EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT

XV

COUNCIL OF MINISTERS

RESOLUTIONS

LISBON, 29/30th JUNE, 1965
PARIS, 26th NOVEMBER, 1965

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RAIL TRANSPORT PROBLEMS

Resolution n° 14 concerning
THE STANDARDIZATION OF RAILWAY ROLLING STOCK

THE COUNCIL OF MINISTERS OF TRANSPORT,

Meeting in Lisbon on 29th and 30th June, 1965 :

Having regard to the Reports by the Committee of Deputies on the Standardization of Railway Rolling Stock [CM(64)7(final) : Wagons][1] and [CM(65)3 : Locomotives; below];

Noting with satisfaction the progress made with the standardization of wagons during the period 1957/1963;

Noting further the present situation with regard to locomotives;

Referring to its earlier Resolutions;

REAFFIRMS the importance it attaches to further standardization of rolling stock at international level;

INSTRUCTS the Committee of Deputies, in co-operation with the UIC, to keep under review :

- in respect of wagons : the progress made towards further standardization and, especially, unification of modern types and their future inclusion in the EUROP pool;
- in respect of locomotives : developments in regard to standardization,

and to present a further general report on the results achieved between 1957 and 1966 for wagons and between 1964 and 1966 for locomotives.

1. See volume XIV of the ECMT Resolutions (1964).

REPORT BY THE COMMITTEE OF DEPUTIES ON THE STANDARDIZATION OF RAILWAY ROLLING STOCK (LOCOMOTIVES)

[CM(65)3]

I. INTRODUCTION

1. The report CM(64)7(Final) of 23rd July, 1964, submitted at the meeting of the Council of Ministers in Bordeaux in May 1964, dealt only with the standardization of goods wagons, the report on the standardization of locomotives being postponed for a year. The difficulty was that on lst January, 1964, the Office for Research and Experiments (ORE) of the UIC introduced a new classification for diesel locomotives taking into account technical advances and future prospects. Rather than prepare a report based on the old classification, it seemed better to wait until the difficulties of changing over from one system to another were overcome. The report could then include the study of other problems concerning diesel and electric locomotives raised at the meeting of the Council of Ministers in November 1963.

22. The decision to divide the report on the standardization of railway rolling stock into two parts, one dealing with goods wagons and the other with locomotives, gives rise to no difficulties as the respective problems are very different. The building of locomotives generally concerns only the railways and the manufacturers, whereas in the case of goods wagons users requirements are among the primary considerations.

3. While only a very limited proportion of the total number of locomotives in the various countries cross the frontier and thus have to be adapted to conform with specifications in the neighbouring country, almost all goods wagons with the Technical Unity clearance gauge can be moved freely about Europe, as users ask only to be supplied with wagons having the same dimensions and the same maximum load capacity irrespective of whether they are French, German or Italian.

4. The report consists essentially of a chapter on diesel locomotives, followed by a chapter on electric locomotives. A short chapter on steam locomotives, indicating the date on which steam traction is likely to be abandoned, completes the picture as regards locomotives. A summary is given in Chapter V and a few conclusions in the final chapter.

II. DIESEL LOCOMOTIVES

A. Definition of standard locomotives

1. Under the new rules a type of diesel locomotive is stated to be *ORE standard* when it meets the conditions specified in paragraph 2 below and when :

a) at least two railway administrations members of the ORE have adopted the type in question, and are each having a series built, the total number of locomotives built amounting to at least one hundred (in the present report fulfilment of this condition is not taken into account);

b) it can be built in several countries;

c) it can be equipped with various types of diesel motor.

2. A standard locomotive must :

a) Come under one of the sub-classes specified according to the needs of the administrations (Annex 1);

b) be officially approved by the ORE under this sub-class, following a clearly-defined procedure, and be equipped with a diesel engine officially approved by the ORE;

c) conform to the unified specifications for the building of a locomotive and its traction gear, agreed upon by the railway administrations;

d) differ from existing standard types in the same sub-class in such essential features as single or double cab structure, type of power transmission, whether or not there is a train heating system, etc., or by technical innovations in at least one of these characteristics, and

e) it must be possible to build it in several countries through co-operation between manufacturers and granting of licences.

3. Standardization procedure is as follows : The ORE is informed :

a) either by the builder of an approved locomotive ordered by several railway administrations;

b) or by one of these administrations.

4. With one exception, which has not been taken into account because it no longer matches up to future needs, the classes defined in 1957 have been divided among the new sub-classes; this exception however and the far-reaching changes resulting from the new classification makes any comparison with the figures in Report CM(61)5 concerning the proportion of standard type locomotives in the total number of locomotives (57 per cent at 31/12/1960) incomplete and of little significance.

B. NUMBERS OF LOCOMOTIVES AND SOME TECHNICAL CHARACTERISTICS[1]

1. At 31st December, 1964, diesel locomotives in all power categories (Annex 2a) totalled 14,265 (7,462), of which 9,994, or 70 per cent, belonged to the German, French and British railways. Leaving aside locomotives of 350 h.p. or below (Annex 2b), there were 8,867 (4,006) locomotives, 6,337 of which, or 71 per cent, belonged to the same three railway networks.

2. Of the total number of locomotives, 5,398 (3,456) or 38 (46) per cent fall within the category 350 h.p. or below; 5,083 (2,813) or 36 (38) per cent in the 351 to 1,000 h.p. category; 2,988 (1,043) or 21 (14) per cent in the 1,001 to 2,000 h.p. category and 796 (150) or 5 (2) per cent in the more than 2,001 h.p. category [Annex 3(a), columns 2 - 5]. British Railways own 3,784 or 55 per cent of all locomotives in categories exceeding 1,000 and in particular 2,000 h.p. This is mainly because in the United Kingdom diesel locomotives are mostly used for heavy main line traction, whereas in other countries electric locomotives are preferred.

1. The figures between brackets refer to the six EEC countries.

3. With regard to the transmission system, 1,597 (760) or 11 (10) per cent of the locomotives have mechanical drive 5,416 (3,961) or 38 (54) per cent have hydraulic or hydromechanical drive, and 7,225 (2,714) or 51 (36) per cent electric drive [Annex 3(b)].

4. Annex 3(b) shows that apart from two Swedish locomotives mechanical drive is confined to the category 350 h.p. or below, whereas locomotives with hydraulic drive (including hydromechanical drive) and with electric drive are found in all power categories. The Deutsche Bundesbahn strongly favours hydraulic drive; out of a total of 3,199 locomotives only two, taken over from another network, have electric drive; all the locomotives belonging to the Swiss and the Netherlands railways, on the other hand, have electric drive. All the other networks have locomotives with either hydraulic or electric drive, hydraulic drive being more common among locomotives of up to 1,000 h.p. than among those of over 1,000 h.p., as it is more particularly suited to shunting operations.

5. For purposes of numerical comparison, it may be noted that in the United States, where diesel traction plays a predominant part the railways have more than 28,000 diesel locomotives in service. For a long time most locomotives were between 1,500 and 2,400 h.p. The « second generation » locomotives will include diesel locomotives of between 4,000 and 5,500 h.p. Almost all these locomotives are of the diesel electric type; there are only 21 4,000 h.p. locomotives, imported from Europe, and a few locomotives with hydraulic drive built in the United States.

C. DEGREE OF STANDARDIZATION[1]

1. The ORE rules on standardization and homologation described in Chapter II A are extremely strict and the total number of ORE standard types, types homologated by the ORE or in course of homologation by it is less than fifteen, split up among the various sub-classes. The number of locomotives in service corresponding to these ORE types is not more than 2,700 in all.

On the other hand, however, the ORE classes are now so widely adopted that more than 3,500 of the locomotives in service have the characteristics of the types corresponding to

1. The figures between brackets refer to the six EEC countries.

these classes including those not yet homologated by the ORE.

2. Accounting for the above remarks, 25 (42) per cent of the total number of locomotives in all power categories and all countries are of the standard type as defined in Chapter II A [Annex 2(a) and 2(b), columns 6 to 9]. However, as only locomotives of at least 350 h.p. are standardized, and as, moreover, Bristish Railways could not, in view of their narrower gauge, consider acquiring locomotives of the standard type under the ORE classification, it seems logical to include in the comparison only locomotives of more than 350 h.p., of all countries except the United Kingdom; on this basis the proportion of standard type locomotives amounts to 65 (78) per cent.

3. The railway system with the greatest proportion of standard type diesel locomotives is the Deutsche Bundesbahn — 98 per cent —, which has limited itself to a small number of types, which it builds in large series; the French and Luxembourg railways come next with 78 per cent, the Belgian railways with 73 per cent, Turkey with 70 per cent, Portugal with 64 per cent, and Yugoslavia, Sweden, Norway, Italy, Greece, Denmark and Spain with 53, 45, 39, 29, 26, 22 and 12 per cent respectively. The Netherlands, Austrian, Irish and Swiss railways have no locomotives of standard type. [Annex 2(b), column 9.]

4. The breakdown of standard type diesel locomotives into sub-classes is given in the following table and in Annexes 4(a), 4(b) and 4(c).

TABLE 1. BREAKDOWN OF STANDARD TYPE DIESEL LOCOMOTIVES

SUB-CLASS	POWER CATEGORY : NOT LESS THAN :	NUMBER OF DRIVING AXLES	MAXIMUM SPEED : NOT LESS THAN :	NUMBER OF LOCOMOTIVES	NUMBER OF ADMINIS-TRATIONS
1	2	3	4	5	6
c_1....	350 hp	3	45 km/h	69 (—)	2
c_2....	500 hp	3	60 km/h	1,146 (1,072)	5
d_1....	700 hp	4	60 km/h	845 (733)	7
d_2....	1,000 hp	4	80 km/h	11 (11)	1
f_1....	1,000 hp	4	90 km/h	— (—)	—
f_2....	1,000 hp	4	100 km/h	595 (595)	1
f_3....	1,400 hp	4	110 km/h	297 (246)	3
f_4....	1,400 hp	4	120 km/h	201 (133)	5
f_5....	2,000 hp	4	130 km/h	109 (109)	1
g_1....	1,700 hp	6	120 km/h	19 (14)	2
g_2....	1,700 hp	6	120 km/h	96 (71)	6
g_3....	2,000 hp	6	130 km/h	135 (135)	1
g_4....	3,000 hp	6	130 km/h	— (—)	—
Total number...........				3,523 (3,119)	

Shunting and transfer locomotives belong to classes c and d, main line locomotives to classes f and g. No locomotives in sub-classes f_1 and g_4 have so far been acquired and very few in sub-classes c_1, d_2 and g_1. Locomotives in sub-class d_1 have been bought by seven administrations, those in sub-class g_2 by six administrations, and those in sub-classes c_2 and f_4 by five administrations.

5. With regard to utilisation, it may be noted that so far 2,071 (1,816) or 59 (58) per cent shunting locomotives, classes c and d, have been acquired, and 1,452 (1,303) or 41 (42) per cent main line locomotives (classes f and g).

1,230 (1,083) shunting locomotives or 60 (60) per cent have hydraulic drive, 841 (733) or 40 (40) per cent have electric drive; for main line locomotives the respective figures are 721 (718) or 50 (55) per cent and 731 (585) or 50 (45) per cent.

6. It would be a mistake to conclude from the figures given in paragraph 3 that only the thirteen networks mentioned first have recognised the advantages of standardization and acted accordingly. There are, in fact, networks where dieselisation was already far advanced, or even completed — as in the case of the Netherlands railways — before the ORE standardization plan was put into operation, and which have only a small number of types in service, each type forming a large series of locomotives. For these networks standardization is at national level, and offers them the same advantages as standardization under the ORE classification. In some cases the choice of the type of locomotive to be built will depend on the capacity of national industry.

7. It seems that after the initial period of dieselisation each network tends of its own accord to benefit from standardization by limiting the number of types of locomotive. Standardization on a European scale will be difficult to achieve, as the views of manufacturers even within a single country, and even more so in different countries, differ considerably on technical matters such as the advantages and disadvantages of slow or fastrunning motors, transmission systems, etc. The work of ORE, in cooperation with industry, has, however, helped to speed up the process of standardization, which has been further encouraged by Eurofima's policy of financing almost exclusively diesel locomotives of standard type.

Table 2. LOCOMOTIVES OF STANDARD TYPE FINANCED BY EUROFIMA

COUNTRY	NUMBER	SUB-CLASS
Belgium, Germany, Greece, Turkey	205	c_2
France, Italy, Portugal, Spain, Yugoslavia	275	d_1
Germany	68	f_2
France	69	f_3
Belgium	30	g_2
Total	647	
In service at 31-12-64	559	

There are, in addition, eight non-standard locomotives belonging to the Spanish railways.

Eurofima has thus financed 16 per cent of the standard-type diesel locomotives available at 31st December, 1964, a far more impressive result than that achieved for goods wagons.

7. Trends with regard to numbers, horsepower, transmission and heating systems of trains with diesel traction are shown in Annex A.

III. ELECTRIC LOCOMOTIVES[1]

A. Numbers and some technical characteristics

1. At 31st December, 1964, electric locomotives using all types of current and in all power categories totalled 8,818 (5,887) [Annexes 5(a) and 5(b)], including

30 or 0.3 (—) per cent locomotives on direct current 750v (third rail)
1,558 or 18 (24) per cent locomotives on direct current 1,500v
2,056 or 24 (30) per cent locomotives on direct current 3,000v
4,037 or 46 (30) per cent locomotives on alternating current 16 2/3 c/s
11 or 0.1 (—) per cent locomotives on alternating current 25 c/s
826 or 9 (11) per cent locomotives on alternating current 50 c/s
300 or 3 (5) per cent locomotives on three-phase current.

French railways have a large fleet of electric locomotives (1,966), as have the Italian (1,862) and German railways (1,746). Next, some way behind, come the Swedish and Swiss railways, with respectively 877 and 838 electric locomotives. Among the remaining networks only Austria (422), Spain (364), the United Kingdom (195), Belgium (186) Norway (154) ant the Netherlands (107) have more than 100 electric locomotives.

2. Of the total number of locomotives, 157 (39) or 2 (1) per cent fall within the 350 h.p. category or below; 468 (95) or 5 (2) per cent are between 351 and 1,000 h.p.; 1,091 (659) or 12 (11) per cent between 1,001 and 2,000 h.p.; 3,304 (2,112) or 38 (36) per cent between 2,001 and 3,000 h.p.; 1,685 (1,290) or 19 (22) per cent between 3,001 and 4,000 h.p.; and 2,113 (1,703) locomotives or 24 (28) per cent exceed 4,000 h.p. Whereas for diesel locomotives the proportion above 2,000 h.p. was 5 (2) per cent, for electric locomotives it is 81 (86) per cent. The highest rated output of a locomotive is above 7,000 h.p.

3. Locomotives on direct current and those running on AC 16 2/3 or 25 cycles, or on three-phase current, are built on the same lines as far as the electrical system is concerned. On two locomotives operating 16 2/3-cycle AC and on 651 locomotives (almost 80 per cent) operating on 50-cycle AC, the AC supply is transformed into DC using rectifiers of various types. Counting locomotives of more than, 3,000 h.p. (50-cycle AC supply) the percentage equipped with rectifiers is 94 per cent. The two locomotives operating on 16 2/3-cycle AC are equipped with rectifiers only so as to permit the use of a simplified control system at a later stage.

4. In addition to the locomotives already mentioned, there are 83 (59) locomotives which can operate on two, three or even four types of current, either because a country uses two types of current or because these locomotives are used for international traffic on the railways of several countries each with its own system.

B. Standardization

1. The ORE has not undertaken, and for the time being at least, does not intend to undertake any studies concerning standardization of electric locomotives. The only recommendations made in this field result from research on the behaviour

1. The figures between brackets refer to the six EEC countries.

of current collectors and overhead equipment at high speeds, and on the construction of current collectors.

2. A UIC Commission has, however, laid down rules for electric locomotives for international services, similar to those applying to diesel locomotives. These rules relate to the layout of drivers' cabs, control gear, the disposition of windows, and fire-fighting equipment. This Commission has also adopted a technical specification relating to rubber-insulated electric cables, and has submitted draft rules to the International Electrotechnical Commission to cover resistors in the power circuit.

3. Some of the trends concerning numbers of locomotives, power ratings and transmission of current from feed wire to driving wheels are described in annex B.

IV. STEAM LOCOMOTIVES

1. At 31st December, 1964 the number of steam locomotives totalled 21,746 (9,794) (Annex 6), for the most part those still in service on the German (5,138), British (4,982), French (3,250) Spanish (2,890) and Yugoslav railways (1,584).

2. Three countries (Ireland, Netherlands, Luxembourg) no longer use steam locomotives, two others (Denmark and Sweden), possess only a small number, not in regular service, four countries (Belgium, the United Kingdom, Greece and Switzerland) intend to take the last steam locomotives out of service by the end of 1970 : seven others by the end of 1980, and two other countries by a date not yet known.

V. SUMMARY

The report gives total figures for locomotives at 31st December, 1964 and the way these figures are made up, indicates the progress made towards standardization, particularly in connection with diesel locomotives, and points to some general trends :

a) Diesel locomotives

1. These totalled 14,265, including 5,398 or 38 per cent of up to 350 h.p., 5,083 or 36 per cent of from 351 to 1,000 h.p., 2,988 or 21 per cent of from 1,001 to 2,000 h.p. and 796 or 5 per cent of more than 2,000 h.p.

2. Of the total number, 1,597 or 11 per cent have machanical drive, 5,443 or 38 per cent hydraulic drive and 7,225 or 51 per cent electric drive.

3. 3,523 or 25 per cent of all locomotives, but 65 per cent of locomotives of more than 351 h.p. (excluding those of the United Kingdom) were of ORE standard type, 2,071 or 59 per cent of these being used for shunting operations and 1,452 or 41 per cent for main line services.

4. Eurofima financed the purchase of 655 locomotives including 647 of the ORE standard type, 559 of which were in service at 31st December, 1964.

5. Out of the total number of locomotives of more than 350 h.p. in Member countries, the proportion of locomotives of standard type varies between 0 and 98 per cent; in the case of 7 administrations it exceeds 50 per cent. Other administrations, on the other hand, although they have not acquired locomotives of ORE standard type, have built up a uniform fleet of locomotives conforming to national standards, and thus enjoy the same kind of advantages as those administrations which have bought ORE standard locomotives.

6. The number of diesel locomotives will increase further until steam traction is finally abandoned in all countries. An output of 2,000 h.p. is generally sufficient; only two administrations which also use diesel traction for heavy long-distance hauls need more powerful locomotives.

7. The United States has more than 28,000 diesel locomotives of up to 5,500 h.p., all are of the diesel-electric type, apart from 21 imported from Europe and a few, built in the United States, with hydraulic transmission.

8. As regards transmission there is no evidence of any trend towards uniformity. Two administrations use hydraulic transmission almost exclusively, two others use only electric transmission, while a certain number of administrations mainly prefer hydraulic drive for locomotives used in shunting operations, and electric drive for those used on main line services.

9. One administration uses electricity for heating coaches hauled by diesel locomotives, while all the others use steam from a boiler mounted on the locomotive or from a heating van; five others are working on an electrical system of heating using generating sets built into the locomotives; they consider that as steam

locomotives are gradually taken out of service passenger trains will be heated by electricity alone, so that it will no longer be necessary to equip coaches with heating systems using both steam and electricity.

b) ELECTRIC LOCOMOTIVES

1. The number of electric locomotives totalled 8,818 including 157 or 2 per cent of up to 350 h.p., 468 or 5 per cent of from 351 to 1,000 h.p., 1,091 or 12 per cent of from 1,001 to 2,000 h.p., 3,304 or 38 per cent of from 2,001 to 3,000 h.p., 1,685 or 19 per cent of from 3,001 to 4,000 h.p., and 2,113 or 24 per cent of more than 4,000 h.p.

2. Of the total number of locomotives 3,644 or 41 per cent use direct current (30 operating on 750v DC, 1,558 on 1,500v and 2,056 on 3,000v); 4,874 or 56 per cent use single-phase alternating current (4,037 operating on 16 2/3-cycle AC, 11 on 25-cycle AC and 826 on 50-cycle AC); 300 or 3 per cent use three-phase current.

3. To these locomotives must be added 89 wich are adaptable for two, three or even four types of current.

4. Whereas locomotives of 2,000 h.p. and over represent only 5 per cent of all diesel locomotives, they represent 81 per cent of all electric locomotives. Some locomotives reach or have a power rating of 7,000 h.p. or more. There is no reason why power should not be increased to the maximum corresponding to the permissible axle load. The administrations which are going in for more powerful locomotives are mainly those which were among the first to electrify their networks and now have to consider replacing their older units.

5. In the case of locomotives operating on direct current or on alternating current at 16 2/3 cycles, electrical equipment has not been modified to any great extent for a number of years; in the case of locomotives operating on alternating current at 50 cycles, standardized production of which began only after the second world war — although some had previously been produced on an experimental basis — several systems were at first tried out : locomotives with convertors, locomotives with motors operating on 50-cycle AC supply and others using rectifiers; this last type accounted for 80 per cent of all locomotives operating on 50-cycle AC in all horse-power categories and 94 per cent of all locomotives of more than 3,000 h.p.

c) STEAM LOCOMOTIVES

1. Steam locomotives totalled 21,746, 5,138 of which belonged to the German railways and 4,982 and 3,250 to the British and French railways respectively.

2. Three Member countries have scrapped their last remaining steam locomotives and two others use them only for special purposes; half the administrations, however, will not be able to scrap their last steam locomotives until somewhere between 1970 and 1980.

VI. CONCLUSIONS

1. At 31st December, 1964 the number of locomotives in all the Member countries totalled 44,829 (23,143) including 14,265 (7,462) or 32 (32) per cent diesel engines, 8,818 (5,887) or 20 (26) per cent electric and 21,746 (9,794) or 48 (42) per cent steam. For a number of years to come railway administrations and industry will be faced with a heavy demand for diesel or electric engines to replace steam locomotives or « first generation » diesel or electric locomotives in those countries which were the first to carry out electrification and dieselisation.

2. International standardization on any sizeable scale has so far been confined to diesel locomotives, and to thirteen Member countries. At the same time, as far as diesel and electric locomotives are concerned considerable efforts have been made to ensure that only a few types are acquired, in fairly large series, so that advantages may be gained, at least at national level, from the reduction in the number of types and from standardization; it will also be necessary in some cases to take into account the capacity of the national industry.

Annex 1

Classes of standard locomotives

Classes of locomotives								
Class	Sub-class	Weight: Minimum static adhesive weight	Weight: Maximum weight per axle			Rated output not less than:	Maximum speed	Continuous tractive effort (at the wheel rim) not less than:
		T	T	T	T	(H. P.)	(km/h)	(kg)
1	2	3	4	5	6	7	8	9
***a)* Shunting locomotives with one driver's cab**								
			C	BB	CC		Recommended maximum speed	
c 3 driving axles	c_1	45	16	×××××××	×××××××	350	45	6,300
	c_2	50	18.4	×××××××	×××××××	500	60	8,500
d 4 driving axles	d_1	65	×××××××	18	×××××××	700	60	11,000
	d_2	75	×××××××	21	×××××××	1,000	80	12,500
c 6 driving axles			×××××××	×××××××				
***b)* Main line locomotives with one or two driver's cabs**								
			A1A A1A	BB	CC		Maximum speed not less than:	
f 4 driving axles	f_1	55	×××××××	16	×××××××	1,000	90	8,500
	f_2	60	×××××××	17	×××××××	1,000	100	10,500
	f_3	65	×××××××	18	×××××××	1,400	110	11,000
	f_4	70	18,4	×××××××	×××××××	1,400	120	11,500
			×××××××	20				12,500
	f_5	75	×××××××	21	×××××××	2,000	130	13,000
g 6 driving axles	g_1	90	×××××××	×××××××	17	1,700	120	13,500
	g_2	100	×××××××	×××××××	18.4	1,700	120	16,500
	g_3	105	×××××××	×××××××	19.3	2,000	130	17,500
	g_4	110	×××××××	×××××××	20.2	3,000	130	18,500

DIESEL LOCOMOTIVES

Numbers at 31st December, 1964, and percentage of standardization

Country	Number of locomotives (all power categories)							
	Total	Transmission			Standard type[1]			
		Mechanical	Hydraulic	Electric	Total	Transmission: Hydraulic	Transmission: Electric	%
1	2	3	4	5	6	7	8	9
Belgium	670	—	307	363	427	132	295	64
France	2,333	401	392	1,540	897	—	897	38
Germany	3,199	131	3,066	— 2	1,669	1,669	—	52
Italy	626	227	209	190	81	—	81	13
Luxembourg	66	1	14	51	45	—	45	68
Netherlands	568	—	—	568	—	—	—	0
EEC countries	7,462	760	3,988	2,714	3,119	1,801	1,318	42
Austria	231	—	193	38	—	—	—	0
Denmark	306	89	103	114	48	—	48	16
Greece	27	—	7	20	7	7	—	26
Ireland	209	—	44	165	—	—	—	0
Norway	197	30	141	26	25	—	25	13
Portugal	90	6	—	84	42	—	42	47
Spain	304	48	30	226	10	—	10	3
Sweden	483	27	398	58	104	51	53	22
Switzerland	204	127	—	77	—	—	—	0
Turkey	91	—	62	29	64	59	5	70
United Kingdom	4,462	510	447	3,505	—	—	—	—
Yugoslavia	199	—	30	169	104	33	71	53
Other countries	6,803	837	1,455	4,511	404	150	254	6
All countries	14,265	1,597	5,443	7,225	3,523	1,951	1,572	25

1. The figures in columns 6 to 9 do not include the United Kingdom.

Annex 2 b

DIESEL LOCOMOTIVES

NUMBERS AT 31ST DECEMBER, 1964, AND PERCENTAGE OF STANDARDIZATION

COUNTRY	NUMBER OF LOCOMOTIVES (ALL POWER CATEGORIES)							
	TOTAL	TRANSMISSION			STANDARD TYPE[1]			
		MECHANICAL	HYDRAULIC	ELECTRIC	TOTAL	TRANSMISSION		%
						HYDRAULIC	ELECTRIC	
1	2	3	4	5	6	7	8	9
Belgium	582	—	221	361	427	132	295	73
France	1,161	—	3	1,158	897	—	897	78
Germany	1,696	—	1,694	2	1,669	1,669	—	98
Italy	228	—	44	184	81	—	81	36
Luxembourg	58	—	7	51	45	—	45	78
Netherlands	281	—	—	281	—	—	—	0
EEC countries	4,006	—	1,969	2,037	3,119	1,801	1,318	78
Austria	130	—	92	38	—	—	—	0
Denmark	215	—	103	112	48	—	48	22
Greece	27	—	7	20	7	7	—	26
Ireland	199	—	34	165	—	—	—	0
Norway	64	—	39	25	25	—	25	39
Portugal	66	—	—	66	42	—	42	64
Spain	84	—	30	54	10	—	10	12
Sweden	229	2	169	58	104	51	53	45
Switzerland	77	—	—	77	—	—	—	0
Turkey	91	—	62	29	64	59	5	70
United Kingdom	3,480	—	333	3,147	—	—	—	—
Yugoslavia	199	—	30	169	104	33	71	53
Other countries	4,861	2	899	3,960	404	150	254	29
All countries	8,867	2	2,868	5,997	3,523	1,951	1,572	65

1. The figures in columns 6 to 9 do not include the United Kingdom.

DIESEL LOCOMOTIVES

TOTAL AT 31ST DECEMBER, 1964, SUBDIVIDED ACCORDING TO HORSE-POWER *(Annex 3 a)* AND TRANSMISSION *(Annex 3 b)*

COUNTRY	TOTAL			
	UP TO 350 H. P.	FROM 351 TO 1,000 H. P.	FROM 1,001 TO 2,000 H. P.	OVER 2,000 H. P.
1	2	3	4	5
Belgium	88	221	268	93
France	1,172	837	294	30
Germany	1,503	1,340	331	25
Italy	398	101	125	2
Luxembourg	8	34	24	—
Netherlands	287	280	1	—
EEC countries	3,456	2,813	1,043	150
Austria	101	108	22	—
Denmark	91	120	95	—
Greece	—	17	10	—
Ireland	10	139	60	—
Norway	133	39	25	—
Portugal	24	37	29	—
Spain	220	33	41	10
Sweden	254	171	58	—
Switzerland	127	63	14	—
Turkey	—	59	5	27
United Kingdom	982	1,383	1,488	609
Yugoslavia	—	101	98	—
Other countries	1,942	2,270	1,945	646
All countries	5,398	5,083	2,988	796

Annex 3 b

DIESEL LOCOMOTIVES

TOTAL AT 31ST DECEMBER, 1964, SUBDIVIDED ACCORDING TO HORSE-POWER *(Annex 3 a)* AND TRANSMISSION *(Annex 3 b)*

COUNTRY	MECHANICAL TRANSMISSION		HYDRAULIC TRANSMISSION				ELECTRIC TRANSMISSION			
	UP TO 350 H. P.	FROM 1,001 TO 2,000 H. P.	UP TO 350 H. P.	FROM 351 TO 1,000 H. P.	FROM 1,001 TO 2,000 H. P.	OVER 2,000 H. P.	UP TO 350 H. P.	FROM 351 TO 1,000 H. P.	FROM 1,001 TO 2,000 H. P.	OVER 2,000 H. P.
1	2	3	4	5	6	7	8	9	10	11
Belgium	—	—	86	215	6	—	2	6	262	93
France	401	—	389	1	—	2	382	836	294	28
Germany	131	—	1,372	1,340	329	25	—	—	2	—
Italy	227	—	195	23	20	1	6	78	105	1
Luxembourg	1	—	7	7	—	—	—	27	24	—
Netherlands	—	—	—	—	—	—	287	280	1	—
EEC countries	760	—	2,019	1,586	355	28	677	1,227	688	122
Austria	—	—	101	88	4	—	—	20	18	—
Denmark	89	—	—	103	—	—	2	17	95	—
Greece	—	—	—	7	—	—	—	10	10	—
Ireland	—	—	10	34	—	—	—	105	60	—
Norway	30	—	102	39	—	—	1	—	25	—
Portugal	6	—	—	—	—	—	18	37	29	—
Spain	48	—	—	20	—	10	172	13	41	—
Sweden	25	2	229	169	—	—	—	2	56	—
Switzerland	127	—	—	—	—	—	—	63	14	—
Turkey	—	—	—	59	—	3	—	—	5	24
United Kingdom	510	—	114	30	161	142	358	1,353	1,327	467
Yugoslavia	—	—	—	30	—	—	—	71	98	—
Other countries	835	2	526	609	165	155	551	1,691	1,778	491
All countries	1,595	2	2,545	2,195	520	183	1,228	2,918	2,466	613
Total	1,597 = 11 %		5,443 = 38 %				7,225 = 51 %			

STANDARD TYPE DIESEL LOCOMOTIVES

NUMBERS OF LOCOMOTIVES AT 31ST DECEMBER, 1964, SUBDIVIDED INTO CLASSES AND SUB-CLASSES

COUNTRY	ALL LOCOMOTIVES												
	c		d		f					g			
	c_1	c_2	d_1	d_2	f_1	f_2	f_3	f_4	f_5	g_1	g_2	g_3	g_4
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Belgium	—	132	—	—	—	—	—	120	—	—	40	135	—
France	—	—	683	—	—	—	194	—	—	—	20	—	—
Germany	—	940	—	11	—	595	—	13	109	—	1	—	—
Italy	—	—	29	—	—	—	52	—	—	—	—	—	—
Luxembourg	—	—	21	—	—	—	—	—	—	14	10	—	—
Netherlands	—	—	—	—	—	—	—	—	—	—	—	—	—
EEC countries	—	1,072	733	11	—	595	246	133	109	14	71	135	—
Austria	—	—	—	—	—	—	—	—	—	—	—	—	—
Denmark	—	—	—	—	—	—	—	48	—	—	—	—	—
Greece	—	7	—	—	—	—	—	—	—	—	—	—	—
Ireland	—	—	—	—	—	—	—	—	—	—	—	—	—
Norway	—	—	—	—	—	—	—	3	—	—	22	—	—
Portugal	—	—	25	—	—	—	—	17	—	—	—	—	—
Spain	—	—	10	—	—	—	—	—	—	—	—	—	—
Sweden	—	53	—	—	—	—	51	—	—	—	—	—	—
Switzerland	—	—	—	—	—	—	—	—	—	—	—	—	—
Turkey	39	14	6	—	—	—	—	—	—	5	—	—	—
Yugoslavia	30	—	71	—	—	—	—	—	—	—	3	—	—
Other countries[1]	69	74	112	—	—	—	51	68	—	5	25	—	—
All countries[1]	69	1,146	845	11	—	595	297	201	109	19	96	135	—

1. Not including the United Kingdom.

Annex 4 b

STANDARD TYPE DIESEL LOCOMOTIVES

NUMBERS OF LOCOMOTIVES AT 31ST DECEMBER, 1964, SUBDIVIDED INTO CLASSES AND SUB-CLASSES

COUNTRY	LOCOMOTIVES WITH HYDRAULIC AND HYDROMECHANICAL TRANSMISSION												
	c		d		f					g			
	c_1	c_2	d_1	d_2	f_1	f_2	f_3	f_4	f_5	g_1	g_2	g_3	g_4
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Belgium	—	132	—	—	—	—	—	—	—	—	—	—	—
France	—	—	—	—	—	—	—	—	—	—	—	—	—
Germany	—	940	—	11	—	595	—	13	109	—	1	—	—
Italy	—	—	—	—	—	—	—	—	—	—	—	—	—
Luxembourg	—	—	—	—	—	—	—	—	—	—	—	—	—
Netherlands	—	—	—	—	—	—	—	—	—	—	—	—	—
EEC countries	—	1072	—	11	—	595	—	13	109	—	1	—	—
Austria	—	—	—	—	—	—	—	—	—	—	—	—	—
Denmark	—	—	—	—	—	—	—	—	—	—	—	—	—
Greece	—	7	—	—	—	—	—	—	—	—	—	—	—
Ireland	—	—	—	—	—	—	—	—	—	—	—	—	—
Norway	—	—	—	—	—	—	—	—	—	—	—	—	—
Portugal	—	—	—	—	—	—	—	—	—	—	—	—	—
Spain	—	—	—	—	—	—	—	—	—	—	—	—	—
Sweden	—	51	—	—	—	—	—	—	—	—	—	—	—
Switzerland	—	—	—	—	—	—	—	—	—	—	—	—	—
Turkey	39	14	6	—	—	—	—	—	—	—	—	—	—
Yugoslavia	30	—	—	—	—	—	—	—	—	—	3	—	—
Other countries[1]	69	72	6	—	—	—	—	—	—	—	3	—	—
All countries[1]	69	1144	6	11	—	595	—	13	109	—	4	—	—

1. Not including the United Kingdom.

STANDARD TYPE DIESEL LOCOMOTIVES

NUMBERS OF LOCOMOTIVES AT 31ST DECEMBER, 1964, SUBDIVIDED INTO CLASSES AND SUB-CLASSES

COUNTRY	LOCOMOTIVES WITH ELECTRIC TRANSMISSION												
	c		d		f					g			
	c_1	c_2	d_1	d_2	f_1	f_2	f_3	f_4	f_5	g_1	g_2	g_3	g_4
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Belgium	—	—	—	—	—	—	—	120	—	—	40	135	—
France	—	—	683	—	—	—	194	—	—	—	20	—	—
Germany	—	—	—	—	—	—	—	—	—	—	—	—	—
Italy	—	—	29	—	—	—	52	—	—	—	—	—	—
Luxembourg	—	—	21	—	—	—	—	—	—	14	10	—	—
Netherlands	—	—	—	—	—	—	—	—	—	—	—	—	—
EEC countries	—	—	733	—	—	—	246	120	—	14	70	135	—
Austria	—	—	—	—	—	—	—	—	—	—	—	—	—
Denmark	—	—	—	—	—	—	—	48	—	—	—	—	—
Greece	—	—	—	—	—	—	—	—	—	—	—	—	—
Ireland	—	—	—	—	—	—	—	—	—	—	—	—	—
Norway	—	—	—	—	—	—	—	3	—	—	22	—	—
Portugal	—	—	25	—	—	—	—	17	—	—	—	—	—
Spain	—	—	10	—	—	—	—	—	—	—	—	—	—
Sweden	—	2	—	—	—	—	51	—	—	—	—	—	—
Switzerland	—	—	—	—	—	—	—	—	—	—	—	—	—
Turkey	—	—	—	—	—	—	—	—	—	5	—	—	—
Yugoslavia	—	—	71	—	—	—	—	—	—	—	—	—	—
Other countries[1]	—	2	106	—	—	—	51	68	—	5	22		—
All countries[1]	—	2	839	—	—	—	297	188	—	19	92	135	—

1. Not including the United Kingdom.

ELECTRIC LOCOMOTIVES

NUMBERS AT 31ST DECEMBER, 1964

Direct current

Country	Total	Up to 350 h.p.	Number of locomotives of 351 to 1,000 h.p.	1,001 to 2,000 h.p.	2,001 to 3,000 h.p.	3,001 to 4,000 h.p.	over 4,000 h.p.
1	2	3	4	5	6	7	8
a) DIRECT CURRENT 750 V (3RD RAIL)							
United Kingdom	30	—	—	—	6[1]	24	—
b) DIRECT CURRENT 1,500 V							
France	1,288	12	63	462	120	339	292
Netherlands	107	—	—	—	—	83	24
Countries of EEC	1,395	12	63	462	120	422	316
Spain	98	—	—	49	36	13	—
United Kingdom	65	—	—	—	58	7	—
Other countries	163	—	—	49	94	20	—
All countries	1,558	12	63	511	214	442	316
c) DIRECT CURRENT 3,000 V							
Belgium	186	—	—	—	181	5	—
Italy	1,562	20	20	157	891	240	234
EEC countries	1,748	20	20	157	1,072	245	234
Spain	255	—	—	12	243	—	—
Yugoslavia	53	—	—	—	16	37	—
Other countries	308	—	—	12	259	37	—
All countries	2,056	20	20	169	1,331	282	234

1. Electric locomotives with diesel engine.

Annex 5 b

ELECTRIC LOCOMOTIVES

NUMBERS AT 31 ST DECEMBER, 1964

Alternating and three-phase current

Country	Total	Number of locomotives of					
		up to 350 h.p.	351 to 1,000 h.p.	1,001 to 2,000 h.p.	2,001 to 3,000 h.p.	3,001 to 4,000 h.p.	more than 4,000 h.p.
1	2	3	4	5	6	7	8
a) ALTERNATING CURRENT 16 2/3 C/S							
Germany	1,746	—	12	36	211	415	1,072
EEC countries	1,746	—	12	36	211	415	1,072
Austria	422	—	55	77	51	101	138
Norway	154	—	43	22	65	24	—
Sweden	877	3	157	193	399	50	75 (2)
Switzerland	838	115	118	79	290	124	112
Other countries	2,291	118	373	371	805	299	325 (2)
All countries	4,037	118	385	407	1,016	714	1,397 (2)
b) ALTERNATING CURRENT 25 C/S							
Spain	11	7	—	4	—	—	—
c) ALTERNATING CURRENT 50 C/S							
France	678 (503)	—	—	—	449 (294)	148 (20)	81 (61)
Luxembourg	20 (20)	—	—	—	—	20 (20)	—
EEC countries	698 (523)	—	—	—	449 (294)	168 (168)	81 (61)
Portugal	25 (25)	—	—	—	25 (25)	—	—
Turkey	3 (3)	—	—	—	3 (3)	—	—
United Kingdom	100 (100)	—	—	—	—	15 (15)	85 (85)
Other countries	128 (128)	—	—	—	28 (28)	15 (15)	85 (85)
All countries	826 (651)	—	—	—	477 (322)	183 (183)	166 (146)
d) THREE-PHASE CURRENT							
Italy	300	—	—	—	260	40	—

1. The number of rectifier locomotives is shown between brackets.

Annex 6

STEAM LOCOMOTIVES

NUMBERS AT 31ST DECEMBER, 1964

Country	Number	Date of total replacement
1	2	3
Belgium	456	In 1969.
France	3,250	Between 1972 and 1975.
Germany	5,138	Not before 1980.
Italy	950	End of 1972[1].
Luxembourg	—	31-12-1964.
Netherlands	—	1-13-1958.
EEC	9,794	
Austria	795	Not before 1975.
Denmark	117	Used only for Sunday and holiday trains.
Greece	179	End of 1970.
Ireland	—	1-4-1963.
Norway	131	Replacement in progress.
Portugal	259	In 1972.
Spain	2,890	No date can be given.
Sweden	100	No longer in regular service.
Switzerland	45	End of 1965.
Turkey	870	In 1977.
United Kingdom	4,982	End of 1967.
Yugoslavia	1,584	Between 1975 and 1980.
Other countries	11,952	
All countries	21,746	

1. In 1967 total replacement of shunting locomotives and 80 per cent replacement of main line locomotives.

TRENDS IN REGARD TO DIESEL LOCOMOTIVES

a) NUMBERS AND HORSE-POWER

1. It has always been the policy of the *Deutsche Bundesbahn* to build large series of a few types of locomotive, i.e. : one type for light shunting operations (941 locomotives available or on order) one type for heavy shunting operations (300 to 350 locomotives), one type for use on branch lines (about 750 locomotives available or on order), one type for hauling light trains and one for heavy trains on dense traffic lines (240 locomotives available or on order), and a light motor tractor (300 to 350 available or on order). The construction of locomotives of more than 2,200 h.p. (UIC) is limited as a matter of policy. At the moment a locomotive is being built with an additional gas turbine which will be used only in case of need. By 1967 *Belgian* railways will have bought about 200 locomotives in the 600, 700 and 1,400 h.p. categories. *French railways* intend to acquire several dozen units a year of the types already developed in large series of three categories :

- large series of type f_3, for heavy shunting operations and medium traffic lines;
- large series of type dl, for shunting operations and branch lines;
- three series of small shunting locomotives of 350 h.p. or under i.e not covered by ORE Standardization.

As for increased power, until the last few years Diesel traction was used in France on light and medium traffic lines where railcars provide most of the passenger services and locomotives of not more than 2,000 h.p. are used. The scrapping of steam traction is envisaged in the near future on lines which because of the amount of traffic they at present carry or for regional economic reasons do not warrant electrification, but nevertheless call for high power ratings for certain types of services such as fast passenger trains and heavy freight trains.

It is to these services that the 64 locomotives of 2,400 to 2,700 h.p. corresponding sub-class f_4 and the two prototypes of 4,000/4,800 h.p. corresponding to sub-class f_5 together with two further prototypes in the g_2 sub-class are to be assigned. These 68 locomotives, part of a batch of 189 at present on order, were delivered before 31st December, 1964. *In Italy* diesel locomotives will be used for shunting operations except where electric traction is possible; on lines carrying medium or light traffic diesel locomotives will be used; maximum output will be in the region of 2,000 to 2,500 h.p.

Steam traction no longer poses any problem for *Luxembourg* railways, as the change-over to diesel and electric traction was completed in 1964. The situation is similar in *Ireland,* where dieselisation was completed on lst April, 1963; 960 h.p. locomotives proved to be the most suitable. In the *Netherlands* no increases are planned.

The *Federal Austrian* railways intend to take dieselisation a stage further by acquiring about 60,400 to 600 h.p. locomotives for shunting operations and about 130 1,500 h.p. locomotives for use on branch lines. The *Danish State* railways have ordered 20 standard type locomotives in the f_4 sub-class and 40 locomotives for shunting operations; a locomotive with a maximum output of 2,000 h.p. has proved to be the most suitable.

At the end of the ten year plan (1973) *Spanish* railways will have 461 main line locomotives of between 1,400 and 2,200 h.p. and 411 shunting engines of between 130 and 850 h.p. In *Greece* the railway administration plans to acquire 11 shunting locomotives (650 h.p.) and 26 main line locomotives (1,350 to 2,000 h.p.). *British* railways intend to bring the number of their main line locomotives up to 3,000 and their shunting engines to 2,000. The shunting engines are mainly in the 200 or 350 h.p. range and the main line locomotives in the 650, 900, 1,250, 1,750 and 2,750 h.p. ranges.

In *Norway,* six diesel locomotives have been ordered. *Portuguese* railways hope to go ahead with dieselisation using locomotives of not more than 1,400 h.p. In *Sweden,* no increase is planned in the number of main line locomotives in the immediate future, since the old locomotives used for shunting operations will have to be replaced during the next ten years. Engine power will be stepped up in future, but for the moment is not likely to exceed 2,000 h.p. *Turkish* railways intend to increase the number of locomotives from 67 to 200, at the same time bringing them up to the 2,750 h.p. category. The *Yugoslav* railways are planning to have about 250 to 300 locomotives by 1970, in the 400 to 1,950 h.p. range.

2. Apart from Luxembourg, Netherlands and Irish railways, which no longer have any steam locomotives, all administrations intend to go ahead with dieselisation particularly for shunting operations. Railway administrations with the

exception of the French and the British use locomotives with a maximum rating of about 2,000 h.p. while for heavy long distance hauls, electric locomotives are used.

b) TRANSMISSION

1. The *Deutsche Bundesbahn* and the *Austrian* railways intend to keep to hydraulic transmission; the *French* and *Portuguese* railways prefer electric transmission, while the *Belgian, Danish, French, Greek, Italian, Irish, Turkish* and *Yugoslav* railways have adopted electric transmission for fairly powerful locomotives and hydraulic transmission for shunting engines. The *French* railways have, moreover, adopted hydraulic transmission for 30 locomotives of considerably higher power (640 h.p.) now being built and are trying out hydraulic transmission on the two twin motor set 4,000/4,800 h.p. prototypes put into service in 1964.

In *Spain,* no decision has yet been taken. In the *United Kingdom,* only the 200 h.p. shunting engines and 650 h.p. main line locomotives will have hydraulic transmission, while all the others will have electric transmission. The *Swedish* railways will probably use locomotives with hydraulic transmission and axles with cardan joints instead of coupling rods and chain drive.

2. The trend is not everywhere the same. Apart from the Deutsche Bundesbahn and the Austrian Federal Railways, which on the whole prefer to retain hydraulic transmission, most railway administrations tend to order low-power hydraulic drive locomotives for shunting and locomotives with electric transmission for main line service.

c) HEATING OF TRAINS

1. The *Deutsche Bundesbahn* expects that in future passenger trains will be heated exclusively by electricity; in other words, steam heating will disappear. Four trial locomotives, with an additional 500 h.p., are now being built for the administration; when heating is not needed, on goods trains, this extra power will be used to reinforce the normal traction power. On the *Belgian* railways, main line locomotives are fitted with boilers; only a preliminary study has so far been made of the different solutions possible. In *France,* trains hauled by Diesel locomotives are at present heated by steam either from a built-in boiler (for 20 standard locomotives in the g_2 sub-class and for the recent 2,700 h.p. series in the f_4 sub-class), or from a boiler truck (for the series in the f_3 sub-class and the recent 2,400 h.p. series in the f_4 sub-class).

But the French railways are now working on a system of heating by electricity with current produced by the locomotive generating set. Two heating systems have been put into operation during Winter 1964/1965 one using a generator driven by the Diesel traction engine, in the case of four standard locomotives in the dl sub-class, and the other using current supplied by the traction engine generator, in the case of one unit of the recent 2,400 h.p. series. In the two 4,000/4,800 h.p. prototypes to be put into service in 1965 current for heating will also be supplied by the locomotive generating set. In the *Netherlands,* few locomotives with Diesel traction are used for passenger trains; when necessary a heating van is used. In *Austria,* trains will normally be heated by electricity (1,000 v 16 2/3 c/s), at first with current supplied by a diesel generating set, and later by the main Diesel engine. The *Danish* State Railways use steam from completely automatic oilburning boilers built into the diesel locomotives. No changes in this system are planned. In *Spain, Greece,* and *Yugoslavia* locomotives are also fitted with boilers.

Trains on the *Irish* and *Turkish* railways are heated by steam from a heating van.

On *British* Railways, all trains hauled by diesel-electric or diesel-hydraulic locomotives are heated by steam from a boiler but certain locomotives will no doubt be converted eventually for heating by electricity.

The *Norwegian* railways are studying the possibility of Diesel-electric heating. The *Portuguese* railways favour independent heating of coaches. In *Sweden,* trains drawn by diesel locomotives are heated exclusively by electricity, using diesel generating sets (16 2/3 c/s). For new stock, generators with higher frequencies will be used.

2. Hitherto coaches hauled by diesel locomotives were usually heated by steam from a boiler built into the locomotive, or from a heating van. As steam locomotives are gradually taken out of service, and electric traction becomes more common, the heating of coaches — particularly on long-distance trains — by both steam and electricity, will no longer be economically justifiable. In Sweden, diesel trains are already heated by electricity, and several administrations (Germany, France, Austria, the United Kingdom and Norway) are having suitably equipped locomotives built, or are carrying out tests with a view to using diesel electric generating sets to produce the current needed for heating trains. Some administrations are, at the same time, considering whether the current produced by these generating sets may in addition be used for traction on passenger trains when heating is no longer required, and on all goods trains.

TRENDS IN REGARD TO ELECTRIC LOCOMOTIVES

a) NUMBERS AND HORSE-POWER

In the case of the *Deutsche Bundesbahn*, when locomotives now on order have been delivered more than 1,600 or 70 per cent of all locomotives will be of four standard types, and future orders will continue to be concentrated on these four types; another recent project concerns electric locomotives with a maximum speed of 200 km/h; four of these will be delivered in 1965.

In connection with the new electrification programmes at present under way, *Belgian* railways have on order eight rectifier locomotives designed to operate on four types of current, and are contemplating, an order for 35 locomotives of between 3,000 and 4,000 h.p., to operate on direct current (3,000v). The 35 locomotives will probably be of the single motor-bogie type. In *France* the number of electric locomotives is steadily increasing. New electrification programmes and forecasts of traffic will call for orders over the next few years averaging 85 locomotives a year. These figures make no allowance for the replacement of locomotives due for scrapping.

The present trend is towards higher-powered electric locomotives. Dual purpose locomotives now being built develop a continuous power rating of at least 3,400 h.p. and locomotives for express and fast trains 4,900 to 5,200 h.p.

The next few years will see locomotives of even higher performance with continuous power ratings in the 6,000 h.p. range for the BB type and 8,000 up for the CC type.

As main lines in *Italy* are already electrified no largescale electrification programmes are being planned. For hauling heavy or fast trains it is intended to extend the use of locomotives developing 4,000 h.p. at the wheel rim (continuous rating) with six driving axles. In the *Netherlands* the first replacement programme provided for electric locomotives of about 4,200 h.p. In *Spain*, the number of locomotives is likely to increase but horse-power ratings will remain unchanged. Before 1970 *British* Railways hope to bring the number of their electric locomotives to about 150 operating on direct current and about 320 on alternating current. Output ratings for bitraction locomotives (diesel motor and electric motors) will be 4,000 or 2,000 h.p. with electric traction on lines using direct current, 600 h.p. with diesel traction on lines without conductor rail, and 4,260 h.p. for locomotives using alternating current.

In *Norway* 33 locomotives have been ordered or will have been ordered by 1970. 10 6-axle locomotives already ordered by the Ofoten railway will have an output of 7,000 h.p. In *Sweden* the intention is to replace the present fleet, part of which is very old, by heavier and more powerful locomotives, while keeping the number of types to a minimum. An order was recently placed for 20 4-axle 4,900 h.p. locomotives. The *Swiss* Federal Railways have based their programme on three types of locomotive, a 6-axle locomotive with an output of 6,000 h.p. (hourly rating) mainly designed to haul heavy trains on mountain runs, a 4-axle locomotive with an output of 5,600 h.p. (hourly rating) to haul heavy passenger trains in level country, and an electric railcar with an output of 2,800 h.p. (hourly rating). The *Yugoslav* railways, which are electrifying more than 1,700 kilometres of line, plan to purchase 200 locomotives to run on alternating current and 50 locomotives to run on direct current (3,000v). These will be in the 2,500 to 4,000 h.p. range. The purchase of multicurrent locomotives is also under consideration.

b) TRANSMISSION OF CURRENT FROM CONDUCTOR WIRE TO AXLES

The *Deutsche Bundesbahn* uses 16 2/3-cycle AC between the overhead wire snd the motors, only multicurrent locomotives being equipped with rectifiers. After extensive tests, the *Swiss* Federal Railways have finally abandoned the use of rectifiers to convert the current for the motors, and use 16 2/3-cycle AC not transformed on the locomotives, like the *German and Austrian* Railways. *French* Railways equip locomotives running on alternating current and multicurrent locomotives with rectifiers of different types. A certain number of locomotives have single-motor bogies and locomotives intended for mixed duties have two gear ratios giving two distinct maximum speeds.

Locomotives on *British* and *Yugoslav* Railways run on alternating current with silicon rectifiers. 20 locomotives (16 2/3 c/s), ordered by *Swedish* railways, will be equipped with silicon rectifiers, to make it possible later on to introduce a simplified control system using thyristors.

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Annexes

Section IV

GENERAL PROBLEMS

Resolution n° 15
ON URBAN TRANSPORT PROBLEMS

THE COUNCIL OF MINISTERS OF TRANSPORT,

Meeting in Lisbon, on 29th and 30th June, 1965,

Ater considering the Report below of the Committee of Deputies on Problems of Urban Transport [CM(65)9 final].

1. Recommends to the Member countries of the European Conference of Ministers of Transport that they should take account of the points made in the report when considering what measures they should take for dealing both with the short-term and the long-term problems;

2. Agrees with the emphasis laid in the report on the importance of maintaining public transport services in urban areas as the only satisfactory means of dealing with large flows of peak passenger traffic, particularly for journeys to and from work;

3. Emphasises the urgency of taking measures to regulate where necessary the volume of urban motor traffic, particularly private cars, in the largest towns;

4. Suggests that, in view of the heavy capital expenditure involved in providing additional public transport services (e.g. provision of separate tracks, underground services, etc.), the problems raised by the financing of such expenditure calls for further investigation by the authorities concerned;

5. Requests the Committee of Deputies to continue the examination of point (4) above and of such other aspects of the general problem which can usefully be studied more deeply, with a view to facilitating exchanges of information on the experience gained in each country.

REPORT OF THE COMMITTEE OF DEPUTIES ON PROBLEMS OF URBAN TRANSPORT

[*CM* (65) 9 *final]*

I. INTRODUCTORY

I.1. On 11th June, 1963, the Council of Ministers, at their 17th Session, decided that the Conference should study problems arising from the growth of private motor transport in cities. In October of that year, a Study Group was set up with the following terms of reference :

> « To exchange information and views about the planning of transport in urban areas and, in particular, about the problems arising from the great increase in the use of individual transport. »
>
> In November, 1963, the Council of Ministers approved a programme of work for the Group.

I.2. The Committee of Deputies submitted an interim Report to the 19th Session of the Council of Ministers on 28th May, 1964, which concentrated on a preliminary study of short-term measures for controlling traffic. The Council instructed the Committee of Deputies to continue the study.

I.3. The present Report, for the sake of completeness, discusses at greater length a number of points which were dealt with in the interim Report, but it has extended the field of study to cover long-term measures. The Study Group has worked as a team in producing the Report : it is, of course, based on the free and full discussions at meetings of the Group, but individual delegations then undertook to carry out special studies or to prepare one of the chapters. Some of the studies — which, for reasons of space, it has been possible to include only in very condensed form — are important documents in their own right and will serve as works of reference. In addition, the preparation of the Report has led to exchanges of experience and ideas of a most valuable and stimulating kind. Delegations have also circulated information on recent studies undertaken in their respective countries, and these have influenced the contents of the Report. Some of the documents considered are listed in appendix IV.

I.4. Urban transport is a complex subject, with many ramifications well beyond the field of transport. The Report, in attempting to cover as many aspects as possible, has developed into a rather lengthy document. Wherever possible, a summary has been added at the end of each chapter bringing out the salient points discussed in the chapter, but the subject matter does not lend itself easily to summarising.

I.5. The Study Group is very conscious of the fact that it has, in the time available, had to deal somewhat superficially with some of the problems. On some of the matters too, new lines of thought are still being developed. There is still a lot of useful work to do in this field and the Council may, therefore, wish the Study Group to pursue investigations on those problems where there is a good possibility of making valuable progress.

II. BASIC ELEMENTS OF THE PROBLEM

II.1. In their report published this year, the Commission of Experts appointed by the German Federal Republic to inquire into urban traffic congestion have used the term « Verkehrsnot », traffic emergency, or crisis. To describe the traffic situation in many cities of Western Europe by such a term is no overstatement. Governments, municipal authorities and citizens in most ECMT countries, even if they do not use the same word, are only too familiar with the conditions it describes.

II.2. There is general agreement about the basic elements of the problem. Increasing industrial and commercial activity, growing population and rising living standards and improved communications have led to the expansion of cities and conurbations, and the development of residential areas extending far beyond the boundaries of the cities. The demand for travel has increased, with high peaks at particular hours. These trends have been accompanied by a rapid growth of motor transport, and particularly of private motoring, both within cities themselves and between the cities and the expanding residential areas. Goods vehicles, private cars, public transport, pedal cyclists and pedestrians use the same streets, which in many cities, and especially in their centres, were not constructed to carry this volume and miscellany of traffic, and cannot accommodate it adequately or conveniently. There is therefore serious traffic congestion, with all the delay, frustration and waste this involves. Unless some restraints are imposed, traffic will go on growing rapidly and congestion will rapidly get worse. At the same time, accidents, noise, fumes and obstruction associated with traffic congestion is leading to a general deterioration of the amenities of urban life. Tables I-XI in appendix I show clearly the rapid rate at which the number of cars in some major European cities is growing.

II.3. The main task of the Group has therefore been to consider how the problem of congestion can best be tackled and some order restored in the urban transport system. There is no quick or simple solution and it seems likely that the only way to make an impact will be by a whole series of measures which will complement and reinforce one another and so lead gradually to a more efficient and acceptable traffic pattern. This will involve short-term and long-term measures, traffic management, economic and other restraints on traffic, construction or re-construction of roads, tramways and railways and general improvement of public transport. As actual experience in this field is much more valuable than theory, the Group has brought together in the Report the results of experience and investigations in a number of ECMT countries.

II.4. One important point emerged clearly from the discussions, namely that the solution to this problem could not be found in the transport field alone, but must take account of general town planning considerations. Transport and land use are now so closely inter-related, and react so directly upon each other, that resources and effort devoted to the planning and provision of transport infrastructures, the organisation of public transport services and the regulation of urban traffic will be largely nugatory unless they are applied in the closest association with parallel plans and measures in the field of land-use planning and urban development. The « traffic crisis » forces itself upon public attention primarily as a malfunctioning of the transport system, and it is the Ministers of Transport who will be expected to take the lead in proposing solutions and in getting the co-operation of others in carrying them out. In fact, the underlying causes are complex, and effective remedial measures will go beyond the scope of Ministers of Transport, and will involve other Government Departments, as well as municipal, and possibly regional, authorities.

II.5. In a number of countries (and not only in ECMT countries) where the urban transport problem is acute, there is growing awareness that existing administrative arrangements, traditional divisions of responsibility between central government and municipal or regional authorities, and between the latter authorities themselves, no longer provide adequate machinery for the comprehensive approach to the problem which its scale and complexity demand. This is because the growth of urban populations and the expansion of the built-up areas they occupy often make the existing administrative boundaries of local authorities irrelevant to the organisation and functioning of transport as it now exists. The shortcomings of existing institutional organisations vary, of course, according to national forms of administrations and constitutional provisions, and do not present themselves in the same form or degree in all countries. There was, however, general agreement within the Group that new arrangements and relation-ships, or radical modifications of existing ones, may be needed if the matter is to be dealt with effectively. The difficulties involved are touched upon, in different aspects in several chapters of the report, but the matter is of such general importance that it seems justifiable to draw attention to some of its salient features, in general terms, at this point. This problem is akin to, and in some respects connected with, the problem of devising administrative arrangements for securing integrated transport planning, and the co-ordinated operation of public transport services, in large urban areas and their immediate surroundings, which is discussed below in Chapter VIII. Appendix II gives some illustrations of the measures adopted in certain European cities for the second purpose; progress in securing integrated or concerted planning in the transport field does not of itself bring about closer association between transport planning and land-use planning, but is a useful step towards it.

II.6. As a general consideration, it can be said that, however strong the traditions of local autonomy and initiative, and to whatever level of efficiency urban local government may have evolved — and in some places local government is undoubtedly both strong and enterprising — it is unlikely that the urban transport problem, the « traffic crisis », will be dealt with by traditional institutions and procedures, or solved without new initiatives and continuing guidance from central departments. Governments are, in several countries, becoming increasingly involved, financially, technically and administratively, and the needs of the situation are likely to continue and intensify this trend.

III. SHORT TERM MEASURES

III.1. The first and most logical approach to the problem of traffic congestion is to consider how more efficient use can be made of existing roads and transport facilities and how the demand for transport can be modified to fit the available capacity. This can be done in a number of ways, the most important of which are :

- *i)* Traffic management;
- *ii)* Parking restrictions and parking charges;
- *iii)* Restriction on access of cars and other vehicles at certain times or to certain places;
- *iv)* Complete prohibition of vehicles from some areas;
- *v)* Staggering of working hours;
- *vi)* Improvement of public transport.

i) Traffic Management

III.2. Whole treatises have been written on traffic management and it would not be appropriate here to go into any detail, but experience has shown that the *systematic* application of traffic engineering techniques to the particular traffic problems of any city can yield large dividends in the form of improved and increased flow. For instance, in London, between 1962 and 1964, the average journey speed in the central area increased from 10.4 m.p.h. to 11.7 m.p.h. (+ 12,5 per cent), and in the evening peak hour from 9.4 m.p.h. to 10.4 m.p.h. (+ 11 per cent); during the same period the average total flow of traffic, in vehicles per hour, increased from 1,705 to 1,762 — i.e. by 3.3 per cent. Some of the most useful traffic management measures are — one-way streets; prohibition of left hand turns (right-hand turns in countries with a left-hand rule of the road); routeing of through traffic away from the city centre; clear signposting and carriageway markings; minor improvements to junctions to improve flow; special attention to traffic control at major intersections. Some of these measures are discussed in more detail in Chapter VI, paragraph 3, below. The clarity of carriageway markings and traffic signs at complex junctions is of particular importance, since confusion in drivers' minds can lead to accidents, or to hold-ups which can bring a heavy flow of traffic to a halt. Adequate publicity before the introduction of new schemes is useful to local drivers, but only well-sited and well-designed signs can help those who are strangers to the town.

ii) Parking Restrictions - General

III.3. One of the most important ways of assisting the flow of traffic is to make as much road capacity as possible available to moving traffic, and prevent it from being occupied by stationary vehicles. Parking restrictions must, therefore, be considered as part of the process of assisting traffic flow. The character of the street, as well as its capacity, needs to be examined to determine the extent of restrictions necessary. Adjoining buildings, whether residential or commercial, need a certain minimum of vehicular access in order to function. Vehicles engaged in retail collection and delivery, maintenance work on a building or its services, or refuse collection, or calling to pick up or set down passengers, are a few obvious examples[1]. Unless the premises contain space in which such vehicles can stop, and wait for the minimum requisite time, some parking in the road nearby will be necessary at least for short periods. In the busiest parts of large towns, space for roadside parking is in such high demand that it is necessary that it should be made available primarily to those who have the most need to use it, and that it should accommodate as many of them as possible. Longterm parking militates against this, and hence measures are needed which discriminate against long-term, and in favour of short-term parking.

III.4. According to conditions, therefore, various restrictions may be required in a given street :

a) waiting on the carriageway may have to be prohibited entirely during certain hours, even for loading or unloading, or the picking up and setting down passengers (urban bus services may have to be excluded from such a prohibition, but it is then desirable, if at all practicable, to provide draw-ins, clear of the main carriageway, at stopping places);

b) waiting for the purpose of loading or unloading, or picking up and setting down passengers, may be permitted (possibly with a time-limit), but all other parking may be prohibited; or

c) parking may be permitted in prescribed places in the street, with time limits.

1. Off-street parking space designed and used for such essential purposes is a desirable feature, but it must not be confused with the provision of long-term parking space for private cars belonging to people who work in the building. At one time, such provision was considered desirable in some ECMT countries, and in some cities it was made a requirement under building regulations. The realisation that it generates additional private car traffic in city streets has led to re-consideration of this policy. The provision of parking space for employees' cars in buildings in *city centres* is not to be recommended. In *residential areas* on the outskirts, on the other hand, the provision of adequate, communal parking space, with properly designed road access, is of great importance.

Arrangements under c) can be made flexible. The periods during which parking is permitted can be varied so as to be shortest where the demand for short-term parking is highest, and to allow longer periods in places some distance from congested areas, where longerterm parking does not seriously conflict with the use of road space for other purposes. Examples of arrangements to « ration » parking space in favour of short-term parking are to be found in the « blue zone », and in the systems of control by parking meters.

Roadside parking — long-term and short-term

III.5. A feature of control by parking meters is that, besides enabling the duration of permitted parking in different zones to be varied, it enables the price mechanism to operate through adjustments of the fees charged for occupation of roadside parking space during the permitted time. Differential scales in different zones can discourage parking in the most congested zones and lead to a preference for cheaper, adjoining zones where roadside parking is less objectionable. Parking fees finance the costs of installation, maintenance, enforcement and administration; and, in addition, they can be so related to the cost of using off-street parking, where this is available as an alternative, that they provide a financial incentive to vehicle users to park off the highway rather than on it.

III.6. Among the most important factors which determine the success of a system of controlled, short-term parking are *enforcement* and *public acceptance*. Restrictive regulations are ineffective if they are widely disregarded with impunity, and where there is a choice between methods of control, one which can be made to command obedience without excessive effort on the part of the police or the traffic authority is to be preferred. The introduction of new restrictions often provokes some resentment at first; but this can be much reduced if care is taken to explain the scheme in advance and to provide as far as possible for legitimate needs. If a system is found in practice to share out limited roadside parking space equitably, and at the same time to reduce traffic congestion, with all its frustration and expense, motorists tend to recognise its advantages in a relatively short time.

Off-street parking

III.7. To give preference to short-term parking in the use of roadside space reduces the space available for long-term parking on the highway. This can have various results; some motorists may no longer bring their cars into the centre; others will seek space in streets outside the central area, where parking is not controlled, and this is likely to lead to congestion and loss of amenity in some of those streets. The best place for long-term parking is off the highway, and the provision of off-street car parks, including multi-storey and underground garages, are an essential complement to restriction of roadside parking.

III.8. The provision of off-street parking accommodation in towns presents problems of its own. It occupies land which may be of high value, and construction costs have also to be taken into account. These facts will be reflected in the charges to be made for its use, but if these are higher than motorists are willing to pay, the facilities will be under-utilised. This is most likely to occur if roadside parking is permitted in the vicinity free of charge, or at charges which are lower than those required for off-street parking. The tendency can be countered if roadside parking in the neighbourhood is allowed only for strictly limited periods, which are rigorously enforced, or if longer-term parking at the roadside is charged at a higher rate than off-street parking. The siting of off-street car parks also needs careful consideration if they are to be used to the best effect. They should be on the fringes of the central area, and conveniently accessible from main traffic routes leading into it. They also generate considerable traffic movements, and both their location and the access to them need to be considered with due regard to the effect of those movements upon existing traffic flows. The provision of car-parks in relation to public transport services, and of special parks for road goods vehicles, are separate matters, dealt with elsewhere in this report.

iii) Restrictions on Access. Restrictions for Limited Periods

III.9. If different demands for the same road space conflict seriously only at certain times of the day (or, possibly, on certain days of the week), an acceptable compromise may be found in restricting or prohibiting particular uses at those times, but not at others. (For instance, goods vehicles may be prohibited from loading and unloading in certain streets at specified times, and waiting on the carriageways of major traffic arteries may be banned for all vehicles during the hours when the whole capacity of those streets is needed to accommodate moving traffic.) Such adjustments in time can, in suitable conditions, reconcile conflicting demands for road space with minimum hardship or loss of convenience.

III.10. Restrictions which operate for limited periods only, however, will not suffice where conflict between different uses persists throughout the working day. This is the case in many city streets, and intervention by the traffic authority to restrict one form of use or another becomes the only alternative to growing congestion and ultimate chaos. Which use is to be restricted, to what extent, and what alternative provision may be necessary, or possible, for demands which are displaced by restrictions, will have to be decided in the light of the circumstances of each case, and of an assessment of maximum benefit and minimum hardship. The issues will sometimes be delicately balanced; economic and social considerations will be involved, and decisions will often be difficult.

iv) Complete Prohibition of Vehicles - Pedestrian Precincts

III.11. The extreme form of restriction is complete prohibition of access for vehicles to certain streets, either permanently, or throughout the working day. This creates precincts devoted exclusively to pedestrian traffic. Such restrictions are appropriate to central shopping areas or areas reserved for cultural activities. This form of development is deliberately provided in some new towns, or in comprehensively re-constructed areas, but the possibility of its adoption in existing towns, without physical re-construction, is clearly limited, particularly by the need to ensure that premises fronting on a street to which vehicular access is forbidden can be reached from other streets by vehicles for essential purposes.

v) Staggering of Working Hours

III.12. In most cities the worst traffic congestion occurs during the morning and evening peak periods of travel to and from work. If the demand for transport could be more evenly spread throughout the day, or even if the peak periods could be extended, the effective capacity of the roads and of the public transport system would be greatly increased. Many attempts have therefore been made to « spread the peak » by the staggering of working hours. So far, this had had only limited success. Shops and offices, in particular, seem reluctant to accept working hours different from those generally applying in the city. A useful reduction in the morning peak traffic may be secured if the starting times of schools and other educational institutions are adjusted so as not to coincide with starting times for shops and offices; this reduction in the peak load applies not only to public transport, but also to private car traffic where, as is increasingly common, young children are taken to school in their parents' cars.

In general, however, a subtantial reduction in the density of peak traffic can only achieved, at any rate in the large cities, by staggering hours over a fairly long period. To obtain any effective staggering of hours, therefore, a major effort of education and encouragement of employers is likely to be required. As an extension of the staggering of working hours, the same principle may be applied to working days. The scope for application of this system, again, is limited : people in general wish to spend their leisure time with their families and friends; different working days interfere with this, and resistance on social grounds results. Nevertheless, there are instances in practice where the regular closing of certain categories of business on a weekday, instead of at the week-end, has led to a perceptible reduction in traffic congestion on the selected day.

vi) PUBLIC TRANSPORT - SHORT-TERM MEASURES OF IMPROVEMENT

III.13. The changed pattern of urban activity and development has greatly affected public transport. The general features of this change, and the long-term measures taken, or under consideration, in various countries in relation to urban public transport are discussed in other chapters. It is, however, relevant to note here that, if restrictions are imposed on private cars, it is essential that public transport should be made to operate more effectively, to carry a larger share of urban traffic, and generally to offer a satisfactory alternative service to individual transport. Conversely, the more efficient and convenient public transport can be made, the greater will be its contribution towards reducing congestion by providing such an acceptable alternative.

III.14. In so far as measures of the kinds described in paragraph 2 to 15 above succeed in making traffic in city streets move more rapidly, safely and conveniently, public transport services using those streets will gain important advantages. Higher average speed improves productivity; smoother traffic flow makes for reliable time-keeping, and more comfortable travel — both important « selling points » for public transport. In addition, special measures can be taken for the particular benefit of public transport vehicles; they can be given preferential treatment at junctions, permitting them to make turns across opposing streams of traffic where this is forbidden to other vehicles, or allowed special priority at roundabouts where vehicular traffic is generally required to give way; in some one-way streets they may, exceptionally, be exempted from compliance with one-way traffic working; and, where available road capacity permits, special lanes in the carriageway may be reserved for them.

III.15. Other measures which, since they involve relatively little or no expenditure on equipment or infrastructure works, can be considered as short-term measures, are the arrangement of the schedules of different public transport undertakings so as to provide quick and convenient connections; interavailability of tickets and the co-ordination of tariffs; and the arrangement of stopping places and terminals so as to facilitate interchange. These measures, however, fall more properly under the heading of « co-ordination », which is more fully discussed in Chapter VIII.

Combined Use of Above Measures

III.16. Most of the expedients described above have been known and applied, individually, for many years. With the growing complexity of the traffic problem, it is now becoming necessary to use them in combination so as to complement each other. Experience shows that they can operate more effectively together than when applied in isolation. When their application in any area is under consideration, it is desirable to make a complete review of the various possibilities and to take account of parking space, parking charges, the capacity of approach roads, traffic flow, land use and the adequacy of public transport. Origin and destination surveys are an important element in such a review.

Further Restrictions on Access by Private Cars

III.17. Restrictions on parking, if stringent and thoroughly enforced, have some effect in discouraging drivers from bringing vehicles into the central areas unnecessarily, and thus help to keep down the total volume of urban traffic. However, in so far as these restrictions improve traffic flow by increasing road capacity for moving vehicles, they may attract more traffic into the centre. They may, therefore, alleviate the problem, but they will not solve it. In the longer term, physical reconstruction and the re-location, through planning measures, of industrial, commercial and social activities will be necessary; this should make possible the separation of the main traffic flow from other urban activities. These possibilities are discussed in other parts of the report. It now seems probable that the rate of increase in private transport will result in serious congestion long before such measures can take full effect. Congestion, which already causes serious economic loss in many cities, is thus itself likely to limit access to urban areas indiscriminately.

III.18. This threat makes it advisable to consider possible means of limiting the volume of urban motor traffic, and particularly of private cars, in a more selective way. Such limitation must pose very difficult problems, of which the social and political ones are likely to be at least as intractable as the technical ones, and possibly more so. As an absolute ban on private cars coming into towns is unlikely to be politically acceptable and as restrictions by some form of licensing according to need would give rise to many administrative problems, the use of the price mechanism may provide the best answer. To some extent, variable parking charges have this effect, but they do not impose any limitation on through traffic or on those with their own parking facilities. Road space in urban areas is scarce and the social cost of using it is high, since in congested conditions every additional vehicle on a road imposes additional costs on every other user. There is therefore a good economic case for charging for the use of the roads. This could be done in a variety of ways, for instance by requiring a motorist to obtain an additional daily, or period, licence to come into the centre of a particular city. But the most sophisticated method would be by way of an electronic meter attached to each car which could be activated by control cables in the road, and the charges related to the congestion existing at the time. A study made by a group under the chairmanship of the Road Research Laboratory in the United Kingdom has shown that such a system would be technically feasible, but much further study of the proposal is required.

Summary

III.19. The concensus of views considered in this chapter may be summed up, in broad terms, in the following way. Road space in city centres has become a commodity in high demand and short supply. Different uses compete for it, and it is no longer possible consistently with tolerable urban conditions, to satisfy all of them, or all of them at the same time. In the short term — that is, pending a long-term re-organisation of urban space and re-location of urban activities through physical re-development — regulation and restraint are indispensable. These have several objects : firstly, to make the best use of available road space so as to enable traffic to move more freely : this involves traffic engineering and traffic regulation. Secondly, to impose restraint so as to give some measure of priority to certain uses of road space over others (for example, to give moving traffic priority over parked vehicles; preference to waiting by vehicles used for essential purposes over parking for mere convenience; to short-term as against long-term parking; in limited areas, to pedestrians over vehicular traffic; and to public transport vehicles over other traffic). Thirdly, to discourage unnecessary journeys by private car to some parts of cities by applying restrictions to traffic. The existing techniques operate most effectively when applied in combination, so as to reinforce each other, after study of the overall traffic sophisticated techniques which will operate more selectively, relying upon the price mechanism. Public transport will benefit from any general improvement in general traffic conditions. The short-term measures examined can alleviate present conditions and may avert the impending chaos with which the constant increase in motorisation threatens many cities, but longer-term and more radical measures are urgently needed.

IV. RELATIONS BETWEEN URBAN PLANNING AND URBAN TRANSPORT PLANNING

Urban Development and Mobility

IV.1. Geographical, political, economic and social factors govern the development of human activity in urban surroundings. The natural consequence of the increase in these activities has been the formation of ever larger urban concentrations. These activities entail the movement of people and goods, mobility is indispensable to urban communities, and the need for it increases as they expand. The life and functioning of modern cities is unthinkable without mechanical, mass transport. Urban life today cannot be soundly organised unless the urban transport problem is solved.

IV.2. The problems of urban expansion are therefore closely linked with the problem of urban transport — individual or mass — and of traffic in towns. The concentration of populations in urban areas generates a need for expansion, and basic social needs in such fields as housing, education, health and recreation have to be met. On the other hand, concentration greatly favours certain economic, and collective social, activities, which gain efficiency or enhanced value in an urban environment. As a natural consequence, focal centres of civic, economic, cultural, recreational and social activity, and residential and industrial zones, come into being in every urban area. These activities are intensive and varied, and the organisation of urban life is based upon constant movement of the population between these centres or areas.

The Necessity for Planned Development

IV.3. Urban life as now understood no longer admits of haphazard, unregulated expansion of urban areas. The problems of urban environment are so complex, and so closely interwoven, that expansion must go forward in accordance with an overall plan. Town planning must forecast and provide for expansion by orderly phases, seeking a framework within which the growing needs of community life can be met in a balanced way, and the value of urban activities enhanced. The establishment of good communications — individual or collective — between the various centres and areas of activity is a highly important factor in urban development, and town planning must take account of it.

IV.4. Intensive use of mechanical transport makes those communications easier, and thus contributes on the one hand to concentration of communal activities, and, on the other hand, to the dispersal of residential areas, whereby extensive urban areas come into being. Daily mass travel, to and fro, by urban populations results, and gives rise to complex problems of transport and traffic. The traffic problems are notable for the discomfort and economic waste which they inflict upon the community.

IV.5. As countries have developed industrially, there is a tendency for a greater proportion of the population to live in towns at the same time as the urban areas themselves are expanding. Thus, recent figures show that in the United Kingdom the urban population is 80 per cent of the total population. In the USA the proportion is 75 per cent. The efficiency of urban transport arrangements therefore become an increasingly important factor in the development of the national economy as well as affecting the comfort and convenience of so many people.

Growth and Effect of Individual Transport

IV.6. The rapid increase in ownership of private cars and the wish to use them to give greater mobility in urban areas must be judged against this background. To a large extent this trend is self-defeating; since the use of individual transport leads to difficult traffic and parking problems in existing towns and cities. The load on urban road space grows continually; there are physical and economic limits to the possibility of enlarging it, and of providing parking space. In a recent study made in Hamburg, it was pointed out that if 40 per cent of the 220,000 people who travel daily to the city centre used individual transport, they would use 55,000 private cars, requiring 130 hectares of parking space. Yet the area occupied by buildings is only 150 hectares. Broadly similar results would probably be found in most European cities.

Town Planning, Highway Planning and Traffic

IV.7. As it is neither practicable nor desirable to rebuild cities on such a scale that the growing demands of motor vehicles for space to move and park can be fully met, an alternative remedy, the reduction of the load on the road network, must be sought. No single approach can achieve a sufficient reduction, but a combination of several measures, in the fields of town planning and of transport, offers prospects of useful results in the long run. The length of urban journeys can be reduced by a more rational location of centres of urban activity. A road network can be laid out which takes account of the mutual reaction between built-up areas and traffic, provides the various focal points of the town with means of access adequate to the traffic seeking to reach them, and can be used to maximum advantage by differentiating the respective functions of its various parts. Finally, the use of transport can be influenced so that each form is used for the kind of journey for which it is best suited.

IV.8. As was pointed out in paragraph 3 above, unplanned and uncontrolled urban development is no longer acceptable. Rational rearrangement and balanced distribution of zones reserved for residential, administrative, business or industrial use offers some hope of reducing the distances to be travelled daily by large numbers of the population. The basic unit of such a structure is the « neighbourhood », an urban entity which might have a population of between 5,000 and 8,000.

IV.9. It is not only neighbourhoods, but building plots and individual buildings, which affect traffic. Any building in which human activities go on gives rise to journeys. The number and frequency of these journeys varies according to the function of the building, and thus has a greater or less effect upon travel; and, conversely, the possibility of easy access (and availability of parking space) depends upon the location of the site and the nature of the routes serving it. There is an optimum relationship between the shape of building sites, the size and function of buildings and the number, size and disposition of their means of access to the road system. In the process of urban renewal, sites can be merged and comprehensively re-developed, and buildings rationally located in relation to each other and to the road network, so as to form a structure of precincts and neighbourhoods. By thus relating human activities, the traffic they generate and a road system suited to it, traffic conditions can be progressively improved in the long term.

IV.10. A useful, even if limited, example of the rational location of commercial activities in relation to transport facilities is found in the development, in some ECMT countries, of organised parking places or depots for long-distance motor lorries on the outskirts of towns. These have come into being through the initiative of the carriers themselves rather than by official action, though the arrangement has official approval and, in some place, support. The better developed depots include facilities for rest and refreshment for lorry crews and for vehicle maintenance, and forwarding agents have set up offices at or near them. If sites are well-chosen in relation to the main highway system, lorry journeys into or through city centres can be reduced, and the concentration of these terminal activities in suitably chosen and equipped sites protects residential areas from the noise, fumes and disturbance associated with such activities. The trend is in line with sound urban and transport planning, and well worth encouraging.

Planning and Public Transport

IV.11. An improved road system combined with urban re-development on a more rational pattern will not, however, suffice alone. The pressure of motorisation upon urban space is too heavy, and the demand for mobility increases with rising standards of living. Other means of improving urban travelling conditions must be found. The better use of mass public transport, and the development of public transport systems with sufficient capacity to provide efficient and convenient transport for urban populations seems to offer the best prospects.

IV.12. In most European towns, the maximum duration of journeys between home and work (which provide the proponderant part of an urban public transport system's traffic) should be no more than about half-an-hour, the period which corresponds to the maximum reasonable walking distance. Mechanical transport enables greater distances to be covered in the same time, though allowance must still be made for walking time at either end of the journey, which ideally ought not to exceed about ten minutes. The commercial speed of the form of transport adopted determines the distance which can be covered in that time, and thus governs the distance between stops. The density of population within convenient distance of these stops is a guide to the capacity which the system should have.

IV.13. A public transport system should make the most economic use of the track available to it. The relative advantages and disadvantages of public transport systems operating on roads which they must share with vehicular traffic in general (including the growing volume of private cars), and of those which run on tracks reserved for their exclusive use, are examined in detail in Chapter VII, which brings out clearly the comparatively high capacity of systems with reserved tracks which, with their freedom from interference by other traffic, have higher speed and greater regularity. When demand reaches a certain level, and capacity must be increased, the balance tips in favour of such systems. The larger the city, the greater the reliance upon them for mass transport.

IV.14. Public transport by road and different types of system on railed tracks are not mutually exclusive alternatives, but co-exist, and the urban public transport system should be seen as a co-ordinated system of networks, with its different parts complementing each other — short distance services operating as local extensions of longer-distance ones, or as feeders to them.

IV.15. Large urban centres, moreover, polarize the activities of surrounding regions within their sphere of influence, and their urban transport systems should be co-ordinated with regional transport systems, just as urban planning should be related to regional planning. Chapter VIII discusses some of the problems of co-ordination at regional and local level.

IV.16. There are a few examples of cities which have been planned on the assumption that all travel will be by individual transport. Their experience shows this to have been an unrealistic assumption. It implies that every family can provide individual transport for each of its members. This condition is not, in fact, fulfilled and the city, as an entity, tends to disintegrate. The only remedy has proved to be the belated introduction of public transport into an urban framework originally conceived without any regard to the proper functioning of mass, urban transport, and thus operating at high cost. On the other hand, some examples of new cities, planned with deliberate regard to the reciprocal influence of urban development and transport, including public transport, have clearly shown the advantages of such comprehensive planning. American experience provides a positive example of the recognition of the necessity for such planning in a recent Federal Act requiring all towns with populations of 50,000 or more to draw up plans for the co-ordination and development of individual *and public* transport, having regard to the expansion and development of their areas, as a condition of receiving Federal aid.

IV.17. American cities are characterised by :

- a considerable expansion in the use of motor vehicles;
- an enormous dispersal of houses, industry, and large suburban shopping and recreation centres, this dispersal being facilitated by the lack of town planning powers;
- a deterioration of the physical structure and a decline in land values in town centres resulting from the setting up of more easily accessible suburban business centres;
- the existence of a vast network of motorways designed to facilitate movement in the suburban areas; it is often observed that these motorways become congested as fast as they are built, since the new facilities create traffic and motorways encourage people to live further afield.

American experience has important lessons for the old European cities : however necessary urban expansion may be, to allow it to extend over wider areas at low densities is inimical to efficient transport arrangements, the feasibility of which should be one of the factors governing the location and character of planned expansion.

IV.18. The recognition of the interdependence of transport planning and land-use planning is comparatively recent, and an obstacle to the practical application of integrated planning is that, whilst expertise has grown in the techniques of land-use planning on the one hand and of transport planning and traffic engineering on the other, there are as yet few specialists who combine a thorough understanding of both. There would be considerable advantage in a system of professional training in this combined field. At the least, experts who intend to specialise in either of these fields should, in the course of their training, receive instruction in the essential elements of the other.

SUMMARY

IV.19. This chapter reviews the basic elements of sound planning for urban development. There is an optimum concentration of population which can be efficiently served by any one form of transport, and the proper relationship between planned density and the possibility of ensuring adequate transport, and good co-ordination between its different forms, is essential if the needs of human activities in an urban community are to be adequately met. The development of urban areas and of their transport systems must planned together. The urban transport system must be fitted into the organic structure of the urban area, and every plan for urban development — whether for new city which is being planned *ab initio*, or further re-development of an existing city — should include provision for meeting the population's needs for travel.

IV.20. Simultaneous planning of the basic framework of urban development and of urban transport enables the total investment involved, and the overall results, to be considered. Only if the overall plan can be clearly foreseen is it possible to plan soundly for individual or public transport, and to draw up a suitable, balanced programme to match planned urban expansion and development.

V. BASIC ENQUIRIES, TRANSPORT SURVEYS AND THE FORECASTING OF FUTURE NEEDS

PURPOSE AND SCOPE

V.1. The preparation of plans designed to provide the best solution to urban transport problems requires imagination and vision. If the plans are to be realistic, they must be developed from a sound, factual basis. This calls for the development and application of new techniques for measuring and assessing the merits of alternative solutions. Surveys of transport and traffic in towns, of many kinds, have been conducted regularly in the past. But they have often been related simply to transport and traffic and have led to general forecasts of the increase in demand that can be expected in the future. New analyses of the urban problem demonstrate and emphasise the close relationship between transport in towns and the many social and economic factors which together determine the extent and shape of the demand for transport and which are, in turn, influenced by the transport facilities that are provided. In short, transport in towns cannot be considered or planned in isolation. It is an integral part of a series of inter-related elements which must be dealt with together in planning the future of a town.

V.2. This new definition of the urban problem lies at the root of new concepts on transport surveys in towns. It shows that it is no longer sufficient to deal with transport alone. New urban surveys must cover not only transport, in all its forms, but also the many land use, social and economic factors which are closely inter-related with transport. They must provide a method in which this inter-relationship is measured and used in the overall planning of a town and its transport, looking 20 or more years ahead.

TECHNIQUE

V.3. New survey techniques have now been developed which make such a comprehensive approach possible and which enable planners to explore on a quantitative basis the transport demands that will arise in the future from changing land uses and economic activities and, conversely, the impact on social and economic activities of different transport systems. Such techniques are complicated and are made possible only by the use of large computers. Individual methods differ widely, but the basic processes normally involved in the larger surveys are briefly these :

First, to survey in detail the existing pattern of movement of passengers and goods by all forms of transport. Similarly, to survey in detail existing land uses, population distribution, employment, car ownership and other factors generating a demand for transport. A quantitive relationship is then established between these factors and the transport demand they generate.

Secondly, to use this relationship to project forward a detailed pattern of future demand for transport associated with forecast and planned changes in land use, population, car ownership and other economic and social factors.

Thirdly, to test in practical and economic terms alternative plans for land use and for associated road and public transport systems.

V.4. The process is, in effect, one of building a « model » of a town's general activity and its transport which can be used to test alternatives both in the land use and the transport fields. Such tests provide an objective assessment of the adequacy of the existing and planned roads, and of other transport facilities, in relation to plans for land uses, and provide a sound basis for the development of future plans, on an integrated basis, for the social and economic development of a town and its transport system.

VALUE

V.5. A comprehensive survey involves very extensive field-work and data processing, all of which takes time and is inevitably expensive. But, provided it is properly planned, it provides much more than a means of drawing up, once and for all, a land use and transport plan. Once the « model » has been built it can be kept up-to-date, by checking from time to time the information on which it is based, and can continue to be used to give guidance on future land use and transport decisions. It is considered feasible to draw up a model which can remain reliable, with such periodic checks, for a period of 20 years.

V.6. As well as providing a base for developing an overall plan the survey collects, and makes available, in a form in which it can be readily used, a mass of detailed information — of assistance in considering a wide variety of individual planning projects and transport proposals. A survey also provides material for research into many problems within urban transport and planning.

Preparation and Conduct

V.7. Experience in carrying out surveys has brought certain points to the fore :

a) it is important to prepare the public, and local authorities, in the area concerned, in advance, by explaining the necessity and purpose of these enquiries. Publicity by press, radio and other media could be helpful;

b) the public have usually been found to co-operate well in response to house-to-house interviews, roadside interviewing of drivers, and interviews of passengers using public transport, provided the interviewing staff were well trained;

c) enquiries by questionnaires sent through the post have produced less satisfactory results : replies were received from a small proportion of those approached in this way, and it was not possible to assess how far they were representative;

d) care must be given to defining the area to be covered by a survey : it will normally include the whole of the continuous build-up area (which will often extend beyond the administrative boundaries of the local authority or authorities having jurisdiction in the main part of the built-up area and may include separately administered communities on the periphery). Transport movements within the built-up area need to be studied in detail; journeys to and from places outside this area can then be dealt with by surveys at the external cordon line.

V.8. The techniques which have been evolved for carrying out surveys and constructing statistical models should be valid for any city, though the data obtained will, in general, be peculiar to that city. As a general rule, therefore, it is not to be expected that a model based on a transport survey of any city will provide reliable guidance if applied to any other city. There may, however, be exceptions : an interesting contribution by the Spanish delegation, describing an actual example, suggests that, given a certain degree of similarity in major elements (population, density, numbers of vehicles, incomes per capita, etc.) between two cities, some theoretical predictions derived from a model produced for one city, when verified by actual sample checks in the other, fall within tolerable margins of error. The use of such « comparison models » can be valuable in saving time in certain stages of a survey, particularly in application to smaller cities.

Cost

V.9. The cost of a transport survey may appear high at first sight. In fact, as a proportion of the investments for which it is intended to provide guidance, it is quite small. It varies according to the amount of detail required and the size of the city or conurbation concerned. As there are certain unavoidable costs, regardless of the size of city, the total cost per head of population is higher in small cities than in large ones. In the United States of America, the average appears to be about $1 per head of population. In recent surveys in Continental Europe, in cities ranging from 500,000 to 1 million population, costs have lain between about French F, 2.00 per head for the smaller towns to about F 1.00 for the larger, with an average of about F 1.20 per head. A survey of the travelling habits of the population (about 1.2 million) was carried out in the Stockholm area in 1961-1963, largely by interview, at an estimated cost of about 1 million Swedish Crowns (= about 1 million French F). In the United Kingdom, estimated costs for a number of surveys are approximately as follows :

	Population (millions)	French francs (millions)
Merseyside	1.4	2.9
Birmingham	2.4	3.7
Manchester	2.4	4.2
London	8.8	10.2

Summary

V.10. Chapter IV showed how intimately transport planning and urban planning are related. This chapter describes an essential tool for that kind of combined planning. New statistical techniques have been evolved — and are being further developed in the light of experience — which make it possible to forecast future transport needs in relation to proposed changes in land-use, and to assess the impact of transport upon urban development. These transport surveys necessarily involve detailed and elaborate investigations but the « model » that can, as a result, be built up of the future transport system is an invaluable guide to long-term planning of urban and transport development alike, as well as providing an extremely useful means of testing the value of short-term proposals. The results of the survey, periodically kept up to date, can provide a continuing instrument for planning.

A. Ideal urban road systems

Note. This chapter is a short summary of the first two sections of a very full report by the Belgian delegation on ideal urban road systems, urban motorways and underground tramways.

Urban Planning and the Road Network

VI.1. The proper function of road networks is to promote the functioning of urban communities. As has been made clear in Chapter V, there is a close interaction between the kind and level of activities in any area of a town and the traffic which will be generated. Neither the location of these activities nor the provision of highways to serve them can be usefully considered in isolation. The two are parts of a single urban concept, and must be planned and carried out accordingly.

Concept of a Road Network

VI.2. The general framework of a road network should include :

urban motorways for external links giving access from outside the area to the main urban network of roads; these are full-scale motorways meeting the definition adopted by the Economic Commission for Europe as stated in Annex II, section II B of the Declaration on the Construction of Main International Traffic Arteries, 1950[1];

a *main road network* of primary and secondary routes; the primary routes should have some of the characteristics of motorways, such as dual carriageways and priority for traffic on them over side-road traffic, and should be designed to provide maximum flow of traffic; their width depends upon the capacity desired. This main network should be available for all kinds of vehicular traffic, and provide links between each neighbourhood and its surroundings, and with other neighbourhoods;

a network of *local roads,* serving each group of buildings within a neighbourhood, and having a limited number of points of access to the main road network. The partial sealing of each local network from vehicular traffic is achieved by concentrating the necessary services for daily life and normal activities within the neighbourhood.

Optimum Use of Traffic Routes

VI.3. Many urban highway systems do not enable the potential benefits of motor transport in speed and economy to be fully utilised. These benefits can only be achieved by distinguishing the different functions of the road system and adapting it to fulfil them. The following principles should be followed when an existing urban road system is re-designed or that of a new town is being laid out :

a) *Segregation of motor and pedestrian traffic*

The dangerous and illogical intermingling of areas reserved for pedestrians and for vehicles is the cause of many accidents. It would seem to be difficult, at least in the near future, to separate pedestrians completely from vehicles by providing different levels for each of them, except in specific and limited areas where traffic is very heavy. A more general practical solution is to delimit more clearly at ground level the areas reserved for pedestrians, those reserved for vehicles, and those where both must meet.

b) *Provision of separate road systems for through and local traffic*

Joint use of the same roads by local traffic — which is intermittent and slow — and through traffic — which is fast, and has no concern with the places through which it passes — produces unsatisfactory traffic flow giving rise to delays, bottlenecks and accidents. The necessary segregation of the two types of traffic can be achieved by re-organising the system into :

- primary routes, following roughly the general lines linking main centres of attraction; and
- secondary routes, to be adapted to local needs.

The two types of route would differ in the number, siting and design of intersections and points of access to adjoining premises.

c) *Selective limitation of use by different types of vehicle*

The capacity of a road is reduced when it is used by vehicles with very different characteristics in speed, acceleration, dimensions and

1. Motorways are roads for automobile traffic only; they are accessible only from specially designed interchanges and have no crossings at grade. These roads generally have two separate and independent one-way carriageways, each carriageway having at least two traffic lanes each with a minimum width of 3.5 metres.

load. Stricter segregation according to those features could secure lower costs of road construction : optimum speeds; maximum traffic flow; and increased safety and amenity.

d) *Segregation of traffic streams by speed or direction*

One way systems usefully improve smooth flow and safety in the narrower, secondary roads, but can only be applied where routes of approximately equal length and capacity are available in each direction. Where the main flow of traffic is in one direction at certain times, and the opposite direction at others, ease of movement may be increased by the « tidal flow » system, whereby a part of the road is reserved alternately for traffic moving in whichever is the predominant direction for the time being.

Transitional Measures

VI.4. Urban renewal is inevitably a lengthy process. Whilst it is proceeding, some measures will have to be taken to limit traffic. Certain possibilities are mentioned in paragraph 15 of Chapter III. What should *not* be done is to attempt to provide for increasing use of private cars for optional journeys (e.g. between home and work) by letting the flood of traffic spread over a wider network of streets, particularly those where people live and work. On the contrary, environmental areas must be the basic concept : the existing road network must be re-adapted by defining the limits of neighbourhood units, diverting through traffic from them, and organising local vehicular and pedestrian traffic within them. In Chapter II, paragraph 2, attention was drawn to the manner in which an excessive volume of motor traffic destroys the amenities of an urban environment. The ubiquitous presence of parked and moving vehicles, and even the apparatus for controlling their parking and movement, can prevent enjoyment of urban life, spoiling the appearance of cities and destroying the peace of quiet places in them. In short-term and transitional expedients, further sacrifices of amenity to traffic flow should be very critically considered, and made only under strong necessity.

B. Urban Network

Overall programme

VI.5. Piecemeal improvement of a road system, removing a bottle-neck here and re-designing a junction there, is of very limited value, and may merely transfer the overload to other key points. Both spatial lay-out and phasing in time must be planned and programmed for the system as a whole, and on such a scale as to meet, as far as possible, the maximum foreseeable demands of motor traffic. Large-scale road projects are costly to carry out, or to alter, once completed, and individual improvement schemes must be so designed and executed that they will fit into the final lay-out which is aimed at. If this method is adopted, the pace of the whole programme can be varied according to the growth of traffic and the economic situation.

VI.6. The interaction between transport planning and town planning has been discussed in Chapter IV, which makes it clear how important it is that transport plans should be drawn up on the basis of specific land-uses allotted in the development plan for the area, and of the geographical limits of urban development for which that plan provides.

VI.7. The planned capacity of the network will depend upon how far it is desired to meet the demand for optional, or non-essential, private motoring (e.g. car commuting, shopping, etc.) — that is to say, it is determined by the manner in which the town centre can be re-designed so as to be made accessible, whilst at the same time ensuring acceptable living conditions. The timing of construction and possibly the capacity of a motorway network may also be governed by national and local investment policies. It was pointed out in paragraph 4 above that urban renewal is a lengthy process. The development of an efficient road system in accordance with a master plan based on the principles set out in this chapter is part of that process. The construction of urban roads will, however, make very heavy demands upon financial resources and it may not therefore be possible to proceed as quickly as some road users would like with such plans. So as to take into consideration the order of priorities which will ensure that urban road networks meet the increasing traffic demands, we must see this as a long-term solution which in some cities and in some circumstances may take very many years.

Lay-out of the Network

VI.8. The important economic and financial considerations involved tend to limit the number of urban motorways, but where roads essential to the development of the town are concerned it is essential to be far-sighted. A compensating factor is that the other main roads in the system will only have to carry a volume of traffic requiring little or no road improvement even when the number of vehicles is trebled or quadrupled.

VI.9. The system must suit the lay-out of the city, with its focal points of activity and its traffic axes. A network with radial and concentric routes, for example, is suitable for a city which is expanding in various directions; such an arrangement helps to spread activities better over the whole area of the city.

VI.10. Chapter V describes the comprehensive land-use and transport surveys which provide a factual basis and statistical forecasts on which sound planning for future urban transport can be based. The data so obtained will provide a guide to the main traffic flows which will need to be catered for both in the urban development scheme which is ultimately aimed at and in the intervening stages until that scheme becomes a reality. It should, therefore, establish the basic outlines of the main road network and the sections where full-scale urban motorways are warranted as the only satisfactory means of dealing with the flow of traffic forecast.

VI.11. An urban motorway will normally involve placing some lengths in cutting, tunnels or on viaducts. The costs both of construction and of land acquisition are likely to be very high. In designing the road, therefore, full advantage should be taken of any line which minimises the cost of land acquisition and re-construction for a given flow of traffic. For instance, the line can sometimes make use of areas of slum clearance and so make for healthier buildings adjoining the road.

VI.12. The high proportion of town traffic which consists of journeys into and out of the centre, together with the proportion of rural traffic involving journeys to town, calls for *radial* main roads built to generous specifications and taking into account the fact that the volume of traffic increases towards the centre. Radial roads should not, however, be prolonged into the central area, bringing into the heart of the city a concentrated volume of traffic, exceeding the capacity of the other roads in that area.

Concentric Ring Roads

VI.13. An inner ring-road or relief road, to by-pass the central sector is desirable, so as to divert as much as possible of the traffic moving to or from other sectors.

VI.14. The complete-by-passing of the urban area only affects through traffic, and a fraction of traffic into the city which wishes to reach its destination by the easiest route, taking the length and time of the journey into account. As through traffic accounts for less than 10 per cent in towns of more than 500,000 inhabitants, the profitability of the operation is what must govern the decision to build such a road in each individual case. The by-pass may take the form of a diversion of an inter-city motorway, or in the case of large cities, it may be a ring road.

Performance

VI.15. A well-designed urban motorway has a lane capacity of two-and-half to three times that of an ordinary road. This is not because of greater width, but because dual carriageways, limited access, grade-separated junctions and easy curves and gradients allow uninterrupted flow at a steady rate, and thus increase the throughput of the road. Traffic on it is also much safer, the accident rate being from three to four times lower than for an ordinary road.

Pedestrians

VI.16. Except where built in tunnels or on viaducts, motorways form a barrier to pedestrians. Cities are built for people, and a characteristic of urban life is movement about the city on foot. Safe and convenient movement across the line of motorways must, therefore, be provided by the provision of footbridges or subways in sectors where pedestrian traffic is relatively heavy. Footbridges are obviously more suitable where the motorway is in cutting, as a footbridge need then involve little change in level for the pedestrian; elsewhere, subways involve less effort or inconvenience, but it is desirable, in order to ensure that they are used, that they should be made, and kept, attractive in appearance. At very busy points in some cities, the installation of escalators has been found useful.

Protection of the Line of Route

VI.17. Since a motorway system with its approacheroads will finally take up a lot of space and generate a lot of noise, the town planning aspect is of great importance; the fitting of roads into the site must, therefore, be studied from the point of view of the appearance of the whole. From this point of view elevated roads are aesthetically undesirable, the more so as they need to be served by numerous access ramps if they are to be of use in built-up areas.

SUMMARY

VI.18. The main conclusions reached in this chapter can be broadly summed up in the following way. The re-development of an urban road network should be determined by an overall plan, to be carried out in successive stages, and not in arbitrary or piecemeal fashion. The framework of this plan, which will govern the layout and capacity of the roads, shoul be settled in the light of a previous transport survey, as described in Chapter V. It should include : urban motorways, to provide access between areas outside the urban area and the main road network of the city; an internal network of primary and secondary routes; and, linked to these, local networks serving neighbourhoods. Primary routes, radially disposed and of high capacity should link the outer areas with the centre, but should not penetrate to nor traverse it. Important flows of traffic within the city should be catered for by an inner ring road or relief road, avoiding the congested centre. Optimum use of the network should be ensured by segregating traffic according to type, weight, volume, speed and direction. Whilst the long-term, physical re-development of the area in accordance with the overall plan is in process, interim measures of the kinds described in Chapter III will be required. In these temporary expedients, further erosion of urban amenities should be avoided to the greatest extent possible. Urban motorways, properly located and designed, have a high throughput and increase the economic and safe movement of traffic. The demolition of buildings involved can give an impulse to planned urban renewal, provided the lines of the urban motorways and main road network are suitably fixed and the programme of work is rightly phased.

VII. PUBLIC PASSENGER TRANSPORT : ITS CHARACTERISTICS AND FUNCTION, AND MEANS OF MAKING IT MORE ATTRACTIVE

A. CHARACTERISTICS OF PUBLIC TRANSPORT

VII.1. It was pointed out in Chapter II, paragraph 2, that the capacity of cities to accommodate the increasing volume of motor traffic is not unlimited, nor is their wholesale re-construction so as to enable them to do so feasible, or even desirable. At the same time, economic and social factors in modern urban life continue to increase the demand for mobility. Public transport, therefore, will have an increasingly important part to play. It is better suited than private motoring to handle peak-hour travel between home and work, and — particularly if it operates above or below street level — for journeys within congested city centres. The various forms of public transport have different characteristics, which affect their comparative efficiency in different circumstances. There are also certain identifiable factors which influence the attitude of the travelling public towards public transport.

Speed, capacity, infrastructure and operating costs

VII.2. These characteristics are greatly influenced by whether services operate on tracks reserved for their exclusive use, or share the use of the public highway with other traffic, and must be considered separately in the two differents sets of conditions.

Speed on public roads

VII.3. Public transport on the public highway must in general be limited to the average speed of vehicular traffic as a whole. This average speed has declined with the increase of congestion in city centres. Table I below shows the low average speeds (often little more than walking pace) now prevailing the centres of some large cities in Europe.

TABLE I

TOWN	SPEED AT OFF-PEAK PERIODS (*km. p. h.*)	SPEED AT PEAK PERIODS (*km. p. h.*)
Bordeaux (population 450,000)	12	9
Lyon (population 1,000,000)	11	4
Marseille (population 1,000,000)	8	6
Rouen (population 350,000)	8	5.5
Munich[1] (population 1,106,000)	28.4	7.5
Cologne[1] (population 818,000)	16	12
Dusseldorf[1] (population 705,000)	19.7	9.5
Bremen[1] (population 570,000)	17.3	7.4

1. Trams only.

In the central area of London, the average speed of traffic in general is about 17.6 km p.h. during off-peak hours and about 16.4 km p.h. in the even peak hour. Bus speeds are about 70 per cent of the general traffic speed — about 12.3 km p.h. and 11.5 km p.h. respectively.

Average speeds taken over complete routes are of course, higher than in central areas, but these figures show how greatly public transport on public roads is slowed down by general traffic.

VII.4. Stops to pick up or set down passengers further reduce the average speed of public transport by road. In London, the average loss of time at a bus stop has been assessed at 20 seconds. Counting three stops to a kilometre, a bus loses one minute every kilometre compared with other motor traffic, at whatever average speed the latter moves.

VII.5. Public use has been greatly influenced by the reduction in speed, and has declined in proportion to the population. Between 1954 and 1962, the urban population in France rose by 15.6 per cent, the average accommodation in public transport by 12.44 per cent, the number of kilometre-places available by 8.19 per cent, and the number of passengers by only 3.4 per cent.

Speed on exclusive tracks

VII.6. Public transport on tracks reserved for its exclusive use is not impeded by other traffic. Its average speed depends on the technical characteristics (acceleration, maximum speed) of the vehicles, and the time needed for passengers to board or alight. Only when traffic is approaching saturation point does the latter materially affect average speed, which is otherwise practically constant.

VII.7. When considering the speed of public transport, a distinction should be made between the average speed of vehicles (including stops) and the average speed for the user, which includes travelling time at each end of the journey. Most passengers reach public transport on foot, so that a considerable proportion of the overall journey time is taken up in walking, and in waiting for vehicles. In London, the following proportions have been observed.

TABLE II

Direct distance in miles.

TIME OCCUPED IN	1	2	3
Walking	54 %	27 %	18 %
Waiting	13 %	11 %	11 %
Riding	33 %	62 %	71 %
Overall speed	3 m. p. h	4 m.p.h.	5 m.p.h.

VII.8. Estimates of the optimum duration of journeys and the maximum desirable walking distances to and from public transport vary somewhat from country to country, but there is general agreement that the limit of terminal walking distances, if public transport is not to lose favour, lies between 250 and 400 metres in cities, though in the outer residential areas, 750 metres is acceptable. It follows that public transport is particularly suitable where housing or places of work are concentrated at high density within those radii of terminals or stopping places.

Capacity

VII.9. Table III shows the maximum capacities of various types of transport using a separate track.

TABLE III

	COST (millions of francs per km)	THROUGHPUT (passengers per hour at peak)
Overhead railway	15-20	30,000 - 50,000
Monorail	12-15	10,000 - 12,000
Underground railway	50-60	30,000 - 50,000
Buses using separate lane on motorway	variable	6,000 (with stops along the motorway) 20,000 (without stops)

VII.10. The capacity of buses using the public highway jointly with other traffic depends upon general traffic conditions and the characteristics of the road. In Paris, seven bus routes operate along the embankments on the right bank of the Seine, where a special lane was set aside for the sole use of buses and taxis. During the peak hour, it was used by 80 buses carrying 4,000 passengers, as well as 400 taxis carrying 520 passengers. The notion of capacity is difficult to apply in a precise way to transport services using the public highway, but their maximum throughput is definitely lower than that of services operating on exclusive tracks.

Costs

VII.11. Infrastructure costs should be distinguished from operating costs. The former are high for transport services using exclusive tracks, and low for those which use the public highway. The converse is true of operating costs, which generally tend to be lower for transport on exclusive tracks than for services using the public highway. Because of the large amount of initial installation work which it entails, public transport operating on exclusive tracks is only justified where very heavy loading can be assured. This is also true, but to a lesser extent, of public transport using the highway, which needs a considerable throughput in order to pay its way.

B. Present Balance between Means of Transport

VII.12. Distribution of traffic between the various means of transport varies considerably, in a given city, according to the nature of the journey, from city to city according to size, and from country to country according to the forms of urban lay-out in use.

a) *Variations by type of journey*

i) Starting point or destination : for reasons given in paragraph 8 above, and also because growing parking difficulties in city centres tend to discourage private cars, public transport is particularly suitable for journeys terminating in city centres. As a consequence, in all large towns, public transport accounts for a higher proportion of travel into the centre, than of urban travel as a whole. In the United States, the ratio is about 3:1; it appears to be lower in European cities.

ii) Direction : The importance of the centre has usually lod to a radial lay-out of public transport systems, with the result that connections between outlying districts are very poor, and individual transport becomes almost indispensable.

iii) Purpose : public transport's high capacity makes it particularly suitable to handle high peaks of traffic at particular times or in particular places. This applies especially to travel between home and work. The proportion of the total accounted for by public transport is greater at peak periods than at slack periods. With rising standards of living and increasing leisure, there is a tendency for travel for other purposes to grow rapidly. This form of travel will be mainly by personal transport and, being more dispersed than journeys to work, is more difficult to cater for, either in the provision of new roads for private cars or by a public transport system.

b) *Variations by size of city*

Public transport needs a substantial passenger traffic, and the degree of use can therefore be expected to increase with the size of the town. The figures in tables IV and V bear this out.

Table IV

	Population (*year of study*)	Percentage of travel by public transport
Chicago	5,200,000	25
Detroit	3,000,000	16
Washington	1,600,000	25
Pittsburg	1,500,000	20
St-Louis	1,300,000	15
Houston	900,000	13
Kansas City	850,000	10
Phœnix	400,000	7
Nashville	350,000	7
Ft-Landerdale	200,000	1
Charlotte	200,000	7
Reno	50,000	2

Table V

	Population	Percentage of travel between home and work by public transport
Mulhouse	150,000	13
Nancy	250,000	30
Rouen	350,000	27
Toulouse	350,000	31
Bordeaux	450,000	33
Marseille	1,000,000	54
Lyon	1,000,000	51

Table IV deals with towns in the United States and the figures relate to total travel, not only journeys to work. Private cars predominate in that country, and the smaller the town, the larger is their share of the traffic. Table V deals with travel between home and work in France, and shows the growing importance of public transport. It should be noted that two-wheeled vehicles are much used for individual transport to work; in medium-sized towns, they account for the major part of it.

c) *Variations by country*

Distribution of traffic is affected by two main factors, which vary from country to country : the form of urban lay-out, and the degree of motorisation.

i) Urban lay-out has a decisive effect. Expansion at very low densities, on American lines, militates against the development of public transport. Walking distances between originating or destination points and terminals or stop-

Comparable figures for certain large urban areas in Belgium and the German Federal Republic are given below.

TABLE Va. TRAVEL BETWEEN HOME AND WORK, MAIN URBAN CENTRES IN BELGIUM

BUILT-UP AREA OF	POPULATION	TRAIN	OTHER PUBLIC TRANSPORT	TOTAL BY PUBLIC TRANSPORT	PRIVATE CAR	M/CYCLES ETC.	ON FOOT	BY PUBLIC TRANSPORT TO CENTRE AS PROPORTION OF TOTAL TRAVEL TO BUILT-UP AREA
		PER CENT						
Brussels	1,029,700							
a)		22.7	38.5	61.2	17.9	3.2	17.7	
b)		53.2	18.8	72.0	10.2	1.0	16.8	9.7
Antwerp	656,000							
a)		10.3	29.3	39.6	12.9	26.7	20.8	
b)		3.4	42.2	45.6	19.9	34.5	—	10.8
Ghent	229,000							
a)		12.5	17.3	29.8	8.5	37.8	23.9	
b)		1.8	25.0	26.8	15.6	57.7	—	9.7

a) Place of employment in built-up area.
b) Place of employment in central area.

TABLE Vb. TRAVEL BY PUBLIC TRANSPORT AS PERCENTAGE OF TOTAL TRAVEL BETWEEN HOME AND WORK OR SCHOOL (CITIES IN FEDERAL GERMAN REPUBLIC)

	POPULATION	TRAIN	TRAM	BUS	SHARE OF TOTAL TRAVEL HOME TO WORK/SCHOOL[1]
		PER CENT			
Munich	1,106,000				
(Central area)[2]	171,000				
a)		3.4	58.4	3.2	65.0
b)		64.0	2.5	9.8	76.3
Essen	729,000				
a)		9.7	44.5	16.0	70.2
Dusseldorf	705,000				
a)		0.1	61.6	—	61.7
b)		31.6	32.8	18.6	83.0
Frankfurt	688,500				
a)		3.3	63.4	—	66.7
b)		48.7	7.8	19.3	75.8

1. Excluding pedestrians.
2. Business and working population of central area.
a) Tavelling within the city.
b) Travelling into the city from outer areas.

ping places of public transport are too great, and low densities cannot provide any substantial volume of traffic. At the opposite end of the scale is the type of development adopted, for example, in the German Federal Republic, where many cities plan their expansion in the form of satellite towns centred upon a railway station. This direct link with the centre of the existing city by a form of transport having the advantages of an exclusive track can be expected to give it a predominant role in travel between the satellites and the city centre. (The general relationship between density and efficient public transport is clear enough, but the matter has other implications, outside the transport field, which have been touched upon in Chapter IV, paragraph 17, above.)

ii) The degree of motorisation also profoundly affects the distribution of traffic. In addition, it has a considerable indirect effect on the form of planning- layout. The low-density expansion of American cities is only possible because of the motor car. Nevertheless, despite increasing motorisation, European countries tend to favour town planning on different lines. Statistical data at present available suggests that growing motorisation leads to a change in the distribution of traffic between means of transport, whatever the type of town-planning.

C. Means of Making Public Transport More Attractive

Factors governing choice.

VII.13. Everyone who has to make a journey is faced with a choice between several modes of transport : walking, public transport, individual transport by car or by two-wheeled vehicle, etc. His choice will depend on a number of factors, the most important of which are travelling time, comfort and cost. These factors can be calculated and reduced to a common monetary scale. By influencing these various factors it is therefore possible to change the distribution among means of transport and to make public transport more attractive.

Duration of journey

VII.14. A survey carried out among transport users in Chicago gave the following results :

	Travel by public transport		Travel by private car	
	Destination		Destination	
	City centre	Other	City centre	Other
	%			
Quickest means of transport	40	14	29	37
Comfort	11	2	28	24
Car necessary	0	0	31	19
Only available means	1	19	6	12
Less walking	11	19	4	3
Lower costs	18	16	0	1
Miscellaneous	19	30	2	4

The results depend largely on destination, but undoubtedly also on the motive for the journey. They indicate the high value attached to travelling time in a civilisation where living standards are high, and it may be assumed that this will tend more and more to become the main factor of choice.

VII.15. A recent study made in 1963 by the Institut d'Aménagement et d'Urbanisme de la Région Parisienne (Institute for Town Planning and Improvement in the Paris Area), on the factors of choice for users of SNCF urban lines as between bus and underground railway also gives interesting results. It was noted that users behaved as if they valued their time at about 3 francs an hour (which represents about half their average hourly wage rate, i.e. F 5.50). It thus seems that the value attached to travelling time by transport users is less than their hourly wage, which at first sight is astonishing and contradictory to economic theory. But, as incomes rise, the value which each individual attaches to his time increases and, in an economy where the labour market is completely fluid, the value which the individual attaches to leisure time or travelling time may become the same as that of working time.

Convenience and comfort

VII.16. Few facts are available on the value attached to comfort in transport, yet this is by no means a negligible factor of choice. It has been found that motorists showed a preference for routes on which traffic was uninterrupted (motorways) rather than traditional routes, and studies are now in hand to try to assess this « psychological advantage » of motorways, wich is estimated in France at three centimes a kilometre in open country. It is even more certain that, for equal time and cost, the choice between modes of travel is strongly influenced by the amenities of the competing modes.

VII.17. There are slight differences of view, based on national experience, about the order of relative degrees of importance in which the travelling public in different ECMT countries rates such factors as speed, reliability, number of changes, amount of waiting time and physical comfort. Surveys in a city in the German Federal Republic show the order of public preference was : direct connection; frequency; cheapness; spees; comfort. In London the factors which influence choice seem to be dependability (frequent, regular service or adherence to timetable); convenience and comfort; and cost — in that order. Time spent in waiting, especially for connections, where a change is involved, is certainly an important factor. Investigations in the German Federal Republic indicate that the public will not use underground or city railways for journeys involving more than two changes. The IAURP study mentioned in paragraph 16 above showed that users rated time spent in waiting for public transport, or for connecting services, at double the value of the travelling time. Further studies on this subject would be worth while, for there is reason to believe that, as city-dwellers become more and more exacting and less tolerant of restrictions, they will also tend to attach greater importance to this factor of choice.

VII.18. Although passengers do not appear to rate the physical comfort of travel in public vehicles as highly as some other factors, the general view is that it varies according to duration : passengers, for instance, are willing to travel standing on a comparatively short journey, if by so doing they avoid having to wait a few minutes at a stopping place.

Level of fares

VII.19. As the standard of living rises, the level of fares will tend to decline in importance; in consequence, a much sharper differentiation will be needed to produce the same effect. The highest fares will have to go up; but, on the other hand, reduction of fares is likely to make less and less difference to the pattern of travel. It is estimated that, in the Paris region, the introduction of completely free travel by public transport would have little effect on the travelling habits of a substantial part of the population.

VII.20. Although individual choice between modes of travel depends on the factors of time, comfort and cost, it is often possible to affect overall balance directly, for the number of possible solutions is limited by considerations of capacity. The number of parking places and the size of the roadway thus have a direct influence on the number of vehicles travelling to each part of the city, and the number of passengers may be limited by the capacity of public transport stations. Fares on public transport can be calculated in a number of different ways, e.g. to cover total costs, including interest on capital; to cover costs less a fixed subsidy; to maximise revenue; or on the basis of marginal cost. The best use of infrastructure and vehicles is likely to be achieved when the last basis is used.

Action to influence factors of choice

VII.21. Effort should be directed towards improvement in the major factors which, as pointed out above, influence the travelling public towards or away from public transport — time, convenience and price.

Journey time

VII.22. It was pointed out in paragraph 17 above — and the figures in Table II, paragraph 7 above, illustrate this very clearly — that the important factor is not only the time spent in vehicles, but the total duration of a journey, from point of origin to destination. This comprises time spent in :

a) reaching the station or stopping place;
b) movements within stations, including changes from one vehicle to another;
c) waiting; and
d) travelling in the vehicle.

Each of these elements must be considered separately.

VII.23. *Point of origin to station.* This part of the journey may be made on foot, by car or other individual transport, or by intermediate public transport. Although the acceptable walking distance is limited (see paragraph 8 above), the majority of passengers still arrive at stations on foot. This accentuates the importance of population densities in their immediate vicinity, and reinforces the influence of town planning upon public transport, high density development in residential areas centred on suburban railway stations facilitating rapid travel between homes and places of work in city centres, whilst low density suburban development, in the American style, is highly detrimental to it.

VII.24. It would be well worth while to study the influence of terminal journeys on foot, for little is known about how much value people attach to time thus spent. It may depend greatly upon weather : walking in bad weather being uncomfortable, the time spent would be rated highly, whilst time spent in walking in fine weather may be regarded as no loss, or even a positive gain.

VII.25. It seems likely that the use of private cars to drive to stations will remain limited, at any rate where conurbations with a population not exceeding one million are concerned, though an experiment carried out in Hamburg was inconclusive. In the largest cities, on the other hand, the combination of private car and public transport may become widespread. A programme for building car parks with a capacity of 50,000 is going forward in the Paris region. They will be sited mainly on the periphery, near the outer ring road, and further out at suburban railway stations, and lower fees will be charged than in central Paris. In Portugal, too, parking places are being built at outer terminals of urban railway, tramway or trolleybus services.

VII.26. *Movements within stations and in changing vehicles.* The time taken to reach platforms from outside a station, or to pass from one platform to another, is very important. Lengthy or inconvenient movements are resented. Calculations related to the Paris region have shown that passengers rate time spent in these movements at twice the value of time spent in vehicles. It is very desirable to make these movements as easy and quick as possible. Escalators, moving pavements and protection from the weather should be provided. Convenient interchange between different means of public transport should be included under this heading. Some interesting results have been obtained in stations used jointly by buses and underground railways, a good example being in Hamburg and another at Berne. Similar projects are in hand in the Paris area.

VII.27. *Waiting.* Time spent in waiting is also resented, and is rated by the public at double the value of time spent in travelling in vehicles. In France, it is considered that waiting time should not exceed 5 minutes on urban services — the average time for complete journeys being 10 to 15 minutes. On suburban lines, where so high a frequency is impracticable, special efforts should be made to maintain regularity and punctuality. Experiments in the United States to ascertain the effect of increasing the frequency of services upon public use have been inconclusive so far.

VII.28. *Average speed.* Paragraphs 2 to 6 above emphasised the marked difference between the service speeds (including stops) of public transport running on exclusive tracks and that which uses public roads jointly with other vehicular traffic. Given the peak capacity attainable, the provision of a system using exclusive tracks can only be justified in very large cities. The population level at which an underground railway system becomes justifiable cannot be stated with any precision. It is generally put at between 1 million and 2 million; another estimate calculates it in terms of a peak-hour load of about 25,000 passengers per route in each direction. In this context, it will be seen in Capter IX below that the underground railway system in Stockholm now serves a population of 1.2 million people, and extensions are proposed in order to serve an estimated population of 1.75 million people in 2000 AD. At present 450,000 people use the system, and the ultimate planned capacity is 900,000, with a peak capacity of 36,000 passengers per hour, per track.

VII.29. The high cost of new systems on separate tracks points to the desirability of a close study of the potentialities of the existing railway network. Railway stations are usually centrally located in towns, which is advantageous for urban travel. Railway lines serving provincial stations operate at well below capacity. If progress in this direction were sought, it would be necessary to adopt plans for urban development which would be compatible with it.

VII.30. Generally speaking, there are only limited possibilities of increasing the service speed of transport using exclusive tracks. Electrification of the railways' suburban lines (as in the Paris region) may be mentioned, and the fitting of pneumatic tyres on the Paris metro has increased service speed by about 10 per cent.

VII.31. Punctuality and higher average speeds for public transport using the highway may be achieved in various ways :

i) by improving general traffic conditions by carrying out major road works or making more efficient use of the roads;

ii) by diversifying the vehicles used, so as to adapt them to traffic conditions : small buses, double-decker buses, articulated vehicles, etc.;

iii) by reducing stopping time : through improvement of station facilities, prohibition of parking, widening of the roadway, etc., through better vehicle design;

iv) keeping public transport vehicles clear of traffic congestion as far as possible by :

— marking reserved strips or lanes on existing or new roads. Some experiments with reserved strips are now in progress in various towns throughout the world : London, New York, Milan and Paris;
— partial transfer to separate tracks; major infrastructure works have been carried out on tramways in the principal German towns, in Brussels and in Vienna with the object of keeping them clear of general traffic in city centres;

v) by introducing suitable charges for the use of roads and parking of individual means of transport in order to reduce the volume of this traffic.

Convenience and comfort

VII.32. The convenience and comfort of the four elements in the journey, mentioned in paragraph 22 above, can also be enhanced in various ways. Some of the measures already suggested for reducing journey time would simultaneously increase convenience and comfort.

VII.33. *Access to stations.* The immediate approaches to stations, especially in town centres, are often inconvenient for pedestrians, and conditions could be improved for them by footways segregated from vehicular traffic, and, where possible, sheltered from the weather. Where car parks are provided at stations to encourage « park and ride », they should obviously be made big enough to accommodate the foreseeable peak traffic.

VII.34. *Movement within stations,* including changing vehicles, has been discussed in paragraph 26 above. (In this connection, increases in speed and in convenience amount to much the same.)

VII.35. *Waiting* can be made more pleasant by providing shelter from the weather and — where this has not already been done — by improving the appearance of the surroundings. Re-decoration of underground stations and the provision of show-cases are expedients which have been adopted on the Paris metro. Cleanliness, adequate seats for waiting passengers, good lighting, adequate heating and ventilation, pleasant colours and modern appearance, both in stations and in vehicles, are important if a serious effort is to be made to enable public transport to compete with the private car for public favour.

VII.36. *Travelling in the vehicle.* The best ratio of seats to standing room is difficult to determine. An allocation of 40 per cent - 50 per cent of seating has been suggested, though on some urban bus services proportions of 30 per cent seating accommodation and 70 per cent standing room have been adopted. From the point of view of comfort, it is desirable to provide the maximum of seats, comfortably designed and upholstered. At the same time, peak-hour operation generally requires a good measure of standing room, and where peak-hour traffic is dense, passengers attach less importance to seating than to the minimum waiting time. The importance of seating is also proportionate to the length of journey, and probably the best solution, where practicable, is to provide a higher proportion of standing room on vehicles operating mainly on routes within city centres, with frequent stops, and of seats on longer runs, e.g. suburban railway services. Tip-up seats, used in the off-peak hours whilst allowing more standing room at peak hours, are a convenient compromise. The fitting of pneumatic tyres on the Paris metro has not only increased speed (v. paragraph 31 above) but has also substantially reduced noise and enhanced comfort.

Price

VII.37. Alterations in the fares structure of public transport can be expected, broadly speaking, to have less effect than measures which can be applied to individual transport and to parking, whether monetary, or regulatory, or both. Fares on public transport are generally on the low side, and reductions are unlikely to induce more passengers to use it, in preference to private cars. More effective monetary and regulatory measures applied to other means of transport, therefore, offer better prospects of altering the balance in favour of public transport. A reduction in the volume of other traffic would, moreover, have the secondary effect of improving the service speed of public transport by road (as was noted in Chapter III, paragraph 20 above).

Taxicabs

VII.38. The discussion in this chapter has concentrated upon mass public transport. Taxicabs are a special case. They may be described as hybrids, partaking of the characteristics of both public and individual transport : like public transport, they are available to all, and public authorities exercise some measure of control over their operation; on the other hand, their transport characteristics resemble those of individual transport, for they use the highway jointly with other traffic; do not operate on fixed routes or schedules; have low capacity (v. paragraph 10 above); provide door-to-door service; and are extremely flexible. The possibility of « co-ordinating » a service of this nature with mass, public transport media is obviously very limited. Nevertheless, if a solution to the problem of urban traffic is to be sought along the lines of restricting access by private cars to city centres, whether by direct or indirect means, a fleet of taxicabs, adequate in number and quality, and efficiently operated, will become even more important than now. Even a highly efficient and convenient system of mass, public transport cannot, by present-day standards, adequately replace individual transport in all respects, and it seems clearly advisable, as part of any sustained policy to change the balance in favour of public transport, that systems of control of taxicabs should be reviewed with care and, where necessary, adapted so as to ensure that they respond to the greater demands which will be made upon them.

Summary

VII.39. The analysis of the characteristics of public passenger transport in this chapter shows that, in speed and capacity, transport systems operating on exclusive tracks have, in general, advantages over those which share the use of the public highway with other traffic : the efficiency of systems of the latter kind, and the proportion of urban populations which use it, have declined as private motoring and urban traffic congestion have increased. The relative advantages of systems using exclusive tracks — railways (surface, underground or overhead) and tramways sited on reserved land — increase with the size of cities, and such systems are generally better suited to handle high peak loads, especially between city centres and outlying areas. As for costs, exclusive track systems tend to involve heavy infrastructure costs and low operating costs per unit of performance, whereas the converse is true of services which use the public highway jointly with other traffic. The distribution of traffic between different means of transport is affected in different ways by several varying factors — the type, direction and purpose of the journey; the size of city, the kind of urban lay-out generally favoured in the country concerned and the level of private car ownership prevailing there. Investigations have been made in several countries into the main factors which determine the individual's choice between available means of transport; and the relative influence of these factors can to some extent be measured in monetary terms. The three major factors are : duration of journey; convenience and comfort (these terms including such matters as ease of access, speed, frequency, regularity, through travel to destination, and physical comfort in vehicles and stations); and cost. Public choice can, therefore, be influenced by improvements of public transport services in these respects. The first two factors have a greater effect than cost, the influence of which as a factor of choice probably varies in inverse proportion to the standard of living. Improvements in one of these respects will in several cases produce improvements in another. The density of development within the catchment area of a service has a profound effect upon its efficiency and attractiveness.

Supplementary comment - goods vehicles

VII.40. This chapter has concentrated upon the problems of *passenger* transport in urban areas, which is the sector of urban transport where the change from public to individual transport, and its consequences, are most pronounced. Obviously, however, road goods vehicles are also involved : where congestion prevails, it has adverse effects upon the economics of their operation, just as it has upon the operation of public passenger transport by road; and where goods vehicles are needlessly brought into congested areas, they in turn contribute to the general difficulty. Nevertheless, goods must be carried into and within cities by road. These operations are very diffuse, and do not lend thermselves to the same analytical treatment as public passenger transport. However, in the course of this investigation, both the requirements of essential goods traffic, and the need to apply some measures of control to it, have been borne in mind. Thus, for instance, in Chapter III, reference is made to the need, when parking restrictions are imposed, to make allowance for essential vehicular access to roadside premises, and the possible need to prohibit loading and unloading on some roads. Again, the routeing of through traffic away from congested city centres, and the selective limitation of use of roads by different types of vehicle are recommended in Chapter IV — the latter, in particular, has obvious applications to heavy goods vehicles. In Chapter IV, the development of goods vehicle depots on the outskirts of towns is commented on. In the long term, of course, the physical re-development of cities on more rational lines should enable those activities which generate goods traffic by road to be so located in relation to a city and to a re-organised road network that goods vehicle operation, whether for long-distance haulage or local collection and delivery, can be carried on more efficiently and economically, and without contributing to the general ill-consequences of urban congestion, as it so often does to-day.

VIII. CO-ORDINATION AT REGIONAL AND LOCAL LEVEL

Concept of a Traffic Region

VIII.1. Urban development is expanding more and more beyond the administrative boundaries of towns, into the surrounding country, and the limits of residential areas associated with a town are largely determined by the mode and length (in time and distance) of commuter travel by public or individual transport. There are areas, sometimes extending over a radius of 25 km or more from city centres, where housing, economic activity and transport are closely related. In such areas, it is imperative that local and regional transport should be co-ordinated. The Commission of Experts appointed by the German Federal Government to inquire into urban traffic conditions found these distinctive characteristics in 60 areas in the Federal Republic, of which 13 had populations of 500,000 or more. They designated them « traffic regions ».

VIII.2. The extent of traffic regions, which include or encroach upon the areas of several local authorities, creates an administrative problem. Hitherto there has been no single authority responsible for the planning and co-ordination of transport in a whole traffic region, and the Commission consider that some new form of organisation must be found to assume this function, so that the ordering and improvement of transport and traffic conditions may be accelerated.

Urban Transport Conditions

VIII.3. The national territory is relatively small, but densely populated, and German cities, in common with others in Western Europe, are faced with the problems (described in Chapter II, paragraph 2, above) of heavy pressure of road traffic upon limited and valuable space. The improvement and strengthening of short-distance public, passenger transport is thus essential. As a rule, local public transport is not in single ownership, services being provided by various means and by different undertakings or authorities. Co-ordination therefore assumes special importance.

Functional Characteristics of Means of Passenger Transport

VIII.4. The characteristics of different forms of public passenger transport have been described in some detail in Chapter VII above. It is necessary to recapitulate here only certain salient points which are particularly relevant to the question of co-ordination :

a) Motor buses, whilst less efficient than railways as a means of mass transport, are more flexible and require lower capital investment. Buses often provide, by themselves, adequate services for small towns, and some larger towns also rely upon them exclusively. Trolley buses have very similar operating characteristics : though less flexible than buses, they are noiseless and emit no fumes.

b) The disadvantages (stressed in Chapter VII) of tramways operating on public roads can be overcome by placing tram-lines on reserved tracks, separated from other road traffic in the horizontal, or, in places, the vertical plane - generally by putting them underground. The latter expedient may be 8 to 10 times more costly than the former, but is likely to be increasingly used in congested centres where no space can be made available at street level for segregated tracks. Examples are to be found in cities in several ECMT countries.

c) Local and suburban railway services are part of the transport system of a traffic region, and are well-suited to link the more remote residential areas with city centres, or different centres of a large conurbation, and they can be developed at low cost to provide quick travel between new residential areas and centres of economic activity or satellite towns. It may be possible and advantageous to develop suburban lines so as to converge on approaching the city, and project them through the city centre, so that more direct connections are made possible by rail alone. The development of residential areas along the routes of suburban railways, and of local feeder services by bus, provides an adequate source of traffic.

d) The transport characteristics of taxicabs, and the increasingly important role which an efficient taxicab service can play in the development of urban public transport, are discussed in Chapter VII, paragraph 38. When co-ordination of urban passenger transport is being considered, that role must not be lost sight of.

OBJECTS OF CO-ORDINATION

VIII.5. Co-ordination has several aspects. Its first objective is to secure the smooth and economic movement of traffic in general throughout the city and the surrounding traffic region. In addition, it must aim to secure that each means of transport is employed in the manner and for the purpose to which it is best suited by its characteristics. The choice of the most suitable form of transport to perform a given transport function requires thorough investigation, in which town planning, transport, traffic engineering, technical operating and economic aspects must all be taken into account.

COME FINANCIAL IMPLICATIONS

VIII.6. The most important factors affecting attractiveness and efficiency of short-distance public transport have been discussed in Chapter VII. If public transport is to develop so as to make a real contribution to the improvement of traffic conditions generally, it must be along these lines. The financial implications are considerable. The transport undertakings involved should be placed upon a stronger economic footing. In principle, they should be enabled to charge fares which are commensurate with costs. In many cases, however, they are prevented from doing so by factors over which they have no control, such as low tariffs imposed upon them for social reasons, high licence fees, transport taxes, etc. The removal of these burdens, which are, strictly speaking, extraneous to the economics of transport, may be judged unacceptable upon grounds of general policy, however beneficial to transport development as such. If public transport is to be prevented, on grounds of public policy, from operating on a viable economic basis, public funds appear to be the only source from which the resulting deficit can be made good. If the maintenance of an acceptable standard of service by public transport undertakings is postulated, there appears to be no other alternative. The extensive structural works involved in re-siting tramway tracks on reserved land at street level, or placing them above or below street level in central areas, involve investment which the tramway undertakings themselves could not possibly finance. But there are grounds for thinking that even high investments in the improvement of short-distance public transport may enable still greater investments in highway construction to overcome the growing congestion, to be avoided. These considerations suggest that such works should be carried out free of cost to the tramway undertakings. To a certain extent, the German Commission of Experts advocated the taking over of these costs; this idea finds support in the similar Brussels project, and in experience in the provision of an underground railway system in Stockholm, both of which are treated in Chapter IX.

VIII.7. A policy of equal treatment of different carriers providing short-distance public transport is necessary if effective co-operation between them is to be secured; they should be in the same relative competitive positions as regards taxation, subsidies, etc.

VIII.8. In the context of taxation policy, information supplied by the German delegation shows that the income tax law of the German Federal Republic contains a feature with a direct bearing upon commuter travel by private car. The provision in question allows tax-payers an exemption from income-tax in respect of the cost of travel between home and place of employment. This allowance was originally based on the assumed use of public transport, and the general allowance is at a level which taxpayers' actual expenditure on travel between home and work by public transport seldom exceeds in practice. The allowance was subsequently extended to travel by private car between home and place of work, and car commuters are entitled to exemption calculated at a daily rate which, in many cases, results in an annual exemption higher than the general allowance referred to above. This feature of the taxation system is a direct inducement to commuter travel by private car. Whilst there are instances in other ECMT countries of the cost of daily travel forming a specific element in fixing wages and salaries, these are *borne by employers*, and, except in Austria, no other instance is known to the Group of any provision in national income-tax laws comparable to this one in Germany. Its existence in its present form would clearly seem to be a not inconsiderable obstacle to efforts to influence private car commuters to use public transport.

Co-ordination of Planning and Operation

VIII.9. A particularly important means of co-ordination is the establishment in each traffic region of a unified plan for the development of all means of transport, according to their best operational possibilities. This comes about automatically where a single local authority operates all public passenger services by various means, or is able to regulate closely the operation of services by privately-owned undertakings. In practice, however, these conditions are rarely found. In many traffic regions, an important part of the area is served by main line or local railway services; and frequently services are provided by municipally-owned transport undertakings of adjoining townships in the same traffic region. It is urgently necessary to secure the integration of planning by this variety of authorities. Unified transport plans should cover all forms of transport, including individual transport. Comprehensive transport plans have proved very useful in towns where they have been drawn up. The organisational machinery for bringing about unified planning and co-ordinated operation of puplic passenger transport in a large urban area and its immediate surroundings presents a problem for which no general, ideal solution has emerged. Solutions must in any case, it seems, be worked out in the context of national institutions and administrative practices. Some examples of different attempts to come to grips with this problem have, however, been examined, and are set out in Appendix II to this report.

VIII.10. Emphasis has been laid elsewhere in this report (Chapter III, paragraph 18 and Chapter VII, paragraph 26) upon the importance of relating infrastructures and installations so as to facilitate interchange between different forms of passenger transport.

VIII.11. Co-ordinated operation of different existing forms of public passenger transport is brought about mainly through operating schedules and the formation of tariffs. In fixing fares on a given service, regard should be had to the probable effect upon competing services. Where different transport operators serve the same urban area, they should not compete in fares. This does not mean that fares between the same two points by different forms of public transport must necessarily be identical, since differentiation may be desirable to encourage functional efficiency - as, for instance, between short-distance and longer-distance traffics, or between peak hour and off-peak travel. It is, on the other hand, generally desirable to facilitate through booking for journeys where more than one form of transport is involved, and interavailability of tickets. These objectives require, not indiscriminate uniformity, but the application, where fares are subject to control, of a deliberate and consistent policy.

VIII.12. Co-ordination can to some extent be brought about by voluntary collaboration among transport undertakings; or between public authorities and transport undertakings. The following examples are to be found in the German Federal Republic :

a) Co-ordinating committees, including representatives of municipal and privately owned passenger transport undertakings, bus undertakings of the Federal Railways and the Post Office, and the Federal Railways themselves.

b) An « outline agreement » between the Federal Railways and the association of public transport undertakings (all public transport services represented in the International Union of Public Transport), designed to eliminate competition between their respective services and encourage the provision of local « feeder » services to connect with railways, and inter-availability of tickets.

c) An « outline » arrangement between the two parties mentioned in *b)* and the association of German municipalities, setting out certain planning principles to which all three parties subscribe, to encourage joint consultation so as to co-ordinate long-term and short-term programmes, and to ensure that transport considerations are given proper weight by planning authorities.

Summary

VIII.13. The general conclusions which may be drawn from this chapter are the following : The problem of regional and local co-ordination arises largely from the fact that local government and the organisation of transport have not developed in step with increases in the population, size and economic activity of large urban areas. The dispersal of ownership and administrative control de not favour the consideration of public transport as a whole in large cities or the concerting of administrative measures to secure that local transport services are operated so as to complement each other and meet the needs of the city and associated areas with maximum efficiency. Institutional arrangements are needed which will enable plans to be drawn up and carried into effect with the active collaboration of transport undertakings and of the authorities concerned with the general welfare and development of the urban areas. Substantial investments in transport infrastructures and equipment will often be involved, and the financing of these investments requires careful study. Fiscal policies may need to be aligned to serve the same ends. To some extent, collaboration of the kind required has come about, or is developing, on a voluntary basis; and in some cities, in several ECMT, countries, the process has gone further and assumed definite legal forms. This trend is, however, as yet only partial, and there is scope for further investigation into the possibilities of more effective solutions, though these must necessarily vary from country to country in accordance with constitutional and administrative practice.

IX. DEVELOPMENT OF NEW URBAN TRANSPORT SYSTEMS (BRUSSELS AND STOCKHOLM)

IX.1. Urban transport systems in various European cities have in recent years been, or are now being, radically improved or greatly extended. Two particular examples - the placing of the tramway system in a city centre underground, and the construction of a new underground railway system, are discussed in this chapter. Although the first solution is described below in general terms, it is based upon a project in Brussels; similar schemes are also in hand, or projected, in a number of German cities, of which some further details appear in Appendix III (Reference may also be made to valuable material in the Report by Professor Bockemühl, of Stuttgart, and Dr. Bandi, of Berne, to the International Committee of the International Union of Public Transport at its XXXVth International Congress at Vienna, in 1963). Similar works have been undertaken also at Cannes and Monte-Carlo. The underground railway system is in Stockholm. They appear to be of particular interest fort several reasons : the two cities are very different in geographical situation and configuration, and these factors, among others, have led to the adoption of different solutions : at the same time, the basic problemes of urban traffic congestion, expanding population, the preservation of historic centres and the amenities of urban living, the desire to maintain the vitality of the city centre as a focus of urban life, and the close link between urban transport and planned development of outlying areas associated with the city, have been present in both cities. In short, similar questions have been asked; the cities are different, and different answers have been found. The two projects, moreover, provide concrete illustrations of many of the points which have been discussed in other chapters.

A. Underground tramway Systems

Advantages of separate track systems

IX.2. The handicaps which traffic congestion imposes upon public transport operating on roads in common with other traffic have been stressed at various points in this Report, as have the important avantages to be derived from public transport operating on reserved tracks. The latter are more clearly recognised if the traffic problem is put in its proper terms; it is not how to make room for the greatest number of cars, but how to provide transport for the greatest number of people.

IX.3. Segregated tracks for public transport in city streets may be provided either by siting tramway tracks on reserved strips, or by assigning lanes on the carriageway to the exclusive use of buses. These possibilities are limited in the difficult central areas by lack of space; an alternative is to put public transport on a different level, either underground or on an elevated way.

Critical load factors

IX.4. In towns of more than 500,000 inhabitants, rail transport (trains or trams) is to be preferred to buses or trolley-buses for mass transport in view of its capacity, economic operation and the fact that it uses less street space; this superiority becomes especially obvious if high-capacity vehicles (articulated, for example) are used and if separate routes are reserved for them, including underground routes of which they have exclusive use.

IX.5. An underground railways has the advantages of high operating speed and almost complete safety, but its mode of operation requires it to be segregated from other traffic throughout its length. Accordingly, if the street plan precludes the possibility of building it at ground level or on viaducts, it must be wholly underground. It will then be particularly expensive to construct and will usually be justified only where there is a heavy concentration of traffic, of the order of 25,000 passengers per hour per line in each direction at peak periods.

IX.6. In most towns of less than a million inhabitants these conditions are not met, or could only be met over small sections of the central part of the line. In these circumstances the system could not be at all intensive and on most journeys passengers would be obliged to change vehicles and use a means of surface transport subject to all the hindrances of traffic.

IX.7. In a town of low population density in which the number of passengers at peak periods is comparatively small, but in which traffic is a serious problem, a tramway under the road, the underground part of which is limited to the congested central area, can provide an immediate solution by allowing most travellers living on the outskirts to reach the centre directly without change of vehicle.

Lay-out and phasing

IX.8. To ensure that the underground sections operate at maximum efficiency it will often be necessary to limit their number by re-arranging the system, simplifying and concentrating the lines. In this way it will be possible, with large numbers of passengers at peak periods, to provide frequent services while using vehicles of high capacity. Such a conception represents economies in fixed equipment (workshops, depots) and rolling stock, compared with an underground railway.

IX.9. Initially the system of tunnels can be limited to those most essential to relieve the traffic in the most congested part of the town; it can be extended as surface congestion spreads to other areas. The work can be completed by sections through the use of temporary movable ramps; the capital invested thus becomes productive in a short time.

IX.10. Tunnels provide reserve capacity for rail transport, since the numbers transported can be increased by lengthening trains and increasing their frequency until a figure of the order of 20,000 passengers per hour is reached.

Transition to full underground railway

IX.11. The underground tramway must, however, be regarded as an interim solution, since in the more distant future large towns will not be able to manage without a proper underground railway to serve the suburban area. The design of the system, the routing of lines and the design of stations for underground tramways should therefore be in accordance with practice acceptable for underground railways. It must be possible to make the transition from tramway-type to railway-type operation gradually, one line at a time, as soon as conditions justify the change to the new system.

Co-ordination

IX.12. As with an underground railway system, an underground tramway system must be the central feature of the network, and all other forms of local transport must be subordinate to it. Bus routes serving the suburbs must be adapted to bring traffic bound for the centre to the underground line, at specially designed interchange stations.

IX.13. In studying the re-arrangement of the system care must be taken to establish good links with the suburban railways and with individual means of transport under a « park and ride » system.

B. SURVEY OF THE DEVELOPMENT OF THE UNDERGROUND NETWORK IN STOCKHOLM

Population and its distribution, present and forecast

IX.14. Greater Stockholm is today inhabited by about 1.2 million people. 800,000 of these live within the borders of the town of Stockholm. The last figures will remain constand and even decrease during the next decades, while the number of people living in satellite cities or city-like agglomerations outside Stockholm will increase threefold so that in the year 2000 greater Stockholm will hold about 1.75 million inhabitants. As the Stockholm boundaries do not strecht farther away than 10-15 km from the city centre this means that the majority of the total population in greater Stockholm in the year 2000 will live rather far from the centre, 15-40 km. As many of the inhabitants will continue to have their places of work within the city centre (400,000 in 1990, according to forecasts) this means that the demand for transport, especially at morning and evening peak hours, will become difficult to satisfy. In 1961 the number of journeys during one day was estimated to be 1,5 million inside the Stockholm area, 60 per cent was performed by collective means of transport. Today 250,000 cars are circulating in the area; in the year 2000 it is estimated that the number will be 700,000. Already today it is almost impossible to find a parking space for one's car at rush hours; even with more parking places in reserved areas and public garages being provided (20,000 in 1990) it is evident that the city centre will never be able to swallow all the traffic following from such an increase in the number of cars. A further contributory factor to pressure on space in Stockholm is the growing demand for more living space, so that in the year 2000 there are expected to be 0.5 inhabitant per room unit as against 0.8 today. The effect of this will of course be to force people to live still more distant from the centre.

Choice of an underground system

IX.15. Against this background it is easily understood why Stockholm needs a rapid mass transport medium. In 1941 the choice which was presented to the Stockholm municipal authorities was one between an underground system (the T-bana), tramways or bus lines or combinations of these transport means. Because of the special topographic characteristics of Stockholm — a city built on many islands and peninsulas, several rather hilly, and with only a few bridges connecting them — the decision went in favour of an underground system. Only a T-bana could solve the bottleneck problem at the crossings of the many waters of Stockholm. Trams and/or buses have a much lower capacity, and to provide adequate road space, and particularly bridges, would have cost considerably more than constructing a T-bana.

Lay-out, technical features and capacity

IX.16. The T-bana today consists of two double-tracked, separate, systems, partly subterranean (in the city centre) and partly in the open air on reserved embankments. The first system, which was opened in 1957, stretches from the western suburbs (15 km from the centre), via the commercial centre of Stockholm to the southern suburbs, there dividing itself into three branches. The second system, which is completely independent of the first, goes from the south-western suburbs in two lines, united into one just outside the city centre, via that centre on to the north-eastern suburbs. In the city centre the two systems have parallel traks at three stations, one of which, situated close to the central railway station, makes inter-change between the two systems easy. The south-western system was opened in April 1964, but the north-eastern part of it from the central railway station and onwards will not be completed until 1967.

IX.17. The first system is 41 km long and has 47 stations; the second, when completed, will have a length of 30 km and 25 stations. 17 of these stations will be subterranean. All stations are 145 metres long, accommodating trains with eight 3-door cars. The cars contain 48 seats and can also transport 102 standing passengers, or in total, 150 passengers. 450 cars are in use on the first system, 250 will be needed for the second. At rush hours there will be 75 trains in all, with 30 trains per hour in traffic in the centrally located parts of the two systems, which means a capacity of 36,000 passengers per track an hour.

Function

IX.18. The T-bana is primarily thought of as a means of dealing with the commuter traffic. It is thus constructed radially from the centre to the suburbs. No circular line exists, nor is such a line yet thought of. Instead, a third line is now being projected, going from new suburbs to be built at the end of the 1970's in the north-western parts to the centre, with a possible extension to the south-east suburban area. In addition, a 20 km extension of the eastern part of the second system up to the north is now being studied.

IX.19. From the terminal and some intermediate stations feeder bus lines stretch deeply into the suburbs. Some of these lines will also connect the different subway systems one with the other.

Population served

IX.20. As mentioned in paragraph 14 above, the population of greater Stockholm is today 1.2 million people. In the year 2000 it is estimated that this figure will reach the 1.75 million mark. Today 325,000 people live within or close to the city centre (meaning that they hardly use the T-bana) and 875,000 in the suburbs. 450,000 of these commuters use the T-bana for their daily transport needs, the rest use railways, buses and/or private cars. At the end of the century when the T-bana is completed it is estimated that 250,000 people will live in or close to the city centre, while 1.5 million will live in the suburbs. The T-bana will then have a capacity of around 900,000 passengers, the railway system and direct bus lines from the suburbs to the city will serve about 600,000 people.

Other forms of passenger transport

IX.21. Compared with these figures private motoring only plays a minor part in the transportation scheme for Stockholm. It is estimated that today only 25 per cent of the transport needs of the inhabitants of Stockholm is covered by private cars. Even when the very ambitious road-building programme has been carried out in about 15 years' time this figure will not rise to more than 30 per cent. Tramways will cease to exist in 1967 and there will only be a limited number of local city bus lines.

Finance

IX.22. The financing of the two underground systems has put heavy burdens on the inhabitants of the town of Stockholm. The cost of the first system was 700 million Sw. Crowns (1.05 Sw. Crowns = 1.00 F franc), the cost of the second 550 million. An extension of the latter to the north would cost another 300 million. A third underground as described above would cost 1,150 million, in total 2,650 million, including construction, tracks, stations, cars, depots, etc. So far the Government has not taken part in the financing.

IX.23. The costs are divided between the town of Stockholm and the passenger transport undertaking AB Stockholm Sparvägar. The last-mentioned body is a municipally owned stock company responsible for the operation of the T-bana, the tramways and local and feeder bus lines in Stockholm. The costs for the construction of the T-bana have so far been carried by the town of Stockholm through taxes while operational costs are carried by the AB Stockholm Sparvägar. As revenue from fares, however, only reaches a level of about 180 million Crowns while the costs are about 240 million, the deficit is covered by taxes. Besides, interest and amortisation equal about 35 million Crowns. This means that about 95 million Crowns are paid every year by the Stockholm taxpayers for their collective transport system. The loss of the railway traffic in the Stockholm area is around 17 million Crowns (covered by general local taxes).

IX.24. In this connection it should be noted that the normal fare on the subway as well as trams and buses is 0.80 Crowns for single journey with one inter-change within the city centre or locally outside the centre. This fare is raised according to the distance so that the maximum tariff is 1.20 Crowns. Season tickets exist creating substantial fare reductions. Increases in the fares are decided upon by the city council.

IX.25. The figures mentioned earlier relating to the construction of the underground systems could be compared to the costs for main road construction in the area for the years up to 2000, which is estimated to exceed 6 billion Crowns, not including the cost of the cars, workshops, parking spaces, etc.

IX.26. It is also interesting to note that the construction of 16,000 apartments a year in the Stockholm region, which will probably be raised to 20,000 in a few years, carries together with industrial and commercial investments yearly costs of about 2 billion Crowns (the total investments for the subway system, completed in about 15 years' time, will be about 2.7 billion).

Journey times

IX.27. It was stated in paragraph 16 that the existing T-bana does not extend beyond 16 km from the city centre. This limit was chosen so that average journey times to the centre should not exceed 30 minutes. The limit will in future be 18 to 20 km, a distance which it will be difficult to cover within the 30-minute overall journey time so far aimed at. Special express trains would be a solution, but difficult technical problems would arise in enabling them to overtake local trains.

Distribution of traffic between means of transport

IX.28. In the 20-40 km zone railways have instead been found to provide a solution. The future plans therefore consider the possibility of building two new suburban railway lines, one a southwest — northeast link and another a south-north link, both being parts of the regular railway net of the country. Feeder bus-lines will have to be arranged also for this suburban rail traffic, which will have a total capacity for about 400,000 people.

IX.29. To complete the system express and local bus-lines from areas not adequately covered by the underground and/or railway systems will be arranged ending at special bus terminals in the outskirts of the city, but close to the underground stations so that interchange is easily effected. The capacity of this bus traffic is estimated to 100,000 inhabitants.

IX.30. The total capacity for the whole system, T-bana, railways and buses, would arrive at about 1.9 million inhabitants in the Greater Stockholm area. It is, however, evident that private car traffic will continue to play an important role. To avoid congestion in the centre two solutions are being tried. First the city is now being provided by two crossing and one peripheral circular motorways. Secondly, the park-and-ride system has been largely adopted whereby large parking areas in the vicinity of the T-bana stations are set up. There parking is free while charges are heavy in the centre.

Lessons to be drawn

IX.31. What lessons can be drawn from the experience of the Stockholm underground system so far?

a) Investments in roads have been found to be more expensive than investments in rail traffic (subways and/or railways). The comparison becomes still more advantageous when taking into account that now $\frac{3}{4}$ of the total passenger transport need can be satisfied by collective means of transport. The heavy costs should, therefore, not be discouraging.

b) The T-bana of Stockholm is intended to be the skeleton of the transport system in the Stockholm region. As the underground, if it is not to lack in convenience, should not exceed a distance of 20 km from the centre, the transport needs for the 20-40 km zone could best be satisfied by normal railway services. Underground lines as well as railways should be complemented by a system of feeder bus-lines and large parking areas close to the stations.

c) Undergrounds, railways and buses can never meet all the transport needs of a city. Adequate space must therefore also be provided for private cars. Motorways must be constructed, existing roads enlarged and parking lots or multistorey car parks set up. In many cases this means complete reconstruction of the city area. When part of an integrated system of mass transport media and roads, the effects would, however, not be so disastrous.

d) The provision of quick transport to the centre by the underground has brought with it a revival of the commercial activities of an old city centre which otherwise would have been strangled to death by traffic congestion from private cars. Many new stores, banks and shopping centres have been created in close proximity to the underground stations, or even with direct entrance from them.

e) To be most efficacious the total public transport media should be integrated. Interchange between rail, bus and car must be easy and convenient. The fares in the whole region should be homogeneous.

f) Housing and transport planning must go hand in hand. The underground station has been found to be the natural nucleus of a suburban city centre. Together they form pearls on a string. Between them, nature is conserved to provide recreation areas.

X. SUBSIDIES TO PUBLIC TRANSPORT

Social and Economic Aspects of Urban Public Transport

X.1. In earlier chapters of the Report, emphasis has been placed on the need to maintain adequate and efficient public transport services as a corollary to imposing restraints on the use of private cars for journeys into town centres. It is generally accepted that every large city, if it is to continue to providc at its centre the kind of service and facilities that have traditionally been found there (shops, offices, theatres, cinemas, concert halls, libraries, etc.) must retain and, if possible, develop its public transport system. It is also a generally accepted thesis that transport services should, wherever possible, be commercially viable. These two concepts are increasingly coming into conflict with one another. An urban transport authority faced with rising costs (particularly of labour), increased congestion on the roads which slows down bus services and falling traffic due to greater use of private cars, will normally be reluctant to make substantial increases in fares because these will lead to further decrease in traffic and possibly a net loss of revenue. If, in addition, the authority has to consider substantial capital expenditure, for example in new underground railway lines, the financial prospects are even more depressing. This then is the broad picture facing most large urban transport undertakings in ECMT countries. It is against this background that the question of subsidy to public transport must be considered.

X.2. The dilemma outlined in general terms in paragraph 1 above has, in several countries, particularly difficult aspects from the point of view of railways, and thus introduces an additional complication into general transport policy. In Chapter VII, reference was made to the usefulness of railway transport for handling intensive passenger traffic between city centres and peripheral areas, and the valuable contribution which is being, or can be, made by the development of the local and suburban services of the national railways is also referred to at various points in the report. In several ECMT countries, considerable investments have been, or are to be, devoted to improvement and modernisation of the railways to enable them, among other things, to provide more efficient and attractive suburban services. Operating deficits, however, continue, and there is reason to believe that, if fares are raised to a level high enough to cover total costs, more passengers will turn to individual transport, thus at once depriving the railways of revenue and adding to congestion on urban roads. If, on the other hand, low fares are introduced or retained in an effort to counter this tendency, it is difficult to see how the drain upon railway revenues can be met except by subsidy. This intractable problem is one which could usefully be the subject of fuller study.

Definition of Subsidy

X.3. Subsidy, which can be defined as the provision of funds (by the responsible authorities) to transport undertakings in order to cover operating deficits, may take the following forms :

- *a)* coverage for deficits on one or more of the following items : operation, infrastructure (including interest and amortization), rolling stock, social charges;
- *b)* exemption from one or more taxes;
- *c)* provision of fuel and/or power at reduced prices.

The purpose of subsidies, as explained above, is briefly :

- — to maintain or even develop such transport services as are regarded as essential for the society in question, even though the individuals making up that society are unable or unwilling to pay the tariffs at which operation without a deficit would be possible;
- — to provide the public with transport services at very low cost.

In some countries where, for social reasons, passenger transport undertakings are obliged by law to operate services on uneconomic routes, or to carry particular categories of passenger at below-cost fares, it is the practice for the state, or other authority at whose behest such obligations are imposed, to make some compensation to the transport undertaking in respect of loss of revenue entailed. (It has been strongly argued that anything less than full indemnification for losses thus imposed, for social reasons, upon transport undertakings makes for an undesirable distortion of the economic basis of operation, and that, from this point of view, it is quite immaterial whether an operating deficit results, or not.) Such indemnification is, in effect, no more than a payment for special services rendered; it does not constitute a subsidy in the sense intended above, and should not be confused with it.

Arguments for Subsidy

X.4. The main arguments in favour of paying subsidies are :

- *a)* the need to maintain an adequate system of public transport, irrespective of commercial viability;
- *b)* the social benefits to the community of providing the public transport services will often exceed the financial loss incurred in their operation;
- *c)* they permit transport charges to be kept at an artificially low level, so discouraging the transfer of traffic from public to private transport and thus easing traffic congestion;
- *d)* they discourage the tendency for economic activities to be moved out of the city centres to places where travelling costs would be lower;
- *e)* they enable those sections of a city's transport system which show the biggest deficits to be served with the same standards of convenience and speed, and at the same level of fares, as the rest of the system.

Arguments against Subsidy

X.5. There are, however, strong economic and practical arguments against the introduction or extension of subsidies :

- *a)* they interfere with the normal operation of the economic test of the need for a service, namely whether the user is prepared to pay the full cost of providing it;
- *b)* there is less incentive towards the satis-

faction of transport requirements in the cheapest and most efficient manner;

c) managements are no longer subject to the stringent test of commercial viability and tend to lose concern for keeping costs down (though this tendency may be mitigated if the subsidy is in the form of a limited sum, fixed in advance of the year of accountancy);

d) as a consequence of *b)* and *c)* above, the attractiveness of public transport will probably not be increased sufficiently and the relative proportion of private transport used will still be too high;

e) this latter circumstance may then entail a drop in tariffs or their maintenance at too low a level, with consequently larger deficits;

f) lower transport costs remove one of the public's objections to longer journeys (although of course extra time will still be needed for longer travel), thus encouraging migration to areas far from the place of work; movement to and from shopping and entertainment centres are stimulated;

g) experience has shown that reliability, comfort and convenience are more important than cost in the public's assessment of transport services; the maintenance of low fares, involving heavy subsidy, may therefore have only marginal effect on the transfer of passengers from public to private transport.

Competition between Public and Private Transport

X.6. These arguments, for and against, tend however to ignore the basic problem, namely that public transport is prevented from charging passengers the full cost of the service provided because it is in competition with private motorists who do not have to pay the full social cost they impose on others by using their cars in congested city streets. The phrase « full social cost » must be understood in the widest sense. It is certainly not confined to highway costs : for although it is true that the cost of providing an urban road system fully adequate to carry the foreseeable load of motor traffic, assuming current rates of increase (if, indeed, such provision is possible) would be very high indeed, the cost does not end there. Every additional vehicle using a congested street imposes delays on all other road users, and the « full social cost » is the total consequence of this collective delay (including loss of operating efficiency to public passenger transport and essential goods transport by road), plus such factors as accidents, noise, fumes and the general deterioration of urban amenities. If motorists were faced with the alternative of meeting the full (very high) economic cost of using their cars or of making use of public transport (at possibly a slightly higher charge than at present), most would chose the latter, traffic congestion would be reduced and public transport undertakings could operate without subsidy. This may then be the key to the problem. But it would not be easy to achieve in practice. As explained in Chapter III, paragraph 15, it is technically feasible to devise methods of charging motorists, at differential rates, for the use of congested streets, but much more study is required of the social, administrative and economic problems involved. In the short term, however, it would be possible to move in this general direction by imposing heavy charges for parking in the centres of cities as a direct means of discouraging people from bringing their cars in.

General Conclusions on Subsidy

X.7. After considering all these arguments, the general conclusion reached by the Group was that, although ideally subsidies to public transport should be avoided, it would in practice be difficult to avoid them altogether, at least in the short term (until private cars can be made to bear the costs to which they give rise), if efficient public transport systems are to be maintained. They also felt that, if subsidy were to be given, its disadvantages would be less marked if it were in the form of subsidy for infrastructure or other capital investments rather than to meet operating deficits. In this connection, it has been pointed out that, as labour is so important an element in the provision of transport, and the proportion of operating cost represented by wages is generally rising, so the importance of labour-saving forms of operation increases. This, however, often involves large capital investments in infrastructures and equipment — as, for instance, with the construction of underground railways or automation — and correspondingly heavy amortization and interest charges. Subsidies to cover the latter can to some extent be regarded as a better substitute for subsidies to cover operating deficits.

X.8. Investment in mass public transport should be considered in the light of its contribution to the life and activities of the city, in the same way as other public services which enable an urban area to function properly. Its infrastructures — whether provided for its exclusive use, or shared with individual transport — should be regarded as public utilities, and the necessary investments treated in the same way as other public utilities, such as the drainage system, which are essential to the urban community. Investments in public utilities are part of the total public funds allotted to the planned development, which are normally recouped indirectly through State and municipal revenues. The size of the investment in transport infrastructures is proportionate to the importance of the urban area, and given the essential character of public transport, there seems no good reason for treating that investment differently from the rest.

X.9. When investments in transport infrastructures are considered in isolation, and in absolute terms, there is a tendency to underestimate their importance and priority. These can only be put into proper perspective by relating the investments to the contribution which adequate and efficient transport makes, directly and indirectly, to the economic and social welfare of urban communities.

Appendix I

GROWTH OF PRIVATE CARS IN SOME EUROPEAN CITIES IN RECENT YEARS

TABLE I. AUSTRIA

	1953			1963					
	TOTAL MOTOR VEHICLES	PRIVATE CARS (INCL. TAXIS)	BUSES AND COACHES	TOTAL MOTOR VEHICLES	% INCREASE OVER 1954	PRIVATE CARS (INCL. TAXIS)	% INCREASE OVER 1954	BUSES AND COACHES	% INCREASE OVER 1954
Vienna	109,345	33,318	2,297	252,406	130.8	189,940	470.8	3,004	30.8
Graz	17,267	4,322	149	39,311	127.1	27,542	537.25	223	49.7
Linz	11,795	3,326	101	33,060	180.3	23,593	609.4	127	25.7
Salzburg	9,371	3,084	100	23,114	146.7	16,913	448.4	136	36
Innsbruck	6,960	2,563	57	16,830	141.8	12,418	384.5	84	47.4
Total Austria	448,812	91,963	3,898	1,160,989	158.7	627,582	582.4	5,476	40.5

TABLE II. BELGIUM

	1953					1962									
	TOTAL MOTOR VEHICLES	PRIVATE CARS	GOODS VEHICLES	BUSES AND COACHES	MOTOR CYCLES	TOTAL MOTOR VEHICLES	% INCREASE ON 1953	PRIVATE CARS	% INCREASE ON 1953	GOODS VEHICLES	% INCREASE ON 1953	BUSES AND COACHES	% INCREASE ON 1953	MOTOR CYCLES	% INCREASE ON 1953
Antwerp	57,500	32,214	11,767	218	13,301	103,344	79.2	77,022	139.1	16,056	36.4	530	143.1	9,736	—16.8
Brussels	109,165	72,288	19,972	258	16,647	193,326	77.1	156,506	116.5	26,267	31.5	619	139.2	9,934	—32.4
Charleroi	20,495	10,799	4,722	59	4,915	33,206	62.02	23,888	121.2	4,386	— 7.1	48	—18.6	4,884	— 0.6
Ghent	20,428	11,810	3,998	77	4,543	33,196	62.5	25,071	112.3	4,997	25.0	71	— 7.8	3,057	—32.8
Liege	52,515	27,404	9,668	307	15,136	85,157	62.2	60,521	120.8	10,077	4.2	366	19.2	14,193	— 6.2
Total Belgium	733,561	368,057	159,026	3,363	203,115	1,314,153	79.1	914,565	148.5	194,015	22.0	6,283	86.8	199,290	— 1.9

Table III. FRANCE

	1955			1964						
	Total cars buses	Private cars	Buses and coaches	Total cars	% increase over 1955	Private cars	% increase over 1955	Buses and coaches	% increase over 1955
National Totals	2,706,500	2,667,000	29,500	7,842,500	189,8	7,800,000	191.4	42,500	44.1

Major cities and conurbations
Private cars

	1956	1960		1964	
		Number	% increase	Number	% increase
Department of the Seine (including Paris)...........	587,600 (348,400)	824,500 (459,000)	40.3 (31.7)	1,149,700 (630,200)	95.7 (80.9)
Paris Department of Seine-et-Oise................	143,300	244,700	70.8	430,600	200.5
Lille-Roubaix-Tourcoing Cornurbation.............	45,300	64,600	42.6	—	—
Lyon..	64,800	95,800	47.8	—	—
Marseille.....................................	55,600	85,300	53.4	—	—
Bordeaux......................................	40,100	53,600	33.7	—	—

Table IV. GERMAN FEDERAL REPUBLIC

Towns with over 100,000 inhabitants

	Registered motor vehicles			Registered private cars			Private cars as pourcentage of total vehicles	
	1950	1962	% increase	1950	1962	% increase	1950	1962
Berlin (west).....................	40	252.7	532	13.8	200.7	1,354	34.5	79.4
Hamburg..........................	59.2	298.1	404	23.6	236.5	902	39.9	79.3
Munich...........................	37.3	220.3	491	14.2	179.5	1,163	38.1	81.5
Other towns with over 100,000 inhabitants	403.8	2,194.9	444	157.2	1,717.2	992	38.9	78.2
Total for above towns............	540.3	2,966	449	208.8	2,333.9	1,018	38.6	78.7

Table V. REPUBLIC OF IRELAND

Increase in number of road vehicles between 1955 and 1964

Classification	Dublin City and C°			Cork City			Limerick City			Waterford City			Entire State (including cities)		
	1955	1964	% + or —	1955	1964	% + or —	1955	1964	% + or —	1955	1964	% + or —	1955	1964	% + or -
Private Cars...........	37,750	76,367	+ 102	2,935	5,380	+ 83	1,970	4,082	+ 107	1,244	2,353	+ 89	127,511	254,494	+ 10
Motor-cycles...........	10,456	20,122	+ 92	458	1,824	+ 298	390	543	+ 39	246	656	+ 167	21,436	52,173	+ 14
Taxis..................	734	589	— 20	110	101	— 8	34	36	+ 6	26	34	+ 31	5,013	3,426	— 3
Large Public Service Vehicles (Buses & Coaches).	1,135	1,368	+ 21	3	13	+ 333	—	2		2	5	+ 150	1,301	1,562	+ 2
Cars & Motorcycles per 1,000 pop............	68	134	—	42	92	—	46	91	—	51	107	—	51	109	—
No. of persons per vehicle (car & motorcycle) ...	14.6	7.5	—	23.6	10.8	—	21.6	10.9	—	19.4	9.4	—	19.5	9.2	—

Table VI. LUXEMBOURG

In the Grand Duchy, the number of buses and coaches increased, between 1955 and 1964, from 289 to 420, an increase of 45,3 per cent.

Table VII. NETHERLANDS

	1955			1964					
	TOTAL CARS AND BUSES	PRIVATE CARS	BUSES AND COACHES	TOTAL CARS AND BUSES	% INCREASE OVER 1955	PRIVATE CARS	% INCREASE OVER 1955	BUSES AND COACHES	% INCREASE OVER 1955
National total	274,757	268,035	6,722	1,084,400	294.7	1,075,000	301.1	9,400	39.8

Table VIII. PORTUGAL

	1953				1962							
	TOTAL MOTOR VEHICLES	TOTAL PASSENGER VEHICLES	LIGHT PASSENGER VEHICLES	BUSES AND COACHES	TOTAL MOTOR VEHICLES	% INCREASE OVER 1953	TOTAL PASSENGER VEHICLES	% INCREASE OVER 1953	LIGHT PASSENGER VEHICLES	% INCREASE OVER 1953	BUSES AND COACHES	% INCREASE OVER 1953
National total	110,828	79,350	76,926	2,424	243,932	120.1	178,151	124.5	174,576	126.9	3,575	47.5

	1956				1962							
	TOTAL MOTOR VEHICLES	TOTAL PASSENGER VEHICLES	LIGHT PASSENGER VEHICLES	BUSES AND COACHES	TOTAL MOTOR VEHICLES	% INCREASE OVER 1956	TOTAL PASSENGER VEHICLES	% INCREASE OVER 1956	LIGHT PASSENGER VEHICLES	% INCREASE OVER 1956	BUSES AND COACHES	% INCREASE OVER 1956
Lisbon district[1]	56,075	43,158	43,010	148	97,922	74.6	79,238	83.6	79,121	84.0	117	— 20.9
Oporto district[1]	24,080	17,810	17,773	37	37,472	55.6	27,210	52.8	27,158	52.8	52	40.5

1. Excluding buses on regular services, military vehicles and vehicles belonging to other state services.

Table IX. SPAIN

	1953				1962							
	TOTAL VEHICLES	PRIVATE CARS	MOTOR CYCLES	COMMERCIAL VEHICLES	TOTAL VEHICLES	% INCREASE OVER 1953	TOTAL PRIVATE CARS	% INCREASE OVER 1953	TOTAL MOTOR CYCLES	% INCREASE OVER 1953	TOTAL COMMERCIAL VEHICLES	% INCREASE OVER 1953
Barcelona	32,794	18,726	6,242	7,826	131,892	302.2	67,700	261.5	47,960	668.3	16,232	107.4

Table X. SWEDEN

1953					1963								
TOTAL VEHICLES	PRIVATE CARS	GOODS VEHICLES	BUSES	INHABITANTS PER VEHICLE	TOTAL VEHICLES	% INCREASE OVER 1953	PRIVATE CARS	% INCREASE OVER 1953	GOODS VEHICLES	% INCREASE OVER 1953	BUSES	% INCREASE OVER 1953	INHABITANTS PER VEHICLE
542,334	431,085	102,977	8,272	13	1,696,687	212.8	1,556,005	260.95	130,979	27.2	9,703	17.3	4.5

TABLE XI. UNITED KINGDOM

	TOTAL NUMBER OF MOTOR VEHICLES (ESTIMATE)			NUMBER OF CARS IN USE (ESTIMATE)			PRIVATE CARS AS PERCENTAGE OF TOTAL	
	1952	1962	PERCENTAGE INCREASE	1952	1962	PERCENTAGE INCREASE	1952	1962
London	617	1,241	101	310	793	156	50.2	63.9
Birmingham	157	309	97	83	198	139	52.9	64.1
Liverpool	69	156	126	31	89	187	44.9	57.0
Manchester	93	183	97	42	108	157	45.2	59.0
Glasgow	54	113	108	24	69	188	44.4	61.1
Total	990	2,002	102	490	1,257	157	49.5	62.8
Great Britain	4,904	10,505	114	2,508	6,556	161	51.1	62.4

N. B. In the United Kingdom the results of a recent large-scale survey of car owners in the London area are at present under study. This area covers the entire conurbation of London and has 11 and a half million inhabitants. Figures have been obtained, both for the central area and for the outlying areas, of *households owning a car.* Actual figures for 1961 and estimates for 1981 are as follows.

	1961		1981	
	Total number of households	*Households owning a car*	*Total number of households*	*Household owning a car*
Central area	1,134	316	1,157	610
Outlying areas	1,825	807	1,940	1,157

(All figures are given in thousands)

In other words, in 1961 28 per cent of the households living in the central area and '48 per cent of the households living in the outlying areas owned cars. The estimated percentages for 1981 are 53 per cent for the central area and 77 per cent for the outlying areas.

Appendix II

INSTANCES OF LEGISLATIVE OR ADMINISTRATIVE MEASURES TO SECURE OR PROMOTE CO-ORDINATION IN THE PLANNING AND OPERATION OF PASSENGER SERVICES IN LARGE CITIES AND ASSOCIATED AREAS IN CERTAIN ECMT COUNTRIES

See Chapter VIII, paragraph 9

DENMARK

Concessions for tramwaylines are issued by the Ministry for public works — nowadays concessions for such lines are of no real interest as several lines are or are going to be replaced by bus lines.

In the cities of Copenhagen and Frederiksberg, both parts of the City of Copenhagen, concessions for bus lines are issued by the town-councils for each of the two areas or by both together.

In the environs of Copenhagen and Frederiksberg the concessions are issued by a traffic committee covering the neighbourhood area around the City of Copenhagen.

If the line concerns both this area and Copenhagen or Frederiksberg a concession cannot be issued without agreement between the town-council and the committee.

If the line concerns both the traffic committee and the two-town-councils the concession is to be issued by a so-called country-board.

This board must also issue the concession in case of disagreement between a town-council and the traffic committee about the granting of a concession to a bus line, which concerns both the town-council and the traffic committee.

GERMAN FEDERAL REPUBLIC

The Federal Ministry of Transport issued a questionnaire to three German cities. The questions, and the answers given by each city, are reproduced below.

Question 1

Is there, in the region of Hamburg, Munich or Frankfurt, a central authority, responsible for the planning and/or co-ordination of public transport? If so, what are its functions and powers?

Answers :

a) *Hamburg*

No authority exists in Hamburg which is responsible solely for the planning and co-ordination of public transport as such. Jurisdiction is divided between the building authority (Civil Engineering Office) and the authority for economics and transport (Transport Office). Whilst the building authority is responsible for the technical planning and construction of the underground railway's lines, the Transport Office is entitled to participate in and influence developments from the point of view of transport policy, and in addition it has some formal jurisdiction under the Passenger Traffic Act (e.g., final approval of plans, etc.). There is close contact between the two Offices about all questions, and for practical purposes there can be said to be a central authority.

b) *Munich*

The Bavarian State Ministry of Economics and Transport exercises certain supervisory functions, but it is not concerned with co-ordination or planning of transport. The Chief Building Authority, an independent authority linked to the Ministry of the Interior, includes a Group concerned with road and bridge construction. It deals with the construction of State roads and bridges, and of those over which the State exercises control. Its chief function is the construction of Federal (trunk) roads inside Bavaria, and co-ordination with other Federal States. It can also exercise a limited influence over other road construction through the approval of grants for State, county and district roads. This, however, extends only to roads having more than purely local value; road construction in built-up areas is carried out in the independent discretion of local councils. There is no central office or authority at or near Ministry level for the co-ordinanion and planning of all transport matters in municipalities.

c) *Frankfurt*

At present, no central authority or organisation exists in the Frankfurt area for the planning or co-ordination of all means of local public transport. Plans for municipal tramways and bus services within the city area are made in the Transport Department and the municipal governing bodies (the « Magistrat » and the city council) approve them and resolve upon their execution.

In 1962, the increase in private car traffic, and the steadily increasing obstruction of public transport caused by it, led to a resolution in principle to place the tramways underground in the city centre, to extend the underground sections by further lengths of track on specially reserved land to the outer parts of the city, thus transforming the system into an efficient, attractive, express service having the character of an urban railway system. The Transport Department sought the advice of the Federal Railways when the designing of the lay-out of the network was still at an early stage. In the course of planning discussions, a draft agreement between the Federal Railways and the City of Frankfurt on the organisation of public, local passenger transport in the area of the city was settled, but it has still to be ratified.

Question 2

By what means is co-ordination of forms of public transport achieved? A single company, responsible for all operation? Co-ordinated fares, time-tables and interavailability of tickets between different forms of transport and/or transport undertakings? Shared terminals for buses, railways and underground railways?

Answers :

a) *Hamburg*

The two main carriers providing local public transport are the Hambourg (Elevated) Railway Company (HHA) and the City Railway (S-Bahn), which is operated by the German Federal Railways. The following figures illustrate the importance of these two major undertakings : the City Railway is a system of 140 route-kilometres, and the HHA Railway is 75 km long (of which 20 km is underground, 45 km at ground level and 9 km elevated). In 1963, about 550 million passengers were carried in Hamburg, some 75 per cent of them on the HHA and some 25 per cent by the City Railway. There is partial co-ordination between the two undertakings. The Transport Office has been trying for a long time to make it complete. Negotiations between them on a proposed agreement on fares are in hand, and are to be concluded in Autumn 1964.

The following should be noted in connection with the present state of affairs : the HHA is an independent, private company with share capital. The City Railway is part of the Federal Railways. The two undertakings act independently of each other in fixing fares and drawing up time-tables. At present, there are seven points at which passengers can transfer directly from one of the two systems to the other. In addition, there are numerous points at which passengers can transfer between the City Railway and buses or trams owned by the HHA, because many of the Company's bus and tram stops are at City Railway stations. However, co-ordination is incomplete, especially in the lack of a common fares structure.

A merger between the two local passenger transport undertakings in Hamburg at a future date is planned. Present draft agreements provide for the formation of a company to plan and operate the whole network of passenger transport services in Hamburg, whilst leaving the ownership of their respective installations and vehicles with the contracting parties. Traffic planning, fares and time-tables are to be closely co-ordinated, and bus and tram stops, City Railway and underground stations connected wherever possible.

b) *Munich*

The public transport operator within the city boundaries of Munich is the city itself. Its Transport Department operates tramway, bus and trolleybus services. A few neighbouring communities are also served by this network. Bus services are run with municipally-owned and also hired vehicles. The latter are used, under long-term hiring contracts, to provide so-called « feeder bus services », linking peripheral areas with the tramway system, or, under short-term hiring contracts, especially whilst winter timetables are in operation, to provide relief services to supplement the tram services.

The outer suburban area of Munich is served mainly by the German Federal Railways, who operate a network of railway and bus services. The German Federal Post Office has also organised a system of bus services. All these services terminate at centrally located points inside the city. Independent, privately-owned undertakings play an insignificant part, but both the Federal Railways and the Post Office hire privately-owned buses.

There is no co-ordination of public passenger transport services at present, but discussions of particular measures are pending; for the rest, the operation of the Passenger Transport Act of 21st March, 1961, makes provision for the necessary co-ordination.

The overall transport plan for the city of Munich, approved by the city council in 1963, provides for a co-ordinated public transport system, to be carried into effect by successive stages. Public passenger transport by rail in the city and the surrounding area will be provided by a combination of local surface lines and underground railways. Access to the surrounding region, and travel to the urban centre will be the function of the Federal Railways, whose thirteen suburban lines radiate into the outer area. The main railway station, where lines from the west converge, and the East station, where the eastward lines are joined, are to be connected by an underground link-line passing through the centre of the city (Marienplatz). In this way, the outer areas will be directly connected with the very centre of the city, and mass transport into the city will be provided. In addition, all suburban lines will be inter-connected. The link-line will simultaneously cater for the main flow of east-west traffic within the city, thus serving local, short-distance traffic. The municipal underground railway's lines provide the main north-south connections and serve those areas to which the link-line does not extend. The municipal underground is to extend beyond the city boundaries at two points only, serving areas for which no ordinary railway service is planned. This plan for a combined system of link-line and municipal underground railway has been worked out jointly by the Federal Railways and the city council. Easy interchange between the two systems is a specially important feature. As regards co-ordination of fares within the City, negotiations have already taken place with the Federal Railways to enable passengers to make journeys using both the municipal services and the Federal Railways' services at the same fares. There is no proposal at present to establish a single passenger transport undertaking. However, negotiations are in progress between the Federal Railways, the Bavarian State and City of Munich with the object of forming a holding company whose primary responsibility would be to finance the link-line and municipal underground railways.

c) *Frankfurt*

The draft agreement mentioned in the answer to question 1 provides for the formation of a « Works and Planning Group for Local Transport ». The intention is that the Group should work out proposals for harmonious collaboration between the municipal transport undertakings and the suburban services of the Federal Railways and the provision of complementary services, within the city itself. This includes not only the co-ordination of constructional, operational and traffic matters, but also (through special committees) the preparation of an agreement for a common fare structure.

In Frankfurt, a railway network is being extended on a radial plan, with bus services acting as feeders or extensions. In conformity with this pattern, the Federal Railways will ultimately run their suburban trains through the city centre by means of the proposed tunnel. The plan does not, therefore, provide for combined terminal stations, but it does provide, in the town centre, for two combined stations and for interchange stations between the urban railway/tramway system and the Federal Railways at several points in the network. The future network of bus routes is still in the planning stage. This, also, is to afford as direct transfer as possible to the railways at the exchange points.

Republic of Ireland

Co-ordination of Public Transport in Dublin City

Dublin city has a fully co-ordinated public transport service in both the urban and suburban areas. Both rail and bus transport are controlled by the same body, i.e. CIE. About 650,000 people are conveyed daily by the bus services and 10,000 by a suburban railway. The railway line runs close to the coast and the termini are not convenient to the city centre. For these reasons, the service which it can offer to the suburban areas is limited. However, for distances of about eight miles outwards, it is attractive for commuters to get a bus to the nearest railway station and continue their journey by rail. About eight suburban stations are served in this way, the nearest being approximately eight miles from the city and the furthest twenty-five. In the city, bus services are scheduled to pass all the railway termini at frequent intervals giving connections to both the city centre and other points in the city.

SWEDEN

On 17th December 1964, a preliminary agreement was reached between representatives of the city of Stockholm and representatives of the surrounding cities and municipalities regarding future organisation of the public transport system in the Stockholm area. This agreement forms the basis for a co-ordination of the existing public transport media in the area. The agreement will, however, not enter into force unless the Government undertakes to contribute 95 per cent of the costs for construction of tunnel, rail and stations of new underground railways (T-bana) serving the area, i.e. not only serving the City of Stockholm but also its neighbouring communities.

Through a joint organisation (« kommunalförbund ») the City of Stockholm on the one hand and the surrounding municipalities on the other hand, both with equal representation in the « Kommunalförbund », will co-operate in the planning, construction and financing of the public transport system. The existing stock-company, AB Stockholms Sparvägar, now responsible only for the operation of the public transports in the City of Stockholm, will be reconstructed and named AB Stockholms Lokaltrafik. It will be owned by the « Kommunalförbund » instead of the city of Stockholm and it will have the responsibility of operating the system. It is foreseen that now existing private bus and rail lines will be incorporated into the new system. As an important role in the transport apparatus will be played by the state railways in the region, the railways have undertaken to organise local swing traffic on two of their major railway lines to Stockholm. Construction and modernisation of lines and rolling stock will cost the railways about 400 million Crowns. The revenues of this swing traffic will be paid to the AB Stockholms Lokaltrafik which however, will contribute to the operational and amortization costs of the state railways for this local traffic.

The subterranean system which now consists of two lines will be extended with a third one connecting the centre with new suburbs and one of the now existing lines will be considerably extended. The total costs for these works are estimated at 1.450 million Crowns.

The financing of new T-banas will take place through loans (finally covered by taxes) and by the Government, which will contribute 95 per cent of the infrastructure costs. A deficit on the operation of the system will, as hitherto, be covered by tax money. Besides, through its railways the state contributes 400 millions to the local transport system.

It can be foreseen that the heavy commitments of the Government in order to help in solving the difficult public transport problems in the Stockholm region will arouse considerable discussion in Parliament. As the contributions to the T-bana will be taken from the tax revenue on automobiles and fuel it can be argued that the rest of the country heavily subsidises specific interests solely for the benefit of the inhabitants of the Stockholm region. Should, however, the growing need for transports in the region be covered only or mainly by private motorism and/or buses the state as well as the communities would have to allocate even greater sums for the construction of the necessary road and expressway system.

UNITED KINGDOM

Co-ordination of Urban Transport in the United Kingdom

London

Traffic and Highways

1. In the United Kingdom, the first deliberate and concerted attempt to co-ordinate traffic control in a large conurbation was made in London, and started in 1924 when the London Traffic Act was passed. Up to that date, the organisation of local government in the London area consisted of several separate metropolitan boroughs, under the general supervision of the London County Council (LCC), which were surrounded by a suburban area where powers of traffic control were divided between a variety of local authorities. There was no overall higway authority or traffic authority for the whole area.

2. The London Traffic Act gave the Minister of Transport powers of traffic authority over a large area around the Capital, and set up a standing advisory committee (the London and Home Counties Traffic Advisory Committee) to advise and assist the Minister in carrying out his functions as traffic authority.

The London Government Act, 1963

3. Although the administrative arrangements have been considerably modified of recent years, the Minister's responsibilities as traffic authority for the London area have continued. In 1963, however, the whole structure of government in the Greater London Area was radically reformed. The London Government Act replaced the London County Council by a Greater London Council exercising certain powers over a much wider area. Within this area (extending over a radius of about 20 miles from the centre) the Greater

London Council will be the highway authority for a number of major traffic routes and will exercise powers as regards the regulation of traffic comparable to those hitherto exercised by the Minister. The transfer of responsibility becomes effective on 1st April 1965. The Greater London Council will also exercice town planning powers in its area.

Public passenger transport

4. The effective co-ordination of transport in London began with the London Passenger Transport Act, 1933. It established a public authority, to be known as the London Passenger Transport Board, in which were vested all the Underground undertakings (bus and train), the Metropolitan Railway Company, tramways owned by local authorities and the Tilling and independent bus undertakings, together with the rights and liabilities of the undertakings within the London area.

5. The Act also provided for a Standing Joint Committee, consisting of four members appointed by the Board and one by each of the four amalgamated railway companies, who were given a duty to consider proposals made to them for co-operation between the Board and the railway companies in the provision or working of passenger services and facilities. The Committee were also given the duty to prepare a scheme for pooling of the whole of the traffic receipts in the London area and the proportions of the total which the Board and the railway companies were to receive.

6. The Board were given a virtual monopoly of road services within the « London Special Area », i.e. the part of the London Passenger Transport Area (for the greater part) which lay within the London Traffic Area — see map attached. Services within that part of the London Passenger Transport Area which lie outside the « Special Area » are subject to licensing by the Metropolitan Traffic Commissioner (see paragraphs 12 and 13 below). Express bus services of provincial companies are allowed to run into and from the London Passenger Transport area with passengers but, without the consent of the Board, are not allowed to pick up and set down the same passengers within the area.

7. Finally, the Act laid down in detail the statutory functions and duties of the London Passenger Transport Board. The main duty which the board were given was to « secure the provision of an adequate and properly co-ordinated system of passenger transport for the London Passenger Transport Area ». This was to be done by the extension and improvement of facilities so as to provide the most efficient and convenient transport system possible. This involved the running of a number of unremunerative services, cross-subsidised from profits on remunerative routes. Within this framework, the Board had to be self-financing, though in certain circumstances they were given powers to borrow. Fares were at the Board's discretion.

8. Under the provisions of the Transport Act, 1947, the whole of the undertaking of the London Passenger Transport Board was transferred to the British Transport Commission. The management of the undertaking was put under the London Transport Executive, a public authority appointed to assist and act as the agents of the Commission. The basic status of the London Transport Executive was not affected by the Transport Act, 1953, but the effect of the Transport Act, 1962, has been to transfer to a new London Transport Board, from the beginning of 1963, the facilities previously operated and responsibilities previously discharged by the London Transport Executive on behalf of the British Transport Commission, now dissolved. The Board still have a virtual monopoly, still have to provide a number of unremunerative services and to finance them from their more profitable operations and still have to pay their way. It is interesting to note that the Board are responsible for the finance of the new underground railway, known as the « Victoria Line », now being constructed.

9. The London Transport Board and the British Railways Board, although both nationally owned, are separate and independent undertakings. Formal provisions to ensure co-ordination between them are contained in the Transport Act, 1962, which requires the two Boards to co-operate to ensure properly co-ordinated services in the London Passenger Transport Area. To give practical effect to this, a Passenger Transport Committee, with membership drawn from both bodies, was set up in 1963. The Committee deals both with current problems of co-ordinating services and fares and with long-term planning. Fares on London Transport's road and rail services, and on the services of British Railways within the London Passenger Transport Area, are controlled by the Transport Tribunal. With minor exceptions, fares are the same on all services for the same distance travelled. Both the London Transport Board and the British Railways Board are formally associated in the London Transportation Study which has been undertaken by the Government and the London County Council (from 1st April, 1965, the Greater London Council) to devise a system for transport which will

meet the needs for travel in London in the most economical and practical way.

Outside London

10. The co-ordination of transport services outside London has developed more slowly and has not advanced to the same extent. The conditions which existed in the road passenger transport industry in the 1920s were chaotic, and a Royal Commission concluded that they were the direct result of allowing unregulated competition. The result of this was the passing of the 1930 Road Traffic Act, the main provisions of which have been maintained in force by the Road Traffic Act of 1960, the principal statute governing road passenger transport.

11. Under the Road Traffic Acts, the country was divided up into a number of areas, and a panel of « Traffic Commissioners » appointed for each area. The Chairman of each panel is a full-time official paid from public funds and is appointed by the Minister of Transport. The Commissioners work, however, independently of Ministerial control, except that there is a right of appeal to the Minister against their decisions, and are responsible for, inter alia, the licensing of all road passenger services in their area. When granting a licence (known as a road service licence), the Traffic Commissioners have wide powers to attach conditions to the licences to regulate such matters as fares, time-tables, routes and stopping places.

12. The purpose of the licensing system is to regulate the operation of bus services in the general public interest. When considering any application for the issue of a road service licence, the Commissioners have to consider the need for, or desirability of, the proposed service, the extent to which the routes are already served, the needs of the area as a whole, the suitability of the roads to be traversed, the elimination of unnecessary, and the provision of unremunerative services, and the co-ordination of *all* forms of passenger transport.

13. The results of this system have proved to be beneficial, and the industry has become more stable and able to provide safe and reliable transport. Many operators run a high percentage of their mileage at a loss, but cross-subsidise such mileage by profits from other services where they have received some measure of protection from competition. These views were borne out by the report of a government committee (the Thesiger Committee) in 1953. In provincial cities, therefore, a measure of co-ordination is achieved, but integration on lines comparable to the London Transport Board's undertaking does not exist.

The provincial conurbations

14. In recent years, it has become accepted that public transport will have an increasingly important role to play in the large towns and conurbations of the future. (It should be noted that in the United Kingdom a « conurbation » is not morely a large town, but consists of a group of towns which have grown and spread to form one large urban area.) The realisation of the importance of this future role is being taken into account in the land-use/transport surveys which are now being carried out, or are planned, in many of the largest towns in Britain. These transportation studies are designed to indicate, among other things, the most desirable future pattern for public transport services for the area : they will not, however, show how this pattern can best be achieved in practice.

15. It is essential to have the full co-operation of the transport operators at every stage of the development of plans for a comprehensive urban transport system. In the initial stages, in which existing traffic is surveyed, the operators can provide a great deal of essential information : in the later stages, when proposals for possible alternative systems are being formulated, the transport operators can provide much useful experience and expertise.

16. For these reasons, when transportation surveys are begun, all the major public transport operators in the survey area (which, outside London, may mean two or three municipal bus undertakings, one or two private bus operators and the British Railways Board) are brought together as members of the main committee controlling the survey, and of any appropriate technical sub-committees. In one survey area, a special Public Transport Sub-Committee has been set up, with representatives from all the principal bus operators and the British Railways Board, to advise on all public transport aspects of the transportation study, and, in particular, on the development of long-term proposals in the public transport field. It is hoped that this will prove successful and that the pattern will be followed in other areas conducting similar surveys. The close collaboration of local authorities and transport undertakings in transportation surveys, and in the study of their results, makes for greater mutual understanding and establishes an atmosphere of consultation and co-operation in examining long-term problems of common interest which may well itself be an important factor in the development of future forms of organisation.

Appendix III

EXPERIENCE OF GERMAN CITIES IN PLACING TRAMWAYS UNDERGROUND

It is reported from the German Federal Republic that, in small towns of less than 300,000 inhabitants, trams are being progressively replaced by motor buses.

On the other hand, in the sixteen large cities with populations of over 300,000 — excepting Berlin and Hamburg, where tramways will be progressively replaced by underground railways — trams represent about 70 per cent of total transport capacity.

Twelve of these cities are planning to place their tram tracks below ground, and four of them (Stuttgart, Frankfurt, Essen and Cologne) have already put the necessary works in hand.

Two towns of less than 300,000 population (Bielefeld and Aachen) have also begun studies.

The table attached shows the features of the networks and projects of the towns concerned.

Nearly all the towns are building their tunnels in the same fashion as an underground railway.

According to German experts in mass urban transport, the object of placing tramways underground is to provide an urban rapid transport line, for they consider that the high commercial speed will help to make short-distance public transport more attractive.

From this point of view, there is no doubt that sections of entirely independent, modern underground railway can attain a commercial speed one third higher than a modern tramway system operating in tunnel in central areas and on reserved tracks on the surface. But it must also be borne in mind that, given the same rates of acceleration and deceleration, an underground tramway can operate with shorter distances between stops and better connections, that is, less transit and less inter-change with other forms of transport. Consequently, a passenger's whole journey can be made with greater comfort and convenience, and just as fast as by underground railway.

For the sixteen towns with populations exceeding 300,000, the construction of the tunnels, including superstructures and provision of current, is expected to cost about DM 7,000 million for a total length of 150 km of tunnel. To build full-scale underground railways in all cities of 500,000 inhabitants and upwards would cost many times that amount.

If the DM 7,000 million were applied exclusively to the building of underground railways, each large city could obtain only one underground line, however attractive it might be. The alternative, on the other hand, will mean that tramlines will vanish almost entirely from the centres of each of these large towns.

	BOCHUM AND GELSEN KIRCHEN	BREMEN	DUISBERG	DORTMUND	DUSSELDORF	ESSEN	FRANKFURT-ON-MAIN	HANOVER	COLOGNE	NUREMBERG	STUTTGART
Length of existing network......... km	94	59	80	97	160	98	125	90	119	68	138
Length of tramlines on reserved land. km	13.3	14	22.3	29.1	54.6	16.5	62.4	29.7	71	15.6	48.8
Under construction or projected : Sections of underground tramway.. km	approx. 1	4.6	4.6	15	15	5.7	32	7.6	14	11.5	13

Appendix IV

SOURCES REFERRED TO, OR FROM WHICH MATERIAL HAS BEEN DRAWN

Report to the Urban Transport Study Group on highways and public transport infrastructures, by the Belgian Delegation (September, 1964).

Summary of the Report of the Commission of Experts appointed to investigate means of improving urban transport conditions, circulated by the Delegation of the German Federal Republic.

« Traffic in Towns ». A study of the long-term problems of traffic in urban areas. (The « Buchanan Report »), circulated by the United Kingdom Delegation.

XXXVth International Congress of the International Union of Public Transport. « Horizontal and vertical separation of public and private transport to improve the fluidity of urban traffic ». Prof. Dipl. Ing. A. BOCKEMÜHL and Dr F. BANDI.

CONTENTS

Appendices

Resolution n° 16 concerning
THE REGULATIONS GOVERNING INTERNATIONAL TRANSPORT BY ROAD AND THE LIBERALISATION OF CERTAIN TYPES OF TRANSPORT IN THIS CATEGORY

THE COUNCIL OF MINISTERS OF TRANSPORT,

Meeting in Paris on 26th November, 1965,

Having regard to the results of the efforts made to work out the basic elements which might, in principle, be adopted for purposes of general transport policy by the Member countries of the ECMT;

Recalling its intention to find solutions to the concrete problems which arise in the field of international transport;

Considering that it is desirable to take a first step in this direction without delay;

Having regard to the decision taken at Lisbon on 29th June, 1965 [CM/M(65)1], to give priority to matters concerning international transport by road, with special reference to the liberalisation of certain hauls and the criteria concerning the procedure for issuing licences and for determining quotas;

Recommends the Member countries[1] :

a) To exempt the following transport from any quota or licensing regulations :

a.1. Passenger transport, without remuneration, in private passenger vehicles with a maximum seating capacity of eight, excluding the driver.

a.2. Occasional passenger transport in the form of « closed-door » circular tours[2].

a.3. Goods transport in frontier areas, up to 25 km, as the crow flies, on each side of the frontier, provided that the total length of haul does not exceed 50 km as the crow flies[2 3 4].

a.4. Transport of goods carried on an occasional basis, to or from airports, in cases where services are diverted.

a.5. Transport of luggage carried on trailers attached to passenger-transport vehicles, and luggage carried on vehicles of any type to or from airports.

a.6. Post-Office transport.

a.7. Transport of damaged vehicles.

a.8. Transport of garbage and refuse.

a.9. Transport of animal corpses for the purpose of their disposal.

a.10. Transport of bees and fish stock.

a.11. Funeral transport.

b) To refrain from making the following types of transport subject to quota, though they may remain subject to licensing regulations involving no quantitative restrictions :

b.1. Transport in special vehicles of certain perishable goods[2 5 6].

b.2. Goods transport from a Member country to the frontier area of a neighbouring Member country, to a distance of 25 km, as the crow flies, from their common frontier[2 6].

b.3. Freight carried in motor vehicles when the total laden weight, including trailers, does not exceed 6 tons[6].

b.4. Transport of works and objects of art for fairs and exhibitions or for commercial purposes.

b.5. Transport of articles and equipment intended exclusively for advertising and information purposes.

1. The Greek Delegation made a general reservation.
2. The French Delegation made a reservation.
3. The Swiss Delegation made a reservation.
4. The Yugoslav Delegation made a reservation.
5. The German Delegation made a reservation.
6. The Austrian Delegation made a reservation.

b.6. Removals carried out by contractors having the staff and equipment specially suitable for this purpose[1].

b.7. Transport of properties, accessories and animals to or from theatrical, musical, film, sports or circus performances, fairs or fetes, and those intended for radio recordings, or for film or television production.

NOTE. Member countries should ensure that the decision on granting a licence should be reached within five days of the application being received.

c) To adopt the following general criteria concerning the procedure for the issue of licences where these are required :

c.1. Licences should be issued by the authorities concerned in the country where the vehicles to be used are registered.

c.2. Countries should exchange such information as may be appropriate concerning the licences issued in accordance with the above procedures.

c.3. Licences should be issued in an agreed standard form and in the languages of the countries concerned.

c.4. Special provision should be made to the effect that holders of licences must produce them when required to do so by qualified officials.

c.5. Any breach of the licencing regulations by a carrier should be reported to the countries concerned by the authorities of the country where the offence is committed and, where appropriate, the country where the vehicles is registered should be notified of the penalties applied or proposed for the enforcement of the above regulations.

d) To adopt the following basic criteria for the determination of quotas in cases where these continue to be applied :

For the improvement of bilateral transport relations between neighbouring countries :

d.1. The operation of goods transport by road on own account should not be limited in any way, provided that the basic conditions are brought as closely as possible into line with those concerning other forms of transport and provided that suitable supervisory measures are taken to prevent hauliers in this category from handling goods for hire or reward[1 2].

d.2. The operation of goods transport by road for hire or reward should be regulated in such a way as to ensure that the subjective conditions for access to the carrier trade are fulfilled.

d.3. In cases where a quota system is established, it should be based on the trend of demand, which can be estimated from the statistics concerning external trade between the countries concerned. Account should also be taken of some of the advantages peculiar to road transport[3 4].

d.4. The quota should be periodically reviewed to match any changes in trade and traffic trends. For the improvement of bilateral transport relations between non-neighbouring countries.

d.5. In such cases, at least one country is crossed in transit. Account must consequently be taken of its interests in order to enable it, for example, to participate in this traffic[1 2].

For the improvement of multilateral quotas :

d.6. The fact that road traffic exists or shows a tendency to develop in a geographical area including more than two countries may lead to the easing of quantitive restrictions on transport between these countries through the establishment of multilateral quotas, account being taken of possible bilateral quotas.

Instructs the Committee of Deputies :

1. With regard to *a*) and *b*) above, to make arrangements to give effect to these provisions, to fix the date for their coming into force, and to report back to the Council.

2. With regard to *c*) and *d*) above, to continue investigations with a view to drawing up proposals, to be submitted to the Council as soon as possible, concerning procedures for the application of the criteria provided for in these provisions.

1. The French Delegation made a reservation.
2. The Danish Delegation made a reservation.
3. The German Delegation made a reservation.
4. The Austrian Delegation made a reservation.

PART II

REPORT BY THE COMMITTEE OF DEPUTIES ON TRAFFIC INVESTMENT AND DEVELOPMENTS IN 1964

[*CM (65) 16 final*]

Chapter I. GENERAL

Each year, the Committee of Deputies submits to the Council of Ministers a detailed report on investment in the previous year for railways, roads and inland waterways and on the activities of each of these means of transport during the same year.

Presentation of the results for 1964 is the same, with a few additions, as that used for previous reports; this will make it easier to compare the data from one year to another.

A separate chapter grouping together all the relevant information including numerous figures is devoted to each means of transport. The general part, which forms Chapter I, is drawn up, in the usual manner, so as to bring out in the various sectors the main features of the year under review, distinguishing, where appropriate, between Member countries as a whole, the six countries of the European Economic Community and the countries whose situation differs from the average.

Table I, as an adjunct to this chapter, sets out essential data concerning amounts invested in each form of transport by ECMT Member countries in 1962, 1963 and 1964.

Briefly the situation in 1964 may be described as follows :

a) RAILWAYS

The pace of electrification has been markedly faster than last year.

From October 1964 to October 1965[1] 533 km of what are usually called European main lines were electrified as compared with 353 km for the previous period, while 2,217 km of ordinary lines as against 863 km were equipped with the usual types of current, except 1,500 V.d.c.

1. By way of exception, electrification is generally studied in periods of twelve months starting in October.

However, the programmes for the next five years are not appreciably different from those given in our 1964 report. These are particularly heavy for Germany (1,700 km) and for Yugoslavia (1,500 km).

Owing to differences in the types of current used, the number of multi-current locomotives is growing, and the number has increased from 125 to 181.

Diesel traction is still developing : 15,600 locomotives will be in service by the end of 1965 compared with 14,265 at the end of 1964. British railways have the largest share with 83 per cent of locomotives of over 2,000 h.p. and 46 per cent of those between, 1,000 and 2,000 h.p. At the end of 1964 the Eurofima Company had financed the construction of 655 Diesel engines including 544 for the countries of the European Economic Community.

The number of wagons in service has remained fairly constant since 1954 but load carrying capacity has increased by an average of 10.4 per cent for the EEC countries, and by 25,9 per cent for the other countries except Great Britain where, on the contrary, it has declined considerably (32.1 per cent).

Replacement of old wagons continues under satisfactory conditions at a rate of about 5 per cent per annum. Seventy-eight per cent of new wagons delivered are of standard type.

From the point of view of performance, results in 1964 were as follows :

Passenger traffic as a whole showed little change (+ 0.2 per cent); it was down by 1.7 per cent for the countries of the EEC. The average distance travelled per passenger being slightly longer, the number of passenger-kilometres rose on average by 2.4 per cent.

The results for goods traffic are slightly better with increases of 2.2 per cent in terms of tons carried and 1.3 per cent in terms of ton-kilometres. The figures for the Spanish, Yugoslav and Greek railways whose activity has increased considerably both for goods and passengers are higher than the average figures given above; the same applies to the Turkish and Norwegian railways, but only for goods traffic. The figures are lower than the average in the case of the Norwegian railways for passenger traffic, and in the case of the Italian and Netherlands railways for goods.

b) ROADS

Statistics are still lacking for evaluating the activity of road transport, but the Committee of Deputies is endeavouring to make good this deficiency. As in previous years, therefore, it has only been possible to study the road sector in relation to the trend of numbers and the development of infrastructure works.

In 1964, the number of four-wheeled vehicles increased at a faster rate than the year before, rising from 40.5 million to nearly 46 million, the percentage increase being 13.3 per cent against 12.4 per cent in 1963 for the ECMT countries as a whole; for the member countries of the European Economic Community the figures are slightly higher. The increase mainly applies to private cars, the rate of increase for buses and lorries being much lower.

In this report an attempt has been made for the first time, to provide a breakdown of lorry capacity according to three categories of tonnage; under 2 tons, from 2 to 10 tons and over 10 tons. This is a first experiment and is particularly interesting as it should enable comparisons to be made with other forms of transport, but it cannot be hoped to have obtained homogeneous data from the start; subsequent studies will doubtless give more soundly-based results.

As for two-wheeled vehicles, machines of large engine capacity continue to decline (5.7 per cent) except in Spain, Italy and Luxembourg while small capacity machines show a slight decline for the first time.

The international road network as defined in Geneva in 1950 includes an increased percentage of motorways : 13.8 per cent as against 12.6 per cent in 1963; for the countries of the EEC : 27.8 per cent against 23.8 per cent. Six hundred and forty six km of motorways were built on this network, of which 575 km in the EEC countries, the figures for last year being respectively 462 km and 246 km. This increase includes 270 km for Italy, 127 km for Germany and 122 km for France.

The Geneva Declaration of 1950 laid down standards for the three categories of roads envisaged : roads with two traffic lanes (category I), roads with more than two traffic lanes (category II), motorways. It may be considered that 62 per cent in length of the roads of the international network can comply with these standards, against 59 per cent last year. If, instead of the degree of standardization the adaptation of the network to traffic requirements is considered, it will be found that 82 per cent of the network is adequate (74 per cent for the EEC) the position being worst for category II roads.

Gross investment in the international network reflects a new effort by the governments : an additional $ 154 million of appropriations i.e. 21.4 per cent more than last year.

A study was undertaken for the first time, to ascertain the bases on which the economic benefits procured by road investment are assessed in the various countries : saving of time, reduced accident rate. First discussions show a certain diversity of views, especially on the last point. Further studies are needed.

Finally, as in previous years, the Chapter on roads reviews the work in progress on the main European highways.

c) INLAND WATERWAYS

In contrast with the years 1962 and 1963 which were affected by drought and severe winter weather, navigation conditions were good in 1964. Compared with the previous year, there was a considerable increase in tons carried : 382 million against 335 (i.e. 47 million). Compared with 1960, the increase was 53.5 million tons.

Performance in terms of ton-kilometres again shows, as compared with 1955, a less rapid rate of increase than for the gross national product : 44 per cent as against 57 per cent.

The Chapter on Inland Waterways analyses the situation for each country.

For the Rhine, the record of 1960, based on traffic crossing the German-Netherlands frontier was beaten. Downstream traffic has increased for the first time since 1961.

Whilst transport of ores rose by 28 per cent, transport of coal and hydrocarbons continued to fall.

On the Moselle, for the period June-December 1964, 2,323 boats carried a total of 863,000 tons. In 1965 traffic on this river is expected to be about 3.5 million tons.

Total capacity of the fleet has again appreciably increased rising from 18,378,000 tons (end

1963) to 18,878,000 tons (end 1964). Taking 1955 as 100 the index figure for the increase in capacity is 123 and that for tonnage carried 148. But it should not be concluded from this that the position is satisfactory or that it has improved, as numerous factors need to be taken into consideration such as the situation of the reference year, the modernisation of the fleet, etc.

The Chapter on Inland Waterways reviews, for each waterway, the work done on the main links of interest to Europe as a whole, as defined by Resolution No. 9 of the Council of Ministers of 3rd December, 1964. It points out that for the Scheldt-Rhine Link the treaty between Belgium and the Netherlands came into force on 23rd April, 1965.

Finally, attached to this Chapter is the Report by the Group of Experts on Inland Waterways giving data on the basis of which an agreement has been reached with the UINF, putting an end to certain divergencies of view between that body and the ECMT.

Chapter II. RAILWAYS

I. ANALYSIS OF RAILWAY TRAFFIC

A. Traffic in 1964

a) *Passenger traffic*

1. A traffic analysis shows that the number of passengers carried in the Member countries as a whole increased slightly by 0.2 per cent (but declined by 1.7 per cent in the EEC countries) and that the number of passenger/kilometres rose by 2.4 per cent (but fell by 0.4 per cent in the EEC countries) compared with the results for 1963.

2. The very slight movement observed since 1961 has thus continued. The changes in the number of passengers carried are in general fairly small except for Spain, Yugoslavia and Greece where they increased by 14.3, 12.2 and 6.9 per cent and Norway, Ireland and Italy which show declines randing between 7.6 and 5.9 per cent. The average length of journey per passenger has again increased.

3. The increase in the number of passenger/kilometres was most marked in Spain (17.1 per cent), Yugoslavia (15.3 per cent) and Greece (11.2 per cent).

4. The complete results are shown in Table 1 hereby.

Table 1. PASSENGER TRAFFIC

Percentage.

COUNTRY	PASSENGERS CARRIED 1964/1963	PASSENGER/ KILOMETRES 1964/1963
Belgium	— 0.7	+ 0.1
France	+ 1.6	+ 2.8
Germany	— 2.1	— 0.6
Italy	— 5.9	— 4.2
Luxembourg	— 1.8	+ 3.0
Netherlands	— 1.9	— 0.7
EEC countries	— 1.7	— 0.4
Austria	— 1.2	— 0.7
Denmark	+ 3.1	+ 5.5
Greece	+ 6.9	+ 11.2
Ireland	— 6.8	+ 0.3
Norway	— 7.6	— 2.6
Portugal	+ 2.6	+ 4.8
Spain	+ 14.3	+ 17.1
Sweden	— 3.3	+ 1.3
Switzerland	+ 2.8	+ 7.1
Turkey	+ 2.2	+ 3.3
United Kingdom	— 1.2	+ 3.3
Yugoslavia	+ 12.2	+ 15.3
Other countries	+ 2.0	+ 6.5
All countries	+ 0.2	+ 2.4

b) *Goods traffic*

5. The number of tons carried increased by 3.3 per cent for the 18 countries as a whole (EEC countries + 2.1 per cent). The number of ton/kilometres also increased slightly by 2.2 per cent (EEC countries 0.0 per cent). The trend is thus as unfavourable as in 1962 and 1961 whereas in 1963 there was an increase of 3.9 per cent in tons carried and 5,9 per cent in ton/kilometres. However, it should be noted that the 1963 results do not give a clear picture as the railways were favoured by the exceptionally long spell of cold weather during the first quarter.

A considerable increase in ton/kilometres was recorded in Greece (+27.3 per cent), Spain (+20.4 per cent), Turkey (+17 per cent) and Norway (+9.1 per cent). The Italian railways show a decline in ton/kilometres amounting to 9.1 per cent and the Netherlands railway a fall of 5.1 per cent. The percentage movement in other countries ranges between +3.8 per cent (United Kingdom) and — 2.2 per cent (Denmark). The highest increases in tons carried were recorded in Spain (+18.2 per cent), Turkey (+17.8 per cent), Greece (+17.4 per cent), Norway (+ 15 per cent) and Sweden (+10.6 per cent).

6. As in 1963 a better trend was observed in the traffic in non-EEC countries (see Table 2).

TABLE 2. GOODS TRAFFIC

Percentage.

COUNTRY	TONS CARRIED 1964/1963	TON/ KILOMETRES 1964/1963
Belgium	+ 2.0	+ 1.6
France	+ 3.4	+ 3.6
Germany	+ 3.7	— 1.2
Italy	— 9.7	— 9.1
Luxembourg	+ 5.5	+ 3.0
Netherlands	— 2.2	— 5.1
EEC countries	+ 2.1	+ 0.0
Austria	— 1.2	+ 0.9
Denmark	— 2.0	— 2.2
Greece	+ 17.4	+ 27.3
Ireland	— 0.4	— 1.5
Norway	+ 15.0	+ 9.1
Portugal	— 0.6	— 0.5
Spain	+ 18.2	+ 20.4
Sweden	+ 10.6	+ 6.3
Switzerland	+ 4.3	+ 0.3
Turkey	+ 17.8	+ 17.0
United Kingdom	+ 2.0	+ 3.8
Yugoslavia	+ 8.4	+ 6.7
Other countries	+ 4.9	+ 6.2
All countries	+ 3.3	+ 2.2

B. TREND OF TRAFFIC IN THE EARLY MONTHS OF 1965

1. An analysis of passenger traffic in the first six months of 1965 as compared with the same period in 1964 shows a very slight decline in passenger traffic but an increase in passenger/kilometres in Member countries as a whole. Greece and Yugoslavia show a considerable increase in passenger traffic and passenger/kilometres.

2. The provisional figures for goods traffic are rather unfavourable in most Member countries (see Table 3 hereby). As regards tons carried only Sweden, Norway and Turkey show a marked increase (6.9, 13.1 and 15.2 per cent) while seven countries show an increase of 0.7 to 24.1 per cent in ton/kilometres and three countries a decline from 5.1 to 13.8 per cent.

TABLE 3. FIGURES FOR THE FIRST SIX MONTHS OF 1965

Percentage.

COUNTRY	PASSENGERS CARRIED 1965-1964	PASSENGER/ KILOMETRES 1965-1964	TONS CARRIED 1965-1964	TON/ KILOMETRES 1965-1964
Austria	+ 1.2[2]	+ 2.1[2]	— 3.0[1]	— 4.8[1]
Belgium	+ 2.8	— 2.0	— 3.5	— 1.5
Denmark	— 0.8	— 4.8	+ 0.6	— 5.1
France	+ 0.9	+ 1.6	— 4.3	— 3.1
Germany	+ 2.3	+ 5.2	— 2.8	— 3.0
Greece[2]	+ 17.1	+ 18.0	— 3.1	+ 9.3
Ireland	— 1.0	+ 0.6	— 5.7	+ 5.2
Italy	— 8.2	— 8.0	— 5.5	+ 1.4
Luxembourg	— 0.5	— 0.3	— 2.5	— 3.4
Netherlands	— 3.2	— 3.4	— 12.4	— 13.8
Norway	— 5.0	— 0.4	+ 13.1	+ 9.5
Portugal	+ 4.9	+ 6.3	— 1.0	— 0.8
Spain	.	.	.	.
Sweden	— 4.7	.	+ 6.9	+ 10.1
Switzerland	— 1.6	— 5.3	— 1.1	+ 0.7
Turkey	+ 0.8	+ 5.9	+ 15.2	+ 24.1
United Kingdom	— 2.7	.	— 3.2	— 1.3
Yugoslavia	+ 11.2	+ 10.7	— 4.2	— 4.1
All countries	— 0.1	+ 0.6	— 2.9	— 1.5

1. First five months only.
2. First four months only.

II. SURVEY OF SELECTED CATEGORIES OF INVESTMENT

A. ELECTRIFICATION[1]

a) *Increase between October* 1964 *and October* 1965

1. A review of the progress made since October 1964 shows that the growth of electrification which had slowed down since 1955 reached a very active stage between October 1964 and October 1965. The length of electrified main lines amounted, in round figures, to 23,400 (16,500) km in October 1965. It had thus increased by 533 (467) km, 424 (424) km of which were electrified with 16 2/3 cycle single-phase AC and 13 (13) km with 50-cycle single-phase AC. 185 (119) km including 89 (89) km previously electrified with three-phase AC were converted to 3,000 V DC.

1. The figures in brackets refer to the six countries of the EEC.

For the third year in succession no line was electrified with 1,500 V DC. In addition 1,684 (937) km of line not ranking among the European main line network were electrified.

2. Out of a total length of 185,800 (93,300) km for the whole network electrified lines now account for approximately 45,800 (25,400) km representing in round figures 24.7 (27.2) per cent. Table 1 shows the breakdown of electrified lines by type of current.

4. It is the French railways which have the longest electrified network (8,180 km) followed by the Italian railways (7,967 km), the Swedish railways (6,958 km) and the German railways (6,415 km). The five countries in which electrified lines represent the highest percentage of the total network are Switzerland (100 per cent). Sweden (58 per cent), the Netherlands (50 percent), Italy (49 per cent) and Norway (47 per cent).

TABLE 1. LENGTH OF LINE ELECTRIFIED AND TYPE OF CURRENT

TYPE OF CURRENT	ALL ECMT COUNTRIES			EEC COUNTRIES		
DC 600/1,200 V	1,880	4.1		160	0.7	
DC 1,500 V	7,306	16.0	43.4	6,355	25.0	59.0
DC 3,000 V	10,676	23.3		8,451	33.3	
Single phase AC 16 2/3 cycles	20,517	44.8		66,455	25.4	
Single phase 25 cycles	47	0.1	56.6	—	—	41.0
Single phase 50 cycles	4,806	10.5		3,409	13.4	
Three-phase AC	571	1.2		571	2.2	
Total	45,803	100.0		25,401	100.0	

3. It should be noted that new lines were electrified in 10 (4) Member countries, namely Germany (950 km), Belgium (30 km), France (374 km), Italy (50 km), Austria (17 km), Spain (239 km), Norway (121 km), Portugal (60 km), the United Kingdom (224 km) and Yugoslavia (152 km).

Table 2 below gives a general picture of the progress of electrification since the end of 1953 :

TABLE 2. ANNUAL INCREASE IN THE ELECTRIFIED NETWORK

SITUATION	LENGTH OF ELECTRIFIED NETWORK	LENGTH ELECTRIFIED DURING THE YEAR
End 1953	27,295	1,061
End 1954	28,356	1,639
End 1955	29,995	2,022
End 1956	32,017	1,755
End 1957	33,772	1,682
End 1958	35,454	1,592
End 1959	37,046	1,589
End 1960	38,635	1,465
End 1961	40,100	1,520
End 1962	41,620	1,268
End 1963	42,888	1,112
End 1964	44,000[2]	2,217[1]
October 1965	45,803	

1. October 1964 - October 1965
2. Estimate.

b) *The programmes up to* 1969

5. Under the existing programmes of the railway administrations the network of European electrified main lines will be extended by a further 3,200 (1,600) km and other lines by 2,800 (1,000) km between October 1965 and the end of 1969.

The biggest programmes are those of the German (approximately 1,700 km), Yugoslav (about 1,500 km), French (approximately 800 km), Spanish (about 600 km), British and Norwegian (about 400 km) railways. Italy is continuing its programme of changing over from three-phase AC to 3,000 V DC on 100 km of European main lines.

On the basis of these programmes the total length of the network of European electrified main lines will be 26,600 (18,100) km by 1969. The total length of all electrified lines will be 51,800 (28,000) km, the proportions represented by the four principal types of current being 14.4 (23.3) per cent using 1,500 V DC; 22.4 (31.0) per cent using 3,000 V DC; 44.3 (29.1) per cent using 16 2/3 cycle single-phase AC and 14.0 (14.4) per cent using 50-cycle single-phase AC. The proportion using three-phase AC will be 0.9 (1.6) per cent, that using 600 to 1,200 V DC 3.9 (0.6) per cent and that using 25-cycle single-phase AC 0.1 (—) per cent.

7. Graph 2*a* shows the increase in European electrified main lines broken down among the four principal types of current between

October 1955 and October 1965 with estimates up to 1969 and Graph 2(b) shows the annual increase in all electrified lines for the years 1954 to 1965.

c) *The electrification map*

8. The map of European electrified main lines has been brought up-to-date as at October 1965. It also shows the connections between Belgrade and Greece and Belgrade and Turkey, which represent about 2,600 km of main line. To enable a comparison to be made with the figures given in the past, the percentage of electrification for the two networks is reproduced below :

TABLE 3. LENGTH OF THE MAIN LINE NETWORK

LENGTH OF THE NETWORK OF EUROPEAN MAIN LINES	WITHOUT	WITH
	CONNECTIONS FROM BELGRADE TO GREECE AND TURKEY	
Of which :	31,100 (21,300) km	33,700 (21,300) km
Electrified by October 1965....	75 (78) %	69 (78) %
Probably electrified by the end of 1969....................	85 (85) %	79 (85) %

9. The map shows not only the electrification of the main lines but all other electrified lines (except narrow-gauge lines).

d) *Multi-current locomotives and railcars*

10. The railways have taken into account the increasing number of points of contact between electrified networks with different systems. Thus in 9 (5) countries the number of multi-current locomotives, etc. now in use amounts to 181 (153) while 60 (60) are under construction and orders are likely to be placed for 29 (28) others. These figures include 8 (7) locomotives for three types and 32 (17) for four types of current. The total number of multi-current locomotives, etc. in service, under construction or planned is therefore 270 (241) of which 227 (203) are locomotives and 43 (38) are railcars.

B. DIESEL TRACTION[1]

a) *Trend of numbers*

1. At the end of 1964 number of diesel locomotives reached a total of 14,265 (7,462). The British Railways have the greatest number of diesel locomotives i.e. 4,462 (=31.3 per cent of the total); they are followed by the German (3,199) and French Railways (2,333).

2. At the end of 1965 there will be approximately 15,600 (8,200) in service, of which approximately 9,600 (6,000) will be for shunting and 6,000 (2,200) for main line service. Deliveries are distributed roughly as follows : 400 locomotives for the British railways, 300 for the German and French, and 350 for the other systems.

3. The growth in the number of diesel locomotives is shown in the table below and in the attached Graphs 3 and 4. The breakdown is by power categories.

4. A determining factor in this development has again been the progress of dieselisation in the United Kingdom. At the end of 1965 approximately 46 per cent of locomotives in the 1,001 to 2,000 hp class and 83 per cent of those in the category above 2,000 hp will be owned by British Railways. It must be pointed out that if other large networks have not carried dieselisation so far for heavy traction it is because they have given first place to electrification.

1. The figures in brackets refer to the six countries of the EEC.

TABLE 4. NUMBER OF DIESEL LOCOMOVIVES

POWER CATEGORY	NUMBER OF DIESEL LOCOMOTIVES END 1950	END 1954	END 1964	END 1965[1]
Up to 350 hp..	2,047 (1,627)	2,228 (1,741)	5,398 (3,456)	5,748 (3,725)
From 351 to 1,000 hp......................................	166 (144) (From 351 to 2,000 hp)	839 (392)	5,083 (2,813)	5,302 (2,924)
From 1,001 to 2,000 hp....................................		51 (13)	2,988 (1,043)	3,568 (1,421)
2,001 hp and over...	—	6 (2)	796 (150)	989 (115)
Total..	2,213 (1,771)	3,124 (2,148)	14,265 (7,462)	15,607 (8,185)

1. Estimate.

5. The trend in the number of diesel railcars is shown by the following table :

SITUATION	NUMBER OF DIESEL RAILCARS
End 1950	2,664 (1,880)
End 1956	4,617 (3,110)
End 1960	8,252 (3,401)
End 1964	8,970 (3,465)
End 1965[1]	9,148 (3,574)

1. Estimate.

6. Of the total of 9,148, the number belonging to the British Railways alone is 4,107. At the end of 1965, only three other administrations will have more than 1,000 railcars, namely :

France 1,128
Germany 1,089
Italy 1,055

The trend in the number of diesel railcars is shown in Graph No 5.

7. Up to the end of 1964 the Eurofima Company had financed a total of 655 (544) diesel locomotives of which 88 were under construction, and 19 (—) diesel railcars for nine railway administrations.

b) *Standardization*

8. The Council of Ministers having received the second part (locomotives) of its report on the standardization of railway rolling stock at its Lisbon session in June 1965, no information on this point is given in this report.

C. THE RELATIVE SCALE OF ELECTRIC AND DIESEL TRACTION[1 2]

I. In 1964 the proportion of steam traction was further reduced to 24.7 (21.9) per cent in terms of train/kilometres and 29.2 (27.1) per cent in terms of gross ton/kilometres.

2. Electric traction accounted for 47.7 (49.8) per cent in terms of train/kilometres and diesel traction for 27.6 (28.3) per cent.

In terms of gross ton/kilometres electric traction accounted for 57.4 (60.8) per cent of the total traffic [although only 26.4 (25.7) per cent of the total network was electrified in 1964] and diesel traction for 13.4 (12.1) per cent.

1. The figures in brackets refer to the six countries of the EEC.
2. The figures do not include British and Irish Railways as these do not supply figures for gross ton/kilometres.

D. GOODS WAGONS[1 2]

a) *Trend of numbers*

1. At the end of 1964 the number of goods wagons stood at 1,088,277 (782,843).

2. The above total includes 427,332 (296,373) covered wagons, 420,851 (295,873) open wagons and 240,094 (190,597) other wagons; the number of wagons of standard type was 121,515 (105,605) and the number of unified type 109,676 (82,511). The proportion of wagons of both standard and unified types in the total figure has thus increased to 21.2 (24.0) per cent, the respective percentages of covered, open and other wagons being 20.3 (22.4); 20.2 (21.6) and 24.6 (29.6) per cent.

3. Of the 213,070 (193,163) wagons allocated to the Europ Pool at the end of 1964, 85,423 (71,640) or 40.1 (37.1) per cent [compared with 21.2 (24.0) per cent for all wagons] were either standard or unified types, 46.2 (42.8) per cent of these being covered wagons and 35.8 (33.3) per cent open wagons.

b) *Trend in capacity*

TABLE 6. WAGON CAPACITY

COUNTRY	WAGON CAPACITY		
	THOUSAND TONS		% 1964/1954
	END 1954	END 1964	
Belgium	1,521	1,368	— 10.0
France	7,140	6,930	— 3.0
Germany	5,243	6,880	+ 31.2
Italy	2,208	2,619	+ 18.6
Luxembourg	88	80	— 9.1
Netherlands	500	555	+ 11.0
EEC countries	16,700	18,432	+ 10.4
Austria	585	751	+ 28.4
Denmark	212	228	+ 7.5
Greece	89	121	+ 36.3
Ireland	121	118	— 2.5
Norway	191	183	— 4.2
Portugal	125	134	+ 7.2
Spain	984	1,106	+ 12.4
Sweden	974	1,232	+ 26.5
Switzerland	291	529	+ 81.7
Turkey	328	334	+ 1.8
United Kingdom	15,509	10,536	— 32.1
Yugoslavia	1,039	1,478	+ 42.2
Other countries	20,448	16,750	— 18.0
Other countries[1]	4,939	6,214	+ 25.9
All countries	37,148	35,182	— 5.3
All countries[1]	21,639	24,646	+ 13.9

1. Excluding the United Kingdom.

4. Although the number of railway wagons has only increased from 1,076,155 to 1,088,277 (1.1 per cent), capacity has expanded considerably (13.9 per cent between 1954 and 1964, see table 6 below). Five Member countries show a decline of 2.5 to 10 per cent, excluding the United Kingdom, and twelve show increases ranging from 2.4 to 81.7 per cent.

Average capacity increased during this period from 20.1 to 22.7 (13 per cent) T/wagon for all countries, from 20.8 to 23.5 T/wagon for the EEC countries and from 18.0 to 20.4 T/wagon for the other countries.

5. Fluctuations and divergencies in wagon capacity and volume of traffic trends in the various countries are due to such factors as increase or decline in traffic, increase in wagon capacity unloading on Saturdays.

6. The capacity of privately-owned wagons has increased more than that of wagons owned by the railways i.e. from 2,691 (2,270) to 4,325 (3,591) thousand tons (excluding the United Kingdom and Turkey) i.e. 61 (60) per cent.

c) *Deliveries in* 1964[1]

7. In 1964 a total of 31,829 (26,019) new wagons and 17,464 (15,013) reconditioned wagons were delivered making an overall addition of 49,293 (41,032) wagons representing 4.6 (5.2) per cent of total numbers.

8. Of the new wagons delivered 10,756 (9,032) were of standard type and 14,040 (11,665) of unified type, the two together representing 78 (80) per cent of all deliveries of new wagons. Of the reconditioned wagons 74 (70) per cent were of standard or unified type.

9. Up to the end of 1964 the Eurofima Company had financed a total of 9,762 (8,200) wagons of which 9,149 were in service and 613 under construction, for nine railway administrations. In 1964 1,697 wagons were delivered, i.e. 5.3 per cent of all deliveries of new wagons.

1. Excluding the figures for the United Kingdom except for wagons for the ferry-boat service.

d) *Standardization studies*

10. Pending the conclusion of the ORE study the railway administrations are continuing to work on the design of wagons suitable for automatic coupling. But further work on the unification of two-axle wagons depends — for reasons connected with automatic coupling — on a revision of present conceptions of the optimum ratio between width and length. The ORE has put the necessary research in hand but the solution adopted will in all probability be simply a compromise between conflicting requirements. For this reason many railway administrations are increasingly inclined to envisage a wider use of bogie wagons.

11. Accordingly, only one single new type of unified wagon has been defined. This is a short flat bogie wagon particularly suitable for carrying high density goods. Moreover, it was decided that before considering the possibility of introducing sliding-roof wagons into the Europ pool further progress should be made towards their unification. The survey showed that traffic requirements made it necessary to consider the unification of three types derived respectively from the unified two-axle open wagon, one of the unified two-axle covered wagons and the short, flat bogie wagon which has just been unified. Work on this last type are to be put in hand.

e) *Incorporation of other types of wagons in the Europ pool*

12. A further survey has shown that conditions are not yet suitable for the joint operation of unified flat bogie wagons particularly as available wagons are not sufficiently uniform. However, at a meeting in 1965 the Europ Commission considered that subject to certain transitional arrangements a limited pool of unified two-axle flat wagons might be formed initially involving the German, Belgian, French, Luxembourg and Swiss railways. 1st January, 1967, as adopted as a possible date for putting this new joint venture into operation.

Chapter III ROADS

I. Number of motor vehicles

1. *Trend of motor vehicle numbers*

Table 2 traces the trend of motor vehicle numbers over the past three years.

For ECMT countries the number of motor vehicles totalled almost 46 million, including 29 million for the EEC countries.

However, the table for 1964 shows an anomaly when compared with that for 1963 : a fall in the number of buses and motor coaches in Italy.

It is therefore evident that the bases used have been modified and a direct comparison with previous years is not possible[1].

After correction, and leaving aside Greece, Portugal and Turkey, for which data are incomplete, the percentage increases by category and for all categories were approximately as follows :

	ECMT		EEC	
	1963-1964	1962-1963	1963-1964	1962-1963
Private cars	13.4	14.9	14.8	16.1
Buses and motor coaches	4.6	4.6	5.9	5.0
Lorries	7.0	8.1	6.3	7.7
All categories	12.3	13.6	13.4	14.7

As far as can be judged from the incomplete data available, it therefore seems that the slight slowing down first recorded in 1963 continued in 1964.

2. *Total transport capacity of utility vehicles*

This section did not appear in the previous report, and like any new statistical exercise calls for a certain running-in period before any conclusions can be drawn.

Table 3 *a* gives the fragmentary data obtainable in this connection (11 countries) while Table 3 *b* gives the corresponding percentages.

Setting aside Belgium (where the data concern only transport for hire or reward), Luxembourg, Norway and the United Kingdom (for which country the data are incomplete) a first rough estimate for the eight remaining countries shows the breakdown of vehicles by different categories to be as follows :

Carrying capacity	Average carrying capacity (t)	Percentage	
		of number of vehicles	of total capacity
0 to 1.9 t	0.94	64.6	26.3
2 to 9.9 t	4.36	33.0	61.8
10 t and over	11.8	2.4	11.9
All vehicles	2.32	100.0	100.0

II. Two-wheeled motor vehicles (Table 4)

The same trends are again apparent : a fall of 5.7 per cent in the number of vehicles of large cylinder capacity (EEC : 7.6 per cent) and an increase of 0.4 per cent in the number of vehicles of small cylinder capacity (EEC : 3.3 per cent).

The number of motorcycles of large cylinder capacity nevertheless increased in Spain, Italy and Luxembourg, while the number of motorcycles of small cylinder capacity began to fall in a certain number of countries, including Germany, Spain and Sweden.

The total number of motorcycles remains in the region of 20 million.

III. Road infrastructure

Table 5 gives a breakdown by categories of the present international network. Its total length has hardly changed, but there has been some redistribution between categories. Thus the length of motorways has increased by 646 km (including 575 km for the EEC).

Motorways now account for 13.8 per cent of the total length of the international network, as against 12.6 per cent at the end of 1963 (for the EEC : 27.8 per cent instead of 23.8 per cent).

Italy takes the lead in this increase with 270 km, and is thus a long way ahead of the other countries : Germany, with 127 km, followed by France with 122 km. Germany still holds the record for motorways in service (50.6 per cent of the international network situated on its territory).

Table 6 gives a breakdown by categories of the sections of international roads which conform to EEC standards, together with the corresponding percentage of their total length (standardization ratio). This is now 62 per cent for the ECMT as a whole (as against 59 per cent in 1963), and 71 per cent for the EEC (instead of 67 per cent). Undoubted progress has therefore been made in the standardization of the network. At this rate standardization of the existing network could be complete within 13 years (10 for the EEC).

Table 7 gives the length of sections whose capacity is regarded as adequate for the traffic they carry. This would appear to be the case in general for 82 per cent of the international network (74 per cent for the EEC). However, as has been pointed out before, the standardized sections and those with adequate capacity do not necessarily coincide. It is mainly on category II roads that capacity is inadequate.

The two maps appended in the Annex represent respectively the existing situation, sections of inadequate capacity being shown in red, and the future network as at present planned, sections already in service with their final characteristics being shown in black.

1. In an attempt to correct this disparity to a certain extent, 10,000 buses have been added for Italy.

Table 8 is an attempt to show in figures how the future network will be made up and how far it has already been built. The data obtained are still not sufficiently complete to enable any general conclusions to be drawn from them. For the seven countries for which data are available, the overall percentage of completed network is 33 per cent, this figure varying between 18 and 64 per cent in the individual countries.

IV. INVESTMENT (Table 9)

During the period 1963-1964, gross investment in the international network was $154 million[1] higher than in 1963 (EEC : 86), i.e. an increase of 21.4 per cent (EEC : 21.8 per cent).

This increase, though much higher than that forecast, is less than that recorded during the previous period, $173 million[1] (EEC : 93).

The percentage increase in investment amounts is smaller, and this trend seems to be confirmed by forecasts of investments on a smaller scale in 1965 (3 per cent for all countries and 9 per cent for EEC countries).

V. ECONOMIC STUDIES

This section has been added to the traditional report to enlarge the scope of what hitherto has been an exclusively statistical exercise.

Information received (Table 10) indicates that most Member countries try or have tried, at least occasionally, and most frequently in particular cases, to work out the economic benefits resulting from road investment.

In France, the United Kingdom and Turkey, these benefits are calculated systematically, at least in the case of large scale projects. France and the United Kingdom have provided details of the principles applied.

In Norway an Institute specially set up to study these questions established methods of calculation in 1962.

Leaving aside Yugoslavia[2], the methods used take different forms. The final results are, however, similar in all cases.

In Germany the method consists in calculating the total cost of transport (expenditure by public authorities and users) and trying to minimise it.

In the other countries, although the methods applied are fairly varied, the procedure is to work out the total profit from the operation (difference between benefits and expenditure) and try to maximise it.

Methods of application differ mainly in respect of the period considered for the calculation of benefits and expenditure.

Where, as is generally the case, this period covers several years, a number of countries (Belgium, France, the Netherlands, Spain, Sweden) relate benefits and expenditure to a reference year, for example the year in which the project is drawn up.

But the process is often considerably simplified, when, for instance, the operation is an isolated one, which does not depend upon or affect other operations. In this case it is sufficient to express the operation in terms of a profitability factor, which is simply the ratio of benefits to expenditure, the benefits being calculated for a single year. It makes little difference what year is chosen as reference year when classifying the projects to be carried out. This reference year can be, for example, the year the project is drawn up (France), the year the new construction is brought into service (United Kingdom), or some later year (the Netherlands, Switzerland). The profitability factor can therefore be likened to an interest rate, relating to the year in which benefits are worked out.

Any of these various methods make it possible to classify the different operations possible at a given moment, and make a reasoned selection between them. They call for estimates of expenditure and benefits.

As the calculation of expenditure generally gives rise to no special difficulties, it is mainly the manner in which benefits are assessed in the different countries that deserves attention.

Yugoslavia apart[3], all countries take into account benefits to users, i.e. usually : less wear on vehicles, reduced petrol consumption, saving of time, increased safety. In France reference is even made to more comfortable conditions on the motorways.

But all these factors are not always taken into consideration. In the Netherlands, for example, no account is taken of the increase in safety, and in Turkey the only factor that counts is the reduction in the cost of using motor vehicles, no account being taken of time saving or safety.

In the Netherlands, on the other hand, account is also taken of possible saving by the public authorities (investments in other routes

1. This figure does not include Greece, as details of investment in 1963 are not available.

2. In Yugoslavia, the benefits of road investments would seem rather to be assessed from the point of view of their effects on the economy as a whole. Direct benefits to users, which are less substantial, compared with benefits to the community, than in the other countries, are not taken into account.

3. See note 2.

may become unnecessary, lower maintenance and operating costs).

To assess the value of an operation, benefits are always calculated exclusive of taxes, that is to say that account is taken only of benefits to the community, not benefits to individuals. The latter may however be taken into consideration at an intermediate stage, for instance in studies on the distribution of traffic between several competing routes (France).

Bases for the countries' economic calculations differ fairly widely. However they have some points in common, and it seemed worthwhile including a comparative table (Table II) showing the value attributed in the different countries to two of the factors, independent of routes, for which figures could be given : value of time and cost of accidents (the cost of utilisation of vehicles depends upon the route followed and on speed, so that direct comparison is impossible).

In order to facilitate comparison, values have been expressed in dollars.

In all cases where a value is attributed to it, time saved is estimated on the basis of the average hourly wage, taking into account the average number of people in each vehicle, this number sometimes being reduced by a factor based on the economic value of the occupants' time. Some countries add any possible advantage to be gained by better utilisation of the vehicle.

The values indicated (column 1) correspond fairly closely, taking into account the considerable degree to which subjective judgements can affect estimates of this kind. The same applies for the number of occupants per vehicle (column 2).

But there are much more substantial divergencies in the cost of accidents (column 3), which some countries do not take into consideration, and which, in the case of the other countries, varies in the proportion of one to five. It would seem that these costs are calculated in a fairly arbitrary manner, and it would be useful to analyse the methods used.

VI. Current development works on the main European arteries

The following is a summary of current development works on the main European highways, listed in numerical order, with particular reference to motorway construction.

The length indicated corresponds to the existing network, i.e. that which can actually be used. Because of gradual modification of the network in preparation for the « future » network, lengths generally differ from those mentioned in the previous report.

It should perhaps be recalled that these are always net lengths, i.e. they do not include sections of highway which might be shared with a highway bearing a lower number, nor sections outside the territory of ECMT countries.

E 1. *United Kingdom - Italy* (3,095 km)

In the United Kingdom, where there is as yet no motorway section in service on this higway, work is still in progress.

A considerable effort is at present being made in France, where 78 km of motorway were put into service in 1964, thus increasing the length of motorway in service to 278 km, with 241 km of new motorway under construction (average percentage completed : 48 per cent).

In Italy, the completed section of the Genoa-Seravalle motorway is open to traffic : 282 km of motorway are now in service on this highway. Work is in progress on the motorway sections Albissola - Savona, Rome - Civitavecchia, Genoa - Rapallo, Salerno - Reggio Calabria, and has begun on the Sestri Levante - Leghorn section.

E 2. *United Kingdom - Italy* (2,233 km)

In the United Kingdom work is continuing in Kent; expenditure for 1964-1965 amounts to $3.8 million. About 11 km of motorway are in service.

In France and in Switzerland, where 90 per cent of the length of highway satisfies traffic requirements, work has been limited to standardization.

In Italy, a second carriageway is being built on the Milan - Larghi section; other work is in progress between Bologna and Rimini and to the west of Milan. Of the 1,151 km covered by this highway, 233 are at present in the form of motorway.

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E 3. *Portugal - Sweden* (3,586 km)

In Portugal, 131 km out of 406 are standardized, 23 in the form of motorway.

In Spain, where the highway includes no motorway, only standardization work has been reported.

In France, 85 km of motorway are in service, 35 since 1964. A further 163 km of new motorway are under construction (average percentage completed 58 per cent), and a new suspension bridge is being built at Bordeaux.

In Belgium, work has begun on a new tunnel the Scheldt, at Antwerp. It will accommodate a motorway with two three-lane carriageways in two channels and will also comprise a channel for a double track railway, and another for cyclists.

In the Netherlands, where 3 km of motorway are in service to the south of Eindhoven, the construction of the motorway in co-operation with Belgium and the German Federal Republic is expected to be completed (73 km) in 1970.

In Germany, 407 km of motorway are already in service. Work on by-passes is proceeding at various points, over a total of 33 km.

In Denmark there is as yet no motorway in service on this 349 km highway, 200 km of which are standardized. A six-lane tunnel under the Limfjord, near Aalborg, which at present is still in the planning stage, will probably be opened by 1969.

In Sweden, finally, 6 km of motorway, and 17 km of new road will shortly be opened to traffic. There are at present 14 km of motorway in service.

E 4. *Portugal - Finland* (4,883 km)

In Spain, various work to a total cost of $23 million has been carried out on this highway, which has a total length of 1,193 km including 785 km of standardized road but only 15 km of motorway.

In France, work has begun on the first 48 km of motorway between Nimes and Montpellier, as well as on a 14 km motorway by-pass between Voreppe and Grenoble, and another between Grenoble and Meylan; in Grenoble itself, elimination of the level crossings is almost complete.

In Switzerland, where there are already 76 km of motorway, there are few changes to report.

Since last year almost all the German section of highway E 4 has been put into its final form, a 738 km continuous stretch of motorway, crossing the whole of Germany from north to south. The amount of new construction is therefore very small.

In Denmark, 44 km of motorway are in service. There are plans to build a further 50 km south of Copenhagen.

In Sweden, finally, 59 km of new road, including 32 km of motorway, will shortly be opened to traffic, supplementing the 90 km of motorway already in service.

E 5. *United Kingdom - Turkey* (4,085 km)

Nothing to report in the United Kingdom, where the 129 km of the highway are shared with E 2.

In Belgium, 50 km of motorway have been opened to traffic between Liège and the German frontier, in the direction of Aix-la-Chapelle (Aachen). The length of motorway in service is thus increased to 157 km.

In Germany, the section of motorway from the Belgian frontier to Aix-la-Chapelle has also been put into service, as well as the 42 km section between Würzburg and Nuremberg. One-hundred and eleven km of new road have been built in all, and there is now a continuous stretch of motorway between Liège and Nuremberg, which represents 488 km in Germany alone. In addition, work has begun on a new 103 km section from Nuremberg towards the Austrian frontier.

In Austria, four extra km have been built. There are, now 108 km of motorway in service between Linz and Vienna, representing 61 per cent of the total length to be built between these two towns.

E 6. *Italy - Norway* (2,485 km)

In Italy, 270 km of motorway were put into service in 1964 between Florence and Rome, bringing the length of motorway in service to 398 km. Work has begun on the Brenner - Verona section.

In Austria, the Brenner motorway is still under construction (7 km in service).

In Germany, where 287 km of motorway are in service, the present B 2 (Olympiastrasse) is being converted into motorway to the south of Munich.

In Sweden, 44 km of new motorway are under construction on this highway, which at present has 63 km.

Finally, Norway has put its first 5 km of motorway into service near Oslo.

E 7. *Italy - Poland* (1,256 km)

There have been few changes on this highway. In Italy, in addition to a certain amount of standardization work, construction of the Bologna - Ferrara motorway is continuing. Twenty-five km of motorway are in service between Padua and Venice.

In Austria, however, 12 km of new motorway have been put into service south of Vienna, which brings the length of motorway in service to 49 km, including 4 km which for the moment have only one carriageway. A further section of motorway is under construction between Klagenfurt and Villach. The Massenberg tunnel will be opened in 1965.

E 8. *United Kingdom - Poland* (610 km)

Few changes here also.

In the United Kingdom the work already mentioned last year is continuing, as is that in the Netherlands, where 72 km of motorway are in service. The junction with E 9, near Utrecht, at present in the form of a roundabout, is being replaced by a « clover leaf ». The work is expected to be completed by 1968.

Similar work is in progress in Germany near Lotte, at the junction with the Hansalinie (Kamen - Bremen) at present under construction. Ninety km of motorway are in service in Germany on this highway.

E 9. *Italy - Netherlands* (1,217 km)

In Italy, where 175 km of motorway are in service, there is nothing new to report for 1964 except that work has begun on a new motorway on the Como - Chiasso section.

No change in Switzerland either, and very little in France, where it should however be mentioned that the length of motorway in Service has been increased from 19 to 25 km, while 19 km are being completed and work has begun on 25 km between Mulhouse and Basle.

In Luxembourg and Belgium, no change worth mentioning on this highway which does not include any motorway; nor in the Netherlands, where there are at present 100 km of motorway.

E 10. *France - Netherlands* (546 km)

In France and Belgium there has been no change since last year.

In the Netherlands 102 km of motorway are in service. The large bridge over the Meuse to the east of Rotterdam, already mentioned last year, was put into service in February 1965.

The tunnel under the Noordzeekanaal (Coentunnel) to the west of Amsterdam will be completed in 1966.

E 11. *France - Austria* (788 km)

In France, continuation of the first stages of work on the motorway east of Paris (10 km).

In Germany, 398 km of motorway are in service. Construction of a 4-lane road, with no intersections on the same level, is continuing between Strasbourg and Appenweier.

Nothing to report in Austria, where there are only 3 km of this highway, which are moreover in service in the form of a motorway (access to Salzburg).

E 12. *France - Poland* (623 km)

There is nothing to report in France.

In Germany the length of motorway in service (126 km) remains the same. But work has begun on two new sections : 96 km to the west of Nuremberg, and 47 km to the east of the same town. In addition, work has started on a viaduct over the Sarre, to the west of Sarrebrück, and is due to be completed by 1967.

E 13. *France - Italy* (716 km)

In France, work is continuing on the motorway deviation of La Tour-du-Pin : the Modane deviation came into service in 1964. The discussions with Italy concerning the construction of a road tunnel at Fréjus, are continuing.

E 14. *Italy - Poland* (555 km)

In Austria, the Mondsee - Regau section (41 km) of the Linz-Salzburg motorway has been provided with a second carriageway, so that the whole of this motorway is now complete (137 km). On the remainder of the highway improvement works are in progress at various points.

E 17.[1] *France - Austria* (799 km)

France has standardized a few kilometres of road.

In Switzerland, 8 km of motorway are now in service to the west of Saint-Margrethen. This is the first section of motorway put into service on this highway.

In Germany, where there are only 22 km of two-lane roads, there is nothing to report.

In Austria the work of standardization is continuing, for example in the Vorarlberg region and the Tyrol.

E 18. *Norway - Sweden* (1,063 km)

In Norway, 2 km of motorway have been put into service to the west of Oslo.

In Sweden, an 11 km section of motorway between Stockholm and Enköping is in service with a single carriageway. It is expected to be completed for 1967. In addition work is in progress on a total of 33 km of ordinary road.

E 19 (469 km) and E 20 (256 km) cross only one ECMT country, Greece. They do not include

1. There is nothing to report on E 15 (Germany-Hungary), which includes only 46 km on Federal Republic territory, nor on E 16 (Hungary - Poland) which does not cross any ECMT Member country.

any motorway. There are no changes to report. However, on E 19, extensive work is in progress between Agrinion and Corinth (191 km). It is expected to be completed for 1967 or 1968.

E 21. *Italy - Switzerland* (479 km)

This highway, which starts at Savona, in Italy, divides at Aosta into two branches, one of which (E 21 A) runs directly into switzerland through the Great Saint-Bernard tunnel, while the other (E 21 B) runs towards Geneva, crossing part of French territory, which it enters through the Mont-Blanc tunnel.

The Great Saint-Bernard tunnel (length 5,800 m, altitude 1,900 m) was put into service at the beginning of 1964; the Mont-Blanc tunnel (length 11,600 m, altitude 1,300 m) was opened in July 1965 by the Presidents of the two countries that built it.

With regard to access roads, 100 km of motorway are in service in Italy on the main section (E 21) and 9 km on the branch E 21 A. Construction of a motorway between Ceva and Fossano is continuing, and work has begun between Quincinetto and Aosta.

VII. LARGE-SCALE DEVELOPMENT WORKS IN PROGRESS OUTSIDE THE E NETWORK.

Germany

1. *Bremen-Kamen motorway* (« HANSA » line) in the Bremen and Lower Saxony territories.

Total length 125 km.
Completed : 30 km.
Under construction or in planning stage : 95 km.
Total cost : DM.487 million.
The Kamen-Münster section will be put into service in September 1965.

2. *B 4 By-pass west of Braunschweig*

Length : 10 km.
Number of lanes : 4.
Cost : DM.52 million.
Start of work : 1964.
Probable completion : 1968.

3. *The expressway Rhine-Main :* between the approach road to Frankfurt/M. - West and the Erbenheim inter-change was classed in the motorway category on lst January, 1965.

4. *Mönchhof-Darmstadt motorway* : link between European highways E 5 and E 4, entry into service : 30th July, 1965. Work is at present in progress on the link E 4 near Darmstadt, but does not involve any narrowing of the road.

5. *Montabaur - Koblenz - Bassenheim motorway :* constitutes the link between the B 408 and the Federal motorway Köln-Frankfurt (E 5). It is in service as far as the Bendorf junction on the B 42 (right bank of the Rhine). The Rhine crossing will be completed in August 1965 as far the junction with the B 9 (left bank).

6. The B 400 is under construction between Bingen-Diertersheim and Rheinböllen (on the B 50), probable completion of the single carriageway section Dietersheim-Stromberg : summer 1966.

7. B 408 : the Manderscheid-Hasborn section (7.5 km) came into service on 19th October. 1964. Work is going ahead on the Kaisersesch-Polch section (17 km).

On the Landstuhl-Glan-Münchweiler stretch (10 km) of the Landstuhl-Trier section : embankment completed. Expected date of entry into service : autum 1966.

It is planned to continue conversion of the B 400 and B 408 into motorway under the 3rd Four-year Plan.

8. *Köln-Bonn motorway :* conversion into six lanes.

9. *Dortmund-Giessen motorway* (Sauerlandlinie) : work in progress from the junction with the Hannover-Oberhausen motorway as far as the Ruhrwaldstrasse at Dordtmund, and from the Westhoven intersection as far as the boundary of land Hesse near Würgendorf.

Austria

1. Continuation of work on the Eisenstadt Federal road (north-south link in the Burgenland) which is important to the economy of the region.

2. Work which will take several years :

9.2 km at the « Gerlospass ».
15 km at the « Pötschenpass ».
12 km at the « Schoeberpass ».
2.6 km at the « Tauernpass ».
2 km at the « Thurn » pass.

3. In addition work is in progress on the main tourist routes.

Denmark

The opening of a 6-lane motorway bridge across the Little Belt is planned for 1969 (E 66).

Spain

The main work in progress will cost about $ 55 million. Projects to a total of $ 30 million are under study.

France

Motorway west of Lille, 4 km under construction (Armentières deviation).

Dunkerque-Bergues motorway, 12 km : preliminary work.

Second line of bridges over the Loire at Nantes : preliminary work.

Exit routes from Paris : Bagnolet-Rosny motorway, Sannois and Montgeron deviation; bridges at Créteil, Choisy, Courbevoie, Epinay, Chatou.

Express route Nice - Plan du Var.

Montbéliard and Melun by-passes (completed in 1964).

Montargis deviation (N 7) (completed in 1964).

Olivet deviation on the southern outskirts of Orléans (nearing completion).

Approach road to the Galliéni bridge at Lyon.

The Matrou bridge over the Charente at Rochefort.

Notes :

136 km of motorway were put into service in 1964.

178 km of motorway will be put into service in 1965.

340 km of motorway will be put into service in 1966-1967.

The 5th Plan (1966-1970) provides for work to begin on the building of an average of 200 km of motorway links a year.

Netherlands

Large-scale roadworks worthy of mention in the Netherlands include :

— the 1,400 metre-long bridge (provisionally a toll bridge) 23 km to the south of Rotterdam, already mentioned last year, was put into service in 1964;

— work is continuing on the 5,000 metre-long bridge (provisionally a toll bridge) over the Oosterschelde, estuary, from Zierikzee to the south-west, also mentioned last year. It will probably be completed in 1967;

— the « Benelux-Tunnel » to the west of Rotterdam, which forms part of the large network of motorway surrounding that town, is expected to be completed for 1967.

Sweden

Work is in progress on various routes. These extend over 163 km and estimated expenditure amounts to $ 31.5 million. The work is expected to be completed by 1967 at the latest.

Switzerland

The most noteworthy development is undoubtedly the boring of the San Bernardino tunnel (E 61), on 10th April, 1965. It will probably be opened to traffic in 1967.

Turkey

An economic and technical survey is under way in the south-west of Turkey to determine what routes would be most likely to stimulate the economy of the region.

Yugoslavia

1. The extension of the main Adriatic route from Petrovac to Skopje, with 7-metre wide asphalt carriageway, and an 8-9 metre substructure.

2. Construction of the transverse road Zupanja - Tuelo - Sarajevo - Metkovic - Opuzen. This road will link the E 94 with the main Adriatic route. It will have a 7-metre wide carriageway.

I. Traffic development

1. *Countries concerned as a whole*

For the eight ECMT countries[1] in which inland waterways transport is of some importance, table 12 gives an idea of the volume of traffic in tons and ton-kilometres from 1961 to 1964, with 1955 as the year of reference.

The trend of tonnage carried may be summarised as follows :

TONNAGE CARRIED *'000 tons.*

	Internal traffic (8 countries)	International traffic (not including Italy)	Total
1960.............	223,570	105,080	328,650
1961.............	233,618	105,975	339,593
1962.............	237,354	104,613	341,867
1963.............	227,863	107,181	335,044
1964.............	264,043	118,145	382,188

These figures seem to indicate a return to normal development after the years 1962 (moderate results due to drought) and 1963 (poor results due to the severe winter). According to last year's report total traffic increased by only 6 1/2 million tons from 1960 to 1963. From 1960 to 1964 the increase was 53 1/2 million tons. Since 1960 the increase has been more marked in national traffic (18.1 per cent) than in international traffic (16.2 per cent).

To place this development in a longer-term perspective, it has been compared with the increase in gross national product at constant prices for the period 1955 to 1964. The increase in tons was 47 per cent and in ton-kilometres 44 per cent, while the GNP increased by 57 per cent[2].

	1955	1964	Increase
GNP ($ million)	155.6	244.7	+ 57 %
Tonnage carried ('000 tons)...............	254,497	375,328	+ 47 %
Ton-kilometres ('000 million) (excluding Italy).	57.9	83.2	+ 44 %

1. Austria, Belgium, France, Germany, Italy, the Netherlands, Switzerland and Yugoslavia.

2. Gross national product at 1958 prices and exchange rates. Source : OECD National Accounts Division. As the Yugoslav definition of GNP differs from that used by the other countries, the Yugoslav statistics for tons and ton-kilometres as well as for GNP have been omitted.

The table shows that traffic, both in tons and ton-kilometres, has increased less rapidly then GNP during the nine-year period. The previous report made the same comparison for the period 1955 to 1962 and found elasticities of 0.7 per cent for tons and 0.8 per cent for ton-kilometres; for the period 1955-1964 these two elasticities were equal at 0.8 per cent.

1964 was a good year for inland waterways, and traffic demand was satisfactory in all the countries. There was no ice. However, on the Rhine and on German rivers generally, traffic was slowed down due to low waters in the last month of the summer.

2. *Remarks on the development of traffic in various countries from* 1963 *to* 1964

In Germany[3] the increase in total traffic was considerable (10 per cent), even allowing for the exceptionally poor results of the previous year. This was due to the increase in national and incoming traffic; however, transit and outgoing traffic decreased. This helped to reduce the average length of haul on national territory from 236 to 221 km per ton. Structural changes in national traffic such as the opening of new pipelines and refineries in Southern Germany also contributed to this reduction. Ores, oil products, sand, and iron and steel products contributed most to the increase in total traffic. Coal traffic decreased.

Results in, the Netherlands were also very favourable. All categories of traffic increased, particularly national and outgoing traffic. Total tonnage and ton-kilometres increased in the same way; thus the average length of haul per ton is unchanged. Transport of wheat, sand and gravel, construction material, crude oil and oil products has mainly contributed to the increase in national traffic.

Tables 13 and 14 and Graph 7 give data relating to international traffic on the Rhine at the German-Netherlands frontier, an important barometer for international navigation. Total traffic reached 73 million tons in 1964, thus beating the 1960 record. Upstream traffic also passed the level reached tn that year. Downstream traffic increased for the first time since 1961 but has yet to reach the same level. A wide range of goods contributed to the 1964 increase

3. In contrast with previous years, traffic from East Germany to West Berlin has been included. This has not resulted in any appreciable change in the total, and this traffic is disregarded in the analysis.

in traffic, but particularly ores which were 28 per cent up on 1963. Coal and hydrocarbons traffic continued to decrease.

In Belgium, too, results were good; both domestic and international traffic increased. However, the rise in total tonnage was more marked than in ton-kilometres, and the average length of haul was reduced.

Waterways traffic in France continues its steady development. The increase in ton-kilometres over the nine-year period (40 per cent) was lower than the average (51 per cent).

Waterways traffic in Austria and Yugoslavia likewise continues to develop fairly rapidly in terms of ton-kilometres. Austria reports fairly long interruptions in navigation in 1965 owing to high waters.

On the Mosell, at Grevenmacher, 2,323 vessels carrying 863,000 tons of goods passed the locks during the period June-December 1964. For the first nine months of 1965, traffic amounted to 2,527,000 tons.

II. Development of the fleet

For the period 1955 to 1964 the development of cargo capacity was compared with that of tonnage carried. In the following table the figures in column « e » show the number of times the full capacity of the fleet was used to carry this tonnage. Column « f » gives these figures in the form of indices.

Year	Cargo capacity '000 tons	Idem indices	Tonnage loaded '000 tons	Idem indices	Ratio column C / column A	Idem indices
	a	*b*	*c*	*d*	*e*	*f*
1955	15,318	100	257,660	100	16.82	100
1960	17,234	113	328,650	128	19.06	113
1961	17,580	115	339,593	132	19.31	115
1962	17,997	117	341,867	133	18.99	113
1963	18,378	120	335,044	130	18.23	108
1964	18,878	123	382,188	148	20.24	120

In 1962 and 1963, there was a decline in fleet performance as shown by the ratio of tonnage carried to cargo capacity (columns e and f). In 1964, however, fleet performance was better than in 1961 (previous record). These fluctuations in performance are due to a number of factors : on the one hand, variations in the increase of cargo capacity and on the other, changes in the supply and composition of transport, which in turn is influenced by the general economic situation, competition between types of transport and bad weather.

If ton-kilometres were taken as a basis, the same conclusions would be reached.

Thus, a comparison between tables 16 and 17 reveals that the average capacity of vessels brought into service in 1964 is greater, in almost all cases, than the capacity of vessels in service at the end of the previous year. Vessels broken up often have a smaller than average capacity. The two factors show that in almost all countries average capacity continues to increase. The same is true of speed.

III. Progress report on studies and results concerning waterways of interest to Europe as a whole (*Resolution No 9 : Inland Waterways, 3rd December, 1964*)

1. *Improvement of the Dunkirk-Scheldt link and international extensions*

On French territory, only a few works remain to be completed. The Dunkirk-Denain section will come into service in 1967 as scheduled. In Belgium (from south to north), the straightening of the Hollains section has been completed, while improvement work in the Saint-Jean area at Tournai and straghtening at Audenaerdre are progressing.

Numerous meetings of the Franco-Belgian Commission have been held in connection with developing the section on both sides of the frontier. The ECMT will be advised of the programme of work as soon as the agreement between these two countries has been ratified.

2. *Improvement of the Scheldt-Rhine link*

The ratification procedure having been completed, the treaty between Belgium and the Netherlands concerning this link came into force on 23rd April, 1965. Preparatory work has begun.

3. *Improvement of the Meuse and its international links*

In France, the object is to adapt the Meuse to larger vessels and link it to the Moselle at Toul. The preliminary technical studies having been completed, a Franco-Belgian technical committee was set up and held its first meeting in May.

In Belgium, preliminary work has begun on the new canalisation of the lower Meuse (below Liège).

In the Netherlands, the aim is to increase the capacity of the Juliana canal and the Meuse. Work is continuing on two new locks alongside each of the existing locks at Sambeek and Belfeld and on the replacement of the three locks at Maasbracht. Straightening work below Roermond has begun and involves the construction of a dam and a lock.

4. *Meuse-Rhine link, with connection to Aix-la-Chapelle*

As the technical studies are sufficiently advanced, economic studies have been put in hand.

5. *Canalisation of the Moselle above Thionville*

The canalisation as far as Metz will be completed by the end of 1965. Canalisation of the Metz-Frouard section has begun : the first lock and barrage is under construction.

6. *Improvement of navigation conditions on the Rhine between Strasbourg and Saint-Goar*

The studies undertaken by France and Germany for improvements between Strasbourg and Lauterbourg are continuing. In Germany preparatory work in connection with water-level control has begun on certain sections between Lauterbourg and Mannheim (the entrance to Sondernheim among others). Preparatory work on the Mannheim-Saint-Goar section is likewise continuing. In particular, tests on models of the Binger Loch may be mentioned. Work has been speeded up on the clearing of certain rocky stretches between Oberwesel and Saint-Goar.

7. *Rhone-Rhine link*

In France the technical studies undertaken have been continued. In the V Plan, provision has been made for work on the North Sea - Mediterranean axis.

In Switzerland, technical and economic studies have been continued.

8. *Development of the Rhine between Rheinfelden and Lake Constance*

In Switzerland, economic studies have been undertaken. Nothing further to report.

9. *Rhine-Main-Danube link*

In Austria, work has been completed on water level control to ensure a minimum 2 metre draught between Jochenstein (German frontier) and Vienna. Work below Vienna to ensure a minimum 2.50 metres draught is continuing.

In Germany, work continues between Bamberg and Nürnberg. It is hoped to reach Nürnberg in 1969.

10. *Development of the Elbe, with a link from Hamburg to the waterways network of Western Europe, including the Mitteland Kanal*

Financial negotiations on the construction of the new North-South canal (henceforth to be called Elbe-Seitenkanal) and the conversion of the Mittellandkanal to class IV resulted, in 1965, in an agreement between the Federal Government and the five Länder concerned. Work on the Mittellandkanal has begun between Bergeshövede and Anderten (western section). Among other things, this work includes the construction of two overtaking sections, 11 kilometres long.

Furthermore, it should be mentioned that all the canals in the region will be subject to long-term planning. In addition to the two above mentioned canals, this will cover the Küstenkanal, the Dortmund-Emskanal, the Weser-Dattelnkanal, the Datteln-Hammkanal, the Rhein-Hernekanal and, possibly, the Elbe-Lübeckkanal, which will be either converted to class IV or adapted to the growing traffic.

11. *Oder-Danube link*

Discussion held over.

12. *Link between Lake Maggiore and the Adriatic*

Work has not yet begun on the Lake Maggiore-Milan section. On the Milan-Cremona-Po section, the double lock has almost been completed. Work on the low-water bed between Cremona and the junction of the Mincio is three-quarters finished. On the section Mincio-Poltelagos-Curo-Conca di Volta Grimana, straightening work at Panaro is under way.

The project also provides for the link between the Po and the Venice lagoon to be converted from class III to class IV and studies are in hand. Plans have also been made to link the Po to Port Garibaldi, and some work is already in progress.

Annex to Chapter IV

REPORT OF THE GROUP OF EXPERTS ON INLAND WATERWAYS

I. Requirements of the International Union for Inland navigation concerning the dimensions of locks and canals on the International Network [CM/M(63)2, Item 5]

The UINF was asked for a definition of the characteristics it would like to see adopted and the international connections it had in mind.

In its reply of 12th May, 1964, the UINF advocated the adoption of the detailed standards set out in the blue booklet it had published in 1962.

It may be well to point out that :

a) Waterways of class IV — the class adopted for the projects of interest to Europe as a whole — should be easily navigated by vessels of 1,350 tons (« Rhine-Herne Canal » type) measuring 80 m × 9.50 m × 2.5 m;

b) The 70 m × 9.50 m barge now being standardized is the only barge other than the 1,350 ton Rhine-Herne Canal type answering the requirements for easy handling in a class IV *Canal*, the characteristics of which are :

Minimum width for a draught of 2.5 m : 28 m.

Minimum depth of water : 3.5 m.

Minimum width of water : 3,5 m.

$$n = \frac{\text{wetted cross section}}{\text{cross-section of barge}} \geqslant 5.$$

Minimum radius : 10 L (L = length of barge).

Extra width at ben $\frac{L^2}{2\,R}$.

River dimensions must be based on the above criteria, due regard being paid to the influence of the rate of flow on navigation.

Although locks measuring 85 m × 12 m × 3.50 m are sufficient for self-propelled craft of the « Rhine-Herne Canal » type or for corresponding dumb craft with the appropriate pusher, it is plainly specified that the dimensions of locks on waterways used by towed or pushed barge convoys must be large enough to let the tram through without being broken up.

Thus, it has been agreed that, for the pushed convoys, the effective width of locks must be 12 m or a multiple of 12 m, and their effective length a multiple of the length of the standard barge being planned, i.e. approximately 75 m, plus a variable length to accomodate the pusher and provide a margin of safety in the lock chamber.

The barge in question is the large class V Rhine barge measuring 76.50 m × 11.20 m (11.40 m).

Class V barges can be allowed on certain waterways which do not possess all the characteristics of class V, particularly with regard to depth of water and clearance under bridges, provided that the wetted cross-section of these waterways is at least five times the midship section of the barge authorised on the waterway concerned, and that the width exceeds by 20 per cent the characteristic width of 28 m class IV waterways.

It follows that the characteristics defined by the ECMT comply with the requirements of the UINF provided that the geometrical characteristics of a waterway and (where rivers are concerned) its rate of flow are suitable for the navigation of large pusher convoys.

With regard to international links, the UINF gives the following non-exhaustive list which is set out in the same order as Resolution No 9 of 1964.

Project No 1. Improvement of the Dunkirk-Scheldt link and its international extensions

On the French side, the lock dimensions are 144.6 × 12 × 3.50 and the wetted cross-section of the canal is 138 sq. m.

On the Belgian side, the existing locks on the Upper Scheldt measure 125 m × 14 m.

Project No 3. Improvement of the Meuse and its international links

The Netherlands Meuse below Maasbracht

has locks measuring 260 m × 16 m and 142 m × 16 m.

The Mosan section between Maasbracht and Huy includes locks measuring 136 m × 16 m × 3.50 m (the new locks on the Juliana canal are 142 m × 16 m × 3.50 m).

Between Huy and Givet, the existing locks (100 m × 12 m) can take 1,350-ton and even 2,000-ton craft with a reduced draught of 2.40 m.

The Franco-Belgian working party is considering plans for modernising this section and the French Meuse.

Project No 5. Canalisation of the Moselle

The new locks on the Moselle measure 175 m to 176 m × 12 m × 3.50 m.

Between river banks, the navigable channel is 2.90 m deeper than the theoretical minimum water line and its breadth, 40 m, 2.90 m being a minimum. Extra width at bends has been calculated according to the total length of pushed convoys. The wetted cross-section of the canal portion is 171 sq. m and the width for a draught of 2.50 m is 38.75 m, which means that for a large Rhine barge, n = 6.

Project No 6. Improvement of navigation facilities on the Rhine between Strasbourg and Saint-Goar

There are no locks on this section of the Rhine. If any locks were to be built, they would have to be at least as large as those of the most recent locks on the canalised Rhine (190 m × 24 m).

Project No 7. Rhone-Rhine link

On the Rhone, the existing locks measure 195 m × 12 m × 3 m.

The locks on the Basse-Saone will be 185 m × 12 m × 3.50 m.

The dimensions now planned for special installations (boat lifts) are 100 m × 12 m.

Project No 8. Development of the Rhine between Rheinfelden and Lake Constance

The lock dimensions at present planned are 165 m × 12 m × 3.50 m.

Project No 9. Rhine-Main-Danube link

The canal locks measure 190 m × 12 m × 4 m.

The locks on the Main between Mainz and Bamberg are 300 m × 12 m × 3 m and those on the Danube, 230 m × 24 m × 3.50 m.

Moreover, the cross-section of the canal between Bamberg and Nürnberg shows a minimum depth of 4 m, a width of 40 m for a draught of 2.50 m and a wetted cross-section of 176 sq. m, giving a coefficient n = 7.4 for a 1,350-ton craft of the « Rhine-Herne Canal » type.

It may be useful to add three other important links included in Resolution No 9, to the list supplied by the UINF.

Project No 2. Improvement of the Scheldt-Rhine link

The twin locks being built or planned will measure 320 m × 24 m × 5 m.

The minimum dimensions of the navigable channel will be 90 m × 5 m.

Project No 4. Meuse-Rhine link with connection to Aachen

At the present stage, the plans for this link conform to Class V navigation specifications.

Project No 10. Development of the Elbe, with link from Hamburg to the inland waterways network of Western Europe, including the Mittelland Kanal

The twin locks at Geesthacht (230 m × 25 m) cater for navigation above the tidal reaches of the Elbe.

The dimensions for the boat lifts on the future North-South Canal (Elbe - Seiten Kanal) are not yet decided.

The existing locks on the Mittelland Kanal are 225 m × 12 m × 3 m.

Conclusions

The specifications of the locks or other works constructed or planned for the various international links listed above are actually in line with UINF requirements; they vary according to the type of waterway and the type of traffic (traditional navigation involving craft in classes I to V and pushed convoys).

The examples given show that the ECMT resolutions are applied with due regard to all the factors relevant to each project.

II. CHARASTERISTICS OF CLASS II WATERWAYS

Class II is defined as suitable for navigation with « Campine » type barges, i.e. normally 600 ton craft measuring 50 m × 6.6 m × 2.50 m.

The more recent « Campine » barges have been built larger, thus reducing the clearances originally planned. An analysis of the « Campine » fleet built and measured in Belgium from 1954 to 1963 shows, in addition to craft of the traditional dimensions indicated above :

— « Campine » barges lengthened to about 51 m and 55 m;
— « Campine » barges lengthened to about 55 m and widened to about 7 m and 7.20 m.

Only 20 per cent of the « Campine » units built between 1954 and 1963 conform to the original conventional standards.

The normal tendency would therefore be to work out specifications for class II waterways to match the dimensions of the larger « Campine » barge (55 m × 7.20 m × 2.7 m) of about 750 dwt.

As, however, class II accounts for only an insignificant and declining proportion of the ECMT waterways network, there is hardly any point in laying down specifications for this class.

« Campine » barges will nevertheless continue to be built in view of the industrial and commercial demand for this particular tonnage and the navigability of such craft on waterways ranking above class II.

III. Trend of the pusher fleet

An inventory of the pusher fleets, including both barges and pusher-tugs, has been made for the following countries : Germany, Belgium, France, Italy, the Netherlands and Switzerland.

The results of this inventory are illustrated by the four appended graphs which show that, though the pusher fleet still accounts for only a very small part of the total, it has grown quickly during the last five years.

Closer scrutiny of these graphs shows that, in terms of numbers and capacity, the 70 m × 9.50 m barge is far more usual than the large Rhine barge measuring 76 m × 11.20 (11.40 m). Furthermore, the other types of barge are increasing in number even more quickly.

As the sectional area and breadth of locks is mainly governed by width of the barge, a graph has been plotted to show the distribution of barges, by numbers and tonnage, according to width. Although the number of barges under and over 9.50 m is roughly the same, the tonnage in this latter category (over 9.50 m) is far bigger. Within the range of widths of 9.50 m and under, tank barges are relatively few, but they account for nearly half the barge fleet in the 10 m - 11.44 m range, both in numbers and in tonnage. It should be noted that barges over 10 m wide are used only on class V and class VI waterways, and on the Moselle and the Danube.

Figures showing the pusher craft in service on the Rhine from 1962 to 1st January, 1965, are shown in the Annex.

. . . .

IV. Class I specimen barge

Studies are proceeding in France to fix the specifications for this barge.

The dimensions now under consideration are 38.25 m × 5.05 m × 2.20 m, giving about 400 d.t.w.

As soon as the French studies are completed, the Group of experts will be able to consider how this craft can be integrated in pushed convoys on waterways ranking in classe IV and upwards.

Tests with a detachable self-contained propulsion unit complete with steering and control gear are also being made.

V. Meuse-Rhine link, with branch to Aachen

The Sub-Group of experts appointed by the Governments of Germany and of the Kingdoms of Belgium and the Netherlands submitted their technical report, which constitutes the first part of the general report, to the Secretariat of the ECMT on 8th July, 1964. The economic report, which represents the second stage of the Sub-Group's terms of reference, is still being drafted.

(1) The technical report concludes that the cross-section of the canal should be so designed as to provide three lanes for the crossing and overtaking of 1,350-ton craft, from which it follows that the navigable channel would also be accessible to 2,000-ton vessels. The locks and boat-lifts to be built on the main canal will be in duplicate to ensure that any future density of traffic can be smoothly handled.

The Report describes four main variants, the essential data of which are summarised in the map appended.

(2) When the Sub-Group of experts received its terms of reference, the instructions relating to pusher navigation had not yet been drafted.

In view of the extent to which this technique has developed in the meantime, the Group and Sub-Group of experts will meet to consider how far this factor could or should be taken into account in their future studies.

VI. Lock approaches

The study of the most suitable design for lock approaches, bearing in mind both pusher techniques and traditional navigation, was on the

Agenda (Item 3) of the 21st International Navigation Congress held at Stockholm in 1965. Two solutions were compared : the first, involving a « guide-wall » extending from the side-walls, is generally applied in the United States and the canalised Moselle; the second involves curved « guide-walls » symmetrically laid out on either side of the lock axis. This latter procedure, which has been studied in the Netherlands, both theoretically and in a hydraulics research laboratory, has been adopted for the large locks scheduled for construction, especially on the Scheldt Rhine canal where work is about to begin.

Only practical experience of these two systems will show whether recommandations can be made.

Paris, 24th September, 1964.

Prof G. WILLEMS,
Chairman.

PUSHER FLEET IN SERVICE ON THE RHINE

A. PUSHERS (TUGS WITH NO CARRYING CAPACITY)

DATE	NUMBER	TOTAL HORSEPOWER (CV)
1-7-1962	28	28,150
1-7-1963	42	48,000
1-1-1964	46	51,320
1-1-1965	55	57,355

B. SELF-PROPELLED BARGES USED AS PUSHERS

DATE	NUMBER	TOTAL CAPACITY (T)	TOTAL HORSEPOWER (CV)
1-7-1962	15	16,900	12,350
1-7-1963	21	23,300	17,000
1-1-1964	24	25,666	18,040
1-1-1965	30	36,000	24,505

C1. PUSHED BARGES (BUILT AS SUCH)

DATE	NUMBER	TOTAL CAPACITY (T)	TOTAL HORSEPOWER (CV)
1-7-1962	113	172,000	1,400
1-7-1963	176	284,800	2,000
1-1-1964	183	274,438	2,000
1-1-1965	215	342,350	—

C2. CONVERTED BARGES SIMILAR TO SELF-PROPELLED BARGES

DATE	NUMBER	TOTAL CAPACITY (T)	TOTAL HORSEPOWER (CV)
1-7-1962	13	16,500	800
1-7-1963	20	24,300	1,300
1-1-1964	22	25,413	1,255
1-1-1965	22	30,572	—

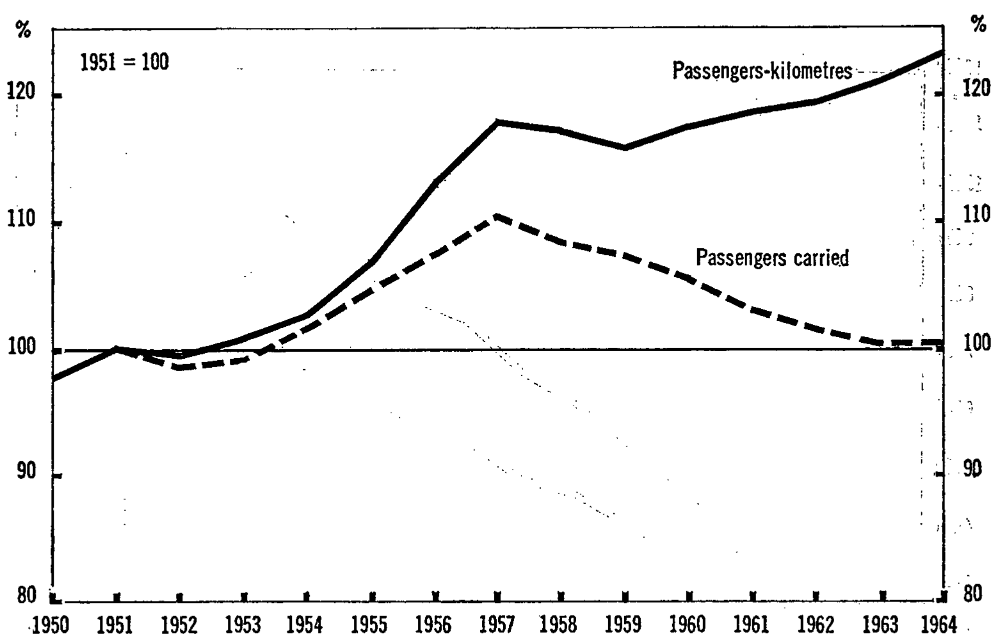
C3. OTHER CONVERTED BARGES

DATE	NUMBER	TOTAL CAPACITY (T)
1-7-1962	15	22,900
1-7-1963	13	20,000
1-1-1964	13	20,000
1-1-1965	—	—

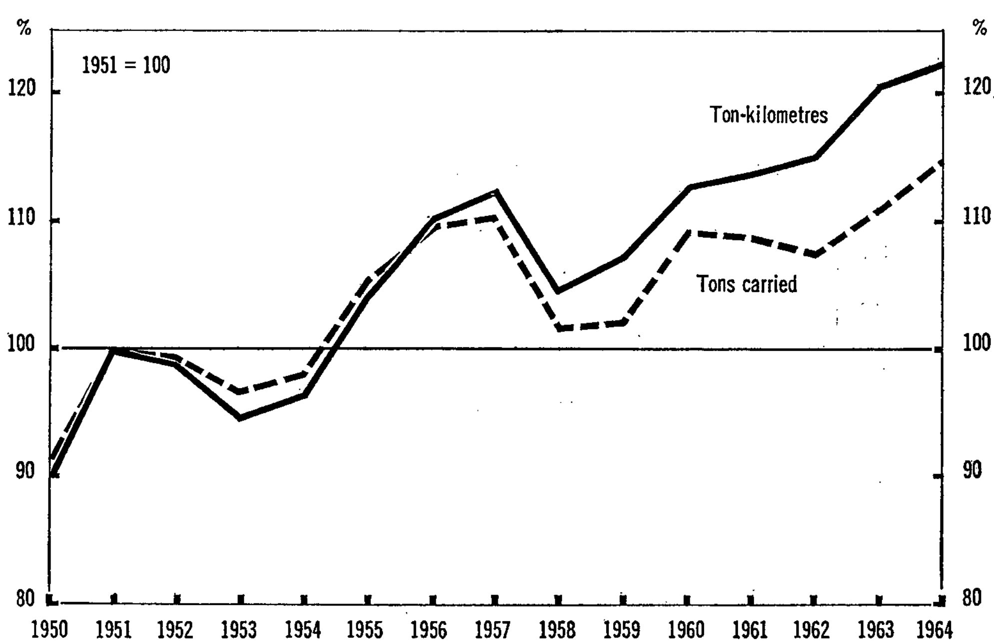
Source: Central Commission for navigation of the Rhine. « Restricted » papers nos 900, 1,010, 1,061 and 1,204.

Graph 1. TREND OF RAILWAY TRAFFIC

a) Passengers



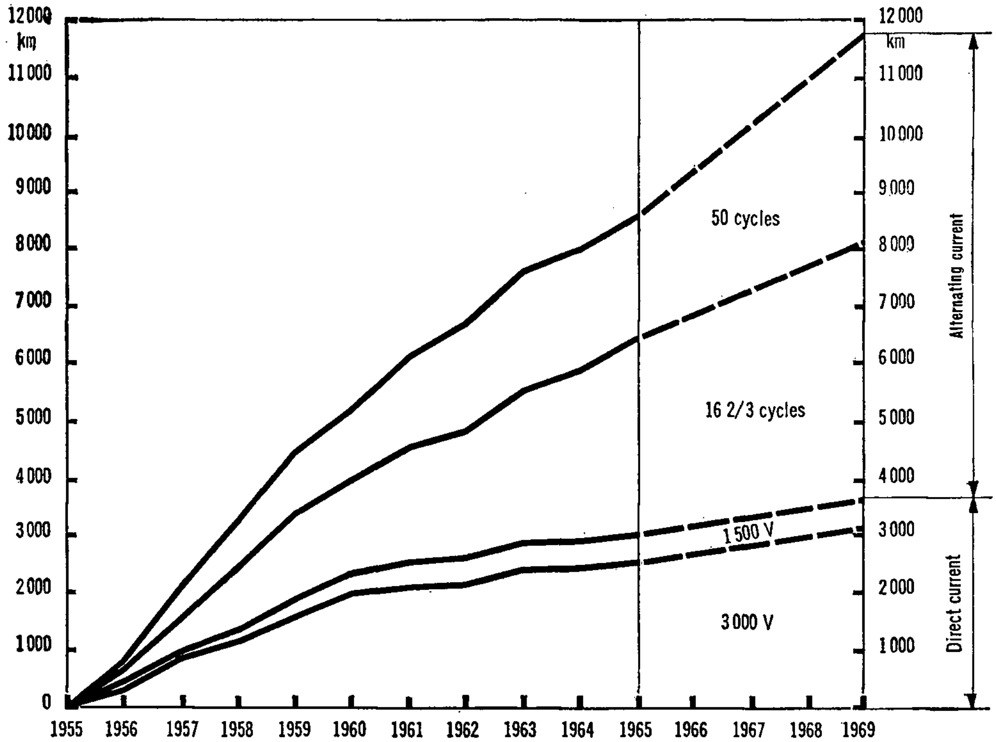
b) Goods



Graph 2. TREND OF ELECTRIFICATION

a) GROWTH[1] OF ELECTRIFICATION OF EUROPEAN MAIN LINES

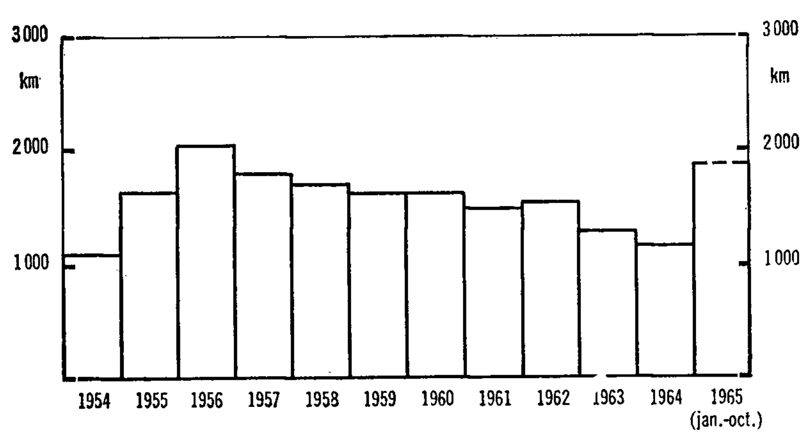
October



1. Results of programmes for conversion of types of current are not included.

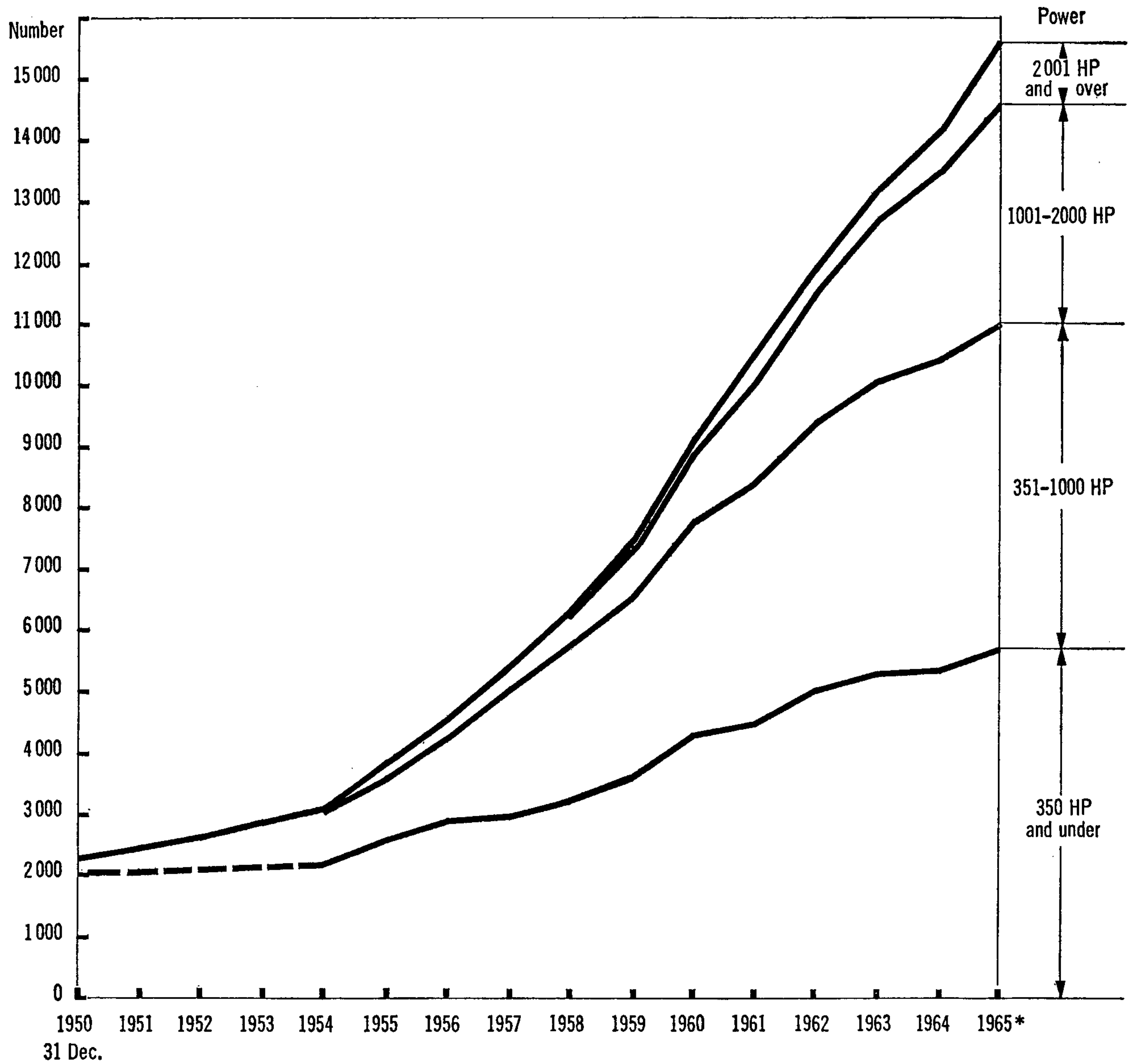
b) ANNUAL GROWTH OF ALL ELECTRIFIED LINES

January-December



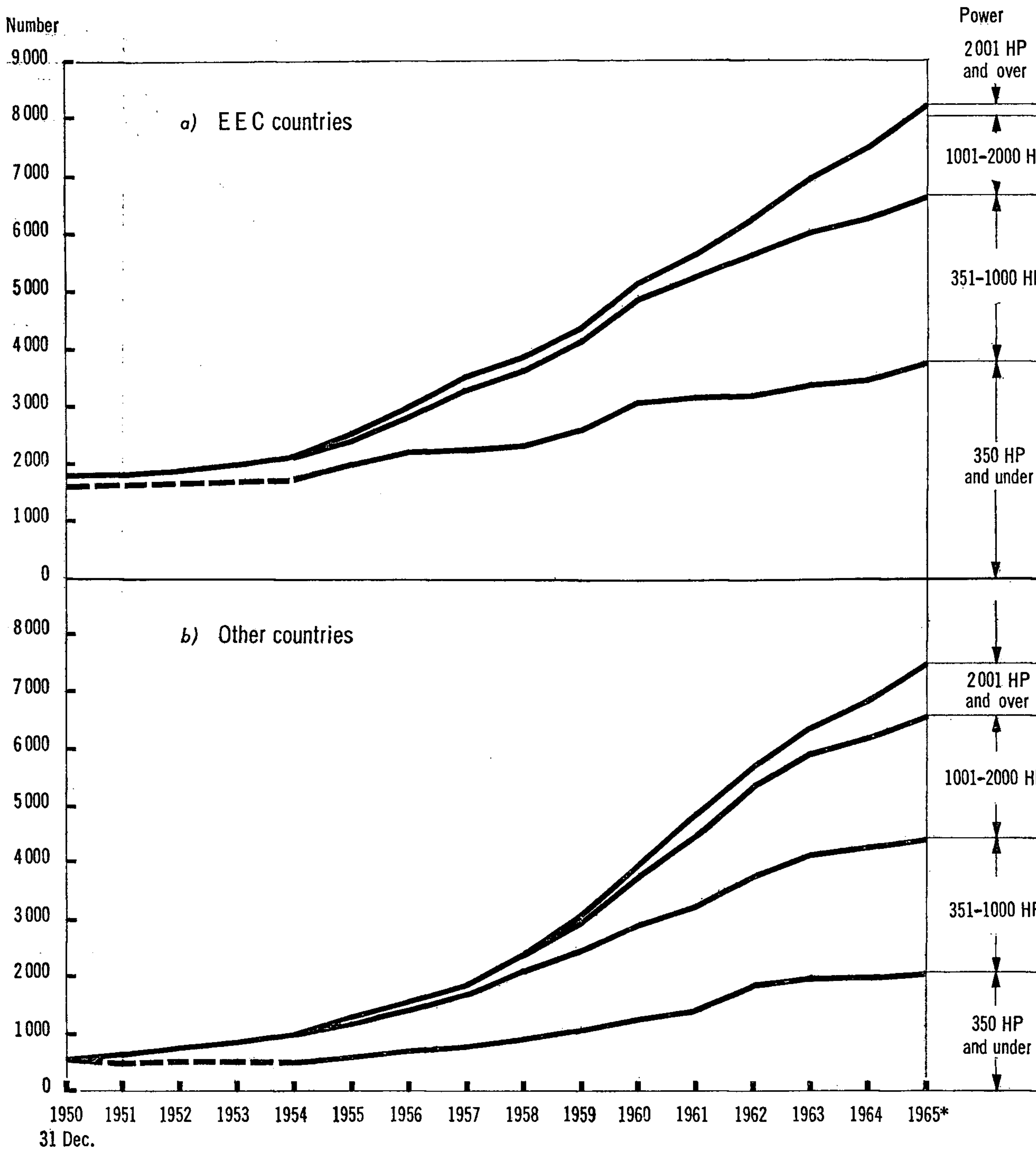
Graph 3. TREND OF NUMBERS OF DIESEL LOCOMOTIVES

BY POWER CATEGORIES



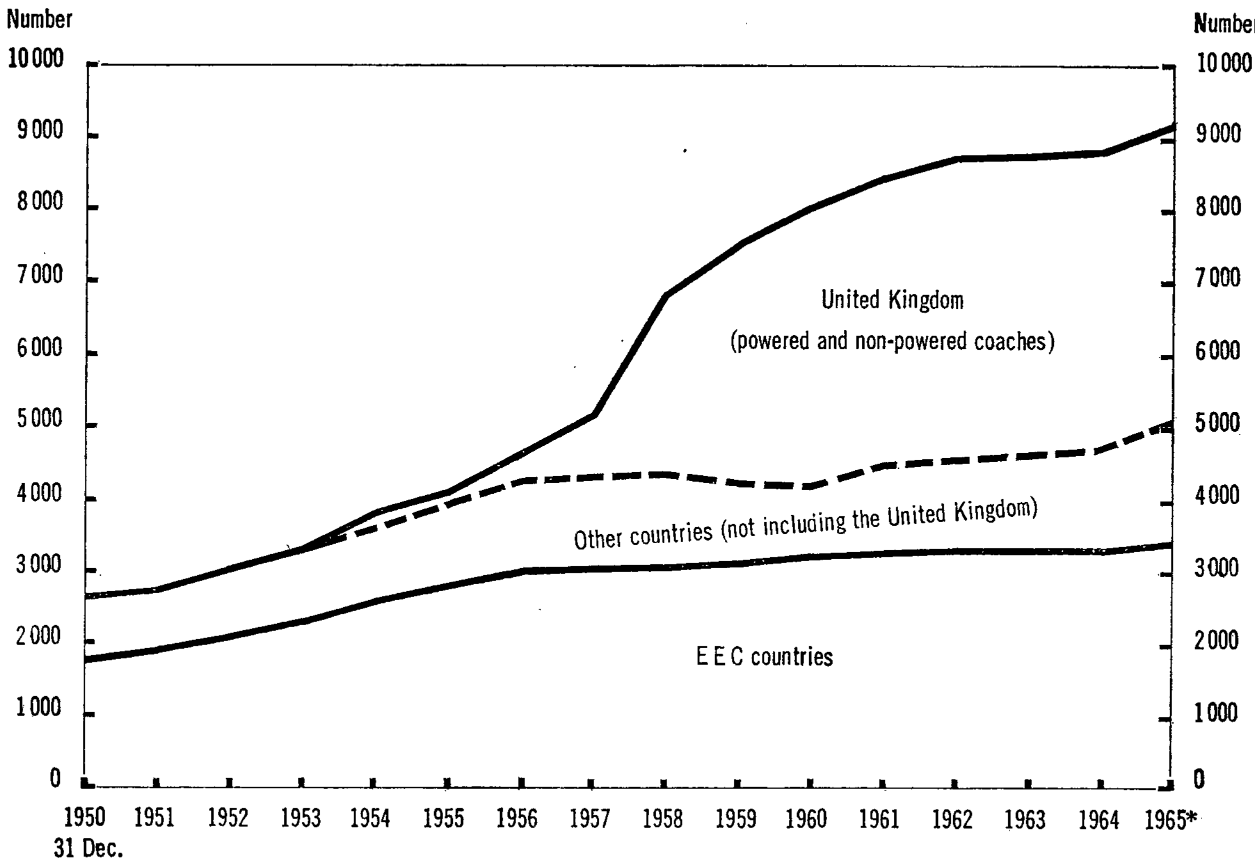
* Estimates.

Graph 4. TREND OF NUMBERS OF DIESEL LOCOMOTIVES
IN EEC COUNTRIES AND IN OTHERS



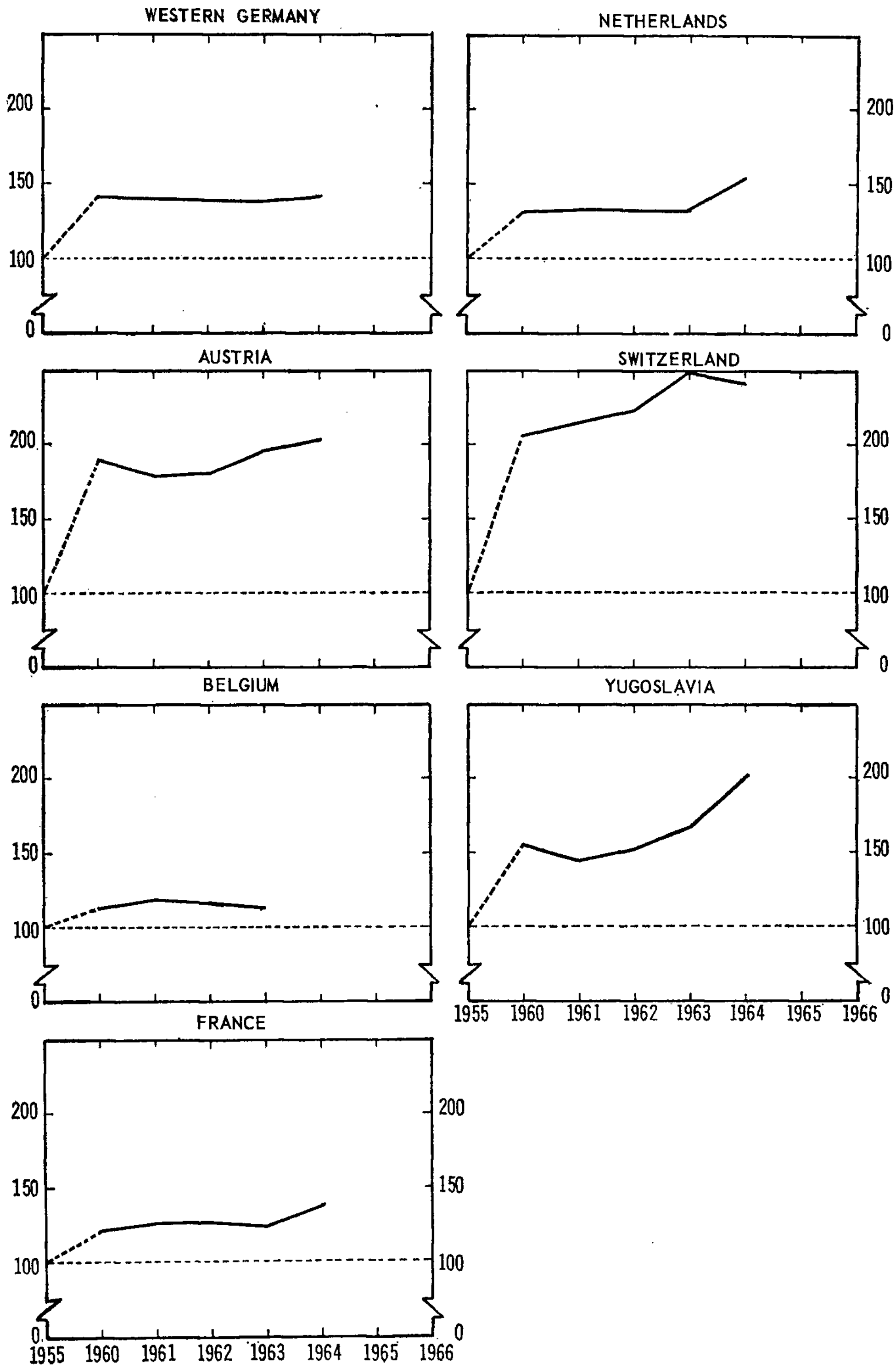
* Estimates.

Graph 5. TREND OF NUMBERS OF DIESEL RAILCARS

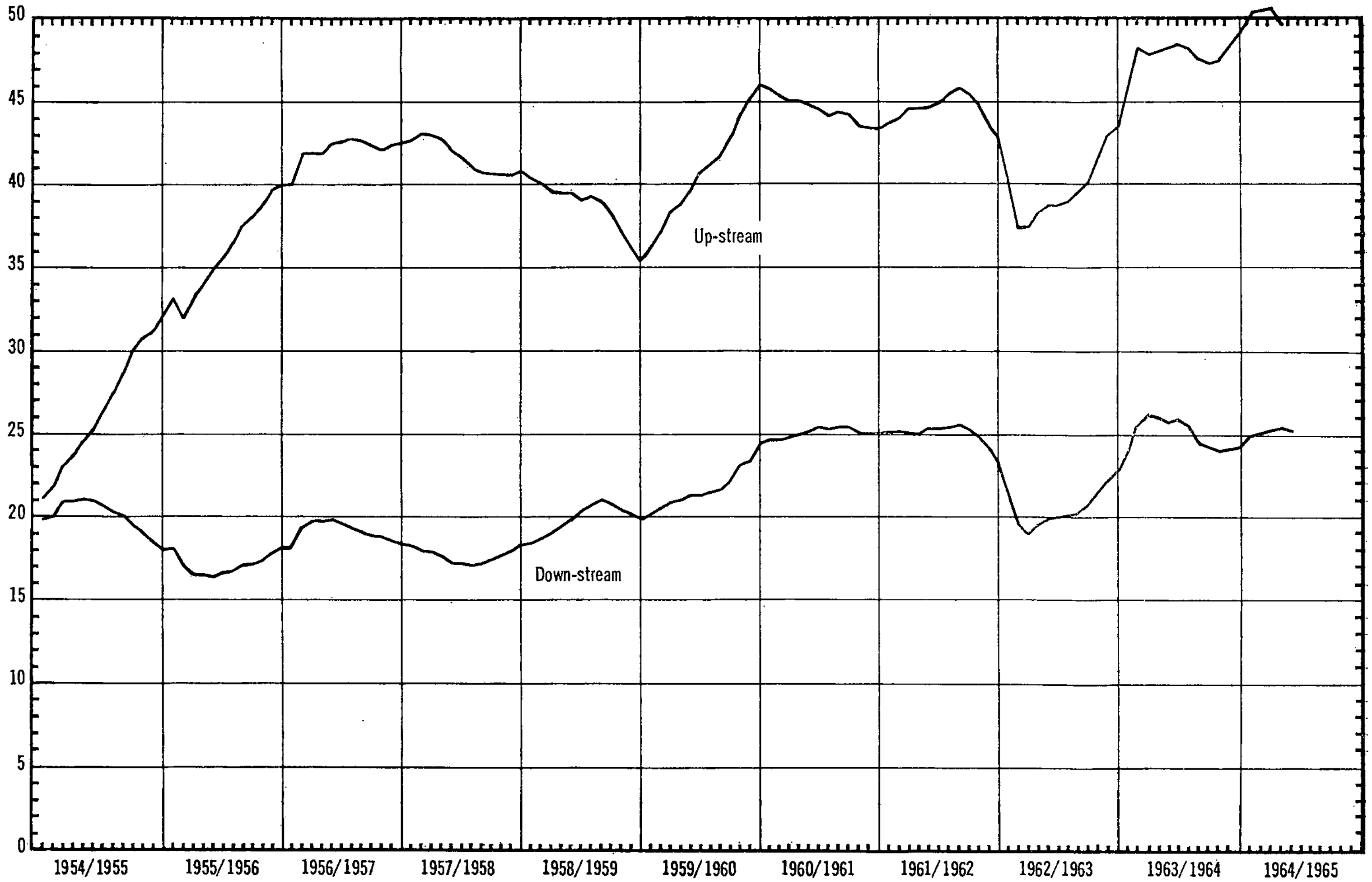


* Estimates.

Graph 6. DEVELOPMENT OF TON-KILOMETRES IN INDEX FIGURES (1955 = 100)

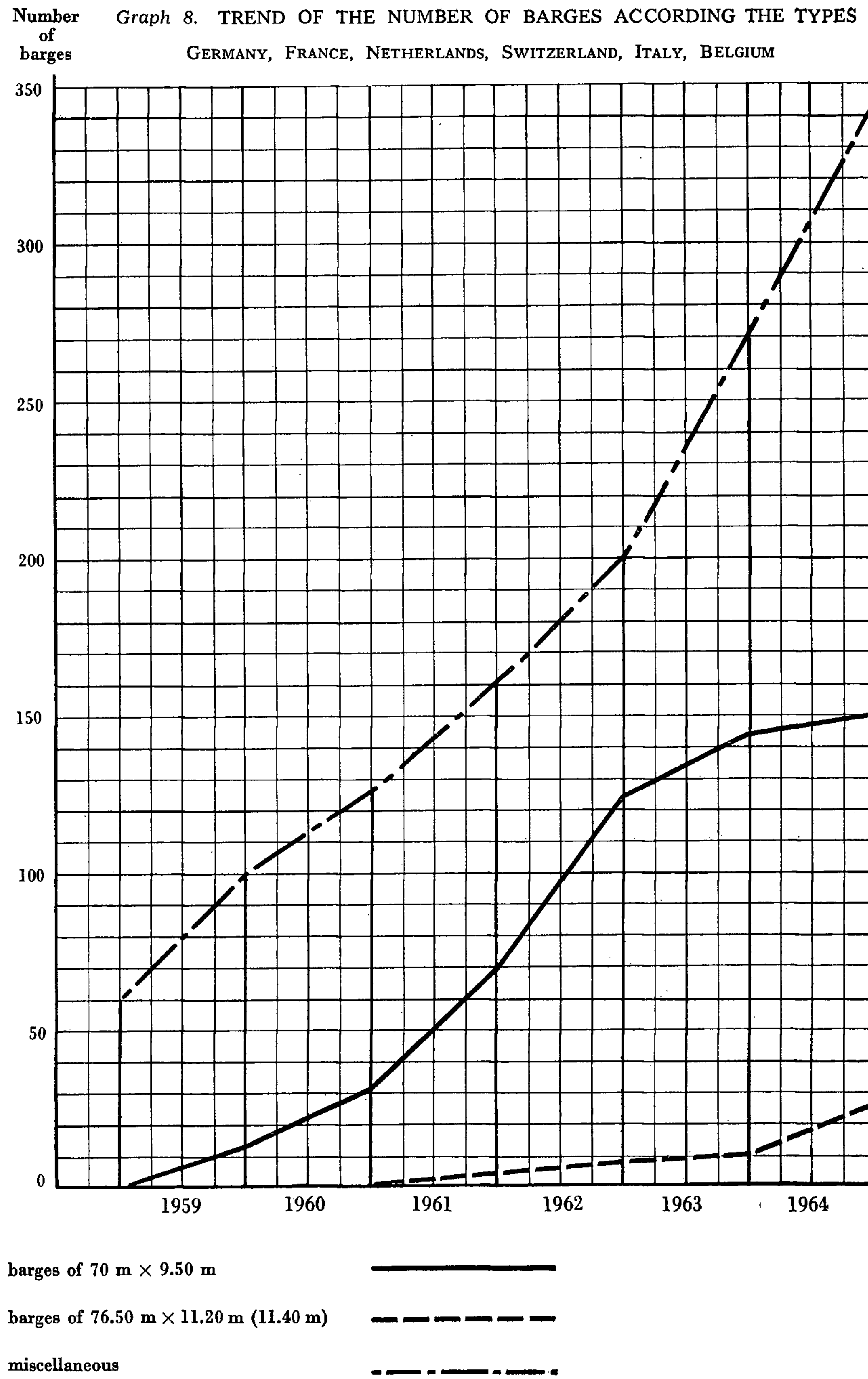


Graph 7. RHINE TRANSPORT AT THE GERMAN-NETHERLANDS FRONTIER (*in million tons*)
Moving period of 12 months



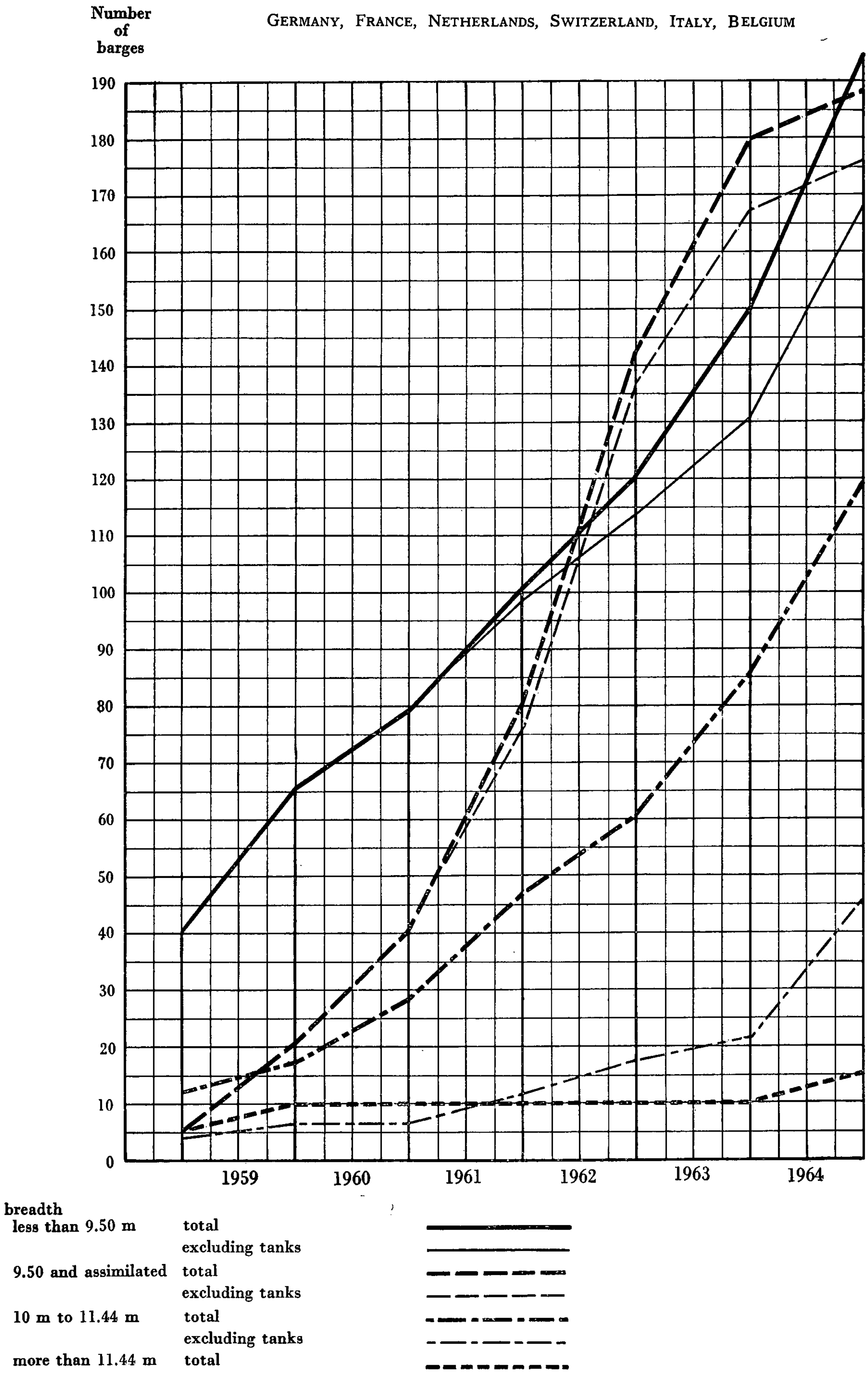
Graph 8. TREND OF THE NUMBER OF BARGES ACCORDING THE TYPES

GERMANY, FRANCE, NETHERLANDS, SWITZERLAND, ITALY, BELGIUM



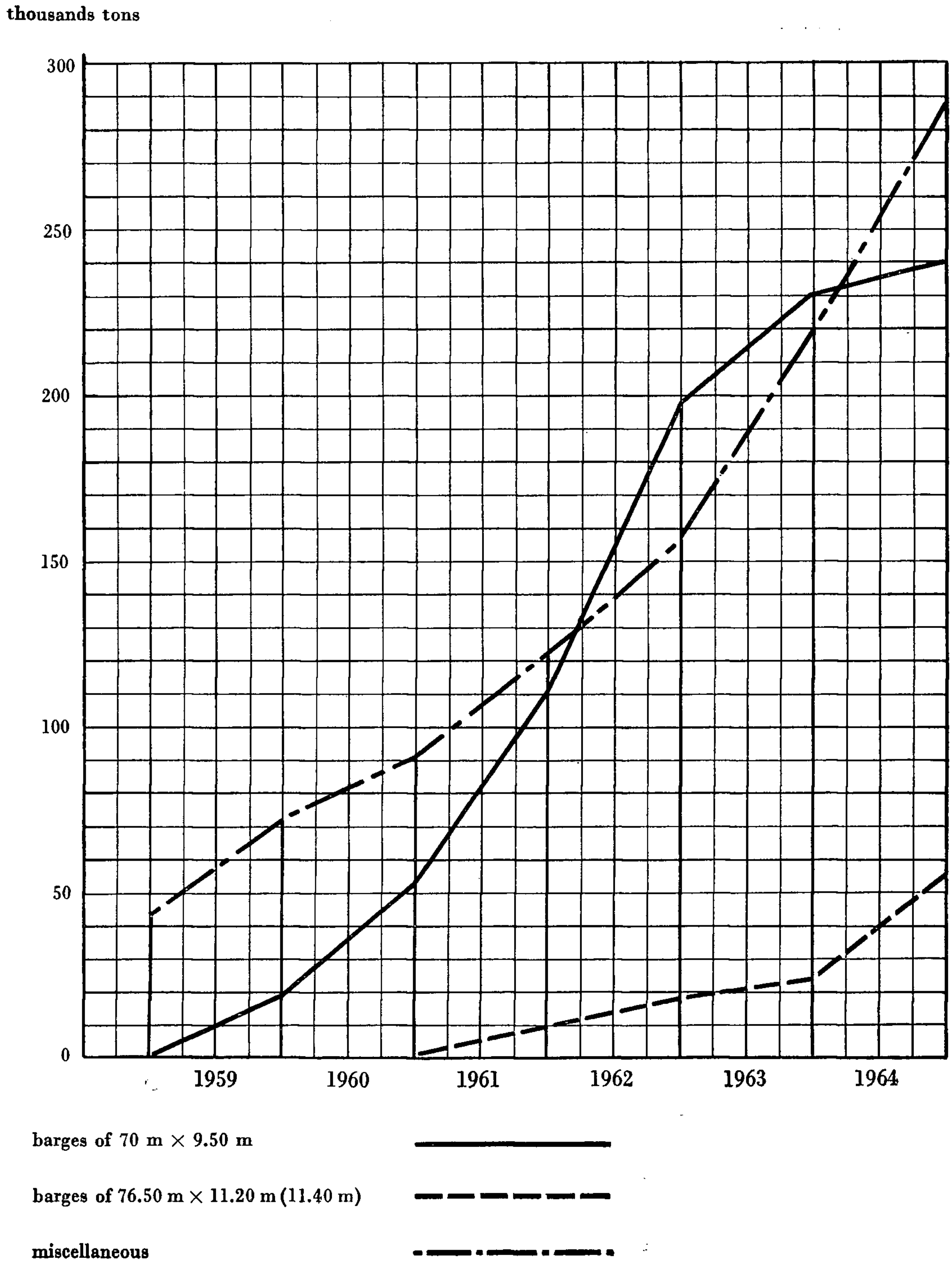
Graph 9. TREND OF THE NUMBER OF BARGES ACCORDING THE TYPES

GERMANY, FRANCE, NETHERLANDS, SWITZERLAND, ITALY, BELGIUM



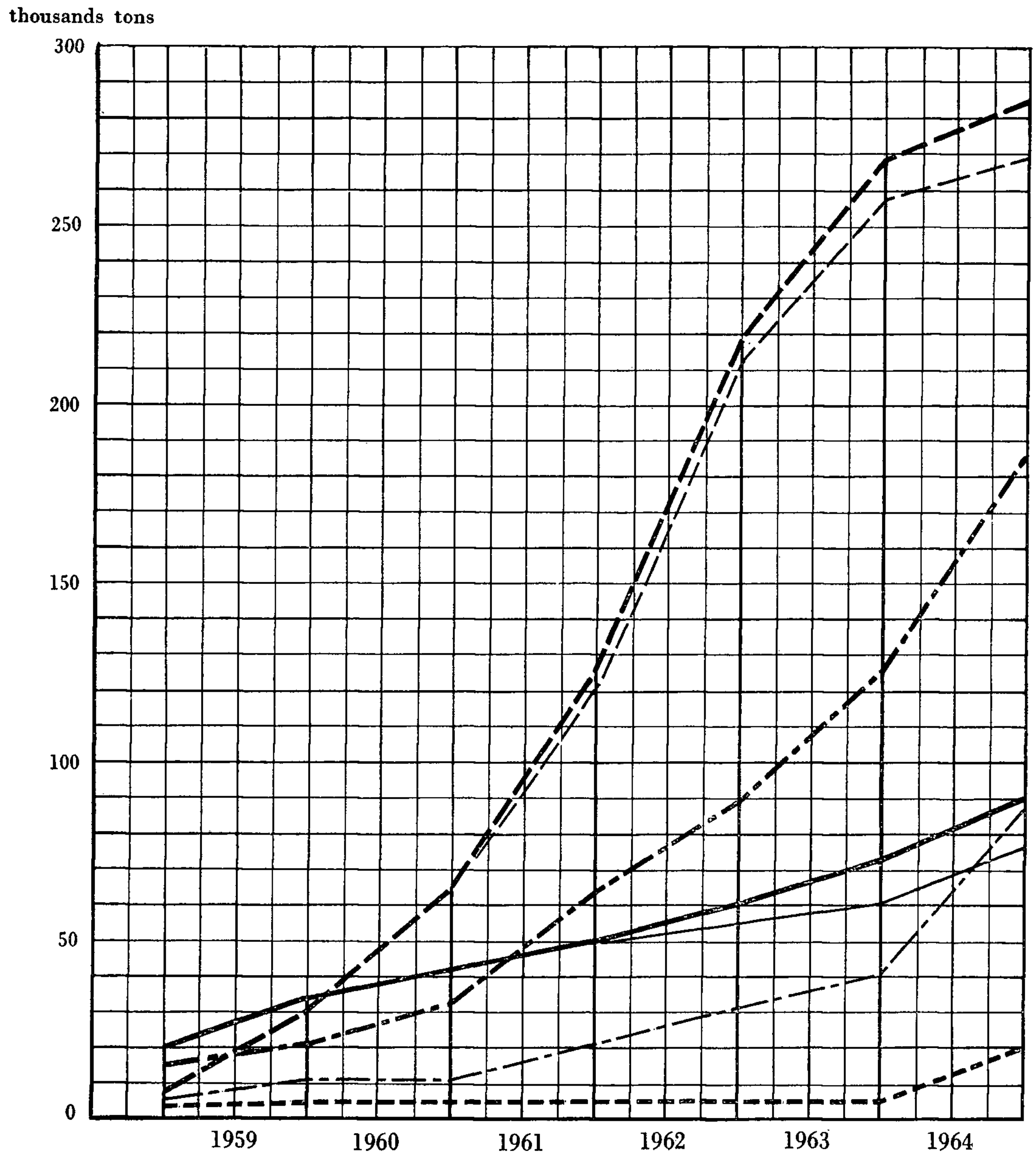
Graph 10. TREND OF THE TOTAL CAPACITY OF THE TYPES OF BARGES

GERMANY, FRANCE, NETHERLANDS, SWITZERLAND, ITALY, BELGIUM



Graph 11. TRENDS OF THE TOTAL CAPACITY OF BARGES ACCORDING THE TYPES

GERMANY, FRANCE, NETHERLANDS, SWITZERLAND, ITALY, BELGIUM



breadth

less than 9.50 m — total / excluding tanks

9.50 m and assimilated — total / excluding tanks

10 m to 11.44 m — total / excluding tanks

more than 11.44 m — total

TABLE 1. INLAND TRANSPORT INVESTME

COUNTRY	YEAR	GROSS NATIONAL PRODUCT (AT CURRENT PRICES)	GROSS FIXED CAPITAL FORMATION[1]	RAILWAYS			LOCAL RAILWA AND URBAN LINE
				ROLLING STOCK	INFRASTRUCTURE	TOTAL (3+4)	
		1	2	3	4	5	6
Germany	1962	354,500	90,200	1,134.9	1,705.2	2,840.1	—
	1963	376,800	95,340	1,133.3	1,766.0	2,899.3	—
	1964	413,400	109,120	1,156.5	1,921.3	3,077.8	—
Austria	1962	188,690	44,830	525.0[3]	806.4[3]	1,331.4[3]	183
	1963	200,050	47,790	549.0	844.6	1,393.6	136
	1964	219,800	53,600	675.9	813.2	1,489.1	108
Belgium	1962	647,160	127,423	1,913	1,973	3,886	230
	1963	697,916	135,612	2,417	2,106	4,523	215
	1964	768,239	154,099	1,834	2,231	4,065	389
Denmark	1962	51,284	10,475	69.0[5]	114[5]	183.0[5]	—
	1963	54,669	10,640	84.6[5]	95[5]	179.6[5]	—
	1964	61,544	13,265	91.7[5]	107[5]	198.7[5]	—
Spain	1962	795,556[4]	164,538[4]	1,133.7	2,372.3	3,506.0	264
	1963	938,573[4]	203,016[4]	2,335.2	2,763.4	5,098.6	—
	1964	1,072,904[4]	242,155[4]	2,667.9	2,427.6	5,095.5	661
France	1962	356,294	70,178	672	838	1,510	165
	1963	395,577	79,088	713	932	1,645	210
	1964	431,870	90,428	832	930	1,762	214
Greece	1962	118,994	25,862	227	78	305	18
	1963	132,919	25,260	24	110	134	3
	1964	150,078	33,020	151	17	168	58
Ireland	1962	765,000	128,900	2,620	549	3,169	—
	1963	817,200	149,000	698	542	1,240	—
	1964	934,000	176,000	....	....	....	—
Italy	1962	24,789,000	5,846,000	27,922[6]	77,760[6]	105,682[6]	7,805
	1963	28,329,000	6,641,000	53,440[6]	65,519[6]	118,959[6]	5,257
	1964	30,950,000	6,525,000	73,874[6]	75,970[6]	149,848[6]	4,258
Luxembourg	1962	25,796	7,131	48.3	57.6	105.9	—
	1963	27,496	8,826	175.6	64.2	239.8	—
	1964	(28,943)		193.0	31.5	224.5	—
Norway	1962	37,867	11,182	82.7	114.2	225.2	60
	1963	40,252	12,277	70.6	141.2	211.8	80
	1964	44,667	12,819	69.3	119.0	228.3	101
Netherlands	1962	48,517	11,611	73.6	93.9	167.5	25
	1963	52,340	12,370	55.4	81.1	136.5	35
	1964	60,800	15,290	32.6	114.6	147.2	47
Portugal	1962	80,254	13,848	32.0	61.7	93.7	64.2
	1963	85,585	15,064	96.9	178.3	275.2	54.4
	1964			65.3	121.4	186.7	66.0
United Kingdom	1962	28,759	4,671	64	51	115	9
	1963	30,561	4,912	48	43	91	8
	1964	32,914	5,802	49	53	102	2
Sweden	1962	75,413	17,096	140.6	64.6	205.2	—
	1963	81,867	18,938	134.8	62.1	196.9	—
	1964	90,395	21,134	127.2	60,6	187.8	—
Switzerland	1962	46,050	12,640	127.9	140.3	268.2	72.1
	1963	50,370	14,400	128.7	176.1	304.8	81.7
	1964	55,565	16,390	161.0	193.4	354.4	154.6
Turkey	1962	55,248		41.1	87.5	131.6	—
	1963	62,759		74.5	88.5	163.0	—
	1964	66,821		26.8	93.5	120.3	—
Yugoslavia	1962	4,385,000	1,341,000	15,000	27,000	42,000	—
	1963	5,304,000	1,596,000	13,000	25,000	38,000	—
	1964			32,000	39,000	71,000	—

1. Source : OECD Statistical Bulletin.
2. Expenditure on the purchase of private cars and motorcycles has been included in investment in inland transport although most countrie consider that part of this expenditure should be classified under consumer goods. The wide variations in the proportion of this expenditure that i classified under consumer goods seems to suggest that classification under « consumption » or « investment » in this sector depends on administra tive and fiscal criteria rather than on trully economic standards.
3. Revised figure.

QUIPMENT AND INFRASTRUCTURE)

National currency units (millions) [for Ireland (thousands)].

ROAD TRANSPORT				INLAND WATERWAYS			INVESTMENT IN INLAND TRANSPORT (5+6+10+13)
VEHICLES		INFRASTRUCTURE	TOTAL (7+8+9)	VESSELS	INFRASTRUCTURE	TOTAL (11+12)	
[CO]MMERCIAL VEHICLES	OTHER VEHICLES[2]						
7	8	9	10	11	12	13	14
3,281	7,233	5,582	16,096	138	166	304	19,240
3,459	7,623	6,682	17,764	128	171	299	20,962
3,612	8,278	....	....	122	146	268	....
1,155[3]	4,003[3]	2,133[3]	7,291	....	37.3	37.3	8,843
1,305[3]	4,367	2,077	7,749	....	44.6	44.6	9,323
1,445	4,804	2,285	8,534	....	62.0	62.0	10,193
3,070	13,533	4,754	21,357	750	1,455	2,205	27,678
3,564	15,452	7,221	26,237	950	1,678	2,628	33,603
3,721	18,950	9,914	32,585	1,125	1,645	2,770	39,809
376	1,078	737[5]	2,191	—	—	—	2,374
....	899	647[5]	....	—	—	—	
....	1,178	957[5]	....	—	—	—	
10,810	12,649	1,602[3]	25,061	—	—	—	28,831
13,689	12,805	2,600	29,094	—	—	—	34,193
18,054	15,491	3,430	36,975	—	—	—	42,732
2,090	7,105	1,676	10,871	43	140	183	12,729
2,595	8,385	2,094	13,074	56	161	217	15,146
2,820[4]	8,640[4]	2,336[4]	13,796[4]	51[4]	152[4]	203[4]	15,975
1,489	61	1,536	3,086	—	—	—	3,409
1,896	66	1,655	3,617	—	—	—	3,754
2,435	118	2,202	4,755	—	—	—	4,981
7,357	20,541	6,803	34,701	—	88	88	37,958
7,960	24,672	6,999	39,631	—	60	60	40,931
....	....	....	....	—	....	....	....
279,000	591,000	201,522	1,071,522	700	1,000	1,700	1,186,709
301,000	840,000	222,941	1,363,941	849	—	849	1,489,006
257,000	729,000	302,771	1,288,771	....	1,800	....	....
136	338	188	662	—	—	—	768
146	432	234	812	—	—	—	1,052
153	487	172	812	—	135	135	1,172
345	968	485	1,798	—	—	—	2,083
323	1,004	545	1,872	—	—	—	2,164
355	1,206	644	2,205	—	—	—	2,534
428	1,052	581	2,061	120	159	279	2,533
483	1,207	649	2,339	139	169	308	2,819
574	1,504	835	2,913	175	226	401	3,508
21	556	305	882	—	—	—	1,040
23	646	320	989	—	—	—	1,319
51	558	255	864	—	—	—	1,117
205	680	131	1,016	—	—	—	1,140
235	847	148	1,230	—	—	—	1,329
265	988	192	1,445	—	—	—	1,549
536	2,359	1,037	3,932	—	0.7	0.7	4,130
555	2,824	1,290	4,669	—	1.4	1.4	4,867
640	3,204	1,516	5,360	—	0.7	0.7	5,549
428	1,220	741	2,389	10	15	25	2,754
374	1,264	1,022	2,660	13	15	28	3,075
436	1,312	1,186	2,934	14	16	30	3,473
747	61	773	1,581	—	—	—	1,713
558	94	850	1,502	—	—	—	1,665
181	61	744	986	—	—	—	1,106
10,700		44,700	55,400	6,600	400	7,000	104,400
15,400		65,190	80,590	3,700	300	4,000	122,590
17,300		80,000	97,300	4,500	500	5,000	173,300

4. Provisional figure.
5. Figures for the years 1962/1963, 1963/1964 and 1964/1965.
6. Figures for the years 1961/1962, 1962/1963 and 1963/1964.
Symbols :
— Nil.
.... Not available.

Table 2. TREND OF MOTOR VEHICLE NUMBERS

Figures in brackets indicate percentages

EEC countries are in italics

	COUNTRY	PRIVATE CARS	BUSES	LORRIES[1]	TOTAL
			1962		
1.	*Germany*	6,562,530 (88.4)	35,669 (0.5)	820,487 (11.1)	7,418,683
2.	Austria	556,757 (83.6)	5,226 (0.6)	103,603 (15.6)	665,586
3.	*Belgium*	914,565 (82.0)	6,861 (0.6)	194,285 (17.4)	1,115,711
4.	Denmark	547,841 (72.8)	3,563 (0.5)	201,602 (26.8)	753,006
5.	Spain	440,611 (66.7)	14,472 (2.2)	205,363 (31.1)	660,446
6.	*France*	7,031,861 (79.7)	40,225 (0.5)	1,749,441 (19.8)	8,821,527
7.	Greece				
8.	*Italy*	3,006,839 (79.6)	27,894 (0.7)	742,213 (19.7)	3,776,946
9.	*Luxembourg*	45,502 (82.4)	393 (0.7)	9,317 (16.9)	55,212
10.	Norway	321,767 (72.4)	5,834 (1.3)	116,546 (26.3)	444,147
11.	*Netherlands*	730,051 (78.9)	9,322 (1.0)	185,534 (20.1)	924,907
12.	Portugal	193,259 (77.4)	3,926 (1.6)	52,369 (21.0)	249,554
13.	United Kingdom	6,783,000 (81.4)	79,000 (1.0)	1,470,000 (17.7)	8,332,000
14.	Sweden	1,424,000 (91.1)	9,200 (0.6)	128,600 (8.3)	1,561,800
15.	Switzerland	655,000 (89.7)	3,400 (0.5)	71,700 (9.8)	730,100
16.	Turkey	60,731 (40.4)	16,437 (10.9)	73,323 (48.7)	150,491
17.	Yugoslavia	99,130 (60.7)	6,239 (3.80)	58,132 (35.6)	163,501
	Total ECMT	29,373,444 (82.0)	267,661 (0.7)	6,182,512 (17.3)	35,823,617
	Total EEC	18,291,348 (82.7)	120,364 (0.5)	3,701,274 (16.8)	22,112,986
			1963		
1.	*Germany*	7,513,652 (89.3)	36,015 (0.4)	865,756 (10.3)	8,415,423
2.	Austria	627,582 (83.6)	5,476 (0.7)	117,773 (15.7)	750,831
3.	*Belgium*	1,050,000 (82.8)	7,484 (0.6)	210,000 (16.6)	1,267,484
4.	Denmark	605,486 (73.6)	3,680 (0.5)	213,232 (25.9)	822,398
5.	Spain	589,700 (69,3)	16,322 (1.9)	244,599 (28.8)	850,621
6.	*France*	7,900,000 (80.6)	42,522 (0.5)	1,858,348 (19.0)	9,800,870
7.	Greece	61,510 (53.2)	7,645 (6.6)	46,490 (40.2)	115,645
8.	*Italy*	3,864,150 (81.6)	30,406 (0.6)	846,955 (18.0)	4,741,511
9.	*Luxembourg*	49,689 (88.0)	405 (0.7)	9,399 (11.3)	59,493
10.	Norway	364,193 (74.4)	5,930 (1.2)	119,439 (24.4)	489,562
11.	*Netherlands*	866,900 (80.7)	9,500 (0.9)	197,500 (18.4)	1,073,900
12.	Portugal	212,139 (77.3)	4,626 (1.7)	57,820 (21.0)	274,585
13.	United Kingdom	7,602,000 (82.0)	81,000 (0.9)	1,585,000 (17.1)	9,268,000
14.	Sweden	1,556,000 (91.7)	9,700 (0.6)	131,000 (7.7)	1,696,700
15.	Switzerland	748,000 (89,5)	3,561 (0.4)	84,351 (10.1)	835,912
16.	Turkey	72,034 (41.9)	19,269 (11.2)	80,695 (46.9)	171,998
17.	Yugoslavia	112,534 (61.4)	6,634 (3.5)	64,499 (35.0)	183,667
	Total ECMT excluding Ireland	33,795,569 (82.8)	290,175 (0.7)	6,732,856 (16.5)	40,818,600
	Total EEC	21,244,391 (83.8)	126,332 (0.5)	3,987,958 (15.7)	25,358,681
18.	Ireland	229,125 (83.1)	1,514 (0.5)	45,209 (16.4)	275,848

TABLE 2 *(suite)*. TREND OF MOTOR VEHICLE NUMBERS

FIGURES IN BRACKETS INDICATE PERCENTAGES

EEC countries are in italics

COUNTRY	PRIVATE CARS	BUSES	LORRIES[1]	TOTAL
		1964		
1. *Germany*	8,689,689 (89.9)	38,053 (0.4)	940,217 (9.7)	9,667,959
2. Austria	702,034 (84.3)	5,655 (0.7)	124,586 (15.0)	832,275
3. *Belgium*	1,158,483 (83.3)	8,173 (0.6)	223,767 (16.1)	1,390,423
4. Denmark	675,167 (74.5)	3,797 (0.4)	228,048 (25.1)	907,012
5. Spain	652,297 (64.4)	18,327 (1.8)	358,362 (34.9)	1,028,986
6. *France*	8,800,000 (81.3)	45,000 (0.4)	1,980,000 (18.3)	10,825,000
7. Greece	64,507 (53.0)	7,896 (6.5)	49,082 (40.5)	121,485
8. *Italy*	4,631,829 (83.7)	31,367 (0.5)	872,817 (15.8)	5,536,013
9. *Luxembourg*	55,138 (84.4)	393 (0.5)	9,968 (15.1)	65,499
10. Norway	415,540 (76.6)	6,131 (0.8)	123,000 (22.6)	544,671
11. *Netherlands*	1,059,400 (81.5)	9,500 (0.9)	213,100 (16.6)	1,282,000
12. Portugal	232,000 (68.1)			341,049
13. United Kingdom	8,461,000 (83.1)	82,000 (0.8)	1,635,000 (16.1)	10,178,000
14. Sweden	1,655,000 (92.0)	9,800 (0.5)	133,000 (7.4)	1,797,800
15. Switzerland	830,000 (89.7)	3,600 (0.3)	92,400 (10.9)	926,000
16. Turkey				
17. Yugoslavia	140,016 (63.6)	7,333 (3.6)	72,847 (33.0)	220,196
ECMT excluding Ireland	38,222,100 (83.9)	277,025 (0.6)	7,056,194 (15.5)	45,664,368
EEC	24,394,539 (84.8)	132,486 (0.5)	4,239,869 (14.7)	28,766,894
Ireland	254,494 (84.1)	1,562 (0.5)	46,626 (15.4)	302,682

1. Note : This column covers only motor-driven road vehicles, excluding agricultural tractors, trailers and semi-trailers.

Table 3 *a*. UTILITY VEHICLES - BREAKDOWN BY CATEGORY AND TOTAL CAPACITY (1964)

EEC countries are in italics

N = number of vehicles ; TC = total carrying capacity in tons

CARRYING CAPACITY	FROM 0 TO 1,9 T		FROM 2 TO 9,9 T		10 T AND OVER		ALL VEHICLES	
	N	TC	N	TC	N	TC	N	TC
Germany[1]	514,900	566,200	340,300	1,720,000	6,184	74,000	861,384	2,360,200
Austria	48,924	48,435	42,125	210,625	191	2,483	91,240	261,543
Belgium[2]	2,432	2,400	18,333	110,000	7,929	124,700	28,694	237,100
Denmark	188,038	135,292	38,920	215,319	464	6,252	227,422	356,863
Spain	217,192	113,000	130,582	668,000	10,588	140,000	358,362	921,000
France	1,330,000	1,300,000	595,000	2,000,000	55,000	600,000	1,980,000	3,900,000
Greece	26,617	26,617	21,812	98,154	650	7,836	49,079	132,607
Italy							931,720	2,293,519
Luxembourg	6,000[4]		3,571[4]		397		9,968	
Norway[3]							82,985	
Netherlands	146,800	141,100	71,400	411,200	14,450	207,800	232,650	760,100
Portugal								
United Kingdom	1,081,000		501,000		53,000		1,635,000	
Sweden	55,700	53,000	51,500	280,000	4,500	45,000	111,700	378,000
Switzerland								
Turkey								
Yugoslavia								
Ireland								
Total	3,617,603	2,386,044	1,814,543	5,713,298	153,353	1,208,071	6,600,204	11,600,932

1. Excluding tankers and special vehicles.
2. Vehicles used exclusively for transport for hire or reward.
3. 31,623 vehicles from 2 to 5 t ; 7,779 over 5 t ; 536 category unknown.
4. Estimate.

Table 3 *b*. UTILITY VEHICLES

Number (N) and total capacity (TC) of each class of vehicle as a percentage of all vehicles (1964)

EEC countries are in italics

CARRYING CAPACITY	FROM 0 TO 1,9 T		FROM 2 TO 9,9 T		10 T AND OVER	
	N	TC	N	TC	N	TC
1. *Germany*	60	24	39	73	0.7	3
2. Austria	54	18	46	81	0.1	1
3. *Belgium*[1]	8	1	64	46	27.6	53
4. Denmark	83	38	17	60	0.2	2
5. Spain	60	12	36	73	2.9	15
6. *France*	67	33	30	51	2.8	15
7. Greece	54	20	44	74	1.3	6
8. *Italy*						
9. *Luxembourg*	60		36		4.0	
10. Norway	67					
11. *Netherlands*	63	19	31	54	6.2	27
12. Portugal						
13. United Kingdom	66		31		3.2	
14. Sweden	50	14	46	74	4.0	12
15. Switzerland						
16. Turkey						
17. Yugoslavia						
18. Ireland						
Average	64[2]	26	32[2]	62	2.6[2]	12

1. Vehicles used only for transport for hire or reward.
2. Excluding Belgium and Norway.

Table 4. TWO-WHEELED MOTOR VEHICLES

Situation at end 1964

EEC countries are in italics

Country	Cylinder capacity over 50 cc[1]	Cylinder capacity not exceeding 50 cc[1]
1. *Germany*	803,727	1,298,332
2. Austria	124,221	103,314
3. *Belgium*	168,493	434,996
4. Denmark	94,773	460
5. Spain	965,130	270,442
6. *France*	700,000	6,400,000
7. Greece	26,000	
8. *Italy*	2,905,000	1,400,000
9. *Luxembourg*	8,770	9,500
10. Norway	67,442	124,657
11. *Netherlands*	150,200	1,400,000
12. Portugal[2]		
13. United Kingdom	1,143,000	497,000
14. Sweden	96,300	700,000
15. Switzerland		
16. Turkey		
17. Yugoslavia[3]		
18. Ireland[5]		
ECMT	7,253,656	12,638,701
EEC	4,736,190	10,942,828

1. 50 kg unladen weight respectively for Denmark.
2. 38,742 in all.
3. 102,146 in all.
4. 13 countries.
5. 31,500 over 75 cc.
   20,178 75 cc or less.

Table 5. PRESENT INTERNATIONAL NETWORK

Situation at end 1964

EEC countries are in italics

Country	Length in each category (km)[1]			Total length (km)
	A. (Motorway)	II (more than 2 lanes)	I (2 lanes)	
1. *Germany*	2,943	128	2,743	5,814
2. Austria	304	96	1,421	1,821
3. *Belgium*	244	624	231	1,099
4. Denmark	69	354	463	886
5. Spain	24	424	5,463[2]	5,911
6. *France*	403	1,968	3,572	5,943
7. Greece	—	53	2,680	2,733
8. *Italy*	1,688	1,046	3,685	6,419
9. *Luxembourg*	—	90	—	90
10. Norway	7	24	2,247	2,278
11. *Netherlands*	472	86	770	1,328
12. Portugal	35	—	1,213	1,248
13. United Kingdom	247	855	538	1,640
14. Sweden	178	72	3,104	3,354
15. Switzerland	87	136	1086	1,309
16. Turkey	—	51	5,525	5,576
17. Yugoslavia		145	1,983	2,128
ECMT	6,701	6,152	36,724	49,577
EEC	5,750	3,942	11,001	20,693

1. Excluding sections shared by several highways.
2. Including 136 km of unclassified roads.

Table 6. IMPROVMENT OF INTERNATIONAL NETWORK (AT END 1964)

EEC countries are in italics

Country	Total length km	Length standardized in: A km	A %	II km	II %	I km	I %	Total standardized (km)	Overall ratio of standardized length %
1. *Germany*	5,814	2,943	100	79	62	1,325	48	4,327	76
2. Austria	1,821	300	99	66	69	543	38	909	50
3. *Belgium*	1,099	244	100	415	67	189	82	848	77
4. Denmark	886	69	100	354	100	258	56	681	77
5. Spain	5,911	24	100	653	65	2,924	53	3,222	55
6. *France*	5,943	403	100	653	33	3,028	85	4,084	69
7. Greece	2,733	—		53	100	823	31	876	32
8. *Italy*	6,419	1,688	100	581	56	1,900	52	4,169	65
9. *Luxembourg*	90	—		57	64	—		57	64
10. Norway	2,278	7	100	13	54	745	33	765	34
11. *Netherlands*	1,328	472	100	73	85	554	72	1,099	80
12. Portugal	1,248	35	100			361	43	396	32
13. United Kingdom	1,640	247	100	609	71	70	13	926	56
14. Sweden	3,354	167							
15. Switzerland	1,309	87	100	90	66	694	64	871	67
16. Turkey	5,576	—		51	100	3,682	67	3,733	67
17. Yugoslavia	2,128	0	0	—	—	1,612	81	1,612	76
ECMT	49,577	6,686	98	3,368[1]	54[1]	18,708[1]	56[1]	28,595[1]	62[1]
EEC	20,693	5,750	100	1,858	47	6,996	70	14,604	71

1. 16 countries.

Table 7. INTERNATIONAL ROAD NETWORK

Length of sections of adequate capacity

EEC countries are in italics

Country	Category A km	A %	II km	II %	I km	I %	All categories (km)	% of total network
1. *Germany*	2,943	100	128	100	2,207	80	5,278	91
2. Austria	304	100						
3. *Belgium*	244	100	275	44	206	89	725	66
4. Denmark	69	100	347[1]	98	235[1]	51	651	74
5. Spain	24	100	403	95	5,207	95	5,634	95
6. *France*	403	100	487	25	2,750	77	3,640	61
7. Greece	—	—						
8. *Italy*	1,688	100	905	87	2,154	58	4,747	74
9. *Luxembourg*	—	—	66[1]	73	—	—	66[1]	73
10. Norway	7	100	11	46	2,101	93	2,119	93
11. *Netherlands*	455	96	48	56	307	40	810	61
12. Portugal	35	100						
13. United Kingdom	247	100	468	55	142	26	857	52
14. Sweden	178	100	72	100	2,722[1]	88	2,972[1]	88
15. Switzerland	87	100	80	19	954	88	1,121	86
16. Turkey	—	—	14	27	5,389	97	5,403	97
17. Yugoslavia			145	100	1,983	100	2,128	100
ECMT	6,684	100	3,449[2]	52[2]	26,357[2]	84[2]	36,151[2]	82[2]
EEC	5,733	100	1,909	48	7,624	69	15,266	74

1. Estimate made after reference to maps.
2. 14 countries.

Table 8. FUTURE INTERNATIONAL NETWORK

EEC countries are in italics

COUNTRY	CATEGORY A a	CATEGORY A b	CATEGORY II (MORE THAN 2 LANES) a	CATEGORY II (MORE THAN 2 LANES) b	CATEGORY I (2 LANES) a	CATEGORY I (2 LANES) b	TOTAL LENGTH a	TOTAL LENGTH b	OVERALL PERCENTAGE OF FUTURE NETWORK COMPLETED %
1. *Germany*	4,520	2,943							
2. Austria									
3. *Belgium*	884	244	183	128	—	—	1,067	372	35
4. Denmark	367	69	362	212	157	157	886	438	49
5. Spain									
6. *France*	2,420	403	2,820	621	480	420	5,720	1,444	25
7. Greece									
8. *Italy*	4,767	1,688	1,178	373[1]	532	327[1]	6,477	2,388	37
9. *Luxembourg*	—	—	90	57	—	—	90	57	63
10. Norway									
11. *Netherlands*	1,153	463	—	—	179	138	1,332	601	45
12. Portugal									
13. United Kingdom									
14. Sweden									
15. Switzerland	740	92	14	4	549	143	1,303	239	18
16. Turkey									
17. Yugoslavia		—	—	—	2,128	1,021	2,128	1,021	48
Total	14,851	5,902	4,647	1,395	4,025	2,206	19,003	6,560	33

1. Estimate.
a) Length planned (km)
b) Length already in service with final characteristics.

Table 9. ROAD INVESTMENT (INTERNATIONAL NETWORK)

Gross investment in $ million

EEC countries are in italics

Country	1963	1964	Forecasts for 1965	
			International network	Total network
1. *Germany*	173.8	172.4	141	1,400[1]
2. Austria	45	45.8	56.1	104.5
3. *Belgium*	44	90	65	110
4. Denmark	11	13[1]		53
5. Spain	13	18.6		
6. *France*	108	128.0	170	638
7. Greece		24	25.7	63.3
8. *Italy*	39.5	59.6	9.7	58
9. *Luxembourg*	0.6	0.3		
10. Norway	10.9	15.4	17.2	69.0
11. *Netherlands*	29.3	30.9	49.4	270.4
12. Portugal	2.2	1.3	—	
13. United Kingdom	82.4	120.5	125.0	565.0
14. Sweden	24	34	43	120.0
15. Switzerland	100	119.5	119.5	282.8
16. Turkey	19.5	20.8	19.2	67.9
17. Yugoslavia	18.4	5.1	0.5	50.0
18. Ireland	—	—	—	39
ECMT	726.6[2]	899.2	841,3	3,890.9
EEC	395.2	481.2	435.1	2,476.4[3]

1. Provisional figure.
2. 17 countries.
3. 5 countries.
4. 15 countries.

Table 10. ECONOMIC STUDIES

EEC countries are in italics

Country	1	2	3	4	5	6
1. *Germany*	+	—	×	+	+	×
2. Austria	—					
3. *Belgium*	+	—	+	+	+	—
4. Denmark	+	—	—	+	+	—
5. Spain	+	—	—	+	+	—
6. *France*	+	+	—	+	+	—
7. Greece						
8. *Italy*	—					
9. *Luxembourg*	—					
10. Norway	+			+	+	—
11. *Netherlands*	+	—	—	+	+	—
12. Portugal	—					
13. United Kingdom	+	+	×	+	+	—
14. Sweden	+		+	+	+	×
15. Switzerland	+		+			
16. Turkey	+	+	+		+	—
17. Yugoslavia	+			+	—	+
18. Ireland						

Column 1. Is it the practice to calculate the economic benefits gained by road investment?
Column 2. Is this caloulation made systematically?
Column 3. Does it cover the whole network?
Column 4. Is it made in special oases?
Column 5. Are benefits to users taken into account? (Direct benefits).
Column 6. Are other benefits taken into aocount? (Indirect benefits).

Meaning of symbols : + = yes.
— = no.
× = to a certain extent.

Table 11. ECONOMIC STUDIES

Comparison of a few basic factors

Column 1. : PC = privates cars
L = lorries
LTC = lorry-trailer combinations

Column 3. = *a)* per person killed
b) per person injured
c) material damage

Country	1 Value of time saved (dollars/hour)	2 Average number of occupants per vehicle	3 Cost of accidents (dollars)
Belgium (1959 prices)	PC : 1.2 L : 1.36	1.2 1.7	*a)* 24,000 *b)* 900
France	PC : 1.63 L : 3.06		*a)* 30,000[1] *b)* 1,100 *c)* 500
Germany	PC : 1.69 L : 3 LTC : 3.75		*a)* 5,660 *b)* 293 *c)* 133
Netherlands	Wage : 1.39		not taken into consideration
Spain	PC : 1.5 L : 1.65		*c)* 100
Sweden	PC : from 0.97 to 1.55 L : from 2.9 to 3.86	1.5	average : from 3,000 to 4,000
Switzerland (1959 prices)	PC : 2.54 L : 2.86	1 1.3	*a)* 5,760 *b)* 576
Turkey	not taken into consideration		not taken into consideration
United Kingdom (1958 prices)	PC : 1.71 Taxi : 2.25 Bus : 5.55 L : up to 1.5 t : 2.44 from 1.5 to 3 t : 2.25 over 3 t : 3.34	1.5 0.8 20 1.6 1.2 1.2	average 1,570

1. France : average for accidents causing injury (including material damage) : $ 5,200.

Table 12. GOODS TRAFFIC CARRIED BY INLAND WATERWAYS

In '000 tons

Country	Year	Internal traffic	International traffic: Loaded	International traffic: Unloaded	Goods in transit	Total tonnage carried	Total ton-kilometres (millions)	Ton-kilometres in index form (1955 = 100)
Germany[1]	1955	64,418	21,908	31,606	6,680	124,612	28,624	100
	1961	90,817	32,167	42,680	6,551	172,215	40,214	140
	1962	90,818	30,626	42,951	6,379	170,774	39,936	139
	1963	84,995	30,698	45,127	6,506	167,327	39,513	138
	1964	96,035	29,022	52,605	6,133	183,795	40,553	142
Austria	1955	284	616	1,738	473	3,112	507	100
	1961	664	1,219	2,941	670	5,494	904	178
	1962	691	1,239	2,708	753	5,391	919	181
	1963	510	1,074	3,440	769	5,793	995	196
	1964	559	953	3,663	731	5,906	1,032	204
Belgium	1955	22,572	15,826	16,441	2,001	56,840	4,617	100
	1961	24,821	14,921	21,877	3,496	65,115	5,473	119
	1962	25,522	15,709	22,156	3,254	66,641	5,421	117
	1963	22,778	16,156	22,599	3,268	64,801	5,201	113
	1964	26,356	18,522	26,195	4,235	75,308	5,543	120
France	1955	40,211	7,752	5,475	4,817	58,255	8,917	100
	1961	48,718	7,543	7,759	7,138	71,158	11,262	126
	1962	49,713	6,470	8,064	7,289	71,536	11,234	126
	1963	51,208	9,115	8,209	7,657	76,189	11,358	127
	1964	58,805	11,490	9,097	6,227	85,619	12,470	140
Italy	1955	2,135	1	120	—	2,256	..	..
	1961	2,356	—	331	—	2,687	..	..
	1962	2,553	..	291	—	2,844	..	..
	1963	2,471	175	363	—	3,009	..	..
	1964	2,394	23	178	—	2,595	..	..
Netherlands	1955	44,426	33,889	20,369	13,589	112,273	15,255	100
	1961	61,401	49,082	23,475	18,855	152,813	20,247	133
	1962	63,801	49,558	22,868	18,037	154,264	20,328	133
	1963	60,719	48,858	22,278	19,584	151,439	20,201	132
	1964	73,849	56,921	25,931	21,381	178,082	23,602	155
Switzerland	1955	2	456	4,131	164	4,753	14	100
	1961	2	324	6,493	208	7,027	30	214
	1962	0	294	6,788	182	7,264	31	222
	1963	2	321	7,960	186	8,469	37	264
	1964	2	397	7,133	218	7,750	34	243
Yugoslavia	1955	2,763	400	122	2,875	6,160	2,106	100
	1961	4,839	719	662	3,714	9,934	3,037	144
	1962	4,154	717	736	3,854	9,501	3,194	152
	1963	5,180	784	891	3,964	10,819	3,518	167
	1964	6,043	817	1,091	4,829	12,780	4,282	203

1. Provisional figures for 1964.

Table 13. RHINE TRANSPORT AT THE GERMAN-NETHERLANDS FRONTIER (EMMERICH/LOBITH)

	Unit	1955	1962	1963	1964
1. Total traffic	1,000 tons	50,116	66,150	66,612	73,059
	index	100	132	133	146
2. Downstream movements	1,000 tons	18,033	23,248	22,977	24,237
	index	100	129	127	134
3. Upstream movements	1,000 tons	32,083	42,911	43,635	48,822
	index	100	134	136	152
4. Upstream movements excluding hydrocarbons	1,000 tons	26,823	33,900	34,635	41,011
	index	100	129	129	153
5. Coal and coke (upstream)	1,000 tons	5,563	3,407	3,964	3,270
	index	100	61	71	59
6. Iron ore and manganese (upstream)	1,000 tons	8,266	13,846	13,800	17,661
	index	100	167	167	214
7. Hydrocarbons (upstream)	1,000 tons	5,260	9,011	9,002	7,811
	index	100	171	171	149
9. Other goods (upstream)	1,000 tons	12,994	16,647	16,869	20,080
	index	100	132	130	155

Table 14. RHINE TRANSPORT AT THE GERMAN-NETHERLANDS FRONTIER

(Emmerich/Lobith) (in '000 tons)

	1963	1964	1965	1965 as % of 1964
Upstream movements :				
January	1,022	3,101	4,439	143
February	907	3,611	3,585	99
March	4,354	3,897	3,987	102
April	4,359	4,613	3,991	87
May	4,269	4,460	4,449	99
June	4,139	4,378		
July	4,756	4,403		
August	4,769	4,022		
September	4,074	3,853		
October	3,994	4,223		
November	3,619	4,218		
December	3,371	4,034		
Year	43,633	48,813		
Downstream movements :				
January	230	1,312	2,040	155
February	154	1,882	2,106	112
March	1,650	2,057	2,239	109
April	2,460	2,345	2,413	103
May	2,694	2,397	2,321	97
June	2,387	2,472		
July	2,447	1,969		
August	2,417	1,717		
September	2,391	1,931		
October	2,346	2,060		
November	2,018	2,075		
December	1,792	2,030		
Year	22,986	24,247		

TABLE 15. NUMBER OF BOATS, BROKEN DOWN BY CARGO CAPACITY AT END OF 1964

COUNTRY	CLASS	SELF-PROPELLED BARGES			DUMB BARGES[2]			TOTAL CARGO-CARRYING CRAFT			TYPE	TUGS + PUSHERS		
		CARGO CAPACITY			CARGO CAPACITY			CARGO CAPACITY				HORSEPOWER (HP)		
		NUMBER	TOTAL (TONS)	AVERAGE (TONS)	NUMBER	TOTAL (TONS)	AVERAGE (TONS)	NUMBER	TOTAL (TONS)	AVERAGE (TONS)		NUMBER	TOTAL	AVERAGE
Western Germany[1]														
Up to 250 t.	0	1,233	173,710	141	191	25,756	135	1,424	199,466	140	up to 250 hp	288	53,913	187
from 251 to 400 t.	I	919	295,689	322	187	59,744	319	1,106	355,433	321	from 251 to 400 hp	275	93,334	339
from 401 to 650 t.	II	1,019	525,694	516	383	208,301	544	1,402	733,995	524	from 401 to 1,000 hp	160	97,278	608
from 651 to 1,000 t.	III	1,792	1,538,452	859	766	642,430	839	2,558	2,180,882	853	over 1,000 hp	27	35,000	1,296
from 1,001 to 1,500 t.	IV	412	508,513	1,234	598	789,444	1,320	1,010	1,297,957	1,285				
Over 1,500 t.	V	7	12,279	1,754	123	221,199	1,798	130	333,478	1,796				
Total		5,382	3,054,337	568	2,248	1,946,874	866	7,630	5,001,211	655	Total	750	279,525	373
Austria														
Up to 250 t.	0	—	—	—	1	222	222	1	222	222	up to 250 hp	1	105	105
from 251 to 400 t.	I	1	341	341	1	333	333	2	674	337	from 251 to 400 hp	3	900	300
from 401 to 650 t.	II	1	555	555	31	18,260	589	32	18,815	588	from 401 to 1,000 hp	27	21,870	810
from 651 to 1,000 t.	III	2	1,708	854	224	189,305	845	226	191,013	854	over 1,000 hp	8	9,370	1,171
from 1,001 to 1,500 t.	IV	2	2,522	1,261	46	51,616	1,122	48	54,138	1,128				
over 1,500 t.	V	—	—	—	—	—	—	—	—	—				
Total		6	5,126	854	303	259,736	857	309	264,862	857	Total	39	32,245	827
Belgium														
Up to 250 t.	0	457	65,551	143	58	7,831	135	515	73,382	142	up to 250 hp	130	15,562	120
from 251 to 400 t.	I	3,367	1,194,052	355	215	77,007	358	3,582	1,271,059	355	from 251 to 400 hp	24	7,406	309
from 401 to 650 t.	II	792	402,630	508	181	89,315	493	973	491,945	506	from 401 to 1,000 hp	6	2,922	487
from 651 to 1,000 t.	III	389	326,002	838	52	45,612	877	441	371,614	843	over 1,000 hp	—	—	—
from 1,001 to 1,500 t.	IV	164	206,051	1,256	149	200,695	1,347	313	406,746	1,300				
Over 1,500 t.	V	18	30,137	1,674	69	120,744	1,750	87	150,881	1,734				
Total		5,187	2,224,423	429	724	541,204	748	5,911	2,765,627	468	Total	160	25,890	162
France														
Up to 250 t.	0	473	74,771	158	1,150	98,696	86	1,623	173,469	107	up to 250 hp	296	25,138	85
from 251 to 400 t.	I	4,489	1,593,526	355	1,628	571,149	351	6,117	2,164,675	354	from 251 to 400 hp	36	11,442	318
from 401 to 650 t.	II	591	262,061	443	618	275,311	445	1,209	537,372	444	from 401 to 1,000 hp	162	94,039	580
from 651 to 1,000 t.	III	253	210,590	832	233	181,840	780	486	392,430	807	over 1,000 hp	10	21,650	2,165
from 1,001 to 1,500 t.	IV	14	15,593	1,114	104	132,330	1,272	118	147,923	1,254				
Over 1,500 t.	V	1	1,516	1,516	117	205,525	1,757	118	207,041	1,755				
Total		5,821	2,158,057	371	3,850	1,464,851	380	9,671	3,622,908	375	Total	504	152,269	302
Italy														
Up to 250 t.	0	605	51,832	86	2,102	107,942	51	2,707	159,774	59	up to 250 hp	123	8,346	68
from 251 to 400 t.	I	—	—	—	—	—	—	—	—	—	from 251 to 400 hp	—	—	—
from 401 to 650 t.	II	8	4,360	545	—	—	—	8	4,360	545	from 401 to 1,000 hp	—	—	—
from 651 to 1,000 t.	III	3	2,800	933	1	1,000	1,000	4	3,800	950	over 1,000 hp	—	—	—
from 1,001 to 1,500 t.	IV	—	—	—	—	—	—	—	—	—				
over 1,500 t.	V	—	—	—	—	—	—	—	—	—				
Total		616	58,992	96	2,103	108,942	52	2,719	167,934	62	Total	123	8,346	68

Luxembourg														
Up to 250 t.........	0										up to 250 hp........			
from 251 to 400 t..	I										from 251 to 400 hp..			
from 401 to 650 t..	II										from 401 to 1,000 hp .			
from 651 to 1,000 t..	III										over 1,000 hp			
from 1,001 to 1,500 t..	IV													
over 1,500 t..........	V													
Total											Total			
Netherlands														
Up to 250 t.........	0	7,023	795,508	113	6,014	476,490	79	13,037	1,271,998	98	up to 250 hp.......			
from 251 to 400 t..	I	2,275	740,649	326	457	146,572	321	2,732	887,221	325	from 251 to 400 hp .			
from 401 to 650 t..	II	1,645	844,252	513	776	397,284	512	2,421	1,241,536	513	from 401 to 1,000 hp .			
from 651 to 1,000 t..	III	691	571,305	827	532	444,560	836	1,223	1,015,865	831	over 1,000 hp			
from 1,001 to 1,500 t..	IV	223	277,871	1,246	537	696,016	1,297	760	973,887	1,281				
over 1,500 t..........	V	28	54,970	1,963	346	695,444	2,010	374	750,414	2,006				
Total		11,885	3,284,555	276	8,662	2,856,366	330	20,547	6,140,921	299	Total	2,194	397,051	180
Switzerland														
Up to 250 t.........	0	6	1,191	199	—	—	—	6	1,191	199	up to 250 hp........	3	575	192
from 251 to 400 t..	I	23	7,265	316	1	358	358	24	7,623	318	from 251 to 400 hp .	—	—	—
from 401 to 650 t..	II	50	27,391	548	—	—	—	50	27,391	548	from 401 to 1,000 hp .	8	4,880	610
from 651 to 1,000 t..	III	184	158,649	862	19	18,098	953	203	176,747	871	over 1,000 hp	9	23,800	2,644
from 1,001 to 1,500 t..	IV	90	108,590	1,207	42	55,911	1,331	132	164,501	1,246				
over 1,500 t..........	V	20	33,986	1,699	20	34,370	1,719	40	68,356	1,709				
Total		373	337,072	904	82	108,737	1,326	455	445,809	980	Total	20	29,255	1,463
Yugoslavia														
Up to 250 t.........	0	9	1,118	124	—	—	—	9	1,118	124	up to 250 hp..	166	16,234	98
from 251 to 400 t..	I	3	837	279	115	22,411	195	118	23,248	197	from 251 to 400 hp .	15	4,601	307
from 401 to 650 t..	II	4	2,384	596	223	120,978	543	227	123,362	543	from 401 to 1,000 hp .	53	40,207	759
from 651 to 1,000 t..	III	3	2,011	670	277	205,045	740	280	207,056	739	over 1,000 hp	7	10,353	1,479
from 1,001 to 1,500 t..	IV	—	—	—	114	124,435	1,092	114	124,435	1,092				
over 1,500 t..........	V	—	—	—	—	—	—	—	—	—				
Total		19	6,350	334	729	472,869	649	748	479,219	641	Total	241	71,395	296

1. According to the situation at the end of 1963.
2. Including pushed barges.

Table 16. DEVELOPMENT OF THE FLEET

Country	At end of year	Self-propelled barges: Number	Self-propelled barges: Cargo capacity Total (tons)	Self-propelled barges: Cargo capacity Average (tons)	Dumb barges[2]: Number	Dumb barges[2]: Cargo capacity Total (tons)	Dumb barges[2]: Cargo capacity Average (tons)	Total cargo-carrying boats: Number	Total cargo-carrying boats: Cargo capacity Total (tons)	Total cargo-carrying boats: Cargo capacity Average (tons)	Tugs: Number	Tugs: Horsepower Total (tons)	Tugs: Horsepower Average (tons)
Germany[1]	1955	3,094	1,363,870	441	3,614	2,650,609	733	6,708	4,014,479	598	834	319,130	383
	1961	4,889	2,603,474	533	2,712	2,309,383	852	7,601	4,912,857	646	767	282,684	369
	1962	5,152	2,843,322	552	2,469	2,130,834	863	7,621	4,974,156	653	763	283,678	372
	1963	5,382	3,054,337	568	2,248	1,946,874	866	7,630	5,001,211	655	750	279,525	373
	1964	5,548	3,221,737	581	2,083	1,770,874	850	7,631	4,992,611	654	709	276,235	379
Austria	1955	2	1,118	559	261	205,729	788	263	206,847	786	35	26,490	757
	1961	2	896	448	303	253,662	837	305	254,558	835	40	31,905	798
	1962	2	896	448	312	264,441	848	314	265,337	845	40	33,095	827
	1963	4	2,604	651	312	265,701	852	316	268,305	849	40	33,045	826
	1964	6	5,126	854	303	259,736	857	309	264,862	857	39	32,245	827
Belgium	1955	4,386	1,522,546	347	1,764	879,238	498	6,150	2,401,784	391	225	26,140	116
	1961	5,153	2,021,587	392	877	586,776	669	6,030	2,608,363	433	171	23,573	138
	1962	5,120	2,060,895	403	807	564,958	700	5,927	2,625,853	443	177	23,643	134
	1963	5,123	2,124,562	415	766	562,514	734	5,889	2,687,076	456	176	26,466	150
	1964	5,187	2,224,423	429	724	541,204	748	5,911	2,765,627	468	160	25,890	162
France	1955	3,925	1,396,719	356	6,506	2,378,053	366	10,431	3,774,772	362	429	135,025	315
	1961	5,243	1,935,459	369	4,404	1,611,997	366	9,647	3,547,456	368	468	126,865	271
	1962	5,435	2,008,204	369	4,137	1,526,996	369	9,572	3,535,200	369	473	128,855	272
	1963	5,640	2,085,608	370	3,996	1,508,545	378	9,636	3,594,153	373	485	137,630	284
	1964	5,821	2,158,057	371	3,850	1,464,851	380	9,671	3,622,908	375	504	152,269	302
Italy	1955	353	36,766	104	1,256	102,686	82	1,609	139,452	87	80	6,323	79
	1961	572	50,378	88	1,882	104,167	55	2,454	154,545	63	97	6,935	71
	1962	571	52,034	91	2,039	104,458	51	2,610	156,492	60	116	7,221	62
	1963	598	55,645	93	2,080	104,366	50	2,678	160,011	60	114	7,484	66
	1964	616	58,992	96	2,103	108,942	52	2,719	167,934	62	123	8,346	68
Luxembourg	1955	—	—	—	—	—	—	—	—	—	—	—	—
	1961	26	9,310	358	11	5,260	478	37	14,570	394	—	....	....
	1962	26	9,310	358	11	5,260	478	37	14,570	394	1	....	....
	1963	....	....	....	....	....	....	40	18,000	450	....	....	....
	1964	....	....	....	....	....	....	....	....	....	....	....	....
Netherlands	1955	8,068	1,473,189	195	7,420	2,732,459	368	15,488	4,205,648	272	....	....	....
	1961	10,736	2,583,410	241	8,506	2,741,857	322	19,242	5,325,267	277	2,128	363,097	171
	1962	11,153	2,836,775	254	8,522	2,778,231	326	19,675	5,651,006	286	2,174	383,550	176
	1963	11,514	3,038,800	264	8,567	2,782,172	325	20,081	5,820,972	290	2,174	389,071	179
	1964	11,885	3,284,555	276	8,661	2,854,418	329	20,546	6,138,973	298	2,194	397,051	180
Switzerland	1955	274	203,896	744	64	63,636	994	338	267,532	792	19	24,800	1,305
	1961	353	312,048	884	59	76,036	1,289	412	388,084	942	16	25,205	1,576
	1962	357	316,472	886	76	99,693	1,312	433	416,165	961	16	25,205	1,576
	1963	364	326,721	898	80	106,001	1,325	444	432,722	975	18	29,555	1,642
	1964	373	337,072	904	82	108,737	1,326	455	455,809	980	20	29,255	1,463

Yugoslavia	1955	18	5,137	285	726	302,327	416	744	307,464	413	145	34,685	239
	1961	18	5,915	329	610	383,328	618	628	389,243	620	188	47,306	252
	1962	18	5,791	322	654	404,160	618	672	409,951	610	217	60,977	281
	1963	21	6,702	319	662	406,412	614	683	413,114	605	243	69,573	286
	1964	19	6,350	334	729	472,869	649	748	479,219	641	241	71,395	296

1. Provisionnal figures for 1964 (including Berlin as from 31st December, 1964).
2. Including pushed barges.

Table 17. NEW BOATS BROUGHT INTO SERVICE IN 1964

Country	Class	Self-propelled barges: Cargo capacity: Number	Self-propelled barges: Cargo capacity: Total (tons)	Self-propelled barges: Cargo capacity: Average (tons)	Dumb barges[2]: Cargo capacity: Number	Dumb barges[2]: Cargo capacity: Total (tons)	Dumb barges[2]: Cargo capacity: Average (tons)	Total cargo-carrying craft: Cargo capacity: Number	Total cargo-carrying craft: Cargo capacity: Total (tons)	Total cargo-carrying craft: Cargo capacity: Average (tons)	Type	Tugs + pushers: Horsepower (HP): Number	Tugs + pushers: Horsepower (HP): Total	Tugs + pushers: Horsepower (HP): Average
Germany[1]														
Up to 250 t.	0	40	4,960	124	2	343	172	42	5,303	126	Up to 250 hp	3	592	198
from 251 to 400 t.	I	23	7,537	328	2	666	333	25	8,203	328	from 251 to 400 hp	6	1,945	324
from 401 to 650 t.	II	36	18,574	516	4	2,095	524	40	20,669	517	from 401 to 1,000 hp	4	3,200	800
from 651 to 1,000 t.	III	114	97,419	855	—	—	—	114	97,419	855	over 1,000 hp	—	—	—
from 1,001 to 1,500 t.	IV	76	97,272	1,280	3	4,112	1,371	79	101,384	1,283				
over 1,500 t.	V	1	1,540	1,540	2	3,162	1,581	3	4,702	1,567				
Total		290	227,302	784	13	10,378	798	303	237,680	784	Total	13	5,737	441
Austria														
Up to 250 t.	0	—	—	—	—	—	—	—	—	—	Up to 250 hp	—	—	—
from 251 to 400 t.	I	—	—	—	—	—	—	—	—	—	from 251 to 400 hp	—	—	—
from 401 to 650 t.	II	—	—	—	—	—	—	—	—	—	from 401 to 1,000 hp	—	—	—
from 651 to 1,000 t.	III	—	—	—	—	—	—	—	—	—	over 1,000 hp	—	—	—
from 1,001 to 1,500 t.	IV	2	2,523	1,262	—	—	—	2	2,523	1,262				
over 1,500 t.	V	—	—	—	—	—	—	—	—	—				
Total		2	2,523	1,262	—	—	—	2	2,523	1,262	Total	—	—	—
Belgium														
Up to 250 t.	0	1	217	217	—	—	—	1	217	217	Up to 250 hp	1	250	250
from 251 to 400 t.	I	43	16,441	382	—	—	—	43	16,441	382	from 251 to 400 hp	—	—	—
from 401 to 650 t.	II	26	14,135	544	3	1,244	415	29	15,379	530	from 401 to 1,000 hp	—	—	—
from 651 to 1,000 t.	III	29	23,370	806	—	—	—	29	23,370	806	over 1,000 hp	—	—	—
from 1,001 to 1,500 t.	IV	16	20,172	1,261	8	10,569	1,321	24	30,741	1,281				
over 1,500 t.	V	4	6,562	1,641	—	—	—	4	6,562	1,641				
Total		119	80,897	680	11	11,813	1,074	130	92,710	713	Total	1	250	250
France														
Up to 250 t.	0	8	1,222	152	9	1,081	120	17	2,303	135	Up to 250 hp	2	250	125
from 251 to 400 t.	I	6	2,149	358	22	7,326	333	28	9,475	338	from 251 to 400 hp	—	—	—
from 401 to 650 t.	II	28	11,590	413	15	6,719	447	43	18,309	425	from 401 to 1,000 hp	15	12,770	851
from 651 to 1,000 t.	III	5	4,373	874	—	—	—	5	4,373	874	over 1,000 hp	—	—	—
from 1,001 to 1,500 t.	IV	—	—	—	3	3,487	1,162	3	3,487	1,162				
over 1,500 t.	V	—	—	—	15	30,893	2,059	15	30,893	2,059				
Total		47	19,334	411	64	49,506	773	111	68,840	620	Total	17	13,020	765
Italy														
Up to 250 t.	0	18	2,400	133	23	915	39	41	3,315	80	Up to 250 hp	9	863	95
from 251 to 400 t.	I	1	450	450	—	—	—	1	450	450	from 251 to 400 hp	—	—	—
from 401 to 650 t.	II	—	—	—	—	—	—	—	—	—	from 401 to 1,000 hp	—	—	—
from 651 to 1,000 t.	III	1	1,000	1,000	—	—	—	1	1,000	1,000	over 1,000 hp	—	—	—
from 1,001 to 1,500 t.	IV	—	—	—	—	—	—	—	—	—				
over 1,500 t.	V	—	—	—	—	—	—	—	—	—				
Total		20	3,850	193	23	915	39	43	4,755	110	Total	9	863	95

Netherlands														
Up to 250 t	0										Up to 250 hp			
from 251 to 400 t	I										from 251 to 400 hp			
from 401 to 650 t	II										from 401 to 1,000 hp			
from 651 to 1,000 t	III										over 1,000 hp			
from 1,001 to 1,500 t	IV													
over 1,500 t	V													
Total											Total			
Switzerland														
Up to 250 t	0	—	—	—	—	—	—	—	—	—	Up to 250 hp	—	—	—
from 251 to 400 t	I	—	—	—	—	—	—	—	—	—	from 251 to 400 hp	3	1,800	600
from 401 to 650 t	II	—	—	—	—	—	—	—	—	—	from 401 to 1,000 hp	—	—	—
from 651 to 1,000 t	III	12	11,157	929	3	2,637	879	15	13,794	919	over 1,000 hp	—	—	—
from 1,001 to 1,500 t	IV	2	2,545	1,273	—	—	—	2	2,545	1,273				
over 1,500 t	V	—	—	—	2	3,560	1,780	2	3,560	1,780				
Total		14	13,702	978	5	6,197	1,239	19	19,899	1,047	Total	3	1,800	600
Yugoslavia														
Up to 250 t	0	1	54	54	—	—	—	1	54	54	Up to 250 hp	4	396	99
from 251 to 400 t	I	—	—	—	—	—	—	—	—	—	from 251 to 400 hp	4	1,180	295
from 401 to 650 t	II	—	—	—	11	5,571	506	11	5,571	506	from 401 to 1,000 hp	3	2,880	960
from 651 to 1,000 t	III	—	—	—	9	6,635	737	9	6,635	737	over 1,000 hp	—	—	—
from 1,001 to 1,500 t	IV	—	—	—	25	29,504	1,180	25	29,504	1,180				
over 1,500 t	V	—	—	—	—	—	—	—	—	—				
Total		1	54	54	45	41,710	926	46	41,764	907	Total	11	4,456	405

1. In 1963.
2. Including pushed barges.

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Chapter I

TABLES

REPORT OF THE COMMITTEE OF DEPUTIES ON FORECASTS OF THE NUMBERS OF PRIVATE CARS UNTIL 1975

[CM (65)20. Annex II.]

I. INTRODUCTION

The present report forms the first part of a study now being made in the ECMT concerning forecasts for all passenger traffic by road until 1975. As such, the study resumes the theme of a report submitted to the Council of Ministers at its 18th session held in Paris on 25th and 26th November, 1963 [CM(63)17], but has extended the estimates to the new economic date limit jointly adopted for all the ECMT's forecast studies, i.e. the year 1975 instead of 1970.

All the Member countries, with the exception of Greece and Yugoslavia, have helped with forecasts of numbers of private cars.

II. SCOPE OF THE STUDY

Member countries were recommended to limit the present study to road motor vehicles other than motor cycles intended for passengers and seating fewer than ten people (including the driver). The term « private car » therefore includes taxis, private hire cars and multi-purpose vehicles, provided they seat fewer than ten people. Two-wheeled vehicles and large-capacity vehicles such as motor coaches and buses have not therefore been included.

Although the range of this study extends to all the motorised equipment used for road passenger transport nor confines itself to private cars properly speaking (i.e. vehicles run by private persons for their personal needs), it has been adopted for the following reasons in particular :

a) the aforementioned definition of « private car » corresponds to that adopted for compiling the statistics of the United Nations Economic Commission for Europe (Geneva) and of the Statistical Office of the European Communities (Brussels). This meant that the Member countries, in compiling their basic data, were able to have direct recourse to a common system of classifying the different categories of motor vehicle, which was already being used in preparing the statistics of the various international organisations. This should ensure maximum comparability among the data supplied;

b) in the course of the preparatory studies concerning forecasts for all passenger transport, it was seen to be advisable from the methodological point of view, to distinguish between public and private transport of passengers by road. Given that, in the latter category, two wheeled transport must for practical reasons be discounted by most of the Member countries in their global estimates, the number of private cars, as defined in the present report, is a primary constituent of the overall study now being made. It is a constituent which can not only be integrated direct, but represents a phenomenon which is at once the most dynamic and the most problematical in the evolution of surface transport;

c) it also seemed advisable to ensure that the range of the present study would coincide with that of the study undertaken in the same subject within the ECMT in 1963 [cf. CM(63)17], in order to afford a comparison of the respective results and reveal, as far as possible, any changes in motorisation trends during the two intervening years. On the whole the latter aim has been achieved. Apart from a few slight changes in the basic figures, the statistics and results provided by the different Member countries are fully comparable to their counterparts in the ECMT's earlier study.

Radical differences appear only in the case of Denmark and Turkey.

In Denmark this is due to the system of taxing motor vehicles. In contrast to the study for 1963, the latest estimates for this country cover, in addition to private cars, motor vehicles which for tax purposes are registered as utilitarian vehicles but in reality are widely used for passenger traffic. There are at present about 125,000 of these vehicles. The Danish experts have assumed that about half of this number are used regularly for passenger transport. They contend however that there will be no increase in the future, because the rise in the standard of living should lead to a preference for private cars properly speaking even though these may be more heavily taxed.

On the other hand where Turkey is concerned, the figures for the 1963 study did not conform to the definition of the private car adopted by the ECMT as they related to private vehicles seating fewer than eight persons. Since then further research by Turkey's State Institute of Statistics has led to a classification which makes it possible to determine exactly the number of cars with a maximum of ten seats.

III. Saturation

The main methods have been set out in the report CM(63)17[1].

One important phenomenon, which should be taken into account in making long-terme forecasts of the number of private vehicles, is saturation. The higher the degree of motorisation and the longer the period covered by the estimate, the greater is the significance of this phenomenon.

It is evident that, for a given number of inhabitants, the number of cars cannot increase indefinitely but must tend towards a certain limit. Once this limit has been reached, the absolute number of cars can increase only in proportion to the rise in population or to any modification in its structure. In short the level of saturation is reached when the degree of saturation (number of vehicles per inhabitant) now remains virtually unchanged.

From the economic point of view moreover, private cars are tantamount in principle to durable consumer goods, i.e goods whose economic value is not used up in a single act of consumption, but in numerous ways over a certain length of time. At a given moment therefore any additional demand will be in the form of replacement. This means that, at saturation level, there is no longer any additional demand except for replacement.

It is difficult to fix the limit of saturation ahead of time because, generally speaking, a large number of factors intervene, such as :

— economic factors, in particular the standard of living, pattern of consumption, relativity of prices;
— size of the country;
— density of the population, its geographical distribution and its structural composition in terms of age and social conditions;
— specific conditions governing the use of cars, such as capacity of the roads, parking difficulties, etc.;
— quality and density of public transport.

As the relative importance of these factors varies considerably from country to country, ideas on the subject of saturation are bound to differ appreciably among some countries. Such figures as have been provided are given below;

COUNTRY	SATURATION POINT	
Germany	290	vehicles per 1,000 inhabitants
Belgium	350 to 400	vehicles per 1,000 inhabitants
France	400 to 450	vehicles per 1,000 inhabitants
Netherlands....	330	vehicles per 1,000 inhabitants

Some studies have mentioned a pre-saturation point defined as the degree of motorisation beyond which the annual rate of increase tends to diminish. In two instances, this pre-saturation point has been evaluated as follows :

— in Austria at 120 vehicles per 1,000 inhabitants;
— in Belgium at 300 vehicles per 1,000 inhabitants.

Other countries have not provided any details in this respect but have taken account of this factor somewhat indirectly by assuming a systematic slowing down of the increase in motorisation over the coming years.

Some countries have recognised, however, that even the pre-saturation point will not have been reached by 1975 and that consequently the annual increase in the number of private cars, while remaining very high, will not be touched by the first signs of eventual saturation, e.g. Belgium, Denmark, Ireland, Portugal, Spain and Turkey.

IV. Results

i) *Assumptions*

If the forecasts are to be satisfactorily interpreted it should be remembered first of all that the studies are based on a number of assumptions and that the results are valid only if these assumptions are proved correct.

In the first instance the studies postulate the absence of any major economic recession, but political and social stability, and some degree of continuity in the pattern of demand.

1. See volume XIII of the Resolutions of the Council of Ministers, pages 157 et seq.

Another basic assumption is that the attitude of the authorities towards motor cars in respect of credit and taxation policies (credit facilities for buying vehicles, purchase and road taxes, price of gasoline, etc.) will not take a more restrictive turn. Furthermore, it is assumed that sufficient credits will be earmarked for the development of the road network, so as to prevent drastic restrictions on traffic circulation and parking such as might discourage possible users.

Other assumptions relate to the form of the econometric model, the choice of the independent variables and their trend.

Consequently, in view of the large number of assumptions, a certain amount of caution should be exercised when assessing any statistics.

ii) *Presentation of results*

The statistical results are reproduced in the five annexed tables which reveal different aspects of the trend in the number of private cars.

a) *General direction of the trend*

Table 1 offers a reference period extending from 1955 to 1963 showing figures for the 16 countries of the ECMT which took part in the study, and estimates for 1970 and 1975. Table 1 thus provides a general picture over a period of 20 years of the trend in the number of private cars.

It is impossible not to be struck by this spectacular expansion which proves how the motor car is taking an increasingly dominant place in modern society and its pattern of consumption.

The estimated total for 1975 of some 80 million private vehicles in the European countries under consideration needs no comment. Three countries, namely France, Germany and the United Kingdom, alone, account for more than two thirds of this total, each of them with an estimated 18 to 19 million cars by 1975.

Compared with the future prospects as outlined in table 1, the trend that set in over the preceding years, although very significant and from some points of view even disquieting, is but a faint foretaste of what it will be like in ten years time. In this respect it is particularly important to note that, by the end of the period 1955-1975, the number of private cars will have increased approximately ten times or even more in Austria, Germany, Italy, the Netherlands and Spain. Denmark and Norway follow immediately after. If the situation in other countries (France, Ireland, Sweden, Switzerland and the United Kingdom) appears less awesome, this is only because the latter already had a comparatively large fleet of private cars at the beginning of the reference period.

b) *The degree of motorisation*

To take account of the degree of motorisation in the different countries in relation to the volume of the population, Table 2 gives the number of cars per 1,000 inhabitants. It can be seen that the differences in the degree of motorisation among the Member countries are tending gradually to diminish. The figures provided suggest that Switzerland will probably continue to have the highest density of motorisation, immediately followed by France, and, at a greater interval by Germany, Norway and Belgium.

If the degrees of motorisation envisaged for 1975 are compared with the estimates of the saturation point referred to in Section III, it is apparent that the foreseeable level of motorisation in most countries will probably remain appreciably lower than the saturation point assumed.

c) *Comparison of the results of the two forecasts made by the ECMT in 1963 and 1965*

The fact that two successive studies conducted on the same subject by the same Member countries, were carried out in the ECMT within a space of two years, enables a partial comparison to be made of the respective results forecast for 1970. Besides making it possible in some measure to verify earlier estimates in the light of more recent experience, this comparison presents the further advantage of indicating as of now the possible changes in future prospects which might have arisen during the two intervening years.

This comparison is presented in Table 3. The statistics available for the most recent forecast covered the years 1962, 1963 and even 1964, during which time the upward trend in the number of private cars was in most countries more rapid than during the preceding years which served as a basis for the first forecast. This meant that the new estimates for 1970 worked out much higher than before. This phenomenon was sufficiently pronounced as to prompt several countries to leave the years 1950 to 1955 out of account as being no longer sufficiently representative to provide an indication of future tendencies.

As can be seen by comparing the results in Table 3, this upturn in future prospects may be regarded as fairly general, although it varies in degree from country to country. The figures obtained from the new studies carried out in

Italy and Sweden are, however, lower than those obtained formerly. The results for Germany, Ireland and Portugal remain unchanged.

d) *Increase in the number of private cars*

Table 4 gives some details about the increase in numbers during the period 1950 to 1975, i.e. over a quarter of a century. The indices in this table (based on 1960 = 100), support the observations already made, namely that the number of private cars is in full expansion and will continue to grow very rapidly.

At some considerable distance behind Spain, the countries foreseeing the largest increase (more than four times) in the number of private cars from 1960 to 1975 are, in descending order, the Netherlands, Norway, Germany and Italy.

A second group of countries (Austria, Belgium, Denmark, France, Ireland, Portugal and the United Kingdom) expect the number to treble at least during the same period.

The last two colums of Table 4 give the average percentages of annual growth for the period 1950 to 1960 and for the period 1960 to 1975.

The following conclusions may be drawn :

— in almost all the Member countries, with the exception of Ireland and Spain, the average rate of annual growth in the number of private cars will diminish;
— despite this reduction it should be noted that the growth rates indicated are significantly higher than those usually adopted for the major economic phenomena such as the gross national product, national income, gross fixed asset formation, private consumption, etc.;
— the results of the forecasts of the Member countries, with the possible exception of Spain, appear reasonably uniform : the actual rates of growth in numbers centre closely round an average of 9 per cent per year for the 16 Member countries;
— the figures appearing at the foot Table 4 would seem to indicate that the rate of increase will be slightly faster for EEC countries than that for the combined total of all the countries that took part in the study.

e) *Comparison between the increase in motorisation up to 1975 and general economic activity*

In order to relate the increase in numbers to the general prospects for economic growth, Table 5 compares the numbers for the year 1975 expressed in the form of indices (1960 = 100) with the factors likely to reflect the expansion of general economic activity (GNP or one of its components), insofar as the Member countries have given some indications on the latter point.

The figures available suggest that economic activity should just about double between 1960 and 1975 in most Member countries but the number of private cars should increase appreciably faster, in certain extreme cases two or three times as fast.

This would seem to indicate that a mounting share of the creation of economic values will be absorbed in the form of « motor vehicle consumption ». On the other hand the heavier investment needed to keep the usage of road vehicles at present levels is closely linked with the development of the general economy.

Because of the many urgent calls on the various public authorities it is indeed difficult to assume that the allocations for transport can rise significantly without jeopardising budget equilibrium. It is therefore unlikely that the share of public investment in transport which is assigned to roads can increase much more. This being so the rise in investment on roads will by and large be limited by a ceiling imposed by the economic resources available.

The divergence between the two sets of indices in Table 5 reflects a disequilibrium between the trend in the motor vehicle industry and that of the economy as a whole. The consequences are already beginning to be felt, particularly in the larger towns and during peak traffic periods. This outlook provides food for thought and will doubtless give rise to further serious difficulties in framing a general transport policy.

Table 1. TRENDS IN NUMBERS OF PRIVATE CARS

Country	Basic figures									Estimates	
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1970	1975
1. Germany......	1,667	2,033	2,456	2,940	3,506	4,341[1]	5,171	6,139	7,080	13,900	18,000
2. Austria.......	143	188	233	286	341	404	475	546	619	906	1,300
3. Belgium......	501	537	605	633	701	753	801	915	1,050	1,757 to 1,850	2,397 to 2,457
4. Denmark[2].....	252	284	321	359	416	485	562	652	717	1,300	1,500 to 1,750
5. Spain.........	128	152	172	194	240	291	359	441	530	1,450	3,000
6. France........	3,016	3,477	3,972	4,512	5,019	5,546	6,158	7,008	7,800	13,000	18,000 to 19,000
7. Ireland.......	133	140	140	148	158	174	190	211	233	350	600
8. Italy.........	861	1,031	1,231	1,393	1,659	1,976	2,449	3,030	3,864	6,535	8,078
9. Luxembourg...	21	24	28	31	33	37	42	46	50	72	80
10. Norway.......	122	134	153	173	193	225	276	322	364	751	1,015
11. Netherlands...	268	328	376	421	450	512	603	730	866	1,800 to 2,000	2,600 to 3,100
12. Portugal......	93	103	112	125	139	151	158	177		309 to 343	435 to 511
13. United Kingdom..........	3,827	4,194	4,500	4,869	5,305	5,875	6,343	6,941	7,775	13,500 to 14,000	18,500
14. Sweden.......	637	735	863	972	1,088	1,194	1,304	1,424	1,556	2,400	3,000
15. Switzerland...	271	309	347	386	430	485	550	630	700	1,091 to 1,125	1,252 to 1,312
16. Turkey.......	38	46	51	52	54	66	75	86	101	146	183
Total for EEC countries............	6,334	7,430	8,668	9,930	11,368	13,165	15,224	17,868	20,710	37,064 to 37,357	49,155 to 50,715
Total for the 16 ECMT countries..	11,676	13,408	15,248	17,173	19,393	22,167	25,153	28,914		59,267 to 60,128	79,940 to 81,886

1. Including the Saar since 1960.
2. Including motor vehicles which, for taxation purposes, are registered as utilitarian vehicles but are widely used for passenger transport.

Table 2. TREND IN THE DEGREE OF MOTORISATION

Unit : Number of cars per 1,000 inhabitants.

Country	Basic figures									Estimates	
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1970	1975
1. Germany......	33	40	48	57	67	82	96	112	128	234	293
2. Austria.......	21	27	33	41	48	57	67	77	86	123	173
3. Belgium......	56	60	67	70	77	82	87	99	113	181 to 191	240 to 246
4. Denmark......	57	63	71	79	91	106	122	140	153	265	294 to 343
5. Spain.........	4	5	6	7	8	10	12	14	17	44	87
6. France........	70	80	91	102	112	122	135	151	164	255	340 to 359
7. Ireland.......	46	48	49	52	56	61	67	75	82	117	190
8. Italy.........	18	21	25	28	34	40	49	60	77	125	149
9. Luxembourg...	69	78	91	100	106	117	132	143	154	210	230
10. Norway.......	36	39	44	49	54	63	76	88	99	193	249
11. Netherlands...	25	30	34	38	40	45	52	62	72	141 to 156	192 to 229
12. Portugal......	11	12	13	14	16	17	18	20		35 to 38	47 to 54
13. United Kingdom..........	75	82	87	94	102	112	120	132	145	238 to 247	315
14. Sweden.......	87	100	117	131	146	159	173	188	204	300	362
15. Switzerland...	54	61	68	74	82	91	100	112	121	182 to 188	202 to 212
16. Turkey.......	2	2	2	2	2	2	3	3	3	—	—

Table 3. COMPARISON OF ESTIMATES OF NUMBERS OF PRIVATE CARS OBTAINED FROM THE FORECASTS MADE IN 1963 AND 1965

UNIT : '000

Estimate for 1970

COUNTRY	THE 1963 FORECAST	THE 1965 FORECAST
1. Germany	13,900	13,900
2. Austria	815	906
3. Belgium	1,450	1,757 to 1,850
4. Denmark	1,080	1,300
5. Spain	1,020	1,450
6. France	12,500	13,000
7. Ireland	310 to 350	350
8. Italy	7,300	6,535
9. Luxembourg	70	72
10. Norway	715	751
11. Netherlands	1,576	1,800 to 2,000
12. Portugal	315	309 to 343
13. United Kingdom	12,000 to 13,000	13,500 to 14,000
14. Sweden	2,600	2,400
15. Switzerland	900 to 1,020	1,091 to 1,125
16. Turkey	90 to 98	146

Table 5. INCREASE IN MOTORISATION UP TO 1975 COMPARED WITH GENERAL ECONOMIC ACTIVITY

COUNTRY	1975 INDICES IN RELATION TO 1960	
	NUMBER OF PRIVATE CARS	GENERAL ECONOMIC ACTIVITY
1. Germany	415	191 *a)*
2. Austria	321	177 to 191 *c)*
3. Belgium	318 to 326	181 to 184 *b)*
4. Denmark	309 to 361	162 to 182
5. Spain	1,031	244 *c)*
6. France	325 to 343	207 *a)*
7. Ireland	345	208 *c)*
8. Italy	409	
9. Luxembourg	216	150 *b)*
10. Norway	451	
11. Netherlands	508 to 605	180 *a)*
12. Portugal	288 to 338	221 to 246
13. United Kingdom	327	
14. Sweden	251	186 *a)*
15. Switzerland	258 to 270	—
16. Turkey	277	259 *c)*

a) Reference value : Gross National Product at constant prices.

b) Reference value : Gross Domestic Product at constant prices.

c) Reference value : National Income at constant prices.

Table 4. INCREASE IN NUMBERS OF PRIVATE CARS

COUNTRY	INDICES (1960 = 100)					AVERAGE PERCENTAGES OF ANNUAL GROWTH IN THE PERIODS	
	1950	1955	1960	1970	1975	1950-1960	1960-1975
1. Germany	13	38	100	320	415	22.5	9.9
2. Austria	(15)[1]	35	100	224	321	23.8[2]	8.1
3. Belgium	36	67	100	233 to 246	318 to 326	10.6	8.0 to 8.2
4. Denmark	24	52	100	268	309 to 361	15.2	7.8 to 8.9
5. Spain	33	44	100	498	1,031	11.6	16.8
6. France	(31)[1]	54	100	234	325 to 343	14.1[2]	8.2 to 8.6
7. Ireland	53	76	100	201	345	6.6	8.6
8. Italy	18	44	100	331	409	19.0	9.8
9. Luxembourg	26	57	100	195	216	15.0	5.3
10. Norway	29	54	100	334	451	13.2	10.6
11. Netherlands	27	52	100	352 to 391	508 to 605	13.9	11.4 to 12.8
12. Portugal	40	62	100	205 to 227	288 to 338	9.6	7.3 to 8.5
13. United Kingdom	42	64	100	238 to 247	327	9.1	8.2
14. Sweden	21	53	100	201	251	16.8	
15. Switzerland	30	56	100	225 to 232	258 to 270	12.7	6.5 to 6.9
16. Turkey	30	58	100	221	277	13.0	7.0
Average for EEC countries	—	48	100	282 to 385	373 to 325	16.2	9.2 to 9.4
Average for the 16 ECMT countries	—	53	100	267 to 271	361 to 369		8.9 to 9.1

1. Figure for 1951.
2. For the period 1951-1960 only.

REPORT OF THE COMMITTEE OF DEPUTIES ON THE STUDY OF RECENT TRENDS IN ROAD ACCIDENT CASUALTIES

[*CM* (65) 6]

I. INTRODUCTION

1. Because of the sharp increase in road accidents in many Member countries during 1964, an enquiry into its causes by the ECMT was considered advisable.

Admittedly, the subject of this study is not explicitly listed in the general programme of work, but it falls within the terms of reference which the Council of Ministers has given to the Working Party on Road Safety within the framework of this programme.

The Officers of the Council of Ministers have accordingly put the subject discussed in the following paragraphs on the Agenda for the next session at ministerial level.

2. The Delegate for the United Kingdom was appointed as rapporteur and delegations were asked to submit replies to a questionnaire which was agreed at the meeting. The following countries did so :

Austria	Ireland
Belgium	Sweden
Denmark	Switzerland
France	Spain
Germany	Turkey
Italy	United Kingdom
Luxembourg	Yugoslavia
Netherlands	

3. While the principal object of the study is to examine the experience in 1964 in relation to previous trends, complete statistics for 1964 have been received as yet only for a few of the Member countries. This interim report accordingly is devoted in Part II to a first consideration of the trends from 1955 to 1963; and in Part III to a preliminary examination of the figures for April to September, 1964, in relation to those for corresponding periods of 1961, 1962 and 1963, for the eight Member countries from which the necessary statistics have been received. It has not, however, been possible in the time available to make a full analysis or systematic presentation of the detailed statistics for the earlier years. This will be done in a later report when the complete figures for 1964 have been received and analysed. Meanwhile this interim report attempts to pick out some of the more significant features of the record.

II. TRENDS IN CASUALTIES IN 1955-1963

Deaths and casualties - all road users

4. Over this period, all ECMT countries for which figures have been received report increases in the numbers killed in road accidents, and all, except the Republic of Ireland, increases in the total casualties — killed or injured. Detailed figures are in annex 1, and, expressed in index form, in annex 2.

TABLE 1. INDEX NUMBERS (1955 = 100)

COUNTRY	DEATHS 1963	TOTAL CASUALTIES 1963	MOTOR VEHICLES 1963	TOTAL CASUALTIES PER 1,000 MOTOR VEHICLES 1963
Austria	122[1]	117[1]	247	47[1]
Belgium	136[2]	167[2]	177[2]	94[2]
Denmark	134	125	207[3]	61
Ireland	121	87	168	52
Italy	171	205	230	89
France	124	136	209	65
Germany	115	116	191	61
Great Britain	125	133	181	74
Luxembourg	162	131	172	76
Netherlands	127	149	257	58
Sweden	124	124	171[3]	73
Switzerland	132	114	229	50
Turkey	194	145	179[3]	81
Yugoslavia	210	390[5]	..	..

1. The statistical basis was changed in 1961. On the previous basis the casualty figures would be higher.
2. 1962 figure.
3. Excludes motor-assisted bicycles.
4. The index figure for Luxembourg for any given year should be interpreted with caution. The absolute figures (for deaths or casualties) on which the index is based are extremely small and small changes in these figures can therefore produce large changes in the index.
5. Killed and seriously injured only.

5. Increases in deaths ranged from 15 per cent upwards and increases in total casualties from 14 per cent upwards. (In the Republic of Ireland total casualties fell by 13 per cent.)

6. Over the same period, the number of motor vehicles increased faster than the number of road casualties.

7. Thus, with few exceptions, the rate of deaths and that of total casualties per 1,000 motor vehicles fell substantially, as shown by the figures in the last column of the above table. The decreases ranged up to about 50 per cent, with considerable variation from country to country. Annex III shows year-by-year trends.

8. A more significant comparison would be one between casualties and the volume of motor traffic in terms of vehicle-miles, but full vehicle mile indices for all categories of vehicles covering the period are available only for France and Great Britain. These show that vehicle-miles have increased slightly less fast than the numbers of vehicles registered, i.e. that the average annual mileage per vehicle has fallen slightly (by about 11 per cent in France and 5 per cent in Great Britain). If this experience is typical, the general reductions in the rate of casualties per vehicle have not been to any great extent due to changes over the period in annual mileage run per vehicle.

Death and Casualty rates, 1955 and 1963

9. Annex 4 gives the death and casualty rates (all road users) in 1955 and 1963, for each country reporting, in relation to vehicle numbers and population, together with total casualty rates for users of each class of vehicle in relation to the numbers of vehicles of that class. The figures vary widely from country to country, but it is difficult to draw conclusions from them about comparative safety standards. The comparisons are affected by differences in definitions of deaths and of other casualties, and differences in coverage of vehicle registration, and may also reflect differences from country to country in the proportions of vehicles of various types, in their annual mileage run, in roads, traffic density, the presence of foreign vehicles and weather conditions.

10. Although the figures for casualty rates for the different classes of vehicles also vary considerably between countries, they show clearly :

- *i)* that the casualty rate for users of motor cycles and scooters is considerably higher than for other classes of vehicles.
- *ii)* that, by and large, in most countries, users of motor-assisted bicycles and « other motor vehicles », i.e. cars, vans, etc. have broadly similar casualty rates per 1,000 vehicles.
- *iii)* that cyclists have much the lowest cusualty rate per 1,000 vehicles. (They have a low annual mileage, of course.)

11. It follows that annual casualty rates tend to increase as persons switch from cycles to motor-assisted bicycles and from motor-assisted bicyles to motor cycles and scooters, but tend to fall as they switch from motor cycles and scooters to cars. The following paragraphs examine the trends in the numbers of the various classes of motor vehicle and in the casualties to their users.

Motor-assisted bicycles

12. Not all the countries report both the numbers of motor-assisted bicycles and casualties to their users separately from those of motorcycles and scooters.

13. The most significant figures are for Belgium and the Netherlands. For Belgium, the sixfold increase in casualties (associated with a threefold increase in motor-assisted bicycles) accounted for over one-third of the 67 per cent increase in casualties for all road-users.

14. For the Netherlands, the increase of nearly 200 per cent in motor-assisted bicycle casualties accounted for nearly two-thirds of the 49 per cent increase in casualties for all road-users.

Motor cycles and scooters

15. Numbers of vehicles in this class, which have the highest casualty rate of all vehicle classes, either declined or increased very little in most countries, and casualties to users were generally reduced, in some cases very substantially.

16. For those countries, e.g. Ireland, France, and Luxembourg, for which the figures include those for motor-assisted bicycles, it is not clear how far the substantial reductions in the casualty rate per 1,000 vehicles reflects a real reduction in casualty rates for each type of vehicle, and how far they simply reflect a higher proportion of motor-assisted bicycles and a lower proportion of the more vulnerable motor cycles and scooters. The 27 per cent increase in this class of casualties in Great Britain and the 74 per cent

TABLE 2

COUNTRY	NUMBER OF MOTOR-ASSISTED BICYCLES			CASUALTIES TO USERS OF MOTOR-ASSISTED BICYCLES				
	PER CENT INCREASE '63 ON '55	PER CENT OF TOTAL MOTOR VEHICLES		PER CENT INCREASE '63 ON '55	PER CENT OF TOTAL CASUALTIES		PER 1,000 MOTOR-ASSISTED BICYCLES	
		1955	1963		1955	1963	1955	1963
Austria		13	28	..	..	20	..	26
Belgium	217[1]	14	25[1]	525[1]	5	18[1]	17	34[1]
Denmark	..	..	..	30	12	13	..	..
Germany	65	15	13	8	8	7	32	21
Great Britain	92	4	4	71	1	2	15	13
Italy	..	..	15	269	4	8	..	14
Netherlands	188	48	54	173	19	34	13	12
Spain	..	..	..	..	..	3	..	..
Sweden	..	..	27[2]	62	8	10	..	3
Switzerland	403	11	24	119	4	7	8	8
Yugoslavia	..	..	..	—[4]	—[3]	8[3]	..	..

1. 1962 figures.
2. Estimates.
3. Killed and seriously injured only.
4. Actual casualties in 1963 were 686, and in 1955 were 6. The percentage increase in this case is not a meaningful index.

— Nil or negligible.
.. Not available.

TABLE 3

COUNTRY	NUMBER OF MOTOR-CYCLES AND SCOOTERS			CASUALTIES TO USERS OF MOTOR-CYCLES AND SCOOTERS				
	PER CENT INCREASE '63 ON '55	PER CENT OF TOTAL MOTOR VEHICLES		PER CENT INCREASE '63 ON '55	PER CENT OF TOTAL CASUALTIES		PER 1,000 MOTOR-CYCLES AND SCOOTERS	
		1955	1963		1955	1963	1955	1963
Austria[2]	+ 51	46	16	+ 3	41	16	55	38
Belgium	— 2	23	11	— 10	27	14	67	62
Denmark	— 16	28	11	— 24	25	15	36	33
France[1]	+ 29	42	34	+ 2	39	30	24	15
Germany	— 21	39	10	— 64	35	11	53	39
Great Britain	+ 6	14	11	+ 27	22	21	72	64
Ireland[1]	+ 13	9	13	— 11	13	13	33	12
Italy[1]	+ 72	68	51	+ 74	44	37	20	20
Luxembourg[1]	+ 7	17	10	— 41	28	13	30	14
Netherlands	+ 1	14	6	— 14	16	9	38	31
Spain	..	..	..	..	..	33	..	..
Sweden	— 16	25	5	— 64	19	6	13	12
Switzerland	— 8	29	9	— 30	32	20	59	57
Turkey	....	..	..	+ 13	3	2	..	..
Yugoslavia	..	..	..	—[3]	7[4]	19[4]	..	..

1. Includes motor-assisted bicycles and casualties to their users.
2. See footnote to table 1.
3. Actual casualties in 1963 were 1514, and in 1955 were 154. The percentage increase in this case is not a meaningful index.
4. Killed and seriously injured only.

in Italy were marked exceptions to the general trend.

Other motor vehicles (cars, lorries, etc.)

17. As is shown in table 4, increases in the numbers of this class of vehicles ranged widely, but the rates of casualties to users per 1,000 vehicles did not change much, and the increases in casualties followed much the same pattern as the increases in vehicles.

18. With relatively small changes in the rates of casualties per 1,000 motor vehicles, the generally substantial increases in the proportion which casualties to this class of road-user bears to total casualties reflect largely the effect of slower growth of reductions in calsualties to other classes of road-users.

Pedestrians and Pedal Cyclists

19. Despite large increases in the numbers of motor vehicles on the road, pedestrian casualties have in most countries been held to smaller increases, and in Ireland they have actually been reduced. Casualties to pedal cyclists were greatly reduced in all but five countries, probably largely as a result of considerable reductions in the numbers of pedal cycles in use.

Contributions to overall trends of casualties

20. The contributions made by the changes in the casualties in the various vehicle classes to the overall net increase in casualties are summarised in annex V. This brings out for most countries the important effect, on the overall trend, of the relatively small increases in pedestrian casualties togheter with overall reductions in casualties to users of motor cycles and scooters.

21. Further analysis is in hand to attempt to assess how far the reductions in the overall casualty rates per 1,000 motor vehicles are due :

a) to changes in the proportions of the different classes of vehicles in use and;

b) to reductions, within a class of vehicle, in the casualty rates to users.

22. The indications so far are that much of the reduction in the total road-user casualty rates has been due to the first of these factors. But a wide variety of safety measures and other influences must also have played an important part. The fact that, in most countries, pedestrian casualties have risen much less steeply than the numbers of motor vehicles is a clear indication of this.

23. Sweden estimates that the temporary speed limits imposed outside built-up areas have reduced casualties by some 20 per cent. Undoubtedly also the imposition of urban speed limits in Germany in 1957 was, in part, the cause of the 7 point decrease which occurred in the casualty rate index in built-up areas between 1956 and 1958, at a time when the index in non-built-up areas rose by 13 points.

(See annex VI, which shows that casualties increased more slowly in built-up than in non-built-up areas in Austria, Denmark, France, Germany, Italy, the Netherlands, Spain, and Switzerland; increased faster in built-up areas in Great Britain, Yugoslavia and Turkey; and at about the same rate in both built-up and non-built-up areas in Sweden and Belgium. These different tendencies would repay further study.)

III. Trends in casualties in 1961 to 1964

24. In attempting a first examination of figures for 1964 in comparison with those for recent years, it was difficult to find an adequate statistical basis for comparison. Figures for the last quarter of 1964 are in most cases not yet available. Comparison of the first nine months of the year with the same period of previous years is hindered by the fact that many countries do not keep monthly figures. Moreover, Germany, the Netherlands and Switzerland report that the previous year, 1963, was abnormal due to the exceptionally severe weather in the first quarter so that comparison with 1964 would show up spurious changes. This was also the experience in Great Britain.

25. It was therefore decided to base this initial examination of 1964 data in relation to recent trends, on the figures for April to September 1961 to 1964, even though this involved a regrettable reduction in the number of countries for which statistics would be quoted.

26. Annex VII gives for Denmark, Germany, Great Britain, Italy, Luxembourg, the Netherlands, Sweden and Yugoslavia, the statistics of deaths and total casualties, total motor vehicles, and the derived casualty rates per 1,000 motor vehicles, all on an index basis with April-September, 1961, as base.

It should be noted, however, that during the particular period of April to September which has been chosen, casualty figures in Luxembourg are strongly influenced by the presence of foreign vehicles. For this reason, and also for

Table 4

Country	Number of vehicles: Per cent increase '63 on '55	Per cent of total motor vehicles: 1955	Per cent of total motor vehicles: 1963	Casualties to users: Per cent increase '63 on '55	Per cent of total casualties: 1955	Per cent of total casualties: 1963	Per 1,000 vehicles: 1955	Per 1,000 vehicles: 1963
Austria[1]	233	41	56	167	22	39	31	26
Belgium	77	63	63[2]	104[2]	34	42[2]	28	32[2]
Denmark	154	72	89	180	17	38	9	10
France	139	58	66	144	27	49	12	13
Germany	222	46	77	218	19	53	26	25
Great Britain	86	82	85	83	33	45	18	17
Ireland	61	91	87	17	36	48	9	7
Italy	254	32	49	353	17	37	15	20
Luxembourg	103	64	74	93	46	69	29	27
Netherlands	173	38	40	128	15	24	14	12
Spain	..	..	..	..	..	36	..	..
Sweden	115	75	95	90	40	60	8	7
Switzerland	155	60	67	113	22	41	19	16
Turkey	..	..	..	56	54	59	..	..
Yugoslavia	..	..	..	203[3]	36[3]	28[3]	..	..

1. See footnote to table 1.
2. 1962 figures.
3. Killed and seriously injured only.

Table 5

Country	Total motor vehicles per cent increase '63 on '55	Pedestrian casualties: Per cent change '63 on '55	Per cent of all casualties: 1955	Per cent of all casualties: 1963	Pedal cyclist casualties: Per cent change '63 on '55	Per cent of all casualties: 1955	Per cent of all casualties: 1963
Austria	+ 147	+ 5[1]	18	16	— 46[1]	19	9
Belgium	+ 77	+ 29[2]	15	12[2]	+ 32[2]	18	14[2]
Denmark	+ 107[3]	+ 33	15	16	— 27	29	17
France	+ 109	+ 22	16	14	— 43	16	7
Germany	+ 91	+ 5	20	18	— 28	17	10
Great Britain	+ 81	+ 18	24	21	— 28	20	11
Ireland	+ 63	— 22	27	25	— 49	24	14
Italy	+ 130	+ 68	21	17	+ 33	13	8
Luxembourg	+ 72	+ 5	16	13	— 25	9	5
Netherlands	+ 157	+ 12	19	14	— 8	30	19
Spain	+ 433	..	..	24	..	..	5
Sweden	+ 71	+ 15	16	15	— 36	17	9
Switzerland	+ 129	+ 10	19	19	— 42	23	12
Turkey	+ 79	+ 48	35	35	+ 47	2	2
Yugoslavia	..	+ 239	34	29	+ 263	14	13

1. See footnote to table 1.
2. 1962 figures.
3. Excludes motor-assisted bicycles.

the reason mentioned in note (4) at table 1, no specific reference to Luxembourg is made in the paragraphs which follow.

27. From annex VII it is seen that for the period in question April to September :

i) In 1962, the number of persons killed fell in both Denmark and Great Britain, remained the same in Germany, and rose by 3 per cent or more in Italy, the Netherlands, Sweden and Yugoslavia. In 1963 there was a decrease in deaths in Italy, as also in the Netherlands, but slight increases in Denmark and Germany and rather larger increases in Great Britain, Sweden and Yugoslovia. In 1964, Italy recorded a major decrease, but all the other countries which reported showed increases. In Sweden the increase was comparatively small, but in Germany, Great Britain, the Netherlands and Yugoslovia the increase was rather larger.

PERSONS KILLED

CHANGE FROM PREVIOUS YEAR

Per cent.

COUNTRY	1962	1963	1964
Denmark	— 6	+ 3	..
Germany	—	+ 2	+ 8
Great Britain	— 4	+ 7	+ 7
Italy	+ 11	— 1	— 11
Netherlands	+ 3	— 1	+ 13
Sweden	+ 3	+ 6	+ 2
Yugoslavia	+ 3	+ 8	+ 26

.. Not available.
— Nil or negligible.

ii) As regards casualties also, no very consistent picture emerges. In 1962 there was a reduction in casualties in Germany, Great Britain and Sweden, a small increase, of one per cent, in Denmark and the Netherlands, and rather larger increases in Italy and Yugoslavia. In 1963, casualties fell in Denmark, remained at the same level in Germany, but increased by 3 per cent in Italy and by 5 per cent or more in Great Britain, the Netherlands, Sweden and Yugoslavia. In 1964, Italy was the only country reporting a decrease in casualties, of 8 per cent, while there was an increase of 2 per cent in Germany and of 6 per cent or more in Great Britain, the Netherlands, Sweden and Yugoslavia.

PERSONS KILLED OR INJURED

CHANGE FROM PREVIOUS YEAR

Per cent.

COUNTRY	1962	1963	1964
Denmark	+ 1	— 3	..
Germany	— 4	—	+ 2
Great Britain	— 3	+ 5	+ 7
Italy	+ 3	+ 3	— 8
Netherlands	+ 1	+ 7	+ 12
Sweden	— 3	+ 10	+ 7
Yugoslavia	+ 8	+ 22	+ 27

.. Not available.
— Nil or negligible.

iii) The total number of motor vehicles continued to increase steadily in all countries.

iv) In 1962 casualty rates per 1,000 motor vehicles showed reductions, most of them considerable, in all countries. In 1963 there was a levelling off in the decrease in both Great Britain and the Netherlands, and an increase in Sweden and Yugoslavia. In 1964, Germany and Great Britain showed a minor decrease in rates, of 2 per cent, while Yugoslavia showed an increase.

CASUALTY RATES PER 1,000 MOTOR VEHICLES

CHANGE FROM PREVIOUS YEAR

Per cent.

COUNTRY	1962	1963	1964
Denmark	— 10	— 8	..
Germany	— 8	— 5	— 2
Great Britain	— 8	— 3	— 2
Italy	— 7	— 10	..
Netherlands	— 8	— 1	..
Sweden	— 8	+ 2	..
Yugoslavia	— 2	+ 9	+ 6

.. Not available.

28. Annex VIII and IX give figures for casualties, numbers of vehicles and casualty rates by individual classes of road users for Germany, Great Britain, the Netherlands and Sweden. As it has been said above, each of these countries

experienced a decrease, or only a minor increase in casualties in 1962, but considerable increases in subsequent years.

From an examination of the figures in annex VIII, it will be see that the exceptionally favourable tendency in 1962 was due to generally large reductions in casualties for users of all classes of two-wheeled vehicles (except only for motor-assisted bicycle casualties in the Netherlands, which rose by 2 per cent). Over the next two years, however, casualties in these classes tended either to fall more slowly or to increase. The notable tendency for the casualty rates per 1,000 vehicles to stop falling or to begin rising again, both for two-wheeled and other motor vehicles, is brought out clearly in annex IX.

29. The most prominent contributions to the overall worsening in the following countries were :

Germany

Motor-assisted bicycle casualties, which had fallen by 32 per cent in 1962 and by 9 per cent in 1963, fell by only 2 per cent in 1964 (a further substantial reduction in vehicle numbers being offset by an increase of 15 per cent in the casualties per 1,000 vehicles).

Great Britain

Pedestrian casualties, which had risen by 6 per cent over the first two years, rose by another 6 per cent in 1964. « Other motor vehicle » casualties rose successively by 2 per cent, 10 per cent and 15 per cent. And motor cycle and scooter casualties, which had fallen by 9 per cent in 1962 and 2 per cent in 1963, and helped to offset much of the increase in other classes of casualties, increased by 4 per cent in 1964, with an 11 per cent increase in the rate per 1,000 vehicles.

Netherlands

Casualties to users of motor-assisted bicycles which increased by 2 per cent in 1962 and 13 per cent in 1963, when they accounted for just under 40 per cent of all casualties, increased by another 15 per cent in 1964.

Sweden

Casualties to users of « other motor vehicles », which increased by 2 per cent in 1961 and by 16 per cent in 1963, increased by another 14 per cent in 1964. Casualties to total users of two-wheeled vehicles, which fell by 12 per cent in 1962, fell no further by 1964.

30. The experience of these four countries suggests that reductions in casualties to users of two-wheeled vehicles as a group are becoming smaller and therefore less significant than they have been in recent years in offsetting the steady growth in casualties to users of cars. This is to be expected as the proportion of cars to total motor vehicles rises. However, deductions from the data from this relatively small number of countries must necessarily be tentative and it may be that examination of the more complete statistics, when these are available, may show that this particular factor is not equally applicable in all countries.

IV. Conclusions

31. Provisional conclusions from the foregoing preliminary analysis of the 1955 to 1963 statistics and the examination of data for April-September 1961 to 1964 for a few countries are as follows :

1. Over the whole period road casualties have increased in all ECMT countries reporting, except Ireland.
2. Casualties have, for most countries, increased much less rapidly than numbers of motor vehicles, so that casualty rates for road-users as a whole per 1,000 motor vehicles, have in most cases decreased considerably.
3. This favourable tendency has, no doubt, been due in part to remedial action, but it has also been partly due to changes in the composition of the vehicle parks, and particularly to switches from the more dangerous or vulnerable motor cycles and scooters.
4. The considerable reductions in most countries in casualties to users of two-wheeled vehicles have, particularly in more recent years up to 1963, helped considerably in limiting the overall rate of growth in casualties.
5. In most of the countries for which it has been possible to examine statistics for April to September 1964, there has been a marked worsening of the trend in casualties again after a favourable turn in 1962 or 1963. Italy, however, shows a favourable tendency in 1964.
6. The worsening of the trend, where it has occurred, appears to have been due in part to a tendency in all countries for casualty rates (per 1,000 vehicles) for

the different classes of vehicles, which had generally been falling, to stop falling or to increase again.

7. In particular, reductions in casualties to users of two-wheeled vehicles, which were particularly large in 1962, were progressively smaller in 1963 and 1964.
8. If the tendencies mentioned in conclusions 6 and 7 are confirmed when more complete analysis is possible, they would appear to point to a faster growth in casualties over the next few years than in some recent years.

32. While this preliminary study has shown that the accident experience in the different ECMT countries is far from uniform in all respects, nevertheless a number of common trends and tendencies have been discerned. The more complete analysis that will be possible given the full statistics for 1964 should be helpful to individual countries in the interpretation of their own accident experience, and in considering possible safety measures.

33. In view of the importance of these statistics in helping Member countries to appreciate the trends in road accidents and to take steps to reduce accidents, having in mind the deteriorating position in accidents in recent years, the Committee of Deputies suggests that these studies be actively pursued and that in particular Member countries should as far as possible take measures :

a) to achieve greater uniformity or harmonisation of definitions and classifications relative to casualties and vehicles, and,

b) to base estimates of casualty rates on vehicle-miles instead of on total numbers of vehicles.

It is proposed that the Committee of Deputies should submit periodic reports on these studies to the Council of Ministers.

Annex I

YEAR	AUSTRIA	BELGIUM[1]	DENMARK	FRANCE[1]	GERMANY	IRELAND	ITALY[1]	GREAT BRITAIN	LUXEMBOURG	NETHERLANDS	SPAIN[1]	SWEDEN	SWITZERLAND	TURKEY	YUGOSLAVIA
Persons killed															
1955	1,485	828	605	8,058	12,651[3]	272	5,752	5,526	58	1,552	..	902	992	1,247	556
1956	1,618	902	617	8,283	13,220[3]	320	6,746	5,367	91	1,628	..	889	1,011	1,083	495
1957	1,984	925	645	8,517	13,004	..	6,936	5,550	88	1,701	..	946	1,127	1,329	738
1958	1,814	1,097	620	8,126	14,406	291	7,137	6,970	79	1,926	..	1,036	1,269	1,552	783
1959	2,041	906	770	8,409	13,822	301	7,160	6,520	74	1,718	..	1,000	1,066	1,301	995
1960	1,918	1,097	735	8,295	14,406	291	8,197	6,970	79	1,926	1,760	1,036	1,269	1,552	1,044
1961	1,640[2]	1,079	841	9,140	14,543	323	8,987	6,908	77	1,997	1,808	1,083	1,381	1,822	1,204
1962	1,622	1,127	810	9,928	14,445	328	9,683	6,709	85	2,082	1,998	1,123	1,370	2,123	1,122
1963	1,811		808	10,027	14,513	330	9,839	6,922	94	1,969[4]	2,230	1,121[4]	1,310	2,422	1,168
1964			..					7,820	103		..				1,461
Persons killed or injured *(In thousands)*															
1955	51.1	51.2	17.8	184.4	377.5	5.4	117.3	267.9	2.0	35.6	..	19.0	28.7	9.9	2.1[8]
1956	55.9	54.9	17.6	188.9	389.6	5.2	143.3	268.0	2.1	38.3	..	20.1	29.1	8.5	2.3[8]
1957	61.3	63.7	19.0	192.3	389.1	..	155.3	273.9	2.0	41.2	..	20.9	30.6	9.5	3.7[8]
1958	62.8	69.7	18.4	184.2	384.7	4.6	160.8	299.8	2.0	41.4	..	21.8	31.1	7.8	4.6[8]
1959	67.6	71.6	20.0	187.2	433.6	4.7	175.0	333.5	2.2	45.2	..	22.5	32.0	8.9	5.7[8]
1960	67.1	79.3	21.0	193.3	469.4	5.7	209.5	347.6	2.2	50.3	43.4	22.6	35.7	9.5	6.1[8]
1961	58.1[2]	85.6	22.5	222.7	462.5	5.3	227.9	349.8	2.5	52.2	48.8	24.0	37.7	12.1	7.3[8]
1962	57.2	85.4	23.0	239.3	442.9	5.4	234.1	341.7	2.6	52.6	48.7	23.6	37.2	13.9	7.3[8]
1963	59.8		22.3	251.0	438.8	4.7	240.6	356.2	2.6	53.1[4]	43.6	23.5	32.6	14.4	8.2[8]
1964			..				..	385.5	2.7		..				10.3[8]
Total number of motor vehicles *(In thousands)*															
1955	655	995[5]	448.7[7]	7,024	6,301	227	3,902.7	6,044	52[6]	1,042	367.6	1,180[7]	544	124[7]	..
1956	823	1,114	486.4[7]	7,805	7,277	243	4,222.8	6,540	57[6]	1,274[6]	450.4	1.266[7]	607	137[7]	..
1957	949	..	524.1[7]	9,340	8,043	253	4,845.6	7,027	63[6]	1,475[6]	539.4	1,390[7]	669	137[7]	..
1958	1,080	1,351	562.8[7]	10,464	8,688	263	5,254.2	7,490	69[6]	1,670[6]	702.1	1,484[7]	726	143[7]	..
1959	1,200	..	623.5[7]	11,706	9,318	278	5,736.1	8,175	71[6]	1,817[6]	849.4	1,584[7]	792	154[7]	..
1960	1,311	1,565	694.0[7]	12,349	10,217	303	6,377.9	8,941	75[6]	2,014[6]	1,004.8	1,675[7]	865	173[7]	..
1961	1,421	..	772.4[7]	12,839	10,940	327	7,017.8	9,455	82[6]	2,244[6]	1,223.5	1,778[7]	983	190[7]	229.4
1962	1,523	1,761	862.8[7]	13,668	11,356	355	7,785.6	10,052	86[6]	2,462[6]	1,463.7	1,892[7]	1,128	211[7]	251.4
1963	1,620	..	926.6[7]	14,665	12,015	382	8,993.2	10,919	90[6]	2,678[6]	1,707.4	2,019[7]	1,248	221[7]	278.0
1964			..		12,583	415	..	11,831	94[6]		1,960.0				318.0

1. Deaths occuring within 30 days of the accident. Departures from this definition are : Belgium, at scene of accident; France, within 3 days of accident; Italy, at the source of accident or during transport to hospital; Spain, within 24 hours of accident.
2. Basis of statistics altered in 1961.
3. Excludes " Saarland ".
4. Provisional.
5. Estimated from $\frac{1954 + 1956}{2}$.
6. Includes estimated figures.
7. Excludes motor-assisted bicycles.
8. Killed or seriously injured.

.. Figures not available.

Annex II

PERSONS KILLED - PERSONS KILLED OR INJURED - TOTAL NUMBER OF MOTOR VEHICLES

Index numbers (1955 = 100).

YEAR	AUSTRIA	BELGIUM[1]	DENMARK	FRANCE[1]	GERMANY	IRELAND	ITALY[1]	GREAT BRITAIN	LUXEMBOURG	NETHERLANDS	SPAIN[1]	SWEDEN	SWITZERLAND	TURKEY	YUGOSLAVIA
PERSONS KILLED															
1955	100	100	100	100	100	100	100	100	100	100	..	100	100	100	100
1956	109	109	102	103	105	118	117	97	157	105	..	99	102	87	89
1957	134	112	107	106	103	..	121	100	152	110	..	105	114	107	133
1958	122	119	102	101	96	97	124	108	143	103	..	104	116	97	141
1959	137	109	127	104	109	111	124	118	128	111	..	111	108	104	179
1960	129	133	121	103	114	107	143	126	136	124	100	115	128	125	188
1961	110	130	139	113	115	119	156	125	133	129	103	120	139	146	217
1962	109	136	134	123	114	121	168	121	147	134	114	125	138	170	202
1963	122	..	134	124	115	121	171	125	162	127	127	124	132	194	210
1964	..	..	..	..	..	..	..	142	178	155	..	..	..	..	263
PERSONS KILLED OR INJURED															
1955	100	100	100	100	100	100	100	100	100	100	..	100	100	100	100[8]
1956	110	107	99	102	103	97	122	100	104	107	..	106	101	85	109[8]
1957	120	124	107	104	103	..	132	102	102	116	..	110	106	96	176[8]
1958	123	136	103	100	102	87	137	112	99	116	..	115	108	79	219[8]
1959	132	140	112	102	115	88	149	125	112	127	..	119	111	90	271[8]
1960	131	155	118	105	124	106	179	130	111	141	100	119	124	96	290[8]
1961	114	167	126	121	123	99	194	131	126	146	112	127	131	123	348[8]
1962	112	167	129	128	117	101	200	128	130	148	112	124	129	140	348[8]
1963	117	..	125	136	116	87	205	133	131	149	100	124	114	145	390[8]
1964	..	..	..	..	..	..	..	144	134	..	..	..	..	..	495[8]
TOTAL NUMBERS OF MOTOR VEHICLES															
1955	100	100	100[7]	100	100	100	100	100	100	100	100	100	100	100	..
1956	126	112	108[7]	111	116	107	108	108	109	122	123	107	112	110	..
1957	145	..	117[7]	133	128	112	124	116	120	142	147	118	123	110	..
1958	165	136	125[7]	149	138	116	135	124	131	160	191	126	133	116	..
1959	183	..	139[7]	167	148	123	147	135	135	174	231	134	146	124	..
1960	200	157	155[7]	176	162	133	163	148	144	193	273	142	159	140	..
1961	217	..	172[7]	183	174	144	180	156	156	215	333	151	181	153	100
1962	233	177	192[7]	195	180	156	199	166	165	236	398	160	207	170	110
1963	247	..	207[7]	209	191	168	230	181	172	257	464	171	229	179	121
1964	..	..	..	..	200	183	..	196	180	..	533	..	..	..	139

1. Deaths occurring within 30 days of the accident. Departures from this definition are : Belgium, at scene of accident; France, within 3 days of accident; Italy, at the source of accident or during transport to hospital; Spain, within 24 hours of accident.
2. Basis of statistics altered in 1961.
3. Excludes " Saarland ",
4. Provisional.
5. Estimated from $\frac{1954 + 1956}{2}$.
6. Includes estimated figures.
7. Excludes motor-assisted bicycles.
8. Killed or seriously injured.

.. Figures not available.

Annex III

DEATH RATE (PERSONS KILLED PER 1,000 VEHICLES)

CASUALTY RATE (PERSONS KILLED OR INJURED PER 1,000 MOTOR VEHICLES)

Index numbers (1955 = 100).

YEAR	AUSTRIA	BELGIUM	DENMARK	FRANCE	GERMANY	IRELAND	ITALY	GREAT BRITAIN	LUXEMBOURG	NETHERLANDS	SPAIN	SWEDEN	SWITZERLAND	TURKEY	YUGOSLAVIA
DEATH RATE *(Persons killed per 1,000 motor vehicles)*															
1955......	100	100	100	100	100	100	100	100	100	100	..	100	100	100	..
1956......	87	97	94	93	91	110	108	90	144	86	..	92	91	79	..
1957......	92	..	91	80	81	..	98	86	127	77	..	89	93	97	..
1958......	74	88	82	68	70	84	92	87	109	65	..	83	87	84	..
1959......	75	..	91	63	74	90	84	87	94	64	..	83	74	84	..
1960......	65	84	78	59	70	80	88	85	95	64	100	81	81	89	..
1961......	51	..	81	62	66	83	87	80	85	60	84	80	77	95	100
1962......	47	77	70	63	63	77	84	73	89	57	78	78	67	100	85
1963......	49	..	65	60	60	72	74	69	94	49	75	73	58	109	80
1964......	..	..	..	..	..	..	..	72	99	..	..	..	..	..	87
CASUALTY RATE *(Persons killed or injured per 1,000 motor vehicles)*															
1955......	100	100	100	100	100	100	100	100	100	100	..	100	100	100	..
1956......	87	96	92	92	89	91	113	92	96	88	..	99	91	77	..
1957......	83	..	91	78	81	..	106	88	85	82	..	94	87	87	..
1958......	75	100	82	67	74	75	101	90	76	73	..	91	81	68	..
1959......	72	..	81	61	78	72	101	92	82	73	..	88	76	72	..
1960......	66	99	76	60	77	80	110	88	77	73	100	84	78	69	..
1961......	52	..	73	66	71	69	108	83	81	68	92	84	73	80	100
1962......	48	94	67	66	65	65	101	77	79	63	77	78	62	82	91
1963......	47	..	60	65	61	52	89	74	76	58	59	73	50	81	93
1964......	..	..	..	..	..	..	..	74	75	..	..	..	..	..	102

1. Deaths occurring within 30 days of the accident. Departures from this definition are : Belgium, at scene of accident; France, within 3 days of accident; Italy, at the source of accident or during transport to hospital; Spain, within 24 hours of accident.
2. Basis of statistics altered in 1961.
3. Excludes " Saarland ".
4. Provisional.
5. Estimated from $\frac{1954 + 1956}{2}$.
6. Includes estimated figures.
7. Excludes motor-assisted bicycles.
8. Killed or seriously injured.

.. Figures not available.

Annex IV

COUNTRY	DEATH AND CASUALTY RATES - ALL ROAD USERS						CASUALTY RATES BY CLASS OF ROAD USER							
	PERSONS KILLED PER 1,000 MOTOR VEHICLES		PERSONS KILLED OR INJURED PER 1,000 MOTOR VEHICLES		PERSONS KILLED OR INJURED PER 1,000 OF POPULATION		PERSONS KILLED OR INJURED AMONG USERS OF EACH CLASS OF VEHICLES PER 1,000 VEHICLES OF THAT CLASS							
							PEDAL CYCLES		MOTOR-ASSISTED BICYCLES		MOTOR CYCLES OR SCOOTERS		OTHER MOTOR VEHICLES	
	1955	1963	1955	1963	1955	1963	1955	1963	1955	1963	1955	1963	1955	1963
Austria[1]	2.3	1.1	78	37	7.3	8.3	..	..	..	26	55[4]	38	31	26
Belgium	0.8	0.6[3]	51	49[3]	5.8	9.2[3]	3	4[3]	17	34[3]	67	62[3]	28	32[3]
Denmark	1.3[2]	0.9[2]	40[2]	24[2]	4.0	4.7	..	..	..	..	36	33	9	10
France	1.1	0.7	26	17	4.3	5.3	..	..	..	..	24[4]	15[4]	12	13
Germany	2.0	1.2	60	37	7.2	7.6	..	..	32	21	53	39	26	25
Great Britain	0.9	0.6	44	33	5.4	6.8	..	..	15	13	72	64	18	17
Ireland	1.2	0.9	24	12	1.8	1.6	..	..	..	..	33[4]	12[4]	9	7
Italy	1.5	1.1	30	27	2.4	4.6	..	..	..	14	..	22	15	20
Luxembourg	1.1	1.0	39	29	6.6	8.0	1	1	..	..	30[4]	14[4]	29	27
Netherlands	1.5	0.7	34	20	3.3	4.4	..	..	13	12	38	31	14	12
Spain	..	1.1	..	27	..	1.7	..	..	..	..	..	..	..	..
Sweden	0.8[2]	0.6[2]	16[2]	12[2]	2.6	3.1	..	1	..	3	13	12	8	7
Switzerland	1.8	1.1	53	26	5.8	5.6	3	2	8	8	59	57	19	16
Turkey	10.1[2]	11.0[2]	80[2]	65[2]	0.4	0.5	..	..	..	..	..	..	..	..
Yugoslavia	..	4.2	..	69	..	1.0	..	..	..	..	..	..	..	..

1. Basis of casualty statistics altered in 1961.
2. Motor vehicle total excludes motor-assisted bicycles.
3. 1962.
4. Includes motor-assisted bicycles or their users.

.. Figures not available.

Annex V

CONTRIBUTIONS TO OVERALL TRENDS OF CASUALTIES

CONTRIBUTIONS TO NET INCREASE 1963 ON 1955

COUNTRY	CASUALTIES 1955	PEDESTRIAN CASUALTIES	PEDAL CYCLIST CASUALTIES	MOTOR-ASSISTED BICYCLE CASUALTIES	MOTOR CYCLE OR SCOOTER CASUALTIES	OTHER MOTOR VEHICLE CASUALTIES	OTHER ROAD USER CASUALTIES	CASUALTIES 1963	NO OF MOTOR VEHICLES 1963/1955	CASUALTY RATES 1963 BASED ON 1955 = 100
Austria[1]	100	+ 1	— 9	(+ 1)		+ 27	— 3	117	2.47	47
Switzerland	100	+ 2	— 9	+ 4	— 10	+ 25	+ 2	114	2.29	50
Ireland	100	— 6	— 12	(— 1)		+ 6	—	87	1.68	52
Netherlands[2]	100	+ 2	— 3	+ 32	— 2	+ 20	—	149	2.57	58
Denmark	100	+ 5	— 8	+ 4	— 6	+ 30	—	125	2.07[5]	61
Germany[3]	100	+ 1	— 5	+ 1	— 23	+ 42	—	116	1.91	61
France	100	+ 4	— 7	+ 21	— 20	+ 39	— 1	136	2.09	65
Sweden[2]	100	+ 2	— 6	+ 5	— 12	+ 35	—	124	1.71[5]	73
Great Britain	100	+ 4	— 5	+ 1	+ 6	+ 27	—	133	1.81	74
Luxembourg	100	+ 1	— 2	(— 11)		+ 43	—	131	1.72	76
Turkey	100	+ 16	+ 1	—	—	+ 31	— 3	145	1.79[5]	81
Italy	100	+ 14	+ 4	+ 12	+ 21	+ 59	— 5	205	2.30	89
Belgium[4]	100	+ 4	+ 6	+ 25	— 3	+ 36	—	167	1.77[6]	94
Spain	..	..	..	..	..	..	..	..	4.64	..
Yugoslavia[7]	100	+ 114	+ 57	+ 46	+ 77	+ 99	+ 2	495	..	..

1. Basis of casualty statistics altered in 1961.
2. Casualty figures for 1963 provisional.
3. Casualty figures for 1955 exclude Saarland.
4. Second figure for 1962. Comparisons are for 1962/1955.
5. Excludes motor-assisted bicycles.
6. 1955 estimated from $\frac{1954 + 1956}{2}$
7. Killed or seriously injured only.

.. = not available.

— = nil or negligible.

Annex VI

PERSONS KILLED OR INJURED IN BUILT-UP AND NON-BUILT-UP AREAS

Index numbers 1955 = 100.

YEAR	AUSTRIA	BELGIUM	DENMARK	FRANCE	GERMANY	GREAT BRITAIN	ITALY	LUXEMBOURG	NETHERLANDS	SPAIN	SWEDEN	SWITZERLAND	TURKEY	YUGOSLAVIA
Built-up areas														
1955	..	100	..	..	100[1]	100	100	.	..	..	..	100	100	100
1956	..	108	..	..	104[1]	100	102	..	..	..	..	101	96	111
1957	..	126	..	..	102	103	117	..	..	..	100	105	105	184
1958	..	139	..	..	97	113	106	..	..	..	102	106	88	239
1959	..	142	..	..	109	126	129	..	..	..	109	108	95	299
1960	..	158	100	..	116	132	169	..	100	100	107	117	96	332
1961	100	169	106	100	112	133	183	..	102	109	116	121	133	412
1962	91	168	109	106	104	131	187	..	103	87	112	115	167	454
1963	95	..	104	109	102	137	189	..	..	100	113	133	168	512
1964	..	..	..	..	..	146	..	..	..	..	..	..	..	622
Non-built-up areas														
1955	..	100	..	..	100[1]	100	100	..	..	..	..	100	100	100
1956	..	106	..	..	102[1]	99	165	..	..	..	..	103	78	120
1957	..	122	..	..	105	99	165	..	..	..	100	109	89	198
1958	..	132	..	..	115	110	204	..	..	..	107	113	73	244
1959	..	137	..	..	131	120	191	..	..	..	106	119	86	300
1960	..	151	100	..	148	125	198	..	100	100	109	141	95	335
1961	100	165	110	100	150	123	219	..	109	117	113	156	116	371
1962	110	165	111	109	154	119	227	..	109	143	114	163	122	333
1963	118	..	111	118	155	123	239	..	..	158	112	146	130	398
1964	..	..	..	..	..	138	..	..	..	..	..	..	..	524

1. Excludes Saarland.
.. = not available.

Annex VII

1961-1964 APRIL TO SEPTEMBER

Index numbers: april to september 1961 = 100.

YEAR	DENMARK	GERMANY	GREAT BRITAIN	ITALY[1]	LUXEMBOURG	NETHERLANDS	SWEDEN	YUGOSLAVIA
Persons killed								
1961.....	100	100	100	100	100	100	100	100
1962.....	94	100	96	111	133	103	103	103
1963.....	97	102	103	110	167	102	109	111
1964.....	..	110	110	99	176	115	111	137
Persons killed and injured								
1961.....	100	100	100	100	100	100	100	100
1962.....	101	96	97	103	107	101	97	108
1963.....	98	96	102	106	106	108	107	130
1964.....	..	98	109	98	112	120	114	157
Motor vehicles								
1961.....	100[2]	100	100	100	100	100	100	100
1962.....	112[2]	104	106	111	105	110	106	110
1963.....	120[2]	110	115	128	110	119	114	121
1964.....	..	115	125	..	115	..	..	139
Death rate — Persons killed per 1,000 motor vehicles								
1961.....	100[2]	100	100	100	100	100	100	100
1962.....	84[2]	96	91	100	127	94	97	94
1963.....	81[2]	93	90	86	152	86	96	92
1964.....	..	96	88	..	153	..	..	99
Casualty rate — Persons killed or injured per 1,000 motor vehicles								
1961.....	100[2]	100	100	100	100	100	100	100
1962.....	90[2]	92	92	93	102	92	92	98
1963.....	82[2]	87	89	83	96	91	94	107
1964.....	..	85	87	..	97	..	..	113

1. Deaths at scene of accident or during transport to hospital. From 1st January, 1964, deaths are within seven days of the accident.
2. Excludes motor-assisted bicycles.
.. = not available.

Annex VIII

1961-1964 APRIL TO SEPTEMBER PERSONS KILLED OR INJURED BY CLASS OF ROAD USER

Index number: april to september 1961 = 100.

YEAR	GERMANY	GREAT BRITAIN	NETHERLANDS	SWEDEN
Pedestrians				
1961..............	100	100	100	100
1962..............	97	101	106	106
1963..............	95	106	106	108
1964..............	94	112	113	107
Pedal cyclists				
1961..............	100	100	100	100
1962..............	90	91	90	94
1963..............	92	85	93	106
1964..............	94	85	98	102
Moped riders				
1961..............	100	100	100	100
1962..............	68	90	102	92
1963..............	62	98	115	98
1964..............	60	119	132	100
Users of motor cycles and scooters				
1961..............	100	100	100	100
1962..............	78	91	88	77
1963..............	66	89	85	74
1964..............	54	93	82	63
Users of other motor vehicles				
1961..............	100	100	100	100
1962..............	116	102	120	102
1963..............	126	114	135	118
1964..............	139	129	161	134

Annex IX

1961-1964 APRIL TO SEPTEMBER

Index numbers april to september 1961 = 100.

YEAR	GERMANY	GREAT BRITAIN	NETHERLANDS	SWEDEN
NUMBER OF VEHICLES :				
Mopeds				
1961........	100	100	100[1]	..
1962........	78	100	108[1]	..
1963........	72	110	114[1]	..
1964........	61	126	..	..
Motor cycles and scooters				
1961........	100	100	100	100
1962........	87	99	96	87
1963........	70	96	91	74
1964........	54	91	89[2]	..
Other motor vehicles				
1961........	100	100	100	100
1962........	116	108	116	108
1963........	131	119	134	117
1964........	146	131	163[2]	..
CASUALTY RATES :				
Users killed or injured per 1,000 vehicles of that class				
Moped riders				
1961........	100	100	100	..
1962........	87	90	95	..
1963........	85	89	101	..
1964........	98	95	..	..
Users of motor cycles and scooters				
1961........	100	100	100	100
1962........	91	92	92	89
1963........	95	93	93	100
1964........	100	103	92	..
Users of other motor vehicles				
1961........	100	100	100	100
1962........	101	95	104	94
1963........	96	96	100	101
1964........	96	99	99	..

1. Estimated.
2. Provisional.

REPORT OF THE COMMITTEE OF DEPUTIES ON STANDARD DEFINITION OF " FATAL CASUALTIES " IN INTERNATIONAL ROAD TRAFFIC ACCIDENT STATISTICS

[CM (65)7]

SITUATION AT 24TH NOVEMBER, 1964

I. GENERAL

1. *a*) The statistics of road traffic accidents include, inter alia :

- number of road traffic accidents and their consequences;
- number and type of road users involved in road traffic accidents;
- nature and frequency of the contributory factors involved in accidents;
- other basic data on the circumstances and consequences of road traffic accidents.

Road traffic accident statistics thus provide a useful source of reference material for the following purposes :

- forming an opinion on the general situation regarding accidents or on certain aspects of it;
- finding an appropriate basis for road traffic accident prevention measures, and
- investigating the effectiveness of such measures.

b) The analysis of accident statistics does not therefore consist merely in compiling and examining absolute figures for a specific place and time. As a general rule, such figures are of real significance only when compared with other statistics :

- at national level : with similar statistics for various periods;
- at international level : with similar statistics for various countries.

c) Close comparability of statistics implies :

- records of identical scope;
- a standard definition of the items covered by accident records;
- appropriate standards of reference.

Unless these conditions are fulfilled, statistics either cannot be compared at all or their comparison loses much of its significance.

2. In view of this, attempts to make road traffic accident statistics as nearly comparable as possible have been proceeding at international level for some time. In Europe, it has been possible to reach agreement within the ECE on the scope of road traffic accident records and the definition of the main items covered by road traffic accident statistics [see Questionnaire TRANS/WP/62 and TRANS/WP6/48 (2nd Revision) of 4th March, 1960]. This is the basis adopted for the summary review of road traffic accident statistics for the principal European countries published since 1959.

However, it has become apparent that some countries are still using definitions which differ from those agreed at Geneva for road traffic accident statistics, and this particularly applies to the definition of « fatal casualties ».

3. The following paragraphs discuss whether the ECMT countries, at least, could adopt a common approach to the particularly important definition of « fatal casualties » and, if so, on what lines.

II. PRESENT SITUATION

1. Under the recommendations of the ECE the definition of « fatal casualties » covers all persons killed outright in a road accident and also those who die of injuries within the thirty days which follow [see Questionnaire TRANS/WP6/62 and TRANS/WP6/48 (2nd Revision) of 4th March, 1960].

According to the recently published ECE report on « Statistics of Road Traffic Accidents in Europe in 1962 », 17 European countries apply the ECE definition of fatal casualties, but five other countries still use different definitions.

2. *a*) The following departures from the Geneva definitions are apparent in the ECE report mentioned above :

Belgium

Only persons whose death occurs at the scene of the accident are counted as killed; all persons whose death does not occur at the scene of the accident are counted as injured.

France

Persons whose death occurs within three days of the accident are counted as killed, those whose death occurs later are counted as injured.

Italy and Portugal

Persons whose death occurs at the scene of the accident, during transfer from the scene of the accident or immediately afterwards are counted as killed. Persons whose death occurs later are counted as injured.

Spain

Persons whose death occurs within 24 hours of the accident are counted as killed; those whose death occurs later are counted as injured.

b) In the course of an enquiry carried out by the Working Party on Road Safety, these same countries made the following statements :

Belgium

The adjustment of road accident statistics to match the ECE definitions will shortly be reconsidered in consultation with all the services concerned; this definition will probably be adopted in the near future.

France

Despite extensive research and considerable efforts, it will not be possible to apply the ECE definition, even at a future date.

Italy

As from lst Jaunary, 1964, Italian statistics count as killed in road traffic accidents all casualties dying within seven days of the accident, with sub-divisions for those killed outright and those who die within 48 hours of the accident. Only an overall figure can be given for persons dying within the 30 days which follow an accident.

Portugal

At present, the statistics merely refer to the facts established at the actual time of the accident or immediately after it.

Spain

The possibility of applying the ECE definition is at present under study, but no decision has yet been taken.

3. In considering whether the 30-day period recommended by the ECE is a reasonable one or whether it would be better to shorten it to, say, the third day after the accident, the following arguments should be borne in mind :

a) *Arguments in favour of the 30-day period :*

— it is important to know, if possible, the total number of persons dying as a result of an accident and be able to see the full affects of road traffic accidents;
— only by choosing a period as long as this can road traffic accident statistics be matched and compared closely enough with overall mortality statistics. This is mainly the view of the World Health Organisation, on which the ECE Recommendation is largely based.

b) *Arguments in favour of a shorter period :*

— the police often have no technical facilities for ascertaining what becomes of an injured person and keeping in touch with him for a long period;
— a short period (e.g. three days) is sufficient for the purpose of road traffic accident statistics since, of all persons dying in an accident or as a result of it, those who die between the third and thirtieth day account for about 15 per cent;
— if the period covered by the records were extended, the number of deaths would be affected by other circumstances having no bearing on the gravity of the accident.

III. Conclusions

1. When considering how — in view of the present state of affairs — complete uniformity and comparability of national and road traffic accident statistics relating to « fatal casualties » may be achieved, the question whether the arguments for or against the 30 day period are the more convincing need not be gone into. The points to bear in mind are these :

— within the ECE and at European level agreement has been reached on the 30 day period;

— the great majority of European countries have adapted their national statistics, in accordance with the decisions taken in Geneva, to the 30 day period;
— these countries will hardly be willing or able to change their statistics again to comply with a new criterion.

Il will therefore be advisible to make a fresh appeal to the few ECMT countries which have not yet adopted the 30 day criterion to comply with the Geneva recommendations in the hope that they will be able to overcome the obstacles which prevent them from doing so at present.

2. It may however be assumed that the countries appealed to will not be able to bring their statistics into line immediately. Some method should therefore be found for ensuring, during the transition period, reasonable comparability of national statistics despite the different criteria used. This might be done for instance :

— by using conversion factors based on carefully conducted ad hoc surveys, so as to bring the figures for the shorter period into line with those for the 30 day period, or;
— by getting the countries using the 30 day period to show also figures for a shorter period, e.g. within 3 days of the accident.

It would be necessary or at least useful that no country should base its statistics of fatal casualties on a period shorter than 3 days after the accident. Otherwise it is to be feared that the converted figures would be too inaccurate and their comparability impaired.

3. The determination of conversion coefficients call for careful studies, based on statistical data.

It would be advisable that these studies should be carried out by the same groups of ECE statistical experts who recently prepared recommendations for the standardisation of European road traffic accident statistics.

4. The question of studying afresh a number of other problems concerning the comparability of road traffic accident statistics might also be considered in this connection. This applies for example to :

a) *the question of the standardisation of definitions for administrative purposes :*

It goes without saying that the adoption of uniform definitions for the various items included in accident statistics will prove a success only if these definitions are also uniformly applied by the subordinate administrative bodies. An exchange of experience on this question — also at the level of the ECE expert groups — is considered desirable.

b) *the question of reference standards :*

Accident figures can only be evaluated and used without restriction for practical calculations if they can be related to suitable reference standards. For example, the figures for the number of motor vehicles are not sufficient for this purpose, because for instance the motor vehicle mileage over a given period varies greatly from one country another. It seems useful therefore to consider whether in the different countries of Europe there are uniform standards of reference for accident statistics and what statistics — if necessary — would be required for the determination of such reference standards.

5. It should moreover be noted that international standardisation of road traffic accident statistics is important and desirable but should not be overestimated as far as the comparison of absolute figures is concerned. From the practical point of view it is often more important to compare :

— trends (e.g. percentage increase or decrease in the number of fatal casualties a given period);
— the breakdown (e.g. changes in the breakdown of pedestrians, cyclists and drivers of motor vehicles as compared with the total number of fatal casualties over a given period);
— the trend of the breakdown (e.g. changes in the percentage of pedestrians included in fatal casualties over a given period).

Comparisons of this kind can be made even if the absolute figures, as such, are not comparable.

IV. *In brief,* the Committee of Deputies proposes that the Council of Ministers should consider and approve the foregoing report and recommend Member countries to take action in accordance with the Conclusions of Chapter III,2. It instructs the Secretariat to contact the Transport Division of the ECE, Geneva to enable the latter to undertake the statistical studies referred to in Items 3 and 4 of the Conclusions.

REPORT OF THE COMMITTEE OF DEPUTIES ON THE ORGANISATION AND WORKING OF SCHOOL PATROLS

[CM (65)8]

I. INTRODUCTION

A. Terms of reference

At its 18th session, held in Paris on 25th and 26th November, 1963, the Council of Ministers of the ECMT instructed the Committee of Deputies to study the problem of the responsibility of school patrols and compulsory insurance cover for them.

It soon became clear that other questions connected with school patrols should also be considered so that an overall view of the problem could be obtained.

The Delegate for Luxembourg and the Delegate for Sweden were appointed as rapporteurs. Each Delegation was invited to let the rapporteurs have its views not only on the two points raised by the Council of Ministers but, more generally, on the advantages and disadvantages of school patrols.

B. Background

The rapid development of motor traffic which occurred in the United States of America immediately after the first world war caused the responsible authorities to take steps, nearly three decades earlier than in Europe, to counter the dangers to which children were exposed on their way to and from school.

There were many children among the victims of road accidents in the United States in 1920 and 1921. For instance, in the city of Chicago in 1921, 205 children were killed on their way to and from school. This frightening total called for protective measures. In 1921 therefore, through the initiative of one father, Mr. Hayes, who was President of the Chicago Motor Club, the first service for the protection of children on their way to and from school was instituted in Chicago.

The scheme was a success. Wherever the protection service operated, the number of accidents involving children on their way to and from school was lower than during the alarming period in 1920 and 1921.

From this modest beginning, a gigantic organisation developed in America and, later, in Europe too, where the density of motor traffic grew unexpectedly rapidly a few years after the end of the second world war. Following the example of the United States, the city of Amsterdam set up a school patrol service on 27th October, 1947. Somewhat later, in 1949, Denmark took a similar initiative, followed not long after by Sweden (1950), Switzerland (1952), Germany (1953), Finland, Norway and Italy (1955).

C. Information supplied by Member countries

The following countries have informed the rapporteurs of their views :

Germany,	Italy,
Austria,	Luxembourg,
Belgium,	Netherlands,
Denmark,	Sweden,
France,	Switzerland.
United Kingdom,	

The information sent in by these countries is reproduced in the *annex* to this paper.

D. Definition of terms

There are two types of school patrol, one operated by the pupils themselves and the other by adults.

In this report the term « school patrol » refers exclusively to the first type; the second is discussed in Section II, H.

II. APPRAISAL OF THE SYSTEM

On the basis of the information communicated to the Rapporteurs and of the report submitted by Mr. A. Thorsson at the meeting of Governmental Experts of the Council of Europe and the ECMT on road safety education in schools, held in Paris, from 1st to 4th October, 1963, it is possible to draw up the following basic principles :

A. Organisation

Members of school patrols perform duties which assist or complement those carried out by the police. It is therefore for the school authorities and the police to co-operate closely in any decisions as to the advisability of setting up school patrols, confining them to places near the school where there is some danger to the children.

The school must draw up a detailed programme of the activities of its patrols, preferably in close consultation with the police, stating the places where patrols are to be posted, the times when they will be on duty, etc.

B. Selection

Not everybody can be allowed to do school patrol work. Members must be selected from among pupils of a certain age who are more mature than their fellows, who are punctual, courteous and attentive and who have a sense of responsibility. In making the selection, consideration should also be given to where the candidates live. Since they have to begin school rather earlier and finish rather later than their fellow pupils they should preferably live fairly near the school.

Candidates must be volunteers and must have their parents' permission.

Leaders of patrols must be appointed from selected pupils who seem most gifted and most capable. They must have qualities of leadership and be exemplary in their general conduct.

C. Training

The training of patrol members is important and needs to be particularly thorough. It should be started well before the patrol services begin and should follow a carefully prepared plan. The person in charge of training must explain the duties involved at each point where patrols operate and the rules to be observed by patrol members and other pupils.

D. Operation

All the Member countries which have supplied information either use or have at some time tested systems for supervising children on their way to and from school. The systems however vary from country to country.

1. One method is to post a school patrol member on the pavement or, failing that, at the side of the road. The patrol member keeps the children back until a gap in the traffic makes it possible for them to cross the road without danger. His task is simply to supervise and control the crossing of the roadway in a disciplined manner when a break in traffic occurs.

2. The increased density of traffic, especially in towns, does not always allow the method described above to be applied. Some countries therefore authorise patrol members to take up a station on the roadway when a sufficient break in traffic occurs and stop approaching vehicles.

Opinions differ as to whether the patrol member should face the traffic or face the children crossing the road. A case can be made out for either solution. Yet this method of barring the road unquestionably calls for at least two patrol members.

3. In addition to their duties of escorting their fellow pupils and helpind them to cross the road during breaks in the flow of traffic, the following duties may also be assigned to school patrols. They may be required :

- *a*) to keep order in trams and buses carrying children to and from school;
- *b*) to act as guide to children who cycle to and from school;
- *c*) to walk in front and at the rear of children walking in file;
- *d*) to supervise children during recreation breaks and on playing fields;
- *e*) to take an active part in the teaching of the highway code in school;
- *f*) to render service to old and infirm persons in road traffic.

E. Legal powers

In most countries, school patrols are not legally empowered to interfere with the flow of traffic and impose a specitfic line of conduct upon road users. The general legal provisions which forbid drivers to endanger the lives of pedestrians are applicable.

In Switzerland, however, a statutory provision compels drivers to obey the signals given by school patrols.

F. Responsibility of patrol members and of the authorities; accident insurance and third-party liability insurance

1. The penal liability of patrol members should be governed by the same general principles applied in other circumstances by the va-

rious countries. There is no need for special regulations.

2. The regulations governing the third-party liability of patrol members vary in the different Member countries. In some the law states that this liability lies with the patrol members, while in others the schools, municipal authorities or other public bodies are answerable for any action by patrol members that may give rise to claims for damages, for the logical reason that they perform a duty for the school.

Liability for damages which may lie with patrol members, the school or other responsible bodies is in many cases covered by taking out third-party liability insurance.

3. Care is also taken to provide accident cover for those who take part in school patrol work. No patrol member should ever fail to be compensated for any injuries sustained in the exercise of his duties. This is essential if parents are to continue to co-operate as willingly as they do at present in helping to spread this form of activity among their children.

4. For both third-party liability and accident insurance, care must be taken to see that full cover is provided for any damages likely to arise in practice.

G. Advantages and disadvantages of school patrols

1. The steady rise in the number of road accidents calls for sustained action to promote road safety on the part of the various public bodies.

All the Member countries operating this system of school patrols report good results and an almost total absence of accidents. School patrols are therefore an excellent means of appreciably increasing the safety of children on their way to and from school.

Road safety education in schools is certainly not to be underrated. The work of school patrols may constitute a valuable link in the educational chain. It makes for a better understanding of traffic and its problems among both teachers and pupils. In this way the activities of the patrols can be made an important part of the safety education taught in schools. They provide the practical application of traffic rules learnt only in theory.

Furthermore, school patrols give both members and other pupils a very strong sense of the responsibility that all road users need to show.

By their example and their alertness on the road, school patrol members contribute to the road safety education of their fellow pupils and give them a special sense of responsibility and discipline.

In time, the training and the work they do will make patrol members into alert, attentive, courteous and disciplined road users.

The constantly increasing traffic in towns and villages exposes children to special dangers on the way to and from school. The multiple duties of the police prevent them from exercising sufficient supervision and this essential duty must therefore be entrusted to others. In countries where school patrols operate, experience shows that the safety of children can be largely ensured by making use of such patrols. The police regard school patrols not only as a valuable aid but as an appreciable lightening of their burden.

Drivers recognise that crossing the road in organised groups is less dangerous and causes less delay than individual and frequently unexpected crossings.

Apart from the job of escorting the children along the pavements and across the roads when a break occurs in the traffic, school patrol members can also carry out other supervisory duties, e.g. in trams and buses and on playing fields, and can ply an active part in the traching of the highway code in school.

2. Some countries are reluctant to use school patrols. They argue that children as patrol members incur too great a risk and that between 10 and 16 their judgement is not sound enough to enable them to take right decisions in every situation.

Responsibility for the safety of other children is too heavy a burden to be borne by school patrol members.

There is also some doubt about the legal position of patrol members in case of accident and about the moral and material consequence to which a patrol member may be exposed should he be the cause of an accident.

Certain countries therefore, while recognising the need to supervise children on the way to and from school, prefer to use properly selected adults, who have the necessary maturity and sense of responsibility.

H. Adult persons as school patrol members

Owing to the difficulties mentioned above, some countries which recognise the need to have children supervised on their way to and from school have in fact engaged the services of properly selected adults.

In the United Kingdom, the police in London and the local authorities elsewhere are empowered to designate crossings for scholl children and have the children supervised and guided by persons other than policy officers. These persons are trained and paid by the authority which engages them. They must wear a uniform and use the prescribed stop sign. Any driver who fails to stop when signalled to do so by a scholl patrol is guilty of an offence.

In Austria, under the new road traffic regulation which came into force on lst October, 1964, traffic control duties may be assigned to certain adult persons such as school teachers. These persons are authorised to request drivers to stop by using clear and easily recognisable signals given with the prescribed stop-sign. This form of traffic control is limited, however, to areas in the immediate vicinity of schools or kindergartens where there are no traffic lights, and may only be used when such persons are actually accompanying groups of children.

The adults responsible for traffic control wear a white coat and cap when on duty and use a clearly distinguishable stop-sign.

III. CONCLUSIONS

School patrols are an excellent means of appreciably increasing the safety of children on the way to and from school. All the countries operating this system of school patrols have reported very good results and an almost complete absence of accidents.

School patrols also give children a sense of responsibility and discipline and are a practical application of the teaching of the highway code in schools.

Despite one or two reservations, most Member countries therefore consider that there is a good case for setting up school patrols and providing for their development.

The following basic principles will provide useful guidelines for the responsible authorities in operating a system of school patrols :

1. School patrol members should obey the rules of the highway code, like all other road users.
2. School patrol members are not intended to replace the police but to guide and supervise their fellow pupils. They should carry out their duties by taking advantage of any breaks which occur in the flow of traffic.
3. Only pupils who have the permission of their parents or guardians may become members of school patrols.
4. Only pupils who are considered sufficiently mature may become patrol members, if they are prepared to carry out their duties voluntarily; they should, by their qualities of leadership discipline, courtesy, prudence and sense of responsibility, have authority over their fellow-pupils so as to induce them to observe in exemplary fashion the fundamental rules of the road.
5. The main responsibilities for the activity of school patrols rests with the school. But planning, training and supervision should be carried out in close co-operation with the police and other road safety organisations.
6. The training of pupils to take part in school patrol work is important. It should be assigned to specially qualified staff and carried out in accordance with a carefully prepared programme.
7. School patrol members should be easily recognisable by their equipment. This might include a white belt and shoulder strap a stop-sign.
8. Appropriate measures should be taken to cover school patrol members against the risk of personal injury and third-party liability, as for instance by the provision of accident and third-party insurance.

In conclusion the Committee of Deputies proposes that the Council of Ministers should recommend Member countries :

a) insofar as they have not already done so and in order to achieve the above aim, to make use as far as possible of school patrols, or, depending on the circumstances, to assign the work of supervision and guidance to adults;

b) as regards the school patrols which have been or will be established :
- to operate school patrols under the authority of the school, the local authorities, the police or an independent road safety organisation;
- to accept as members of school patrols only children who are sufficiently reliable and mature and who voluntarily accept their duties;
- to obtain the consent of parents or guardians;
- to provide thorough training for pupils taking part in school patrol work and assign these duties to specially qualified staff;
- to assign to school patrol members an educational and preventive duty, in

guiding and supervising their fellow pupils on their way to and from school;
- to ensure that appropriate measures are taken to cover school patrol members for personal injury and third-party liability, as for instance by the provision of accident and third-party insurance.

IV. ANNEX

INFORMATION SUPPLIED BY MEMBER COUNTRIES

In *Germany*, the school patrol service was set up in 1953. It now numbers about 45,000 patrol members between the ages of 12 and 16, who supervise approximately 6,000 crossings outside some 3,500 schools.

The service is recognised as a school institution. The school is therefore responsible for it, but the police and the independent road-safety organisation know as the « Bundesverkehrswacht » also take an active part in its organisation and operation.

The police provide training for the children, and in conjunction with the schools supervise patrol members. The « Bundesverkehrswacht » provides equipment (white cap; white belt and shoulder, strap; stick carrying a red disc edged with white; white cape).

Since school patrols came into operation, there have been no serious accidents recorded at crossings supervised by them. Moreover, the patrol service has proved to be an extremely important means of road safety education.

The schools now take a positive attitude towards safety patrols, instead of their former wait-and-see attitude or even opposition. The police, who would be unable to man all crossings near schools, look upon safety patrols as a valuable help which also considerably lightens their load. As for the parents, they were in favour of school patrols right from the start and made no difficulty about giving their children the necessary permission. Drivers too are in favour of school patrols, for they have realised that crossing the road in groups rather than individually is less dangerous and disruptive of traffic.

The school patrol member escorts each group of pupils accross the road.

German road legislation contains no special provisions concerning school patrol members, and hence no specific regulation which could authorise members to interfere with the flow of traffic (as by stopping vehicles), or compel drivers, over and above any normal obligations under the general provisions, to exercise special care in respect of school patrols.

The school patrol member is thus restricted, just as any other pedestrian, to the mere use of breaks in traffic when seeing his group of pupils safely across the road.

Admittedly, when traffic is heavy the patrol member may in practice have to ask a driver to stop by using his red and white disc. In law, however, this sign carries no greater weight than that made by any pedestrian with his hand, an umbrella or stick to show that he intends to cross the road.

Young people — including school-patrol members — between the ages of 14 and 18 are held liable under the penal code for any error of judgement in this connection, « if at the time the error was committed they were sufficiently mature both morally and mentally to realise the harm which might result from the error and to act accordingly ».

Regarding the third-party liability of patrol members, should they in the course of their duties cause damage or injury to be sustained by pupils in their charge or by other road users, the following points should be noted :

a) whether the work of patrol members should be regarded as a public service and the school be held responsible rather than the patrol member, has not yet been decided; it has, however, been submitted to legal opinion (Rechtsgutachten);

b) should it be decided that the school could not be held liable as a public body, the patrol member could be declared responsible for an error of judgement and would be liable for any resulting damages. If a minor, i.e. under 18 years of age, he would be held liable, only if it were established that at the time of committing his error he had the mental capacity to realise his responsibility;

c) as a precautionary measure, all school patrol members are covered by third-party insurance against any claims for damages.

School patrol members are covered by accident insurance in case they should themselves be injured while carrying out their duties (compensation for disablement may be as high as DM 100,000).

In *Austria* the new road traffic regulation, which came into force on lst October, 1964, contains provisions for the supervision and protection of children on their way to and from school.

Under this regulation traffic-regulation duties may in specified cases be assigned to adults as teachers and other persons connected with education. These are authorised to request drivers to stop by making clear and easily recognisable signs with a special sign. Drivers are required to obey the signals given by these persons. This form of traffic regulation however, mat only be practised where there are no traffic lights and only :

a) in the immediate vicinity of school premises frequented by children under the age of 15, or of kindergartens, and in both cases at places where children usually cross the road on their way to and from school or kindergarten;

b) when the persons described are accompanying groups of children.

The adults responsible for these traffic regulation duties wear a white coat and cap when on duty and use a clearly distinguishable sign.

In addition to such protective measures introduced under the legislation, school patrols are also operating in some areas on a trial basis.

Patrol members are selected from among the more reliable and mature pupils and on a voluntary basis. They are not, however, authorised to control traffic. Their duty is to assemble the children on the pavement at prescribed pedestrian crossings or at other suitable points near the schools prior to seeing them across the road in groups as soon as a break in traffic, a signal from a police officer or the traffic lights allows. In order to be seen more clearly, patrol members wear a white coat and cap.

In *Belgium,* school patrols are used, for instance, near schools and playing fields, but their role is extremely limited. Their only job is to stop traffic to allow groups of children to cross the road outside schools and playing fields. They do not accompany children from one place to another.

School patrols do not operate where there are traffic lights.

A provision in the highway code forbids drivers to cut through a group of children crossing the road under the supervision of a school patrol. There are, however, no legal provisions covering the question of liability. Generally speaking, the school or the local authorities take out insurance to cover any liability that may result from the action of patrol members.

Patrol members are specially trained and carry a disc sign with which they stop traffic. They have strict orders not to interrupt traffic unless the nearest vehicles are far enough away, i.e about 100 metres.

In *Denmark,* the first school patrols date back to 1949. The number of patrol members now stands at about 10,000 and they serve more than 250,000 school-children. Patrol members are generally aged between 14 and 16 but are sometimes younger. The written consent of parents or legal guardians is required.

The school patrol service has its legal basis in road traffic legislation. In co-operation with the police, schools are required to take steps to protect children on their way to and from school and such steps include the operation of school patrols. Apart from the police and the school, the « Raadet for storre faerdselssikkerhet » (Council for the improvement of road safety) also contributes largely to the work of school patrols. Thus the Council has a school adviser whose duties include co-operation in this work.

Special instructors are appointed by the schools to train patrol members. Payment for this work is on a separate basis. The training of patrol members is undertaken first by the police and then by the appointed instructor. A training course covering about five hours has been drawn up.

The school patrols usually operate at authorised and other particularly convenient pedestrian crossing points.

It is the duty of members of patrols to bar the road to school children. This they do by raising their arms until the traffic situation makes it possible to cross, when they lower them again. A school patrol may include two groups of members; those who bar the way and those who indicate to other road users when the children are about to cross the road. Where there is no special pedestrian crossing, the members are also empowered to put up a special warning sign indicating that children are on their way to school and that a patrol is at work.

Members of school patrols do not have the right to interfere with the flow of traffic, but in practice it is very difficult to adhere to this principle and all that it implies.

School patrols have worked well and are to be developed in future. Their operation has given rise to no special comments and there have been no accidents.

As regards the question of damages, the school is liable, as « employer », for any damage caused through the fault of patrol members. The school may also be held responsible for the inadequate training of patrol members. If a member of a school patrol were guilty of negligence, the school would thus be held solely responsible. This risk is covered by the school's general third-party liability insurance.

The question whether third-party liability insurance should be taken out is primarily a matter for the school and members of safety patrols. The question whether the consideration due to third parties in road traffic should constitute a basis for such insurance must be judged in relation to another fact, that pedestrians are not generally obliged to take out third-party insurance. Under the rules governing insurance against accidents at work, members of school patrols are entitled to compensation for injury resulting from accidents occurring in the course of their work as patrol members.

In *France,* there are no legal provisions concerning school patrols. However, in a number of provincial towns school patrols operate at certain designated or other pedestrian crossings. So far they have all given good results.

It is difficult, however, to make more general use of them on a permanent basis, as in Germany, the Netherlands and Sweden.

The teaching profession and parents' associations withhold their consent for three reasons :

i) no legal authority can be vested in a child. If only one of his small charges refuses to obey, no sanction is possible and the whole system collapses;

ii) if a patrol member should involuntarily cause an accident on the public highway, his parents might find themselves liable to very heavy damages;

iii) the State has no right to shift its primary responsibility for the « protection of persons » onto the frail shoulders of 12-year old children.

Some measure of relief has been afforded to parents where insurance is concerned. During the tests carried out in Paris in 1961 and 1964, parents' third-party liability and childrens' accident risks were covered by the « Prévention Routière ».

Despite the freedom from liability for damages thus provided, parents were nevertheless worried about the moral shock a child might sustain if involuntarily responsible for an accident.

In Paris, during the tests in question, school patrol members took charge of the children leaving school and saw to it that they did not leave the pavement, that they crossed the road in obedience to police signals and that they used pedestrian crossings.

Patrol members, who were chosen by their teachers for their reliability and sense of responsibility, wore a red and blue armband with the badge of the Prefecture of Police. They carried a stick bearing a red disc with a white border which they used to make their signals clearer. They were later given the white belt and shoulder strap which are the characteristic international insignia of school patrols.

In spite of conclusive experiments, the opposition — mainly parents and teachers — still feels that the supervision of children on their way to school is a job for the police.

Supporters of the scheme (« Préfectures » and « Prévention Routière » in particular) maintain that school patrols improve road safety for children, give them a sense of responsibility and discipline and are thus a practical application of the teaching of the highway code in schools.

In the face of these divergent views, it is impossible at present to say what direction the problem of school patrols will take in France.

In the *United Kingdom* the introduction of school patrols was first considered in 1936 and again taken up in 1943 in view of the large number of accidents during the war. As of 1944 trials were held in a few schools but these were not continued on a wider scale after the war owing to opposition from local authorities and teachers and to the practical difficulties involving school routine.

Because of this opposition, a different system of supervision was established whereby adult persons were granted certain powers of authority to supervise school children at specially designated crossings.

Under an Act of Parliament of 1953 (which in 1960 was incorporated into the « Road Traffic Act », section 48), the police in London and the local authorities elsewhere are empowered to mark out crossings for school children and have the children supervised and guided by persons other than police officers. No age limits are fixed for these persons, but the authorities generally prefer to engage adults (men and women) for this work. The patrol members are trained and paid by the authority which engages them. They are empowered to stop vehicles, but between 8 a.m. and 5.30 p.m. only. Patrol members must wear a uniform and use the stop sign as prescribed. Any driver who fails to stop when signalled to do so by a patrol member is guilty of an offence.

Even so, some authorities are finding it difficult to recruit enough men and women suited to this work.

In *Italy*, the first school patrols were introduced in Milan in 1955, under the authority of the local Automobile Club. The patrol service was gradually extended to other towns and now has a membership of 3,000.

Patrol members are selected for their sense of responsibility and other suitable qualities. They must be familiar with the principal traffic rules. The Headmaster forwards the names of the pupils who have been appointed to the Automobile Club, which enters them in a special register of patrol members.

They must have the written consent of their parents or guardians.

School patrols are generally used to supervise children on their way out from school. Their duties begin five to ten minutes before the children leave the school and last no more than 20 minutes.

They operate at pedestrian crossings controlled by traffic lights, and at other crossings which are not controlled.

They are not empowered to interfere with traffic or stop its flow, and their sole duty is to assemble the children prior to crossing and to prevent them from doing so outside the prescribed limits for pedestrians.

Patrol members must be at least eight years old.

They are not insured against accident or third-party liability. Neither the teachers nor the Headmaster of the school nor the Automobile Clubs have any responsibility whatever for accidents which may occur during the service of patrol members.

In *Luxembourg*, some school patrols have been operating under the municipal authorities in two towns since 1963.

They operate at crossings uncontrolled by traffic lights.

It is obvious that any accident involving children under their control must engage both the personal responsibility of patrol members and the responsibility of the local authorities.

Any third-party liability which might be incurred by the local authorities and the personal responsibility of patrol members are covered by insurance.

The legal authorities take the view that no mention whatever should be made of the role of patrol members in road traffic legislation. They maintain that the role of school patrols must be confined to carrying out an educative and preventive mission in the vicinity of schools, by drawing drivers' attention to the presence of children and inducing the children to respect traffic rules. Patrol members are strictly forbidden to stop road traffic or to give any instructions to other road users.

In *the Netherlands*, there are no legal provisions governing school patrols.

Such patrols have, however, been in operation for 15 years and have the support of the public. Road users therefore generally obey signals given by patrol members.

The patrols operate at pedestrian crossings and, on occasion, at those controlled by traffic lights.

Patrol members keep the children together and only give them the all clear when a gap in traffic occurs. In some towns, patrol members do not accompany the children across the road for reasons of legal responsibility. Generally speaking, however, they do accompany the children or take up a position in the middle of the roadway, displaying a « stop » sign. Many crossings where school patrols operate are indicated by a special road sign.

School patrols are set up on the initiative of school authorities or parents' associations. Patrol members are generally volunteers but their parents' consent is always required. Patrol members are trained by the police and supervised by police and teaching staff. It may happen that the school authorities, parents or police oppose the operation of school patrols at places which are too dangerous or too congested. Decisions are taken after considering the interests, possibilities and responsibilities of all the parties concerned. It is often the police who take over this work at dangerous or congested spots but adult patrol members may also be called in.

School authorities may sometimes oppose the use of school patrols because they interfere with classwork and upset the school timetable by making it necessary for some pupils to arrive later and leave earlier than others. To avoid these drawbacks care it taken not to employ the same pupils all the year round.

The Road Safety Association has taken out accident insurance and third-party insurance for school patrol members. A few large towns have extended their insurance to cover patrol members.

The accident insurance will pay 2,000 florins in the event of death and 50,000 florins in the event of permanent disability. Third-party insurance guarantees 50,000 florins in the event of more than one person's death and 10,000 florins in the event of damage to the property of a third party.

So far as is known, only one or two accidents involving school patrol members have occurred. The Courts dealing with such accidents have ruled that road users must comply with the instructions of school patrol members.

In short, it must be said that school safety patrols make an effective contribution to the improvement of road safety.

In *Sweden*, school patrols were first established in 1950. They are made up of carefully selected and specially trained boys and girls at least 12 years old.

Patrols operate at crossings of all kinds, but especially at those uncontrolled by traffic lights. Patrol members are stationed on the pavement on both sides of the road, and another on any existing traffic island in the roadway. If the traffic is very heavy or the road very wide, patrol members take the children across.

Patrol members wear a white belt and shoulder strap. They will also wear white gloves and cuffs in the near future.

The role of patrol members is to help their fellow pupils to cross roads near the school where traffic is dense. They may give instructions only to schoolchildren. They may not hold up other road users or give them instructions of any kind.

The school is responsible for the activities of its patrol members.

Training and supervision of school patrols are provided by the school in close co-operation with the police. School patrols are widely used in Sweden and operate without any complications.

There is no law defining the legal status of patrol members. They are subject to the same code of conduct as all other road users. The instructions they give to their fellow pupils must comply with the rules for pedestrians set out in the highway code.

A patrol member may be held responsible at law for the consequences of any wrong instruction if he is aged 15 or more. He may be held liable for compensation in respect of any damage or injury he may have occasioned, irrespective of his age.

In view of this liability the question of providing insurance cover has been considered, but it is unlikely that the State will subscribe to accident insurance for patrol members.

In *Switzerland*, the introduction of school patrols dates back to 1952.

By the end of July 1963, school patrols had been adopted by 251 municipal authorities and the number of patrol members insured against accidents was 7,118. Patrol members must be at least 10 years old.

It is for the municipal and school authorities to decide whether the patrol system should be adopted in a town or village.

Responsibility for training and supervision of patrol members lies with the teaching profession and the specialised police departments.

Equipment is supplied free of charge by the « Automobile Club de Suisse » and the « Touring-Club Suisse ».

Patrol members are selected by the school authorities. They are volunteers but the written consent of their parents must be obtained. Not until then can the intending patrol member sign his undertaking and promise to carry out the duties required of him to the best of his ability.

The usual method is to post patrol member on the pavement or, failing that, at the side of the road. They keep the children back and do not give them the all clear until a break in traffic occurs.

As a rule, school patrols operate at all pedestrian crossing near schools, including those controlled by traffic lights.

Owing to the density of traffic, this method cannot always be applied. Members of patrols may therefore be authorised, by special decision, to step into the roadway when a break in traffic occurs in order to stop approaching vehicles. In such cases somewhat older patrol members are specially appointed for the purpose. This procedure also requires the presence of at least two patrol members.

All road users are compelled by law to obey signals given by school patrols when they are wearing the insignia of their office.

In certain places school patrols may collect the youngest pupils at specified times and escort them to school in groups. For older scholars, cycle patrols may be organised on similar lines.

School patrol members must be registered with the « Bureau suisse d'études pour la prévention des accidents » (Swiss Accident Prevention Research Bureau), in order to be covered automatically against accident or third-party liability.

The amounts of accident coverage are 5,000 Swiss francs in the event of death, 100,000 Swiss francs in the event of permanent disability and up to 5,000 Swiss francs for medical costs. Third-party cover is up to 100,000 Swiss francs.

To date, no patrol member has been the victim of a serious accident in the course of his duties.

The experience gained with school patrols has been conclusive and efforts are now being made to develop them as much as possible.

SUMMARY

REPORT ON MEASURES TO REDUCE NOISE CAUSED BY SURFACE TRANSPORT ON ACTION TAKEN TO INTRODUCE THE ISO METHOD OF MEASUREMENT AND THE FIXING OF STANDARD MAXIMUM NOISE LEVELS

[*CM* (65) 13.]

By a decision of the Committee of Deputies of 12th January, 1965, the Chairman of the Working Party on Measures to Reduce Noise caused by Surface Transport was asked to make a report, in the light of the written data collected, on the application of the measures recommended in Council Resolution No 14/63.

The following information covers both the action taken and the replies to the questionnaire.

I

In Resolution No 14 of 26th November, 1963, the Council of Ministers of Transport decided, inter alia :

1. to adopt a uniform and internationally recognised method of measuring the noise made by motor vehicles and ensure that it is used when vehicles are officially inspected;

2. to define maximum permissible levels in accordance with the standardization recommended by the ECMT, if this has not already been done.

II

VEHICLES

At its meeting on 3rd December, 1964, the Council of Ministers, to give effect to Item 1[1] of Resolution No. 14/63, adopted the ISO Method as a uniform and internationally recognised procedure. A questionnaire was issued to ascertain how far this method was or would be incorporated in the regulations of the Member countries of the ECMT.

The replies to this questionnaire indicate that the great majority of Member countries of the ECMT already have introduced, in principle, the ISO method or will probably do so by the end of 1966.

Official regulations to this effect, or government standards based on the principles of the ISO method already exist in France[2], Belgium[3], Luxembourg[3] and the Netherlands[3].

They are to be introduced in Norway (only for the measurement of noise caused by motor cycles and scooters), Portugal, Sweden (only as part of the inspection tests for types of vehicles), the United Kingdom and Yugoslavia.

After completion of the preparatory texts drafted by various international bodies, and especially in the light of Resolution 107 of the Road Transport Sub-committee of the EEC (Geneva), the ISO method is or will be introduced in Germany, Austria, Denmark, Greece and Italy. In Spain, the matter is under discussion. The information concerning the other countries shows :

- that Ireland is waiting for the fixing of maximum permissible noise levels in Europe before introducing the ISO method;
- that Switzerland has referred to its previous reservation;
- that the introduction of the ISO method in Turkey is at present hampered by the lack of sufficient equipment to test all vehicles.

At the abovementioned meeting of 3rd December, 1964, the Council of Ministers of Transport considered section IV of the Supplementary Report of the Committee of Deputies [CM (64) 17] which recommends that consideration be given to the proposals of the ECE Working Party on the Construction of Vehicles concerning the standardization and fixing of maximum noise levels.

A second questionnaire, similar to the first,

1. The United Kingdom and Switzerland made a reservation on this point.

2. Order of 25th October, 1962, based on article 5.70 of the Highway Code.

3. Article 8 of Decision M(64)9 of the Council of Ministers of the Benelux Economic Union.

was drafted to ascertain how far the ECMT's recommendations on standardization have been taken into account. The replies show that the majority of the ECMT Member countries, when fixing permissible noise levels, are likely to act in the context of their membership of the ECE.

The following countries have already accepted the maximum permissible noise levels proposed by the ECE or will probably do so by the end of 1966 : Greece, Norway (for motor cycles and scooters only), Portugal and Yugoslavia.

Several Member countries state that the discussions of the ECE Working Party on the Construction of Vehicles, which are to be held in Geneva in September, 1965, will have a bearing on their future attitude, i.e. Germany, Austria, Italy and Sweden. On the other hand, maximum permissible noise levels have been introduced in Denmark only for mopeds, and their general application to other types of motor vehicles is still under consideration.

In France, the noise levels for some categories of vehicles are higher than those proposed by the ECE, but others are lower. It is not possible, for the time being, to bring the higher levels down to the proposed standard. The United Kingdom is at present planning maximum levels, some of which are higher than those proposed by the ECE. Their subsequent reduction in the light of experience is envisaged. The United Kingdom cannot therefore accept, for the time being, the maximum noise levels proposed by the ECE.

Belgium, Luxembourg and the Netherlands have introduced maximum noise levels as from lst January, 1965. Ireland is not considering the introduction of such maximum levels until they have been standardized on a European basis. In Spain, the question is still under consideration.

The maximum levels proposed by the ECE are not acceptable to Switzerland because of the units db(B) and methods of measurements applied.

Turkey does not expect that the results will be of practical use for the application of maximum levels in its own case since, as an importer of motor vehicles, it attaches little importance to regulations of this kind.

III

Railway Rolling Stock

The Inland Transport Committee of the ECE has not yet decided to study the fixing of maximum permissible sound levels or a uniform method for measuring the noise caused by railway rolling stock, but the Office for Research and Experiments (ORE) of the UIC has set up, at the request of the ISO, a number of new commissions to deal with noise abatement on the railways. The following commissions are operating at present :

Commission E 82a (« *Diesel* ») deals with noise abatement on diesel locomotives;
Commission E 82b (« *Bridges* ») is concerned with noise caused by vehicles crossing bridges, especially light modern bridges;
Commission E 82c (« *Materials* ») is making investigations on soundproof materials;
Commission E 82e (« *Noise abatement* ») is dealing with the general problem of noise abatement on the railways.

A first approach has thus been made to enable the railways to reach conclusions on noise abatement in the near future.

IV

Conclusions

Replies to the two questionnaires show that the application of the recommendations of the Council of Ministers is still at an early stage as far as national regulations are concerned. In most countries, implementing measures can hardly be expected in 1965.

With regard to the Resolution of the Council of Ministers of 26th November, 1963, which mentions that the noise caused by town traffic may be disturbing and have its effects on public health, especially in residential districts, near clinics, hospitals, schools, etc., or wherever such traffic is particularly dense, and since the tendency is for such noise to become far worse, it would be desirable to speed up government action on the lines of the above conclusion. The Working Party will have to continue its activities in this direction, whilst endeavouring to clarify certain technical differences in the application of the ISO method.

ANNEXES

I. List of Officers of the ECMT

II. List of delegates at the Lisbon and Paris Conferences

I

LIST OF OFFICERS OF THE ECMT

OFFICERS OF THE COUNCIL OF MINISTERS

In accordance with the provisions of article 1 *a*) of the Rules of Procedure, the Council of Ministers, at its sessions of 26th November 1965, elected the following Officers :

Chairmanship (Switzerland) :

Mr. W. SPÜHLER, Member of the Federal Council, Head of the Federal Department of Transport, Communications and Power.

First Vice-Chairmanship (Germany) :

Mr. H. C. SEEBOHM, Federal Minister of Transport.

Second Vice-Chairmanship (Ireland) :

Mr. E. H. CHILDERS, Minister for Transport and Power.

OFFICERS OF THE COMMITTEE OF DEPUTIES

In application of article 3 of the Rules of Procedure, the Officers of the Committee are the following :

Chairmanship (Switzerland) :

Mr B. TAPERNOUX, Deputy of the Director, Federal Office of Transport.

First Vice-Chairmanship (Germany) :

Mr. W. TER-NEDDEN, Ministerial Director.

Second Vice-Chairmanship (Ireland) :

Miss T. J. BEERE, Secretary General.

II

LIST OF DELEGATES AT THE LISBON AND PARIS CONFERENCES

AUSTRIA

Mr. PROBST, Federal Minister of Transport,
Mr. FISCHER, Director-General (Deputy to the Minister of Transport),
BAZANT, Ministerial Director,
Mr. HABEL[1], Director-General, Ministry of Commerce and Reconstruction (Deputy to the Minister of Commerce),
Mr. FENZ, Ministerial Director.

BELGIUM

Mr. URBAIN[2], Minister of Communications,
Mr. VREBOS, Secretary-General (Deputy to the Minister),
NEUVILLE, Administrative Director,
POPPE[1], Adviser,
SINNAEVE[2], Adviser.

DENMARK

Mr. LINDBERG, Minister of Communications,
Mr. CHRISTENSEN[2], Secretary-General (Deputy of the Minister),
FOLDBERG, Deputy Head of Section.
KLOKKER, Secretary to the Minister.

FRANCE

Mr. JACQUET[2], Minister of Public Works and Transport,
Mr. CORBIN, Engineer in Charge, Highways Department (Deputy to the Minister),
AUDIAT[2], Deputy Head of the Minister's Private Office,
LATHIERE[1], Technical Adviser, Minister's Private Office,
DALGA, Civil Administrative Officer, Ministry of Public Works and Transport,
GABARRA, Embassy Counsellor (Ministry of Foreign Affairs).

GERMANY

Dr. SEEBOHM, Federal Minister of Transport,
Mr. TER-NEEDEN, Ministerial Director,
LINDER, Head of Section,
MITTMANN, President,
M^{me} BOROWSKI, Senior Administrative Adviser,
Mr. REHM, Administration Adviser.

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1. Lisbon session.
2. Paris session.

GREECE

Mr. GIANOPOULOS[2], Minister of Communications,
CHRISTIDIS[1], Ambassador, Head of the Greek Delegation to the OECD,
MILON, Adviser, Greek Delegation to the OECD (Deputy to the Minister).

IRELAND

Mr. CHILDERS, Minister for Transport and Power,
Miss BEERE, Secretary-General (Deputy to the Minister),
Mr. SHEEHY[1], Principal Officer, Road Transport Section,
O'SULLIVAN[2], Principal Assistant.

ITALY

Mr. SANTONI-RUGIU, Deputy General Manager of the Italian State Railways (Deputy to the Minister),
MORGANTI, Expert,
TURI, Expert,
ROSSINI, Chief Inspector.

LUXEMBOURG

Mr. BOUSSER, Minister of Públic Works Transport, Postal and Telecommunications Department,
Mr. LOGELIN, Government Adviser (Deputy to the Minister).

NETHERLANDS

Mr. POSTHUMUS, Secretary of State for Transport and Waterstaat,
Mr. VONK, General Adviser to the Minister of Transport and to the Secretary of State (Deputy to the Minister),
RABEN[2], Director, General Directorate of Transport,
DUINDAM, Economiste,
VRIJ[1], Director General in charge of International Transport Policy,
VAN DER NOORDT[1], Deputy Director, International Transport Policy Transport,
NIEUWENHUIJSEN[1], Transport Adviser, Ministry of Foreign Affairs.

NORWAY

Mr. KYLLINGMARK[2], Minister of Transport,
Mr. LORENTZEN, Secretary-General (Deputy to the Minister).

PORTUGAL

Mr. DA SILVA RIBEIRO, Minister of Communications,
Mr. DE GUIMARAES LOBATO, Chairman of the Steering Board (Deputy to the Minister),
DA COSTA, Chief Engineer, General Directorate of Land Transport,
SEQUEIRA BRAGA, Ministerial Secretary,
OLIVEIRA MARTINS[1], Railway Administrative Officer,
DE SOUSA EIRO[1], Deputy-Director, General Directorate of Land Transport,
ABREU E SILVA[1], Director of Services, General Directorate of Land Transport.

1. Lisbon session.
2. Paris session.

SPAIN

Mr. SILVA MUNOZ[2], Minister of Public Works,
Mr. LORENZO-OCHANDO[1], General Director of Land Transport (Deputy to the Minister),
DE CRUYLLES[2], Director General of Land Transport (Deputy to the Minister),
MONREAL[2], General Technical Secretary,
MARTINEZ-CATENA, Engineer, Head of the Operating Division, General Directorate of Land Transport,
CANO[2], General Technical Secretary.

SWEDEN

Mr. O. PALME[2], Minister of Communications,
Mr. HERMANSSON, Minister of State,
PETERSON[2], Under-Secretary of State, Ministry of Communications (Deputy to the Minister),
WIBERG, Head of Section, Ministry of Communications,
FERM[1], Secretary,
FISCHER, Secretary.

SWITZERLAND

Mr. SPÜHLER, Member of the federal Council, Head of federal Department of Transport Communication and Power,
Mr. TAPERNOUX, Deputy to the Director, Federal Office of Transport (Deputy to the Minister),
MESSERLI[1], First Head of Section, Department of Justice and Police.

TURKEY

Mr. Mithat SAN[1], Minister of Communications,
Mr. G. YENAL[1], Chief Adviser, Ministry of Communications (Deputy to the Minister),
S. MENGILIBORU[1], Director of Road Safety, Ministry of Public-Works,
K. GUCYENER[1], Principal Private Secretary.

UNITED KINGDOM

The Rt. Hon. Mr. T. FRASER[1], Minister of Transport,
Mr. MILLS, Under-Secretary, Ministry of Transport (Deputy to the Minister),
HILL, Under-Secretary,
LAWMAN[1], Private Secretary to the Minister.

YUGOSLAVIA

Mr. NEORICIC[2], Secretary for Transport and Communications,
Mr. SENJANOVIC[1], Deputy, Secretary for Transport and Communications,
ILJADICA, Director, International Transport Division (Deputy to the Minister).
KACJAN[2], Director Federal, Secretariat for Transport and Communications.

Secretary : Mr. MANGE.

1. Lisbon session.
2. Paris session.

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