seen later on, this limitation has presented serious difficulties in the — different countries and has been somehow modified.

We must bear in mind that the reasons motivating this limitation were among other things originated by a trend to keep the roads in good — condition, and secondly to protect other means of transportation such as the railway. Many of these reasons no longer exist, and the 8 tons maximum load established at the Geneva Convention in 1949 for single-axle has indeed been changed. In the Convention of European Transport Ministers held in the Haya in 1960 it was agreed to rise the maximum permissible load for single-axle to 10 T. And even though this limitation is still maintained in some countries, there are some other such as Belgium, France and Luxembourg that already allow 13 T.

The above statement shows clearly that in spite of the attempts only a few countries have succeeded in reaching an agreement.

To ilustrate all this we enclose the report "LIMITS OF MOTOR VEHICLE SIZES AND WEIGHTS" issued by the INTERNATIONAL ROAD FEDERATION, which provides with enough data to have a good idea of the picture.

We have seen that in Europe - a gathering of developed countries the problem of axle-loads has raised in line with technical advan in motor industry allowing ever-heavier vehicles.

Let us analyze next what happens in the countries undergoing development, for which we shall refer as before to those of the American Continent. In these countries the international transport of goods and passengers is developing day by day; there are more and more vehicles with greater load capacity, and even progress is being made towards integration at international level for vehicle production. - And yet we believe that a common problem in all those activities has not been regarded: the problem of limits of motor vehicles sizes and weights.

What will happen when a motor vehicle coming from a country where only 11 T. are allowed tries to get into another one with limit down to 8?

How is it possible for two countries to try a joint integration of heavy vehicles production if one allows an axleload of more than 10 T and the other one scarcely 8?

And so we could go on listing questions that would have no other answer than this: An International Agreement before the countries belonging to the Association in order to uniform their transit Legislation.

We only need to analyze the report issued by the INTERNATIONAL ROAD FEDERATION to become acquainted with all above stated. That is to say, referring in fact to the permissible axleload, that quite different values are maintained (almost all of them in the region of 8 to 9 tons), whereas the developed countries try due to reasons already explained to reach even 13 T. axle-load.

As a general conclusion of this study let us indicate that we think advisable the establishment at international level among the countries linked by a geographical, economical, etc .. background of alike transport regulations, and that this would lead to a noticeable increase in their development, since they make possible a more economic transport not only among themselves but also a more effective industrialization.

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LIMITS OF MOTOR VEHICLE SIZES AND WEIGHTS

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VEHICLE TYPES

Type 2

Type 3

Type 2-S1

Type 2-S2

Type 3-S1

Type 3-S2

Type 2-2

Type 2-3

Type 3-2

Type 3-3

Notation

The figure shows silhouettes of most basic commercial vehicle types in regular operation as designated by code based on axle arrangement. The first digit indicates the number of axles of the truck or truck-tractor. The letter "S" indicates a semitrailer, and the digit immediately following an "S" indicates the number of axles on the semitrailer. Any digit other than the first in a combination, when not preceded by an "S", indicates a trailer and the number of its axles. For instance, a 2-S2 combination is a two-axle truck-tractor with a tandem-axle semitrailer. A 3-S1-2 combination is a three-axle truck-tractor with tandem rear axles, a semitrailer with a single axle, and a trailer with two axles.

AFRICA

COUNTRY	WIDTH	HEIGHT	LENGTH				AXLE LOAD		MAXIMUM GROSS WEIGHT (1)									
			SINGLE UNIT		TRUCK SEMI-TRAILER	OTHER COMBI-NATIONS	SINGLE	TANDEM	2	3	2-S1	2-S2	3-S1	3-S2	2-2	2-3	3-2	3-3
			TRUCK	BUS														
	meters	meters	meters	meters	meters	meters	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons
Algeria	2.5	–	11.0	12.0	14.0	18.0	13.0	(2)	19.0	26.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Botswana (3)																		
Cameroon	2.5	3.8	10.0	10.0	14.0	18.0	9.0	10.2 (4) 14.7	13.5	18.0	22.5	23.7 (5) 28.0	24.3 (5) 29.0	25.5 (5) 35.0	27.0	27.0	32.0 (5) 35.0	32.0 (5) 35.0
Chad (7)	2.5	–	11.0 (6) 12.0	12.0	14.0	18.0 (8)	10.0	20.0	16.0	22.0	30.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
French Somaliland	2.5	–	11.0	11.0	12.0	(9)	13.0	(10)	19.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
Lesotho (11)																		
Liberia (12)																		
Malawi	2.5	4.3	11.0	11.0	15.2	18.3	7.0	14.0	14.0	21.0	21.0	28.0	28.0	35.0	28.0	35.0	35.0	42.0
Morocco (7)	2.5	4.0	11.0	12.0	15.0	18.0	13.0	–	19.0	26.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Niger	2.5	–	11.0	12.0	14.0	18.0	11.5	23.0	17.0	22.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Nigeria	2.3	3.8	–	–	–	–	10.0 (13)	15.0(13)	32.0	32.0	32.0	32.0	32.0	32.0				
Rhodesia (S)	2.5	4.6	11.0	11.0	15.2	21.9	6.35	13.7	12.7	19.0	19.0	25.4	25.4	31.8	31.8	31.8	31.8	31.8
Sénegal	2.5	–	11.0 12.0(6)	12.0	18.0	18.0	10.0	14.0	16.0	22.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
Sierra Leone (14)	2.3	3.35	9.14	9.14	10.7	16.5	4.0											
Somalia (15)	2.5	4.0	10.0 11.0 (6)	11.0		18.0												
South Africa	2.5	3.8 (16)	10.0 11.0 (6)	11.0	15.2	21.9	8.15	–	Dependent on axle spacing									
Swaziland	2.5	3.8 (16)	10.0 11.0 (6)	11.0	15.2	–	8.15	–	16.3	24.5	24.5	32.6	32.6	36.3	32.6	36.3	36.3	36.3
Zambia	2.5	3.8 (16)	11.0	11.0	15.2	21.9	8.0	14.5	16.0	22.5	24.0	30.5	30.5	37.0	31.9	38.5	38.5	45.0

1. In accordance with vehicle type. See Page 2.
2. The maximum weight for tandem axles is obtained from the formula $t = 7.35 + 0.35 \left(\frac{d - 90}{5}\right)$, where 90 cm. < d < 135 cm.
3. Legislation under revision.
4. 10.2 tons for tandem axles separated 0.90 m. For tandem axles separated 1.35 m. or more 14.7 tons.
5. Dependent on separation of tandem axles. See footnote 4.
6. Three axle vehicles have the highest limit.
7. All self propelled vehicles or trailers must not exceed 5 tons per meter of length measured between the first and the last axle.
8. 20 meters for vehicle types 3-2 and 3-3.
9. For trucks and trailers, each component vehicle must not exceed 11.0 m. of length.
10. The permissible maximum weight for a tandem axle is 7.35 tons for the most heavily loaded axle, where the distance in the two axles is 0.9 m., but must not exceed 10.5 tons for a distance of 1.35 m. or more between the axles.
11. There is no legislation. Maximum accepted wheel load is 9000 lbs., although not enforced.
12. There is no legislation.
13. Maximum axle load limits vary in accordance with different roads of the network.
14. Special permits are issued by the Ministry of Works for overweight vehicles. The limit in practice is 9 tons gross weight.
15. Actual law prescribes only size limits.
16. Two-deck buses are permitted 4.57 m. height.

NORTH, CENTRAL & SOUTH AMERICA

AMERICA DEL NORTE, CENTRAL Y SUR

COUNTRY / PAIS	WIDTH / ANCHO	HEIGHT / ALTURA	LENGTH / LONGITUD TOTAL						AXLE LOAD / CARGA POR EJES				MAXIMUM GROSS WEIGHT / PESO MAXIMO TOTAL																	
			Single Unit / Unidad Simple				Truck & Trailer / Camion con Remolque		Other Combinations / Otras Combinaciones		Single / Simples		Tandem / Tandem		2		3		2-S1		2-S2		3-S1		3-S2		2-2		2-3		3-2		3-3	
	feet pies	meters metros	feet pies	meters metros	Truck Camiones	Bus Bus	feet pies	meters metros	feet pies	meters metros	pounds libras (1000)	metric tons ton. metricas	pounds libras (1000)	metric tons ton. metricas	pounds libras (1000)	metric tons ton. metricas	pounds libras (1000)	metric tons ton. metricas	pounds libras (1000)	metric tons ton. metricas	pounds libras (1000)	metric tons ton. metricas	pounds libras (1000)	metric tons ton. metricas	pounds libras (1000)	metric tons ton. metricas	pounds libras (1000)	metric tons ton. metricas	pounds libras (1000)	metric tons ton. metricas	pounds libras (1000)	metric tons ton. metricas
Argentina		2.50		2		11.00		12.00		15.50	18.50 20.50 [3]		10.6		18.0																
Bolivia		2.30																												
Brazil		2.60		4.00		11.00		11.00		17.50	17.50		10.0		16.0 [4]		15.0		21.0 [5] 22.0		25.0		31.0 [5] 32.0		31.0 [5] 32.0		37.0 [5] 39.0		35.0		40.0		40.0	
Canada [6]	8.0	12.5 to 14.5		33.0 to 40.0		33.0 to 40.0		50.0 to 85.0			18.0 to 20.0		24.0 to 32.0		20.0 to 36.0		30.9 to 42.0		40.0 to 48.0		48.0 to 74.0		48.0 to 74.0		54.0 to 74.0		48.0 to 67.8		44.0 to 74.0		44.0 to 74.0		44.0 to 84.0	
Chile		2.50		3.00		10.00		11.00		14.00	18.00		8.00		15.0		16.0		23.0		24.0		31.0		31.0		38.0		32.0		39.0		39.0	
Colombia		2.45		4.00		10.65		10.65 12.20 [7]		13.70	15.25		8.2		14.5		(Depender on trig size and axle spacing - Depende del tamano de llantas y distancia entre ejes)																46.
Costa Rica		2.50		3.00		10.00 11.00 [7]		11.00		14.00	-		8.0		14.5		12.0		20.0		20.0		25.0		25.0		25.0		25.0		25.0			
Ecuador		2.50		3.00		10.70				13.70	18.30		11.0		19.0		15.5		23.5		26.5		34.5		34.5		38.7		37.5		43.8		43.8	
Guatemala		2.50		3.00		10.00 11.00 [7]		11.00		14.00	14.00		8.0		14.5		12.0		20.0		25.0		25.0		25.0		25.0		25.0		25.0		25.0	
Guyana	7.5 [8]			27.5		27.5		30.0		30.0							(Dependent on tire size and axle spacing - Depende del tamano de llantas y distancia entre ejes)																
Honduras					No Regulations - No tiene Reglamento																		No regulations - No tiene Reglamento										
Jamaica [9]	8.0	10.5		46.0		38.0		33.0		50.0	17.92						27.0		31.36		45.0		45.0		45.0								
Mexico [13]		2.50		4.35		11.00		11.00		[12]	18.30		9.0		14.5		14.0		19.5		23.0		28.5		29.5		34.0		32.0		37.5			
Netherland Antilles		2.50		3.50		10.00		11.00		14.00	18.00						No Regulations - No tiene Reglamento										No Regulations - No Tiene Reglamento						
Nicaragua	8.2	2.50	12.5	3.00	36.0	11.00 11.50 [7]	45.0	11.00	46.0	14.00	40.0	14.00	17.6	8.00	32.0	14.5	12.0		18.5		28.0		26.5		26.5		33.0		28.0		34.5		34.5	
Panama [3]		2.50		4.30		11.00 12.00 [7]				15.25	15.25		10.0		16.4		14.0		24.0		24.0		32.0		32.0		32.0		32.0		32.0		32.0	
Paraguay		2.40		4.00		10.00											15.0																
Peru		2.50		4.00		10.50 12.00 [7]		10.50		15.00	15.00		11.0				15.0		20.0		20.0		30.0		30.0		30.0		30.0		30.0		30.0	
El Salvador		2.50		3.00		10.00 11.00 [7]		11.00		14.00	14.00	17.6	8.0	32.0	14.5		12.0		18.5		20.0		26.5		26.5		33.0		28.0		34.5		34.5	
Uruguay		2.50		4.00		10.70		10.70		15.30	18.30		10.0 [11]		14.4		(Dependent on axle spacing - Segun distancia entre ejes)																
United States [10]	8.0 to 9.0	12.5 to 14.0		35.0 to 56.0		35.0 to 56.0		50.0 to 65.0		50.0 to 70.0	18.0 to 24.0		32.0 to 48.6		28.0 to 48.0		36.0 to 65.0		46.0 to 69.6		60.0 to 77.5		50.0 to 77.52		64.0 to 86.4		47.8 to 86.4		39.5 to 85.0		53.5 to 86.4		53.5 to 90.0	
Venezuela		2.60		3.96		10.70 12.20 [7]		10.70 12.20 [7]		15.30	18.30		8.5		14.5		12.0		18.6		20.0						30.0		28.0				33.0	
AASHO Policy	8.5	13.5		40.0				55.0		65.0	20.0		32.0				(Dependent on axle spacing and vehicle type - Depende de la distancia entre ejes y el tipo de vehiculo)																
PanAm Hwy Congress Policy	8.2	12.5	5.8	36.0 to 36.0		10.0 to 11.0	36.0	11.00	46.0	14.00	72.0	22.00	17.6	8.0	32.0	14.5	(Dependent on axle spacing - Segun distancia entre ejes)																

1. In accordance with vehicle type. See Page 2
   De acuerdo con el tipo de vehiculo. Ver pagina 2

2. Regulations vary with type of vehicle
   El reglamento varia de acuerdo con el tipo de vehiculo.

3. 18.50 meters for truck and trailer. 20.50 meters for truck-tractor with semi-trailer and trailer
   18.50 metros para camion con remolque. 20.50 metros para camion con semi-remolque y remolque

4. If the tandem axles are 1.34 meters or more apart, limit is 17.00 tons.
   Si los dos ejes estan a una distancia de 1.34 metros o mas, el limite es de 17.00 toneladas.

5. If the tandem axles are 1.34 meters or more apart, weight limit is the highest one.
   Si los dos ejes tandem estan a una distancia de 1,34 metros o mas, el limite de peso es el mayor.

6. Regulations vary by Province. Figures indicate range of variation in maximum limits.
   Los reglamentos varian de Provincia a Provincia. Las cifras indican las variaciones de los limites maximos.

7. Three axle vehicles have the highest limit.
   Vehiculos de tres ejes tienen el limite mayor

8. Except buses that can be 8.0 ft. wide.
   Excepto los buses que pueden tener 8.0 pies de ancho.

9. Special Permit may be granted for vehicles exceeding these limits.
   Permiso Especial puede concederse a vehiculos que excedan estos limites.

10. Regulations vary by States. Figures indicate range of variation in maximum limits.
    Los reglamentos varian de Estado a Estado. Las cifras indican las variaciones de los limites maximos.

11. Two-tire axle maximum load: 5.0 tons.
    Four tire axle maximum load: 10.0 tons.

    Carga máxima en ejes de dos ruedas: 5.0 toneladas.
    Carga máxima en ejes de cuatro ruedas: 10,0 toneladas.

12. Regulations vary with type of vehicle. Type 2-S1 is 14.00 m.. Type 2-S2 and 3-S1 is 14.50 m. 3-S2 is 15.25 m

    Las regulaciones varían según el tipo de vehiculo. El tipo 2-S1 tiene 14,00 m. El tipo 2-S2 y el 3-S2 tienen 14.50 m. y el 3-S2 tiene 15,25 m.

13. Limits shown are for Class A highways.
    Class B highways have lower limits.

    Estos límites son para carreteras Clase A. Las Carreteras Clase B tienen límites más bajos.

EUROPE

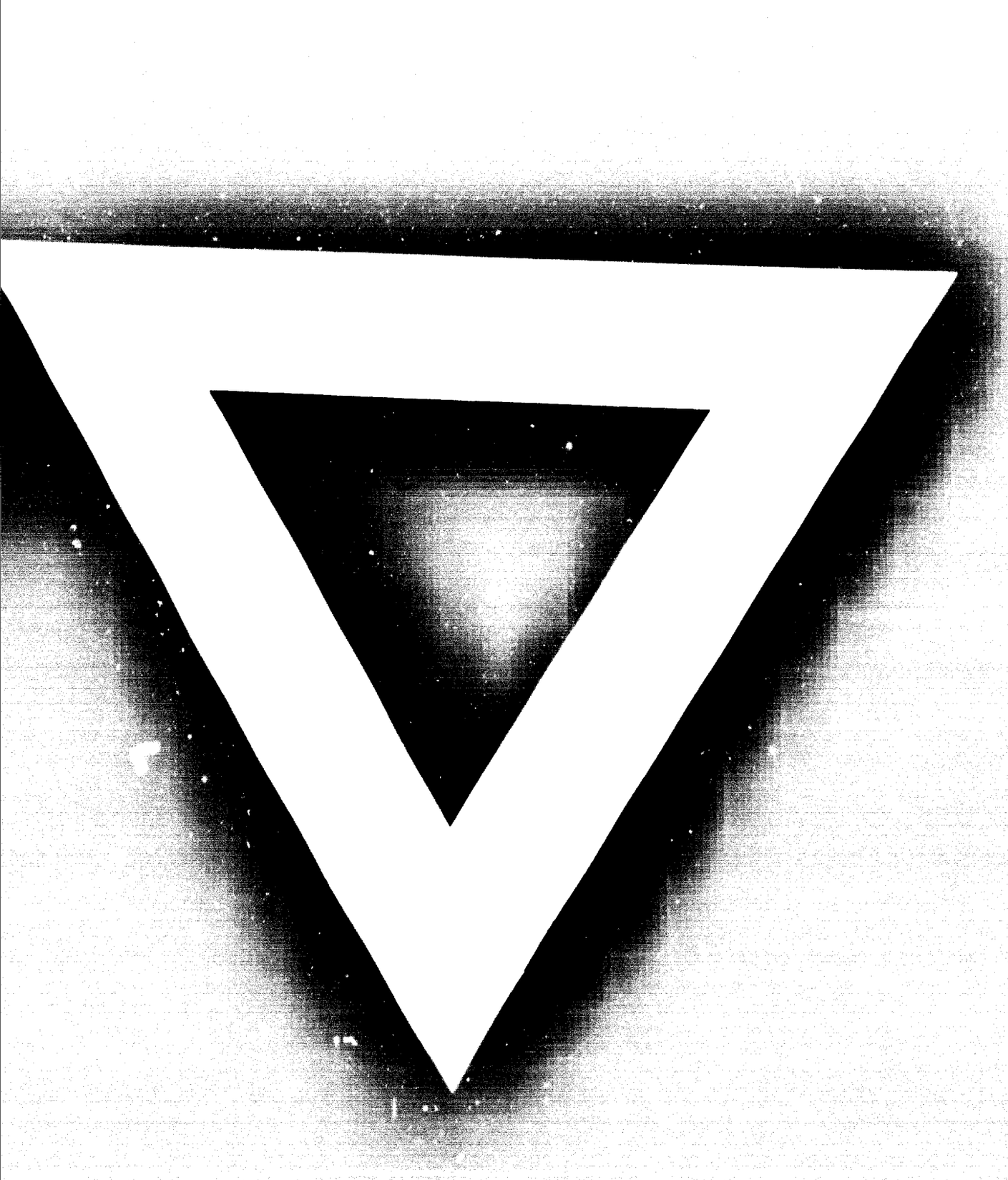
COUNTRY	WIDTH	HEIGHT	LENGTH				AXLE LOAD		MAXIMUM GROSS WEIGHT (1)									
			SINGLE UNIT		TRUCK SEMI-TRAILER	OTHER COMBINATIONS	SINGLE	TANDEM	2	3	2-S1	2-S2	3-S1	3-S2	2-2	2-3	3-2	3-3
	meters	meters	TRUCK meters	BUS meters	meters	meters	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons
Austria	2.50	3.80	11.00 12.00 (2)	11.00 12.00 (2)	15.00	16.50	10.0	16.0	16.0	22.0	24.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
Belgium	2.50	4.00	12.00	13.00	15.00	18.00	13.0	20.0	19.0	26.0	36.0	36.0	36.0	36.0	39.0	40.0	40.0	40.0
Cyprus (3)	2.29	3.35	7.92	7.92	12.19	12.19	5.0		10.0	10.0	10.0	10.0	10.0	10.0	N.P.	N.P.	N.P.	N.P.
Denmark (4)	2.50	3.60	10.00 12.00 (2)	10.00 12.00 (2)	14.00	18.00	8.0	14.5	See footnote (5)				—		See footnote (5)			
Eire	2.50	4.57	10.97	10.97	14.94	16.46	10.0	16.0 (6)	16.0	22.0	22.0	25.0	25.0	25.0	32.0	32.0	32.0	32.0
Finland	2.50	3.80	11.00	12.00	14.00	18.00	8.0	13.0	12.5	17.5	20.5	25.0	25.5	27.0	25.0	30.0	30.0	32.0
France	2.50	-	11.00	12.00	15.00	18.00	13.0	(7)	19.0	26.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Germany (West)	2.50	4.00	12.00	12.00	15.00	18.00	10.0	16.0	16.0	22.0	38.0	38.0	38.0	38.0	32.0	38.0	38.0	38.0
Great Britain	2.50	4.57 (8)	11.00	11.00	13.00	18.00	(9)	(9)	(9)	22.4	22.4	(9)	(9)	(9)	32.5	32.5	32.5	32.5
Greece	No data received								—		No data received							
Italy	2.50	4.00	11.00	10.00	14.00	18.00	10.0	14.5	14.0	18.0	18.0	28.0	28.0	32.0	28.0	32.0	32.0	36.0
Luxembourg	No data received								—		No data received							
Netherlands	2.50	4.00	11.00	12.00	15.00	18.00	10.0	16.0	20.0	26.0	30.0	36.0	36.0	42.0	40.0	46.0	46.0	50.0
No. Ireland	2.50	4.57 (8)	11.00	10.98	13.00	18.00	10.0		16.3	22.4	22.4	26.4 32.5 (9)	26.4 32.5 (9)	26.4 32.5 (9)	32.5	32.5	32.5	32.5
Norway	2.20 (10)	-	-	-	-	-	2.0 (10)	2.0 (10)	(Dependent solely on axle loading)									
Poland	2.50	3.80	10.00	11.00 12.00 (11)	14.00	18.00	8.0 (12) 10.0	14.5 (12) 16.0	14.0 16.0 (12)	21.0 (12) 24.0	30.0 (12) 32.0	30.0 (12) 32.0	30.0 (12) 32.0	30.0 (12) 32.0	28.0 (12) 32.0	35.0 (12) 40.0	35.0 (12) 42.0	42.0 (12) 48.0
Portugal	2.45	4.00	10.00	10.30	12.00	14.00	10.0	16.5	15.0	20.0	20.0	20.0	20.0	20.0	30.0	30.0	35.0	35.0
Spain (13)	2.50	4.00	11.00 12.00 (2)	12.00	16.50	16.50	10.0	16.0	16.0 (14)	24.0 (15)	24.0 (15)	32.0 (15)	32.0 (15)	32.0 (15)	32.0	32.0	32.0	32.0
Sweden	2.50	-	-	-	-	-	(16)	(17)	-	-	-	-	-	-	-	-	-	-
Switzerland	2.30 (18)	4.00	10.00	12.00	14.00	18.00	10.0	14.0	16.0	16.0	21.0	21.0	21.0	21.0	26.0	26.0	26.0	26.0
Turkey	2.50	3.80	10.00 (2) 11.00	11.00	14.00	18.00	8.0	14.5	16.0	22.5	24.0	27.5	27.5	27.5	32.0	32.5	32.5	32.5
1949 Geneva Convention	2.50	3.80	10.00 (2) 11.00	11.00	14.00	18.00	8.0	14.5	See footnote (19)				—		See footnote (19)			

1. In accordance with vehicle type. See Page 2
2. Three axle vehicles have the highest limit.
3. Special permission may be granted for vehicles exceeding these limits.
4. There are special regulations for commercial vehicles engaged in international road transport of goods.
5. The maximum weight depends on the distance a (in meters) between the outer axles and is obtained from the formula G = 15 + 1.25 (a - 2.5). The value in parentheses is rounded to the immediate lower tenth.
6. Tandem axle maximum load is 18.0 tons for vehicle types 2-S2, 3-S1, and 3-S2.
7. Maximum weight for a tandem axle is 7.36 tons for the most heavily loaded axle, where the distance in the two axles is 0.9 m. This weight increases by 350 kg. per 0.05 m. of distance beyond 0.9 m., but must not exceed 10.5 tons for a distance of 1.36 m. or more between the axles.
8. Only for buses.
9. Dependent on axle spacing and other conditions.
10. Exceptions may be made allowing vehicles to have a maximum width of 2.35 m. and/or a maximum weight of 7 tons per axle by means of a special permit valid for certain main roads. Tandem axles are regarded as a single axle if the component axles are less than 2.50 m. apart.
11. The highest limit is for urban buses only.
12. The highest limit is for some types of vehicles on certain roads.
13. Special Permanent Permission is necessary for vehicles: (1) weighing more than 16 tons; (2) truck-tractor with semi-trailer with more than 15.0 meters; (3) truck and trailer with more than 14.0 meters.
14. Provided it does not exceed 5 tons per meter of length between the two axles.
15. Provided it does not exceed 4.25 tons per meter of length measured between the first and the last axle.
16. About 10 per cent of the road network is open to vehicles with maximum single axle load of 6 tons; 80 per cent to vehicles with 8 tons; and 10 per cent to vehicles with 10 tons.
17. About 10 per cent of the road network is open to vehicles with maximum tandem axle load of 8 tons; 80 per cent to vehicles with 12 tons; and 10 per cent to vehicles with 16 tons.
18. On some main roads 2.50 m.
19. The maximum weight depends on the distance a (in meters) between the outer axles and is obtained from the formula G = 11.25 + 1.25 a (the value a should be rounded up to a whole number).

ASIA, MIDDLE EAST AND OCEANIA

COUNTRY	WIDTH	HEIGHT	LENGTH				AXLE LOAD		MAXIMUM GROSS WEIGHT (1)								
			SINGLE UNIT TRUCK	BUS	TRUCK SEMI-TRAILER	OTHER COMBINATIONS	SINGLE	TANDEM	2	3	2-S1	2-S2	3-S1	3-S2	2-2	2-3	3-2	3-3
	meters	meters	meters	meters	meters	meters	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons	metric tons
China (Taiwan)	2.50	3.80	10.00	11.00	14.00		8.0	11.0	12.0	14.0	20.0							
Hong Kong (3) (4)	2.44	3.20 (2)	9.14	9.14	10.00	10.00												
India (5)																		
Iraq	2.60	3.80	10.65 12.20 (5)	10.65	15.24	20.00	11.0	17.0	16.0	22.0	27.0	33.0	33.0	35.7	38.0	44.0	44.0	50.0
Israel	2.50	3.80	10.00 12.00 (5)	11.00	14.00	18.00	12.0	17.5	16.0	22.5	24.0	30.5	30.5	39.0	28.8	28.8	38.5	40.7
Japan	2.50	3.50	12.00	12.00	24.00	24.00	10.0	20.0	20.0	20.0	30.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Korea (6)	2.50	3.50	10.00	10.00			10.0	Total Maximum Weight Not to Exceed 20 Tons.										
Lebanon	2.50	3.50	11.00	12.00	14.00	18.00		14.7 (7)	19.0	26.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Malaysia (8)	2.29	(9)	9.14	9.14	10.97	12.19 (10)												
Saudi Arabia (11)																		
Syria	2.50	3.80	10.00 11.00 (5)	11.00	14.00	18.00	12.0		18.0	22.0	24.0	26.0	26.0	35.0	26.0		30.0	35.0
Thailand	2.50		10.0				8.0	14.4										
Australia (12)	2.44 2.50	4.27 4.42	9.45 20.12	10.67 20.12	13.72 20.12	15.24 21.64	18.13 8.43	13.15 16.26	12.70 14.73	17.69 22.86	19.30 22.86	24.89 30.99	24.89 30.99	25.40 39.12	20.86 30.99	21.17 39.12	25.40 39.12	25.40 47.24
New Zealand (13)	2.44	4.27	9.14	10.06	10.97	18.29	8.13	12.19	14.22	18.29	22.35	26.42	26.42	30.48	30.48	30.48 34.55 (14)	30.48 34.55 (14)	30.48 38.61 (14)

1. In accordance with vehicle type. See Page 2.
2. 4.57 m. for double-deck buses.
3. The regulations with respect to maximum weights state:
   For trucks: 4.58 tons, unladen.
   For buses: 8.16 tons, unladen; 12.7 tons, laden; 8.6 tons, maximum axle load.
4. Except for the height in buses, the Commission of Police may authorize an increase in all other limits.
5. Three axle vehicles have the highest limit.
6. To exceed these limitations requires approval of the Ministry of Transport.
7. Each component of the tandem axle is allowed an increase of 0.35 tons for every 5 cms. over 0.90 m. up to a maximum of 14 tons, provided that the maximum gross weight of the vehicle is not exceeded.
8. Maximum axle loads and maximum gross weight of vehicles vary on different routes of the highway network.
9. No regulations.
10. Not including length of draw-bar.
11. There is no legislation.
12. Regulations vary by States. Figures indicate range of variation in maximum limits. Does not include the State of Tasmania.
13. Class I limits are shown which apply in largest cities and some major routes. More restrictive limits apply on most other roads.
14. Lower limit applies when total length of vehicle is less than 44 ft.



12