Dimensions and Weights of Highway Trailer Combinations and Trucks—1959

MALCOLM F. KENT and HOY STEVENS, respectively, Transportation Economist and Highway Transport Research Engineer, Traffic Operations Research Division, U.S. Bureau of Public Roads

•A SAMPLING of the weights of highway freight trailer combinations and single-unit trucks is obtained by the highway departments in most of the States each year. In 1959, data regarding the dimensions of weighed vehicles were also obtained. Some 90,200 trailer combinations and 65,100 single-unit trucks were weighed and measured. Both empty and loaded categories were included in these 155,300 vehicles.

The sample is believed to give a cross-section of the automotive freight vehicles in use in the continental United States. Insofar as trailer combinations are concerned, the data portray the trucking industry's use of sizes and weights under the legal limitations that had prevailed for several years before 1959.

A 1958 study was concerned with the demand for highway transportation (1) in terms of shipping densities of commodities and tons involved in the five principal media of transportation. A 1961 study contains estimates of the number of cargo vehicles in the United States by type (2). The present study shows a distribution of highway freight vehicles in terms of weights and dimensions.

DIMENSIONS AND WEIGHTS

Loaded and empty weights plus the dimensions of highway cargo vehicles were obtained at truck weighing stations in 46 States during 1959. From the information collected, the vehicles were classified as to axle arrangement and type of cargo body. The lengths of cargo bodies were arrayed in 2-ft intervals, which provided a means of investigating the cubic capacities of cargo bodies in use. The greatest number of cargo bodies was in the length range of 32 to 36 ft. Because new cargo bodies of 40 ft and over are entering the traffic stream, there is a need for repeating the size and dimensions study periodically so that data on cargo-carrying capabilities of highway vehicles can be kept current.

Loaded and empty weights were averaged and the results were used to compute average payloads by type and length of cargo body for each vehicle classification. Average empty weights of five different classes having van bodies increased in step intervals of approximately 5,000 lb. The five average empty weights were 2-axle, dual rear tire truck, 9,300 lb; 3-axle truck, 15,200 lb; 2-S1 trailer combination, 20,100 lb; 2-S2 trailer combination, 24,800 lb; and 3-S2 trailer combination, 30,700 lb. The 4-axle, (2-S2) tractor van semitrailer combination carried on the average about 6 tons more payload than the 3-axle (2-S1) tractor van semitrailer combination, and 2 tons less than the 5-axle (3-S2) tractor van semitrailer combination.

In the States limiting gross weights of motor vehicles to 56,000 to 60,000 lb, the greatest percentage of loaded gross weights occurred in the 50,000 to 60,000-lb weight bracket. But weights recorded in three other groups for States having higher gross weight limits had the greatest percentage in the 60,000 to 70,000-lb weight bracket.

About 1 percent of all trailer combinations and 1 percent of all 2- and 3-axle dual tire trucks exceeded 8.3 ft in width across the wheels and approximately 0.3 percent of the vehicles exceeded 13.5 ft in height.

Paper sponsored by Committee on Intercity Highway Freight Transportation.

Because of several factors, including multiple registration of trailers in more than one State, short trailers used principally in city service, and trailers dedicated to utility and construction purposes, no precise census of the number and type of trailers in highway freight service is available in the United States. It has been estimated (2) that in 1957 there were 712,129 semitrailers and full trailers in highway freight service in the United States used by 602,475 trailer combinations of all classes that were engaged in rural intercity highway freight transportation.

During the weight studies made in the summer of 1959, 90,200 trailer combinations and 65,100 single-unit trucks were weighed and measured. Of course, it is possible that some vehicles and combinations may have been weighed and measured more than once because of the location of the weight stations, the period of time for which the stations were used at a specific location, and the random selection of vehicles and combinations in transit. In spite of these factors, the sample is believed to give a cross-section of the dimensions and weights of highway freight vehicles on rural roads, and insofar as trailer combinations are concerned, the data portray the trucking industry's selection and use of sizes and weights under the legal limitations that had prevailed for several years before the 1959 weight studies.

Vehicle sizes and cubic capacities are not immediately changed to take advantage of permitted increases in sizes, although any additional weight allowances are used to advantage in hauling heavier commodities in the currently owned vehicles. Older and smaller vehicles usually are run until no longer serviceable, although a pressure develops for their earlier retirement and replacement when legal limitations are raised. Changes in legal limitations have waited for technological developments of vehicles, for changes in the characteristics and amount of highway freight transport, and for improvement in the design and construction of a State's highway system. The amount of highway freight has been increasing during the past several years, and this increase has caused the motor carriers to press for larger, more efficient vehicles.

During recent years, legal limitations have been raised to afford additional transport efficiency to motor carriers. The extent of these changes over the 5-yr period, May 1957 to July 1962, can be seen from the data in the Appendix showing the increases in lengths allowed for semitrailers. It is likely that the length limitations of 1957 and previous years had a controlling influence on the lengths of semitrailers recorded in the 1959 weight studies.

In 1957, 31 States permitted semitrailers 40 ft or more in length, although 18 States prevented the use of 40-ft semitrailers in long-haul interstate service. By 1962, this prohibition had been eased and only West Virginia (35 ft) and Georgia (39.5 ft) restricted trailer length to less than 40 ft. It was assumed that for States having no statutory limit on semitrailer length, the maximum possible semitrailer length was 7 ft less than the permitted length of the tractor semitrailer combination. This 7-ft dimension consists of a bumper-to-rear-of-cab dimension of 4 ft, obtainable for cab-over-engine tractors, plus 3 ft of clearance between rear of cab and nose of semitrailer.

DEFINITIONS OF TERMS

Identification of Classes of Trailer Combinations

Trailer combinations are classified according to the axle classification code developed by the Bureau of Public Roads. In this code, each digit represents the number of axles of one vehicle in the combination. The symbol for a trailer combination consists of two or three digits separated by hyphens. The first digit represents the power vehcile, either a truck tractor or a tractive truck (a truck equipped to carry a cargo body and haul a full trailer). An "S" before the second digit indicates a semitrailer, the power vehicle being a tractor. A digit appearing without an "S" in either the second or third position in a combination symbol indicates a full trailer. For example, 3-S2 is the code for a 3-axle tractor and a 2-axle semitrailer combination. Codes for double cargo body combinations include 3-2 for a 3-axle tractive truck and a 2-axle full trailer and 2-S1-2 for a 2-axle tractor plus a 1-axle semitrailer and a 2-axle full trailer. Such combinations are also known as double-trailer combinations.

Identification of Types of Cargo Bodies

Some 40 types of cargo bodies are defined in the SAE Standard Commercial Motor Vehicle Nomenclature (3). However, this number of cargo body types does not permit convenient recording and analysis in this study. Therefore, the following list of descriptive terms was used to group those various types of cargo bodies that have considerable similarity in cargo containing characteristics:

Flatbed—includes platform (flat or stake), low-bed, riggers or oil field, lumber, and express or pickup bodies.

Van—includes rack, livestock rack, canopy, open-top box, van fully enclosed, insulated van, furniture or moving van, bottler, multi-stop or standup delivery, and panel truck bodies.

Log—includes log, pulpwood, or pipe bodies.

Dump—includes grain, dump low side open box, and hopper bodies.

Tank—includes petroleum insulated and uninsulated, bituminous distributor, and other liquid product bodies (milk, acids, sugars, etc.).

Auto—consists of bodies designed primarily for transportation of other vehicles.

Concrete—consists of bodies designed and equipped to mix and agitate concrete.

Utility—includes wrecker, utility (transportation of tools, equipment, and supplies for construction, maintenance and repair purposes), garbage, refuse, lift and equipment (tank-mounted cranes, well drills, compressors, etc.) bodies.

Empty Vehicle Weight

The empty vehicle weight is the weight of a vehicle or trailer combination with fuel and without cargo or payload, but may include fixtures permanently carried to support the payload.

Loaded Gross Weight

The loaded gross weight is the empty weight plus the weight of the cargo or payload carried.

SUMMARY OF FINDINGS

1. Van and flatbed cargo bodies of semitrailer combinations were predominantly 35 ft in length in 1959. Because 40-ft cargo bodies have been constructed since 1959 in significant numbers, periodic study of cargo body lengths will be necessary to provide current information on highway freight movement usage and capabilities.

2. Van cargo bodies on 2-axle, 6-tire trucks averaged about 12 to 14 ft in length and van cargo bodies on 3-axle trucks averaged about 18 to 20 ft.

3. Empty weights of 3-S2, 2-S1-2 and 3-2 trailer combinations averaged about 30,000 lb, and 2-S1 and 2-S2 combinations averaged about 20,000 and 25,000 lb, respectively. Average empty vehicle weights of five different vehicle classes having van bodies increased in step intervals of approximately 5,000 lb as follows: 2-axle, 6-tire trucks, 9,300 lb; 3-axle trucks, 15,200 lb; 2-S1 combinations, 20,100 lb; 2-S2 combinations, 24,800 lb; and 3-S2 combinations, 30,700 lb.

4. Average empty weights of van body, single-unit trucks were panels, 6,100 lb; other 2-axle, 4-tire trucks, 6,400 lb; 2-axle, 6-tire trucks, 9,300 lb; and 3-axle trucks, 15,200 lb.

5. The 2-S2 combinations on the average had loaded gross weights of about 15,000 lb more than those of the 2-S1 combinations of the same body types. The loaded gross weights of 3-S2 combinations having flatbed, van, and tank cargo bodies were about 11,000 lb more on the average than those for the 2-S2 combinations having these same body types. The loaded gross weights of 2-S1-2 combinations were between 28,000 and 38,000 lb more than those for the 2-S1 combinations in the States where the double-cargo combinations are permitted.

6. The average payload of 10,800 lb carried by 2-S1 van combinations was 12,000 lb less than the payload carried by 2-S2 van combinations and 16,000 lb less than that carried by 3-S2 van combinations.

7. The number of trailer combinations having loaded gross weights of more than 60,000 lb was 35 percent of the total number of the loaded combinations weighed in States having a maximum gross weight limit of 60,000 lb, 41 percent in States having a maximum limit of 65,000 lb, 50 percent in States having a maximum of 76,000 lb, and nearly 64 percent in States having gross weight limits of 78,000 lb and over.

8. Approximately 10 percent of the total of the 2-axle, 6-tire trucks, the 3-axle trucks, and the trailer combinations exceeded the 8-ft width limitation, and only about 1 percent of the total exceeded the width of 8.3 ft.

9. Approximately 0.3 percent of all vehicles were more than 13 ft 6 in. in height. A greater percentage of the 3-S2 combinations exceeded this height than any of the other classes of vehicles.

LENGTHS OF CARGO BODIES IN THE TRAFFIC STREAM

In 1959, the length, height, and width of 155,300 commercial cargo vehicles were recorded as the vehicles were weighed at truck weighing stations in 46 States (District of Columbia included). Although at least one estimation (4) had been made by the motor vehicle industry of the lengths of van trailers by year of construction, no industry tabulation had been made available that would give a cross-section of cargo motor vehicles operating on the highways at any given time. Dimensional information concerning new vehicles going into the traffic stream each year would be useful, but a cross-section of the vehicles, old and new, on the highways would give a better understanding of highway freight movement capabilities.

Trailer Combinations

Figure 1 shows the percentage distributions of cargo body lengths and the cumulative percentage curves of 2-S1 trailer combinations. The 20,544 sample of 2-S1 combinations included flatbed, van, auto, log, dump, tank, and utility bodies. Fifty percent of the flatbed bodies were more than 30 ft long and 50 percent of the van bodies were more than 32 ft long. The greatest number of dump bodies were 16 to 18 ft long, and the greatest number of tanks were 24 to 26 ft long. Automobile carrier bodies were predominantly 34 to 36 ft long and log bodies were mostly 16 to 18 ft long. Utility body lengths were spread rather evenly over the wide range of 14 to 42 ft.

Figure 2 shows a rather marked difference in the distributions of cargo body lengths in 2-S2 combinations as compared to 2-S1 combinations. The distributions of cargo body lengths in 2-S2 combinations show a predominance of 32- to 34-ft lengths for all but vans and auto carriers, which were mostly 34 to 36 ft long. The data are for 1959, before 40-ft cargo bodies appeared in appreciable numbers.

Because 40-ft trailers have been built in considerable numbers since 1959, it would seem advisable to repeat this vehicle dimension study every 3 to 5 yr. Periodic studies would also reflect what lengths of cargo bodies were being retired from service. In this connection it should be noted that of the 34,405 van cargo bodies measured on 2-S2 combinations, approximately 36 percent were 34 to 36 ft long and 30 percent were 32 to 34 ft long, or two-thirds were 32 to 36 ft long. Forty-two and 47 percent, respectively, of the 2-S1 and 3-S2 van cargo bodies were 32 to 36 ft long.

The 3-S2 tractor semitrailer combinations had a marked predominance of 35-ft cargo bodies except for the log and utility body types (Fig. 3). Fifty-eight percent of the 3-S2 tanks were at least 36 ft long but only about 14 percent of the 2-S2 tanks and 1 percent of the 2-S1 tanks were 36 ft long. Length of cargo bodies for log trailers ranged evenly from 30 to 46 ft. Only thirty 5-axle tractor-utility-trailers were counted in this study and their cargo bodies were 28 to 42 ft long.

Although high percentages of the total double-cargo body combinations counted were weighed and measured, the samples were small compared to single-cargo body combinations. Figure 4 shows the data for the 3-2, tractive truck, full trailer combinations. Figure 5 shows the data for the 2-S1-2 tractor, semitrailer, full trailer combinations. The lengths of the semitrailers in the 2-S1-2 combinations were the same as the lengths of the full trailers in such combinations.

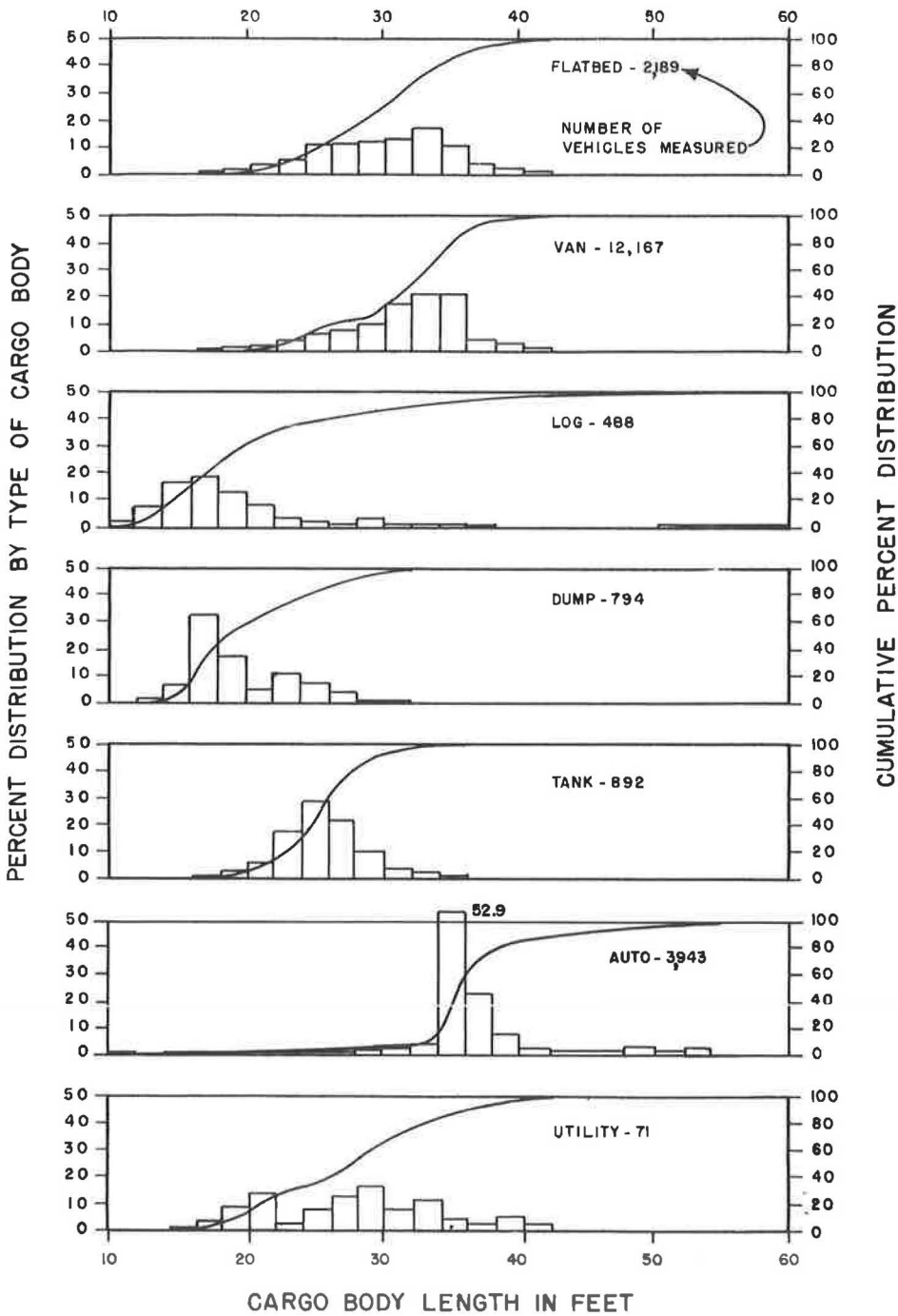

Figure 1. Percent distribution of cargo body lengths, 3-axle trailer combinations (2-S1).

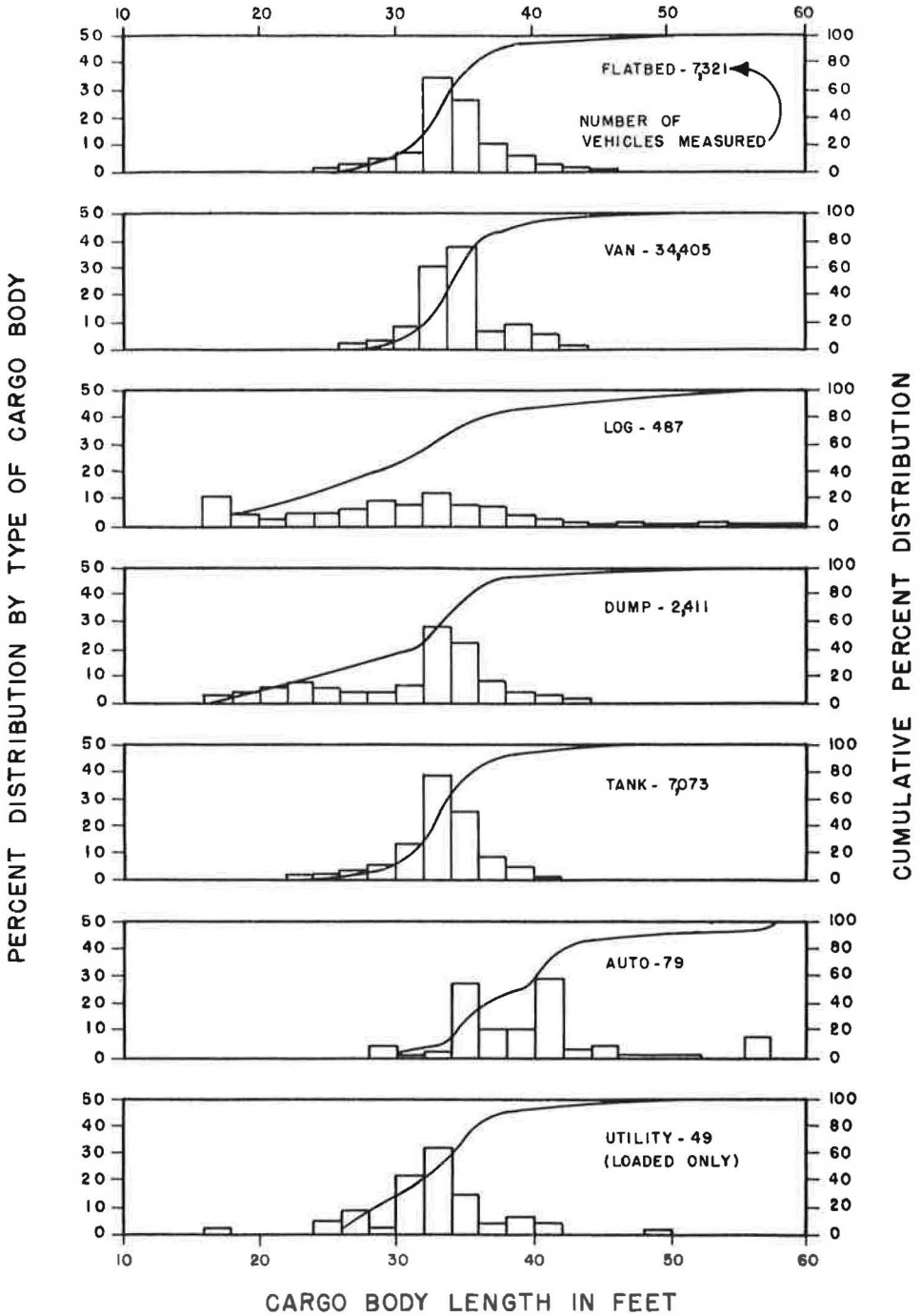

Figure 2. Percent distribution of cargo body lengths, 4-axle trailer combinations (2-S2).

TABLE 1

NUMBER AND PERCENT DISTRIBUTION OF TRAILER CARGO BODY LENGTHS IN TRAILER COMBINATIONS

Trailer Body Length (ft)	2-S1		2-S2		3-S2		3-2		2-S1-2	
	No.	%	No.	%	No.	%	No.	%	No.	%
					(a) Flatbed					
10-11.9	4	0.2	–	–	–	–	–	–	–	–
12-13.9	11	0.5	–	–	–	–	–	–	4	1.5
14-15.9	7	0.3	–	–	–	–	–	–	29	10.9
16-17.9	32	1.5	12	0.2	3	0.2	80	16.7	17	6.4
18-19.9	40	1.8	4	0.1	1	0.1	104	21.8	22	8.2
20-21.9	105	4.8	16	0.2	3	0.2	168	35.2	130	48.7
22-23.9	118	5.4	33	0.5	9	0.5	55	11.5	31	11.6
24-25.9	251	11.5	80	1.1	10	0.6	35	7.3	23	9.0
26-27.9	269	12.3	168	2.3	21	1.3	20	4.2	3	1.1
28-29.9	278	12.7	433	5.9	57	3.5	7	1.5	4	1.5
30-31.9	294	13.4	875	12.0	113	6.8	2	0.4	–	–
32-33.9	367	16.7	2,534	34.5	202	12.2	1	0.2	–	–
34-35.9	223	10.2	1,843	25.1	578	35.0	–	–	–	–
36-37.9	101	4.6	655	8.9	219	13.3	–	–	–	–
38-39.9	55	2.5	373	5.1	205	12.4	–	–	–	–
40-41.9	16	0.7	181	2.5	137	8.3	–	–	–	–
42-43.9	9	0.4	45	0.6	38	2.3	–	–	–	–
44-45.9	1	0.1	34	0.5	31	1.9	1	0.2	–	–
46-47.9	--	–	11	0.2	5	0.3	–	–	–	–
48-49.9	5	0.2	10	0.1	7	0.4	2	0.4	–	0.4
50-51.9	2	0.1	5	0.1	4	0.2	–	–	–	–
52 and over	1	0.1	9	0.1	9	0.5	3	0.6	2	0.7
Total	2,189	100.0	7,321	100.0	1,652	100.0	478	100.0	265	100.0
					(b) Van					
10-11.9	8	0.1	–	–	–	–	–	–	–	–
12-13.9	9	0.1	–	–	–	–	–	–	1	0.2
14-15.9	15	0.1	–	–	–	–	–	–	3	0.8
16-17.9	69	0.6	21	0.1	12	0.1	38	19.0	6	1.5
18-19.9	83	0.7	14	0.1	10	0.1	9	4.5	8	2.0
20-21.9	314	2.6	38	0.1	12	0.1	19	9.5	44	11.2
22-23.9	490	4.0	91	0.3	10	0.1	19	9.5	100	25.3
24-25.9	774	6.4	117	0.3	21	0.2	29	14.5	220	55.8
26-27.9	947	7.8	199	0.6	13	0.1	38	19.0	5	1.3
28-29.9	1,200	9.9	799	2.3	36	0.4	27	13.5	3	0.8
30-31.9	2,011	16.5	3,212	9.3	134	1.4	2	1.0	–	–
32-33.9	2,561	20.9	10,329	30.0	744	7.8	1	0.5	–	–
34-35.9	2,543	20.9	12,386	35.9	3,786	39.5	3	1.5	2	0.5
36-37.9	518	4.3	2,233	6.5	793	8.3	1	0.5	–	–
38-39.9	416	3.4	2,941	8.5	2,129	22.2	1	0.5	1	0.3
40-41.9	158	1.3	1,648	4.8	1,386	14.4	4	2.0	–	–
42-43.9	28	0.2	259	0.8	230	2.4	–	–	–	–

Total	12,167	100.0	34,405	100.0	9,593	100.0	200	100.0	394	100.0
				(c) Log						
10-11.9	13	2.7	–	–	–	–	–	–	–	–
12-13.9	42	8.6	–	–	–	–	–	–	–	–
14-15.9	84	17.2	–	–	–	–	–	–	–	–
16-17.9	96	19.7	55	11.3	2	0.3	13	35.2	–	–
18-19.9	67	13.7	21	4.3	1	0.1	10	27.0	–	–
20-21.9	45	9.2	19	3.9	2	0.3	5	13.5	–	–
22-23.9	21	4.3	27	5.6	1	0.1	2	5.4	–	–
24-25.9	20	4.1	28	5.8	–	–	1	2.7	–	–
26-27.9	13	2.7	34	7.0	13	2.0	–	–	–	–
28-29.9	9	1.8	44	9.0	32	4.8	–	–	–	–
30-31.9	17	3.5	40	8.2	128	19.0	–	–	–	–
32-33.9	10	2.1	70	14.4	59	8.8	1	2.7	–	–
34-35.9	10	2.1	44	9.0	80	12.0	–	–	–	–
36-37.9	11	2.3	34	7.0	103	15.3	–	–	–	–
38-39.9	9	1.8	21	4.3	72	10.7	–	–	–	–
40-41.9	6	1.2	15	3.1	76	11.3	–	–	–	–
42-43.9	3	0.6	8	1.6	48	7.1	–	–	–	–
44-45.9	2	0.4	4	0.8	30	4.8	–	–	–	–
46-47.9	2	0.4	6	1.2	9	1.3	2	5.4	–	–
48-49.9	2	0.4	4	0.8	3	0.4	1	2.7	–	–
50-51.9	–	–	2	0.4	9	1.3	–	–	–	–
52 and over	6	1.2	11	2.3	3	0.4	2	5.4	–	–
Total	488	100.0	487	100.0	671	100.0	37	100.0	–	–
				(d) Dump						
10-11.9	1	0.1	–	–	–	–	–	–	–	–
12-13.9	8	1.0	–	–	–	–	–	–	1	0.4
14-15.9	58	7.3	–	–	–	–	–	–	3	1.4
16-17.9	267	33.6	76	3.2	–	–	20	26.3	57	25.6
18-19.9	133	16.8	88	3.6	8	1.2	7	9.2	85	38.1
20-21.9	69	8.7	141	5.8	20	2.9	27	35.6	59	26.5
22-23.9	39	4.9	155	6.4	26	3.8	8	10.5	17	7.6
24-25.9	90	11.3	120	5.0	20	2.9	12	15.8	–	–
26-27.9	57	7.2	100	4.1	14	2.0	–	–	–	–
28-29.9	31	3.9	101	4.2	19	2.7	–	–	–	–
30-31.9	16	2.0	147	6.1	43	6.2	–	–	–	–
32-33.9	12	1.5	659	27.3	104	15.0	–	–	–	–
34-35.9	3	0.4	496	20.6	221	31.9	–	–	–	–
36-37.9	7	0.9	173	7.2	95	13.7	–	–	1	0.4
38-39.9	2	0.3	82	3.4	63	9.0	1	1.3	–	–
40-41.9	1	0.1	40	1.7	36	5.2	–	–	–	–
42-43.9	–	–	21	0.9	13	1.9	–	–	–	–
44-45.9	–	–	6	0.2	6	0.9	1	1.3	–	–
46-47.9	–	–	2	0.1	2	0.3	–	–	–	–
48-49.9	–	–	2	0.1	2	0.3	–	–	–	–
50-51.9	–	–	–	–	–	–	–	–	–	–
52 and over	–	–	2	0.1	1	0.1	–	–	–	–
Total	794	100.0	2,411	100.0	693	100.0	76	100.0	223	100.0

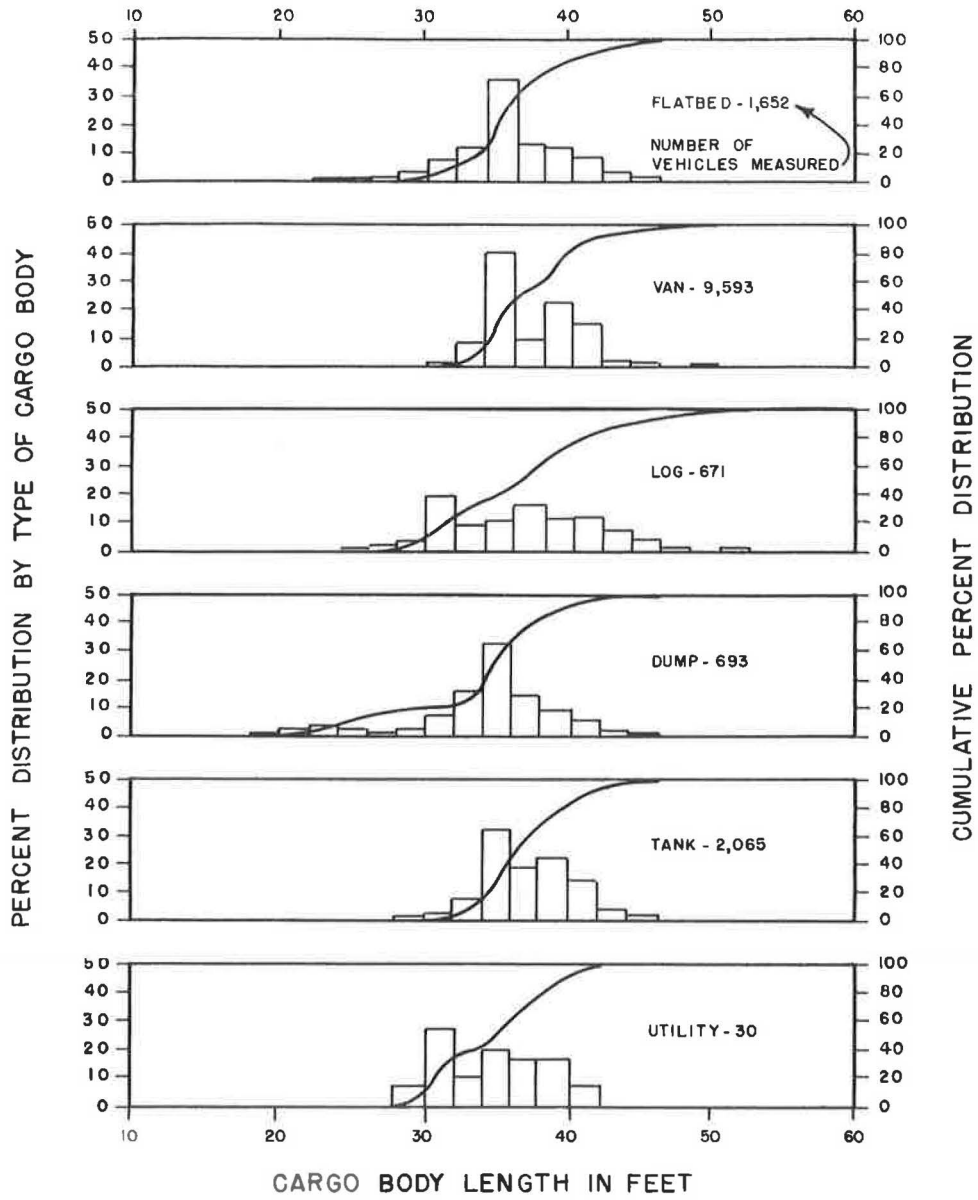

Figure 3. Percent distribution of cargo body lengths, 5-axle tractor trailer combinations (3-S2).

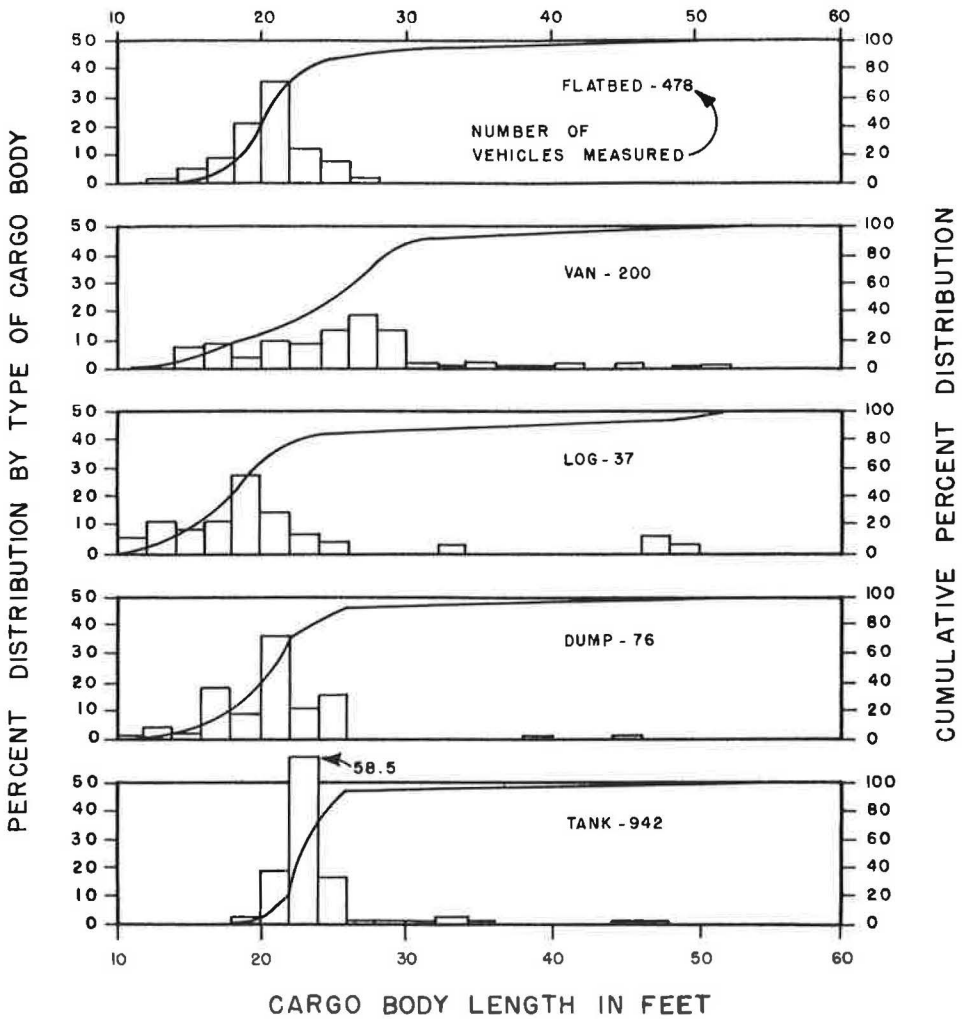

Figure 4. Percent distribution of cargo body lengths, tractive truck full trailer combinations (3-2).

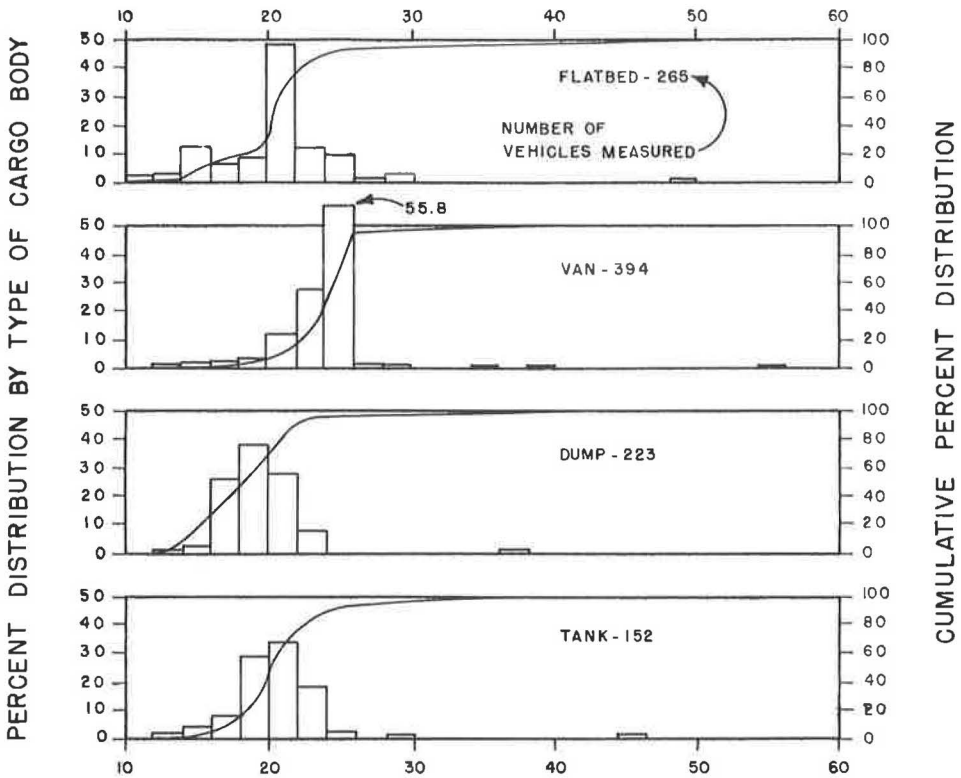

Figure 5. Percent distribution of cargo body lengths, tractor semitrailer full trailer combinations (2-S1-2).

Most of the flatbed, full trailers used in the 3-2 and 2-S1-2 trailer combinations were 20 ft long. Ninety percent of the van, full trailers in the 3-2 combinations were less than 30 ft long, and 97 percent of the van, full trailers used in the 2-S1-2 combinations were less than 26 ft long. Dump, full trailers were mostly 16 to 22 ft long. Tank, full trailers in 3-2 combinations were mostly 22 to 24 ft long, and lengths of the tank trailers in the 2-S-2 combinations were rather evenly distributed from 18 to 24 ft.

The basic data used for Figures 1 through 5 are given in Tables 1 and 2.

Figure 6 shows trailer length distributions of five different double-cargo body trailer combinations for 50 to 100 observations for each combination. The 2-1 class trailer combination has a limited local use, usually as a seasonal, auxiliary freight vehicle in agricultural areas. The trailers in such combinations were flatbed, balanced full trailers and were from 14 to 20 ft long. In the 2-2 class, with lengths ranging predominately only flatbed full trailers were observed, from 14 to 26 ft. Apparently this 2-2 class was not adequately sampled because other body types are used.

Also shown are data collected for tractor semitrailer, and full trailer combinations (2-S2-2, 3-S1-1, and 3-S3-2), three classes of trailer combinations less frequently used than others. All had van full trailers. The 2-S2-2 van trailers were mostly 16 to 18 ft long. The lengths of van trailers in both 3-axle tractor combinations were spread over a wide range from 14 to 40 ft and most of them were from 18 to 26 ft long.

Cumulative percentage curves for all the 2-S1, 2-S2, 3-S2, 3-2 and 2-S1-2 combinations by cargo body type are shown in Figure 7 for comparison. Of course, some long cargo bodies reported may have been special permit vehicles. No predominant length of trailer for all purposes is indicated, and the predominant range of lengths varies from 20 to 40 ft.

TABLE 2

NUMBER AND PERCENT DISTRIBUTION OF TRAILER CARGO BODY LENGTHS IN TRAILER COMBINATIONS

Trailer Body Length (ft)	2-S1		2-S2		3-S2		3-2		2-S1-2	
	No.	%	No.	%	No.	%	No.	%	No.	%
				(a) Tank						
12-13.9	1	0.1	–	–	–	–	–	–	3	2.0
14-15.9	2	0.2	–	–	–	–	–	–	7	4.5
16-17.9	11	1.2	9	0.1	2	0.1	14	1.5	13	8.5
18-19.9	32	3.6	3	0.1	–	–	26	2.7	45	29.4
20-21.9	54	6.1	13	0.2	–	–	177	18.7	52	33.9
22-23.9	152	17.0	41	0.6	–	–	554	58.5	28	18.3
24-25.9	265	29.7	73	1.0	3	0.1	146	15.4	2	1.3
26-27.9	203	22.8	164	2.3	6	0.3	2	0.2	–	–
28-29.9	108	12.1	393	5.6	22	1.1	2	0.2	1	0.7
30-31.9	30	3.4	931	13.2	36	1.7	5	0.5	–	–
32-33.9	17	2.0	2,682	38.0	157	7.6	8	0.9	–	–
34-35.9	9	1.0	1,734	24.5	636	30.8	2	0.2	–	–
36-37.9	4	0.4	564	8.0	357	17.3	–	–	–	–
38-39.9	4	0.4	353	5.0	441	21.4	–	–	–	–
40-41.9	–	–	60	0.8	283	13.7	–	–	–	–
42-43.9	–	–	30	0.4	74	3.6	–	–	–	0.7
44-45.9	–	–	17	0.2	42	2.0	1	0.2	–	–
46-47.9	–	–	2	0.0	3	0.1	1	0.1	–	–
48-49.9	–	–	2	0.0	1	0.1	–	–	–	–
50-51.9	–	–	1	0.0	–	–	–	–	1	0.7
52 and over	–	–	1	0.0	2	0.1	4	0.9	–	–
Total	892	100.0	7,073	100.0	2,065	100.0	942	100.0	152	100.0
				(b) Auto						
10-11.9	4	0.1	–	–	–	–	–	–	–	–
12-13.9	1	0.0	–	–	–	–	–	–	–	–
14-15.9	2	0.1	–	–	–	–	–	–	–	–
16-17.9	3	0.1	–	–	–	–	–	–	–	–
18-19.9	2	0.1	–	–	–	–	–	–	–	–
20-21.9	5	0.1	–	–	–	–	–	–	–	–
22-23.9	2	0.1	–	–	–	–	–	–	–	–
24-25.9	8	0.2	–	–	–	–	–	–	–	–
26-27.9	11	0.3	–	–	–	–	–	–	–	–
28-29.9	19	0.5	3	3.8	–	–	–	–	–	–
30-31.9	22	0.6	1	1.3	–	–	–	–	–	–
32-33.9	138	3.5	2	2.5	–	–	–	–	–	–
34-35.9	2,090	52.9	21	26.6	–	–	–	–	–	–
36-37.9	855	21.6	8	10.1	–	–	–	–	–	–
38-39.9	282	7.2	8	10.1	–	–	–	–	–	–
40-41.9	81	2.0	22	27.8	–	–	–	–	–	–
42-43.9	32	0.8	2	2.5	–	–	–	–	–	–
44-45.9	34	0.9	3	3.8	–	–	–	–	–	–
46-47.9	85	2.2	1	1.3	–	–	–	–	–	–
48-49.9	127	3.2	1	1.3	–	–	–	–	–	–
50-51.9	44	1.1	1	1.3	–	–	–	–	–	–
52 and over	96	2.4	6	7.6	–	–	–	–	–	–
Total	3,943	100.0	79	100.0	–	–	–	–	–	–
				(c) Utility						
14-15.9	1	1.4	–	–	–	–	–	–	–	–
16-17.9	2	2.8	1	2.0	–	–	–	–	–	–
18-19.9	6	8.4	–	–	–	–	–	–	–	–
20-21.9	10	14.1	–	–	–	–	–	–	–	–
22-23.9	2	2.8	–	–	–	–	–	–	–	–
24-25.9	6	8.5	2	4.1	–	–	–	–	–	–
26-27.9	9	12.7	4	8.2	–	–	–	–	–	–
28-29.9	11	15.5	1	2.0	2	6.4	–	–	–	–
30-31.9	5	7.1	11	22.5	8	25.7	–	–	–	–
32-33.9	8	11.3	15	30.6	3	9.7	–	–	–	–
34-35.9	3	4.2	7	14.3	6	19.4	–	–	–	–
36-37.9	2	2.8	2	4.1	5	16.2	–	–	–	–
38-39.9	3	4.2	3	6.1	4	16.2	–	–	–	–
40-41.9	2	2.8	2	4.1	–	–	–	–	–	–
42-43.9	–	–	–	–	2	6.4	–	–	–	–
44-45.9	–	–	–	–	–	–	–	–	–	–
46-47.9	1	1.4	–	–	–	–	–	–	–	–
48-49.9	–	–	1	2.0	–	–	–	–	–	–
Total	71	100.0	49	100.0	30	100.0	–	–	–	–

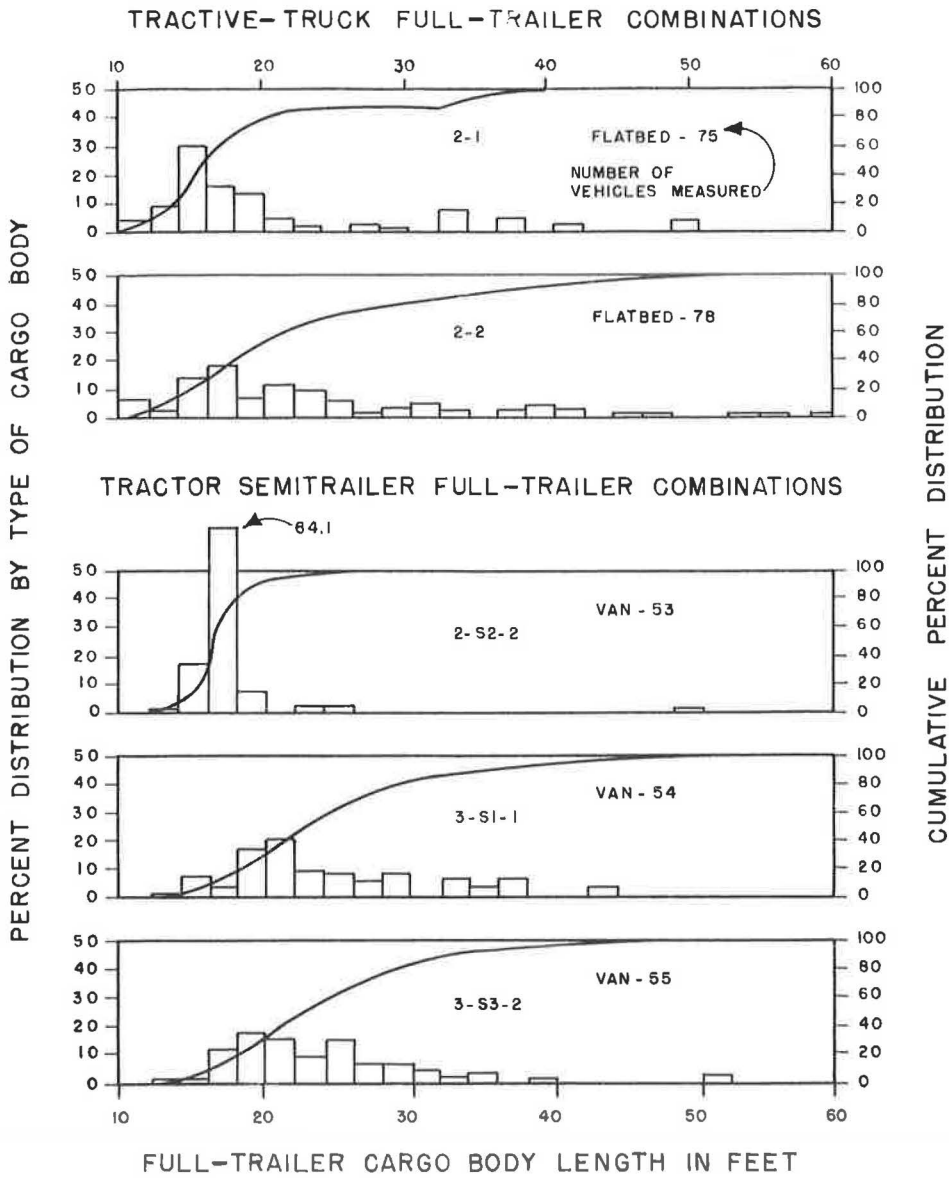

Figure 6. Percent distribution of cargo body lengths, miscellaneous vehicle class.

Trucks

Of the 268 pickup trucks, 85 percent had cargo bodies 6 to 10 ft long and the 614 panel trucks were evenly distributed as to length over the 2-ft intervals from 6 to 18 ft. (Fig. 8 and Table 3). Few panel and pickup trucks are found on rural roads; their primary use is in urban areas.

Two-axle motor trucks with 4 tires, other than panels and pickups, had cargo body measurements similar to the panels and pickups, most of the flatbed bodies were 6 to 10 ft long and the length of van bodies ranged from 6 to 20 ft (Fig. 8 and Table 3).

Two-axle motor trucks with 6 tires had cargo body lengths mostly in the range of 12 to 16 ft, except for dump trucks and utility vehicles. Dump bodies had average lengths

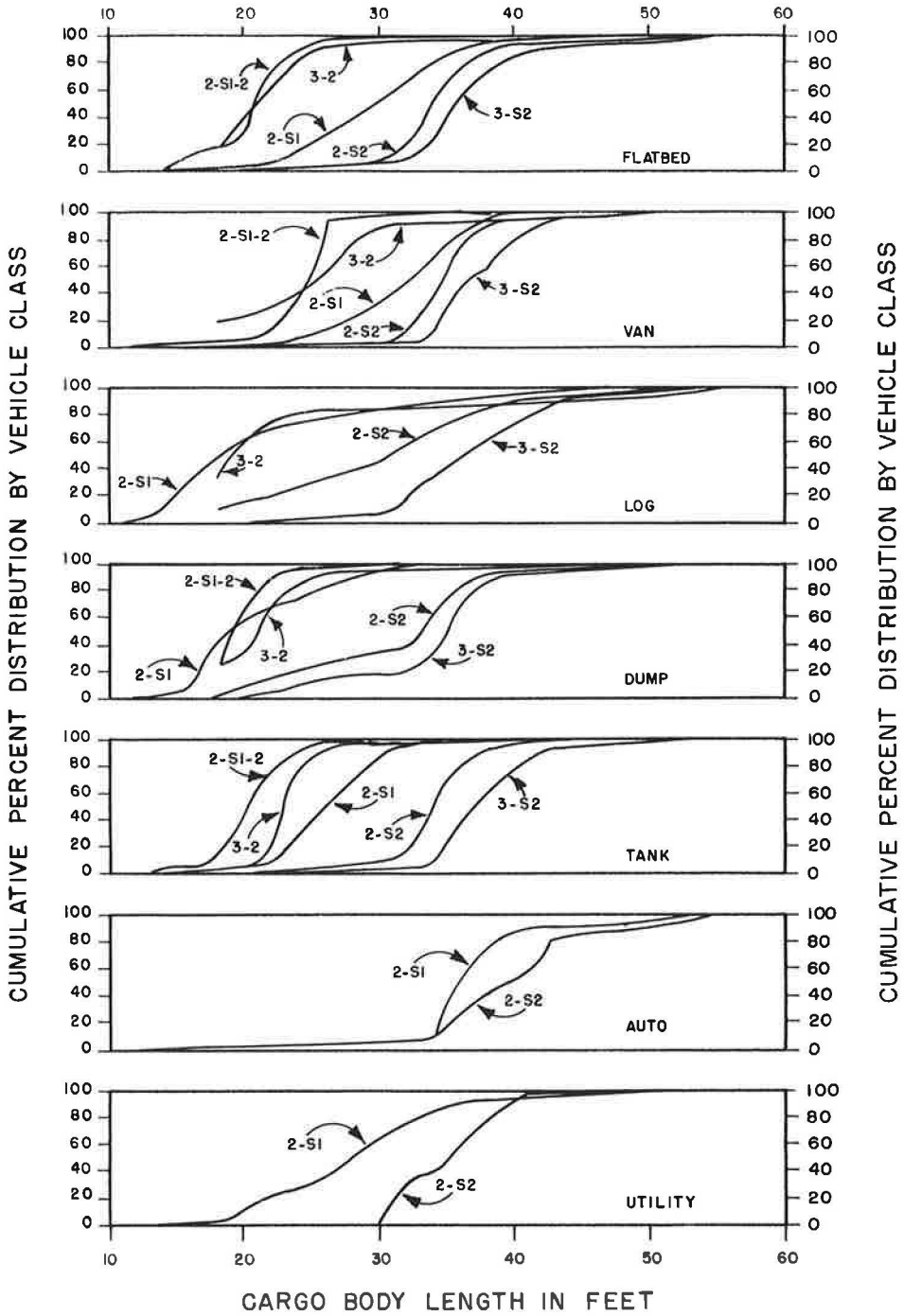

Figure 7. Cumulative percent distribution by vehicle class and cargo body length.

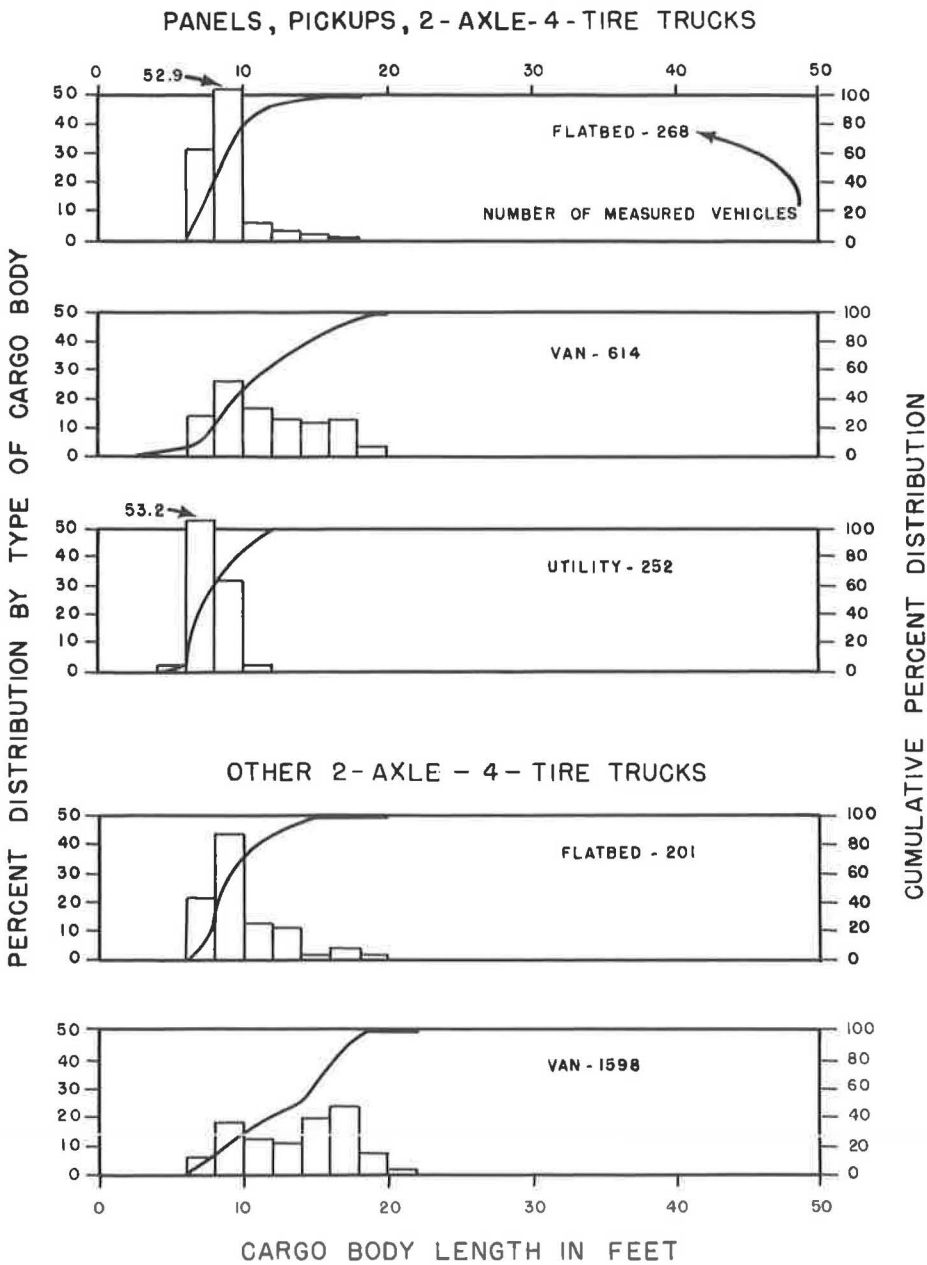

Figure 8. Percent distribution of cargo body lengths, 2-axle-4-tire motor trucks.

of about 10 ft and lengths of utility bodies were rather evenly distributed over the range of 8 to 16 ft (Fig. 9 and Tables 3 and 4).

Considerable differences were noted with respect to the length distributions of the different types of cargo bodies of 3-axle trucks (Fig. 10). Lengths of flatbed and van bodies were predominantly in the range of 16 to 22 ft, and log and tank bodies had lengths mostly in the 14- to 20-ft range. Nearly two-thirds of the dump trucks and 85 percent of the ready-mix concrete trucks were equipped with cargo bodies 12 to 16 ft long.

TABLE 3

NUMBER AND PERCENT OF LENGTH BY 2-FT INTERVALS OF CARGO BODIES IN SINGLE-UNIT TRUCKS

Cargo Body Length (ft)	Panels, Pickups, 4 Tires		Other 2-Axles, 4 Tires		2-Axles 6 Tires		3-Axle	
	No.	%	No.	%	No.	%	No.	%
Under 6.0	—	—	2	1.0	22	0.2	—	—
6-7.9	87	32.5	43	21.4	68	0.6	—	—
8-9.9	142	52.9	90	44.8	921	8.1	1	0.1
10-11.9	17	6.3	26	12.9	1,023	9.0	11	0.9
12-13.9	9	3.4	24	11.9	3,983	35.1	70	5.8
14-15.9	8	3.0	4	2.0	2,714	24.0	118	9.7
16-17.9	2	0.7	8	4.0	1,511	13.3	342	28.1
18-19.9	1	0.4	4	2.0	589	5.2	309	25.4
20-21.9	—	—	—	—	254	2.2	233	19.2
22-23.9	—	—	—	—	122	1.1	60	4.9
24-25.9	—	—	—	—	62	0.5	29	2.4
26-27.9	1	0.4	—	—	39	0.3	12	1.0
28-29.9	—	—	—	—	15	0.1	12	1.0
30-31.9	—	—	—	—	8	0.1	4	0.3
32-33.9	—	—	—	—	6	0.1	8	0.7
34-35.9	—	—	—	—	13	0.1	4	0.3
36-37.9	—	—	—	—	3	0.0	—	—
38-39.9	—	—	—	—	1	0.0	1	0.1
40-41.9	1	0.4	—	—	—	—	1	0.1
Total	268	100.0	201	100.0	11,354	100.0	1,215	100.0
				(b) Van				
Under 4.0	3	0.5	1	0.1	—	—	—	—
4-5.9	1	0.2	3	0.2	39	0.1	—	—
6-7.9	90	14.7	91	5.7	136	0.4	—	—
8-9.9	160	26.0	289	18.0	1,857	6.0	6	0.4
10-11.9	105	17.0	206	12.9	2,288	7.3	10	0.7
12-13.9	77	12.5	197	12.3	9,888	31.7	43	2.8
14-15.9	71	11.6	308	19.3	7,960	25.6	103	6.8
16-17.9	79	12.9	379	23.6	5,251	17.0	319	20.8
18-19.9	27	4.4	105	6.6	1,988	6.4	446	29.2
20-21.9	—	—	9	0.6	712	2.3	345	22.6
22-23.9	—	—	6	0.4	391	1.3	130	8.5
24-25.9	1	0.2	3	0.2	258	0.8	74	4.9
26-27.9	—	—	—	—	161	0.5	15	1.0
28-29.9	—	—	—	—	86	0.3	13	0.9
30-31.9	—	—	—	—	33	0.1	6	0.4
32-33.9	—	—	—	—	40	0.1	4	0.3
34-35.9	—	—	—	—	34	0.1	6	0.4
36-37.9	—	—	1	0.1	14	0.0	1	0.1
38-39.9	—	—	—	—	2	0.0	1	0.1
40-41.9	—	—	—	—	3	0.0	—	—
42-43.9	—	—	—	—	2	0.0	—	—
44-45.9	—	—	—	—	2	0.0	—	—
46-47.9	—	—	—	—	—	—	—	—
48-49.9	—	—	—	—	—	—	—	—
50-51.9	—	—	—	—	1	0.0	1	0.1
Total	614	100.0	1,598	100.0	31,146	100.0	1,523	100.0
				(c) Log				
Under 6.0	—	—	—	—	3	0.5	—	—
6-7.9	—	—	—	—	1	0.2	—	—
8-9.9	—	—	—	—	12	2.1	2	0.5
10.11.9	—	—	—	—	35	6.1	15	3.6
12-13.9	—	—	—	—	276	48.2	38	9.1
14-15.9	—	—	—	—	158	27.6	76	18.2
16-17.9	—	—	—	—	55	9.6	127	30.3
18-19.9	—	—	—	—	15	2.6	98	23.4
20-21.9	—	—	—	—	7	1.2	37	8.9
22-23.9	—	—	—	—	6	1.0	8	1.9
24-25.9	—	—	—	—	4	0.7	9	2.2
26-27.9	—	—	—	—	—	—	4	1.0
28-29.9	—	—	—	—	—	—	3	0.7
30-31.9	—	—	—	—	—	—	—	—
32-33.9	—	—	—	—	—	—	—	—
34-35.9	—	—	—	—	1	0.2	1	0.2
Total	—	—	—	—	573	100.0	418	100.0
				(d) Dump				
Under 6.0	—	—	—	—	20	0.3	—	—
6-7.9	—	—	—	—	228	3.2	—	—
8-9.9	—	—	—	—	2,952	41.7	75	2.8
10-11.9	—	—	—	—	1,587	22.4	444	16.5
12-13.9	—	—	—	—	1,338	19.0	1,028	38.3
14-15.9	—	—	—	—	598	8.4	642	24.0
16-17.9	—	—	—	—	245	3.5	225	8.4
18-19.9	—	—	—	—	76	1.1	167	6.2
20-21.9	—	—	—	—	16	0.2	60	2.2
22-23.9	—	—	—	—	6	0.1	26	1.0
24-25.9	—	—	—	—	3	0.0	8	0.3
26-27.9	—	—	—	—	3	0.0	2	0.1
28-29.9	—	—	—	—	1	0.0	1	0.0
30-31.9	—	—	—	—	—	—	2	0.1
32-33.9	—	—	—	—	2	0.0	3	0.1
34-35.9	—	—	—	—	4	0.1	1	0.0
36-37.9	—	—	—	—	1	0.0	—	—
38-39.9	—	—	—	—	1	0.0	1	0.0
Total	—	—	—	—	7,081	100.0	2,685	100.0

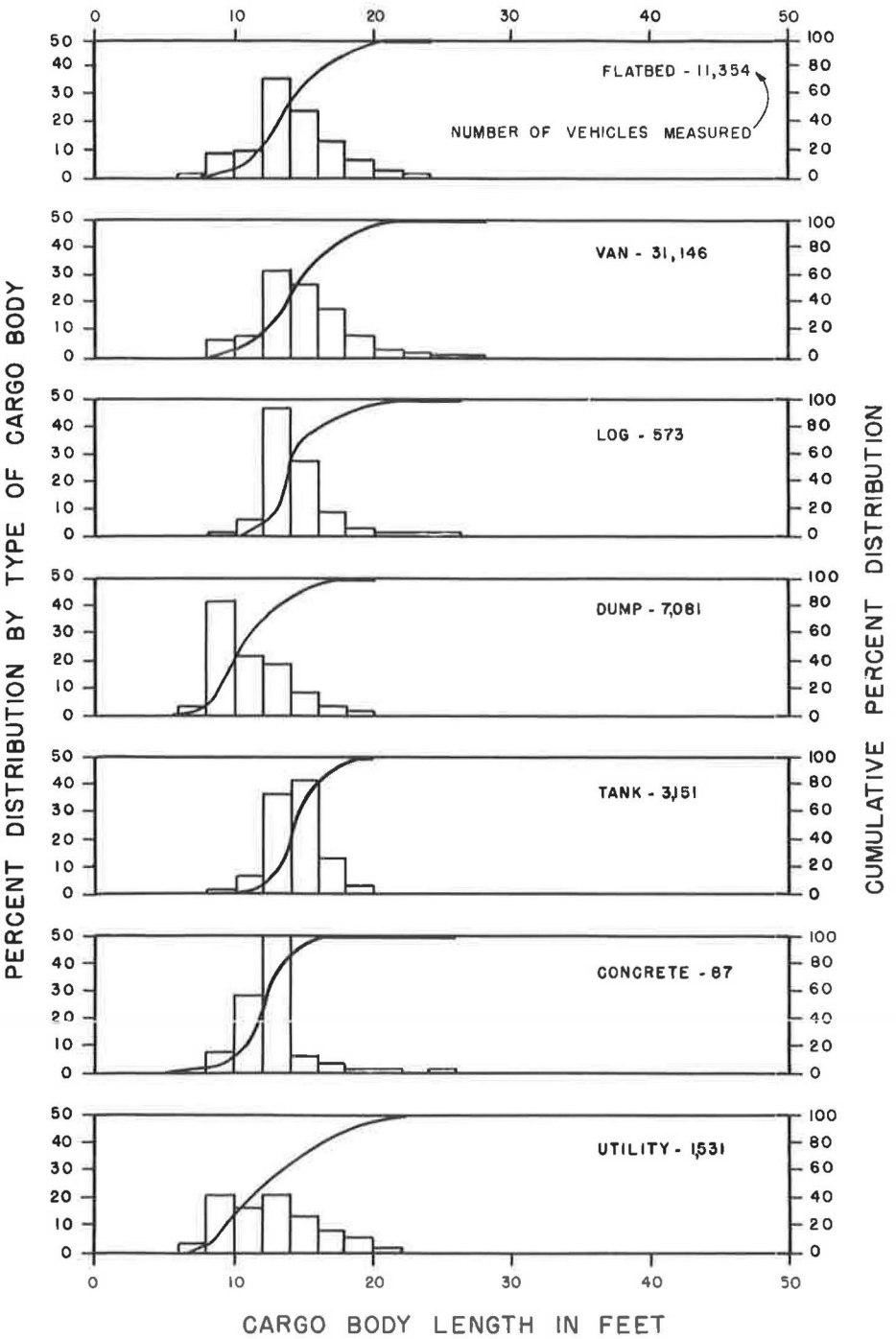

Figure 9. Percent distribution of cargo body lengths, 2-axle-6-tire motor trucks.

TABLE 4

NUMBER AND PERCENT OF LENGTH BY 2-FT INTERVALS, OF CARGO BODIES OF SINGLE-UNIT TRUCKS

Cargo Body Length (ft)	Panels, Pickups, 4 Tires		2-Axles 6 Tires		3-Axle	
	No.	%	No.	%	No.	%
			(a) Tank			
Under 6.0	–	–	4	0.1	–	–
6-7.9	–	–	3	0.1	–	–
8-9.9	–	–	45	1.4	–	–
10-11.9	–	–	166	5.3	3	1.1
12-13.9	–	–	1,115	35.4	14	5.4
14-15.9	–	–	1,315	41.8	66	25.3
16-17.9	–	–	396	12.6	71	27.2
18-19.9	–	–	78	2.5	63	24.2
20-21.9	–	–	11	0.3	35	13.4
22-23.9	–	–	6	0.2	4	1.5
24-25.9	–	–	6	0.2	3	1.1
26-27.9	–	–	1	0.0	–	–
28-29.9	–	–	–	–	–	–
30-31.9	–	–	–	–	1	0.4
32-33.9	–	–	1	0.0	–	–
34-35.9	–	–	2	0.1	–	–
36-37.9	–	–	1	0.0	–	–
38-39.9	–	–	–	–	–	–
40-41.9	–	–	1	0.0	–	–
42 and over	–	–	–	–	1	0.4
Total	–	–	3,151	100.0	261	100.0
			(b) Concrete			
6-7.9	–	–	1	1.1	–	–
8-9.9	–	–	6	7.0	3	0.3
10-11.9	–	–	25	28.7	54	5.9
12-13.9	–	–	44	50.6	384	41.6
14-15.9	–	–	5	5.8	396	42.9
16-17.9	–	–	3	3.5	63	6.8
18-19.9	–	–	1	1.1	10	1.1
20-21.9	–	–	1	1.1	3	0.3
22-23.9	–	–	–	–	6	0.7
24-25.9	–	–	1	1.1	2	0.2
26-27.9	–	–	–	–	1	0.1
28-29.9	–	–	–	–	–	–
30-31.9	–	–	–	–	–	–
32-33.9	–	–	–	–	–	–
34-35.9	–	–	–	–	1	0.1
Total	–	–	87	100.0	923	100.0
			(c) Utility			
Under 6.0	4	1.6	22	1.4	–	–
6-7.9	134	53.2	56	3.7	–	–
8-9.9	81	32.1	335	21.9	13	5.6
10-11.9	28	11.1	269	17.6	23	9.9
12-13.9	4	1.6	340	22.2	34	14.7
14-15.9	–	–	214	14.0	28	12.1
16-17.9	1	0.4	124	8.1	30	12.9
18-19.9	–	–	83	5.4	39	16.8
20-21.9	–	–	24	1.6	24	10.3
22-23.9	–	–	13	0.8	9	3.9
24-25.9	–	–	18	1.2	10	4.3
26-27.9	–	–	14	0.9	5	2.2
28-29.9	–	–	5	0.3	5	2.2
30-31.9	–	–	6	0.4	1	0.4
32-33.9	–	–	2	0.1	1	0.4
34-35.9	–	–	3	0.2	1	0.4
36-37.9	–	–	2	0.1	–	–
38-39.9	–	–	1	0.1	–	–
40-41.9	–	–	–	–	–	–
42-43.9	–	–	–	–	–	–
44-45.9	–	–	–	–	1	0.4
46-47.9	–	–	–	–	2	0.9
48-49.9	–	–	–	–	1	0.4
50 and over	–	–	–	–	5	2.2
Total	252	100.0	1,531	100.0	232	100.0

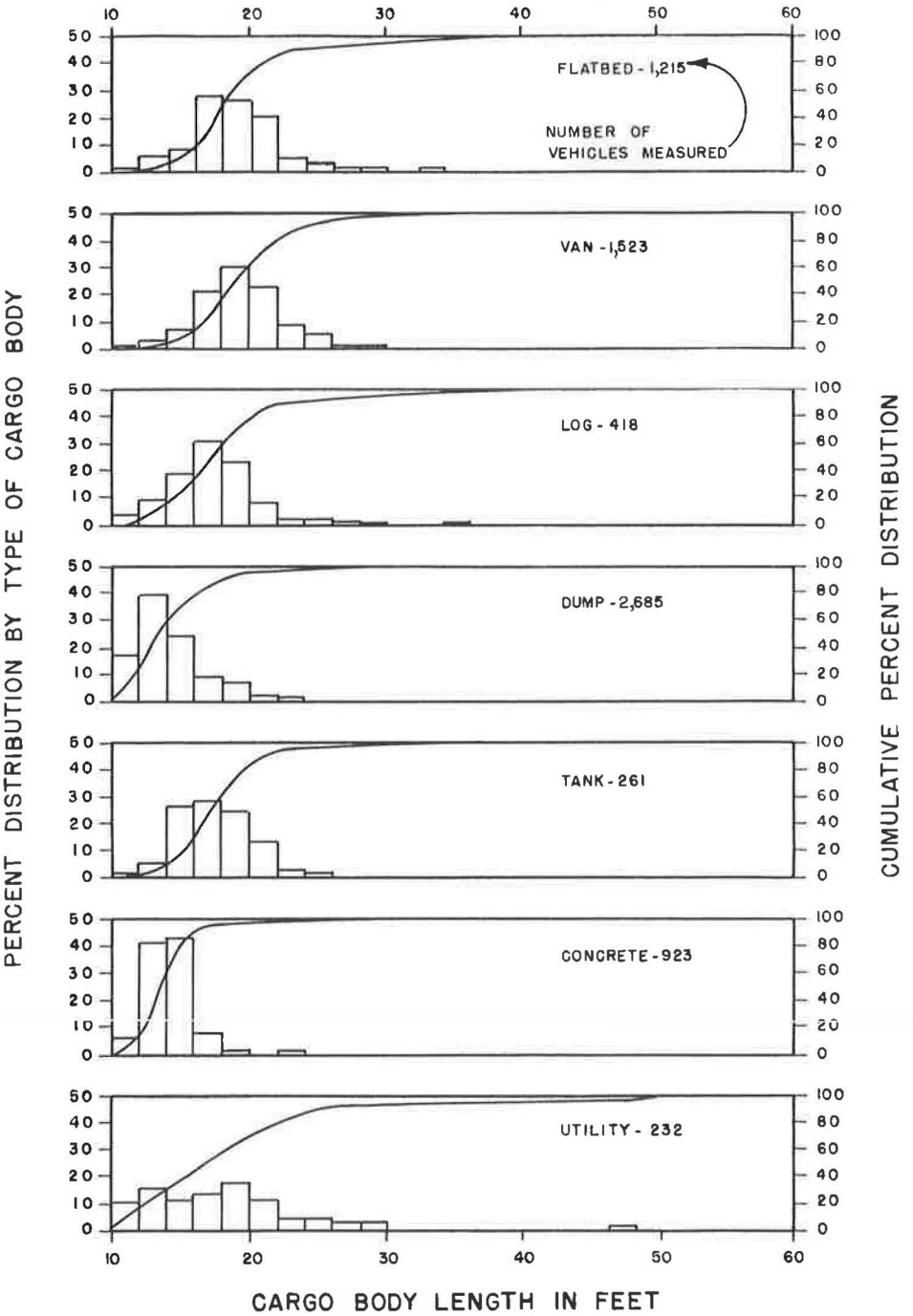

Figure 10. Percent distribution of cargo body lengths, 3-axle motor trucks.

EMPTY VEHICLE WEIGHTS

Trailer Combinations

Empty weights were obtained for 27,144 trailer combinations for the five classifications for which the greatest number of trailer combinations occurred—2-S1, 2-S2, 3-S2, 3-2, and 2-S1-2 (Table 5). The weighted average empty weights by class of combination and type of cargo body provide a means of computing average payload weights when average loaded gross weights are known. The empty 2-S2 combinations weighed on the average about 5,000 lb more than the 2-S1 empty van combinations and about 5,000 lb less than the 3-S2 empty van combinations. Other variations in empty weights between these three classes of combinations and the six types of cargo bodies are given in Table 5. Sometimes the sample of weighed vehicles was small. Averages computed from these data are not as reliable as data might have been if a larger sample could have been obtained. The sizes of the samples are shown in Table 5 for use in evaluating the reliability of the data for average empty weights.

In Figure 11, average empty weights of trailer combinations have been arranged by cargo body types to show the variations in weight of the same body type for the five main combination classes. Similarly, in Figure 12, average empty weights have been arranged by the five main combination classes to show the variations in weight for the different cargo body types.

Single-Unit Trucks

The four classes of single-unit trucks weighed and measured were panels and pickups having 4 tires, other 2-axle trucks having 4 tires, 2-axle trucks having 6 tires, and 3-axle trucks (Table 6). The total number of these trucks observed was 23,844. Empty weights averaged 4,800 lb for pickup trucks and 6,100 lb for panel trucks. Other 2-axle, 4-tire trucks having van cargo bodies on the average had empty weights of only about 300 lb more than the panel trucks. Two-axle trucks equipped with six tires had empty weights that were approximately 3,000 lb heavier than trucks having four tires. Empty weights of 3-axle flatbed, van, and dump trucks ranged between 15,000 and 16,000 lb and empty weights of tank trucks averaged about 19,000 lb. Ready-mixed concrete trucks and utility trucks weighed empty 22,500 and 25,000 lb, respectively. Equipment was a regular part of their empty weight.

In Figure 13, average empty weights have been arranged by cargo body types to show the differences in weight of the same body type for the four different vehicle classes. Similarly, in Figure 14, average empty weights have been arranged by the four vehicle classes to show the differences in weights for the eight cargo body types.

AVERAGE LOADED AND PAYLOAD WEIGHTS OF TRAILER COMBINATIONS

The average empty weights in Table 5 were subtracted from average loaded gross weights in Tables 7 and 8 giving average payload weights in Table 9. Although there is little correlation between cargo body length and average payload weights, there is a considerable difference in average payload weights between different combination classes and cargo body types. For instance, the 2-S1 flatbed combinations had an average payload of 15,000 lb but 2-S1 van combinations carried average payloads of about 11,000 lb. Corresponding average payloads for the 2-S2 combinations were 24,000 and 22,000 lb and for the 3-S2 combinations 28,000 and 26,000 lb.

The 2-S2 combinations for all body types, except auto and utility, operated with gross vehicle weights, on the average, of about 15,000 lb more than 2-S1 combinations with the same body types. The 3-S2 combination having flatbed, van, and tank body types operated with gross vehicle weights between 10,000 and 12,000 lb more, on the average, than the 2-S2 combinations having these body types. The 3-S2 dump combination gross vehicle weights, on the average, were 14,000 lb heavier than the 2-S2 dump combination.

In those States where the double-cargo body combination is permitted, the addition of a 2-axle full trailer to the 2-S1 combination resulted in an average increase in gross vehicle weight of 28,000 lb for the flatbed and van combinations and gross vehicle weights of 36,000 to 38,000 more pounds for the dump and tank combinations.

TABLE 5

AVERAGE EMPTY WEIGHTS OF TRAILER COMBINATIONS BY LENGTH AND TYPE OF CARGO BODY

Trailer Body Length (ft)	Body Type (wt. in lb)						
	Flatbed	Van	Log	Dump	Tank	Auto	Utility
				(a) 2-S1			
10-11.9	–	23,600	11,900	–	–	–	–
12-13.9	–	17,500	9,400	18,300	–	–	–
14-15.9	13,000	17,900	9,600	15,500	–	20,000	–
16-17.9	14,200	18,000	10,500	16,800	18,100	12,600	21,400
18-19.9	17,300	18,300	10,700	15,700	19,500	–	12,200
20-21.9	15,200	17,800	10,800	15,400	19,900	–	21,200
22-23.9	13,500	18,600	12,300	16,400	20,200	–	–
24-25.9	17,000	18,900	13,400	15,600	19,400	17,700	19,600
26-27.9	13,700	19,100	11,300	15,300	22,100	20,600	17,000
28-29.9	17,500	19,300	–	16,500	22,200	18,100	22,700
30-31.9	13,300	20,400	12,400	16,700	22,700	20,100	22,100
32-33.9	13,800	20,400	15,000	20,000	21,100	19,900	20,000
34-35.9	13,200	21,200	11,700	–	17,000	19,000	–
36-37.9	17,300	20,900	12,300	16,800	–	18,600	–
38-39.9	17,300	21,300	11,000	–	19,800	19,300	21,800
40-41.9	13,400	21,500	13,500	–	–	20,100	17,800
42-43.9	20,400	23,400	–	–	–	19,300	–
44-45.9	13,000	17,900	–	–	–	19,000	–
46-47.9	–	22,300	10,100	–	–	20,400	–
48-49.9	–	–	10,400	–	–	21,300	–
50-51.9	–	–	–	–	–	20,700	–
52 and over	–	17,700	–	–	–	22,100	–
Weighted avg.	17,500	20,100	10,600	16,200	20,600	19,200	19,900
No. weighed	866	3,447	216	337	395	1,672	16
				(b) 2-S2			
Under 16	25,700	25,700	–	19,900	–	–	–
16-17.9	18,900	25,100	14,600	21,200	–	–	–
18-19.9	–	19,000	16,200	23,300	24,200	–	–
20-21.9	15,000	27,000	13,000	24,500	24,400	–	–
22-23.9	25,400	24,300	16,900	25,700	31,400	–	–
24-25.9	24,400	25,500	17,500	26,200	25,200	–	–
26-27.9	22,300	23,100	19,700	24,800	25,000	–	–
28-29.9	23,900	24,400	19,300	23,800	25,700	–	–
30-31.9	22,100	24,100	20,200	24,000	25,400	–	–
32-33.9	22,300	24,200	18,700	24,700	24,400	–	–
34-35.9	22,500	25,100	20,400	22,500	24,700	21,600	–
36-37.9	22,300	25,400	20,300	23,400	25,200	20,100	–

Under 18	37,800	–	–	–	–	–	–
18-19.9	32,800	17,100	–	26,300	–	–	–
20-21.9	38,000	23,400	22,100	28,300	–	–	–
22-23.9	28,400	27,300	–	27,900	–	–	–
24-25.9	35,600	30,800	–	30,500	–	–	–
26-27.9	31,600	22,300	24,600	29,300	32,200	–	–
28-29.9	32,300	25,400	–	34,900	29,200	–	32,900
30-31.9	29,100	30,000	19,800	27,300	33,000	–	25,500
32-33.9	30,800	28,000	–	27,400	30,900	–	25,000
34-35.9	31,000	31,100	24,500	29,300	27,600	–	25,800
36-37.9	32,500	30,500	22,500	27,500	28,800	–	–
38-39.9	30,300	31,400	24,000	28,200	27,700	–	–
40-41.9	28,500	31,500	–	27,200	25,000	–	–
42-43.9	31,900	33,300	–	26,600	26,700	–	–
44-45.9	31,100	30,600	–	25,600	25,800	–	–
46-47.9	30,500	30,600	–	31,000	–	–	–
48-49.9	–	34,400	–	23,000	–	–	–
50-51.9	–	39,600	–	–	–	–	–
52 and over	–	33,300	–	27,000	–	–	–
Weighted avg.	31,000	30,700	23,500	28,500	27,800	–	26,400
No. weighed	611	1,522	14	212	973	–	8

(d) 3-2

14-15.9	28,200	24,400	–	28,800	–	–	–
16-17.9	29,600	26,000	27,800	28,300	30,800	–	–
18-19.9	27,400	24,600	27,200	28,500	27,400	–	–
20-21.9	28,200	23,800	24,600	32,900	29,600	–	–
22-23.9	31,900	25,000	–	29,000	28,300	–	–
24-25.9	29,100	31,400	–	37,000	27,000	–	–
26-27.9	28,200	36,300	–	–	24,800	–	–
28-29.9	35,400	34,300	–	–	29,800	–	–
30-31.9	–	–	–	–	27,000	–	–
32-33.9	–	–	–	–	24,600	–	–
34-35.9	–	–	–	–	29,500	–	–
Weighted avg.	29,400	28,600	26,300	31,200	28,400	–	–
No. weighed	156	89	6	27	415	–	–

(e) 2-S1-2

Under 16	25,400	–	–	33,500	31,400	–	–
16-17.9	25,900	–	–	25,300	29,700	–	–
18-19.9	26,900	29,500	–	28,700	34,400	–	–
20-21.9	28,300	33,500	–	30,300	31,700	–	–
22-23.9	30,600	29,800	–	33,700	33,300	–	–
24-25.9	24,800	34,300	–	–	31,500	–	–
26-27.9	–	35,800	–	–	–	–	–
28-29.9	40,600	–	–	–	–	–	–
Weighted avg.	28,000	33,000	–	28,800	32,700	–	–
No. weighed	80	77	–	98	73	–	–

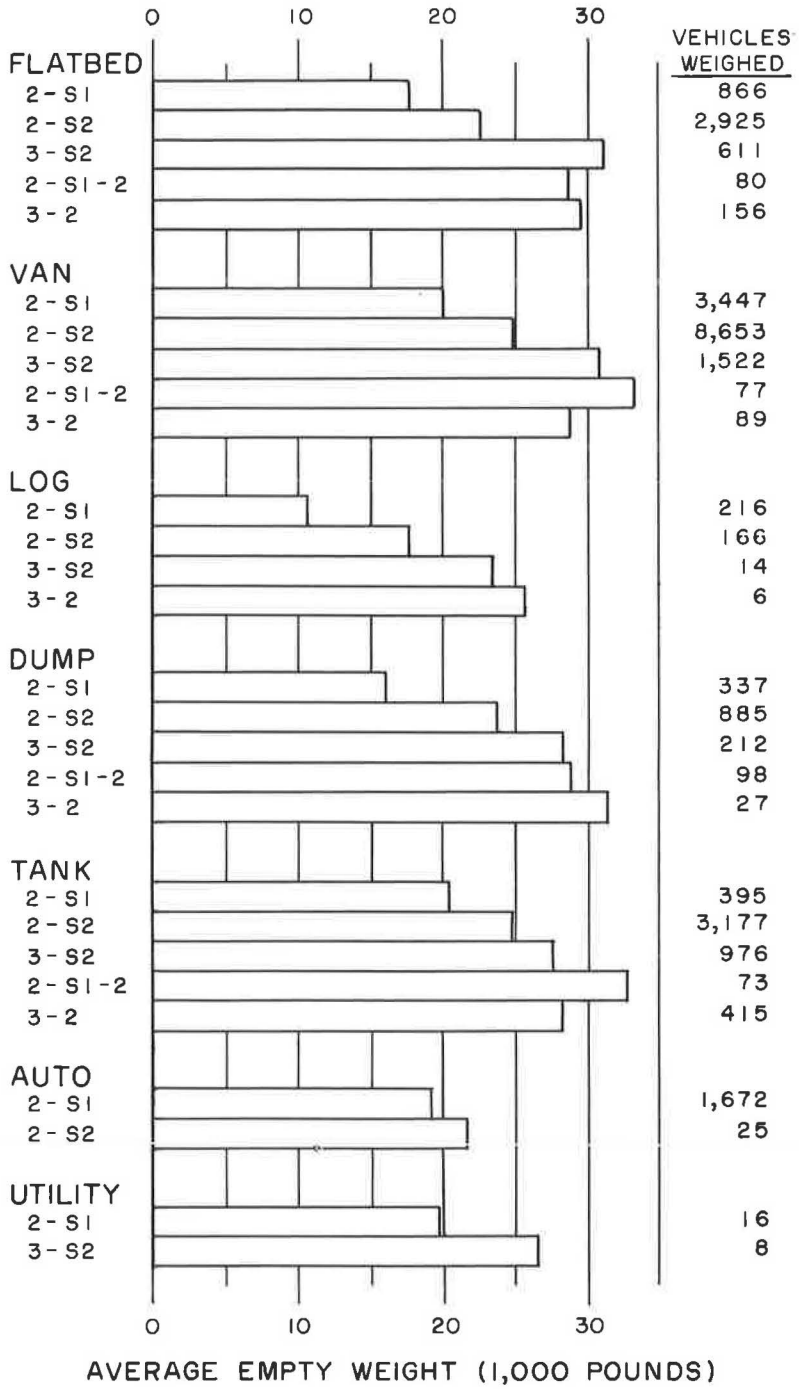

Figure 11. Average empty weights of trailer combinations by vehicle class and cargo body type.

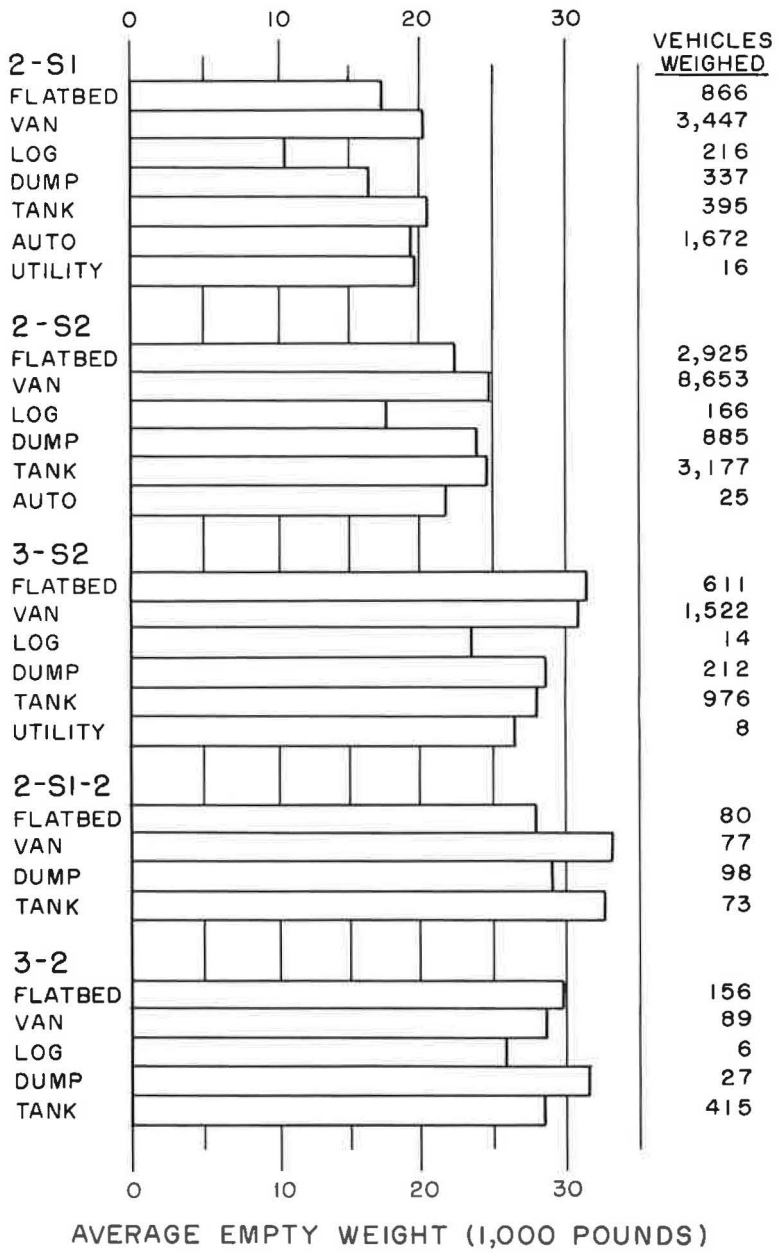

Figure 12. Average empty weights of trailer combinations by cargo body type and vehicle class.

TABLE 6

AVERAGE EMPTY WEIGHTS OF SINGLE-UNIT TRUCKS BY LENGTH AND TYPE OF CARGO BODY

Cargo Body Length (ft)	Body Type (wt. in lb)								Total Vehicles Weighed
	Flatbed	Van	Log	Dump	Tank	Auto	Concrete	Utility	
				(a) Panels, Pickups, 4 Tires					
6.0- 7.9	4,200	4,600	–	4,600	–	–	–	4,100	–
8.0- 9.9	4,800	5,400	–	5,800	–	–	–	5,100	–
10.0-11.9	5,400	5,700	–	5,600	–	–	–	5,100	–
12.0-13.9	7,000	6,600	–	8,400	–	–	–	–	–
14.0-15.9	7,200	7,900	–	–	–	–	–	–	–
16.0-17.9	10,000	10,400	–	–	–	–	–	–	–
18.0-19.9	–	6,400	–	–	–	–	–	–	–
Weighted avg.	4,800	6,100	–	5,700	–	–	–	4,900	–
No. weighed	144	218	–	20	–	–	–	26	408
				(b) Other 2-Axles, 4 Tires					
Under 6.0	–	6,500	–	–	–	–	–	–	–
6.0- 7.9	4,500	4,600	–	–	–	–	–	4,600	–
8.0- 9.9	5,000	5,000	–	–	–	–	–	6,500	–
10.0-11.9	5,500	5,800	–	–	–	–	–	10,000	–
12.0-13.9	8,400	7,300	–	–	–	–	–	5,200	–
14.0-15.9	6,200	6,300	–	–	–	–	–	–	–
16.0-17.9	7,700	6,600	–	–	–	–	–	–	–
18.0-19.9	7,200	6,800	–	–	–	–	–	–	–
20.0-21.9	–	7,600	–	–	–	–	–	–	–
22.0-23.9	–	8,600	–	–	–	–	–	–	–
Weighted avg.	5,400	6,400	–	–	–	–	–	7,500	–
Veh. weighed	110	423	–	–	–	–	–	11	544
				(c) 2-Axles, 6 Tires					
Under 6.0	7,400	7,900	9,800	9,200	8,800	5,900	–	6,000	–
6.0- 7.9	6,500	6,900	7,200	9,900	10,400	–	–	7,500	–
8.0- 9.9	6,200	6,600	7,200	9,900	8,100	–	11,800	8,600	–
10.0-11.9	7,100	7,600	7,200	9,900	9,700	–	14,000	9,600	–
12.0-13.9	7,700	8,800	7,200	9,100	10,600	8,800	14,200	10,500	–
14.0-15.9	8,400	9,800	7,500	9,700	11,400	9,600	15,400	12,600	–
16.0-17.9	9,200	10,300	8,700	9,500	13,400	12,500	13,300	12,200	–
18.0-19.9	9,900	11,000	10,400	11,500	14,400	–	–	13,400	–
20.0-21.9	10,400	11,800	9,100	9,400	16,100	–	–	12,100	–
22.0-23.9	9,600	11,900	8,000	–	15,600	–	–	5,900	–
24.0-25.9	11,000	12,700	7,600	–	19,200	–	22,000	10,800	–
26.0-27.9	9,400	12,700	–	12,600	–	–	–	10,900	–
28.0-29.9	10,200	13,700	–	–	–	–	–	8,400	–
30.0-31.9	10,800	14,200	–	–	–	–	–	10,800	–
32.0-33.9	11,000	13,200	–	6,500	–	–	–	–	–
34.0-35.9	9,800	16,500	–	8,700	11,000	–	–	17,500	
36.0-37.9	8,100	9,300	–	8,400	–	–	–	–	–
38.0-39.9	–	–	–	–	–	–	–	–	–
40.0-41.9	–	–	–	–	–	–	–	–	–
42.0-43.9	–	7,000	–	–	–	–	–	–	–
44.0-45.9	–	21,700	–	–	–	–	–	–	–
Weighted avg.	8,000	9,300	7,600	9,700	11,300	9,100	14,300	10,200	–
Veh. weighed	4,901	9,479	337	3,799	967	7	33	429	19,952
				(d) 3-Axle					
Under 6.0	–	–	25,100	16,400	–	–	–	24,700	–
6.0- 7.9	–	12,600	24,200	17,200	–	–	–	–	–
8.0- 9.9	–	16,700	–	12,400	–	–	26,200	25,500	–
10.0-11.9	14,300	12,800	22,500	13,800	–	–	20,900	22,300	–
12.0-13.9	14,300	15,700	22,500	16,900	13,500	–	20,900	20,400	–
14.0-15.9	13,500	15,000	24,000	17,600	16,400	–	23,400	23,000	–
16.0-17.9	13,900	13,600	13,700	18,200	18,500	–	26,600	23,100	–
18.0-19.9	14,400	15,300	16,900	16,800	19,000	–	20,500	26,100	–
20.0-21.9	15,400	15,300	22,200	16,400	27,100	–	–	18,100	–
22.0-23.9	21,400	17,000	20,800	17,300	23,400	–	20,300	36,400	–
24.0-25.9	20,400	15,200	12,900	14,200	25,600	–	–	40,200	–
26.0-27.9	30,400	15,700	15,100	17,700	–	–	26,700	29,800	–
28.0-29.9	35,400	15,200	18,800	–	–	–	–	21,400	–
30.0-31.9	–	19,400	–	13,800	–	–	–	–	–
32.0-33.9	18,000	14,700	–	15,400	–	–	–	–	–
34.0-35.9	12,200	17,000	–	–	–	–	25,800	–	–
36.0-37.9	–	–	–	–	–	–	–	–	–
38.0-39.9	–	28,000	–	–	–	–	–	–	–
40.0-41.9	–	–	–	–	–	–	–	–	–
42.0-43.9	–	–	–	–	–	–	–	–	–
44.0-45.9	–	–	–	–	–	–	–	–	–
46.0-47.9	–	–	–	–	–	–	–	52,700	–
48 and over	–	–	–	–	–	–	–	63,000	–
Weighted avg.	15,100	15,200	19,600	16,600	18,900	–	22,500	25,000	–
Veh. weighed	485	564	137	1,232	96	–	361	65	2,940
Total weighed	5,640	10,684	474	5,051	1,063	7	394	531	23,844

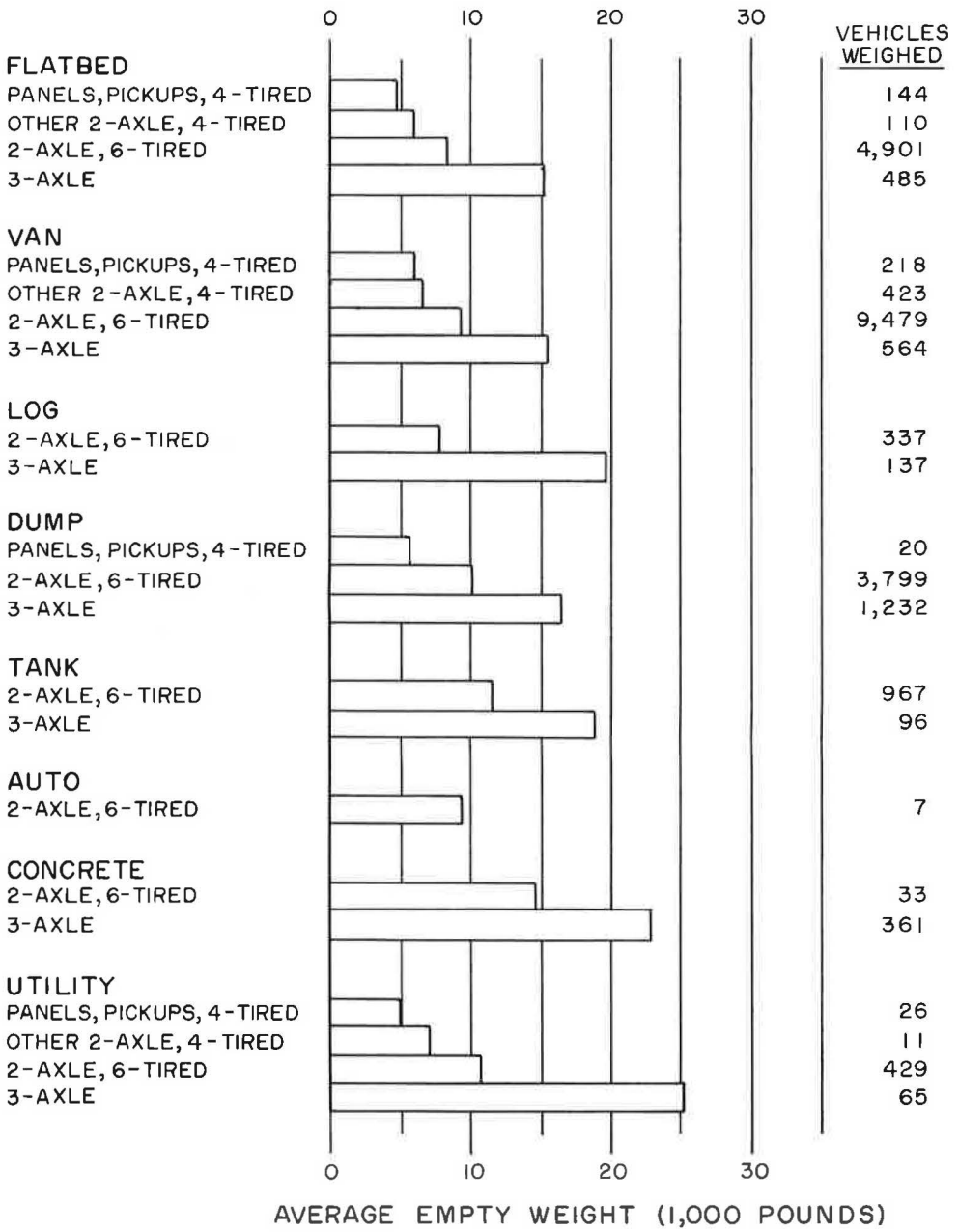

Figure 13. Average empty weights of single-unit trucks by vehicle class and cargo body type.

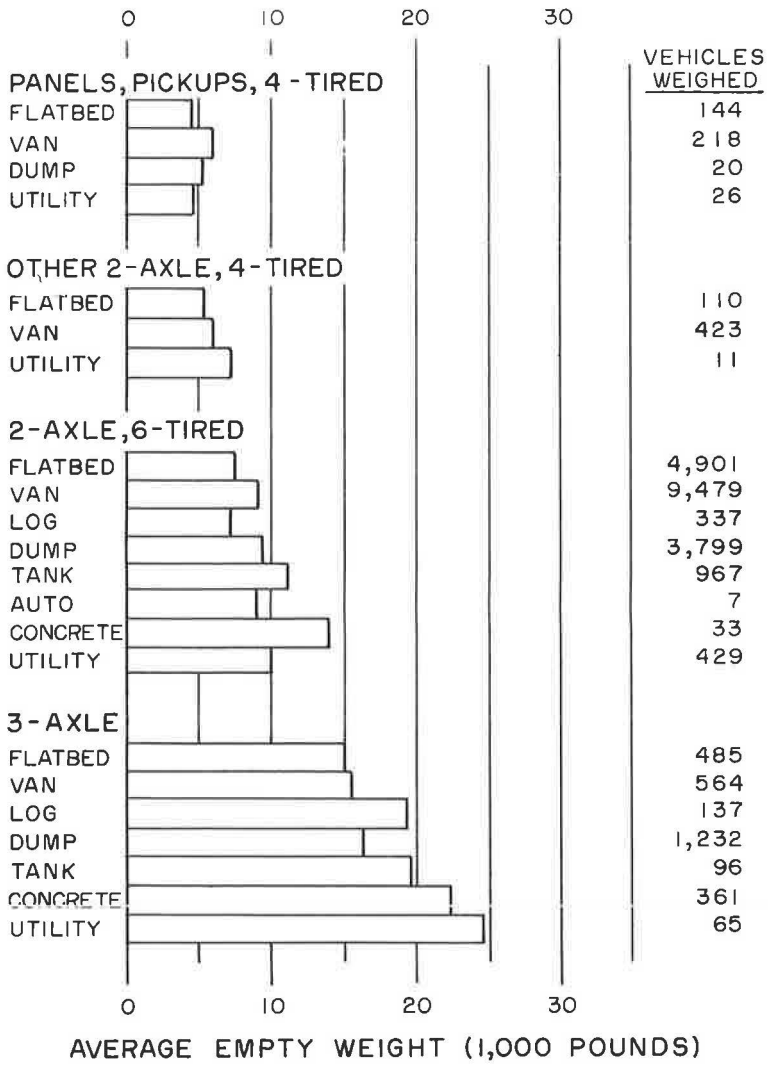

Figure 14. Average empty weights of single-unit trucks by cargo body type and vehicle class.

TABLE 7

AVERAGE LOADED WEIGHTS OF TRAILER COMBINATIONS BY LENGTH AND TYPE OF CARGO BODY

Trailer Body Length (ft)	Body Types (wt. in lb)						
	Flatbed	Van	Log	Dump	Tank	Auto	Utility
				(a) 2-S1			
Under 10.0	–	36,300	–	40,400	–	42,200	–
10.0-11.9	43,400	49,200	31,100	–	–	24,800	–
12.0-13.9	30,000	24,700	34,600	37,100	15,900	32,700	–
14.0-15.9	36,700	31,400	33,000	42,500	38,500	–	18,200
16.0-17.9	31,600	33,100	34,000	44,100	27,800	26,600	20,000
18.0-19.9	30,400	30,200	33,700	40,400	34,700	32,200	30,100
20.0-21.9	31,800	29,000	39,300	38,700	35,700	26,100	34,300
22.0-23.9	31,100	28,900	38,400	38,600	36,100	34,800	15,600
24.0-25.9	32,500	29,400	30,200	38,800	38,900	29,900	28,800
26.0-27.9	33,900	30,100	29,300	36,500	42,300	28,400	24,100
28.0-29.9	32,100	30,700	36,400	37,500	44,700	32,600	35,500
30.0-31.9	33,300	30,500	21,400	31,800	40,900	35,500	26,500
32.0-33.9	34,200	30,600	32,700	32,400	42,300	32,400	30,600
34.0-35.9	31,000	32,000	36,200	34,500	38,900	33,300	23,500
36.0-37.9	30,300	32,600	37,700	35,800	29,300	33,700	23,800
38.0-39.9	30,800	32,900	34,700	29,900	34,300	33,800	26,800
40.0-41.9	30,600	32,300	26,200	21,200	–	33,200	37,600
42.0-43.9	30,000	35,100	33,500	–	–	32,900	–
44.0-45.9	–	38,500	42,000	–	–	35,600	–
46.0-47.9	–	36,400	17,800	–	–	36,500	42,000
48.0-49.9	27,400	–	16,400	–	–	34,500	–
50.0-51.9	29,500	–	–	–	–	38,600	–
52 and over	46,600	26,400	31,900	–	–	39,600	–
Weighted avg.	32,500	30,900	33,700	40,300	39,400	33,800	29,200
Veh. weighed	1,323	8,720	272	457	497	2,271	55
				(b) 2-S2			
Under 10.0	–	19,200	–	–	35,700	–	–
10.0-11.9	46,500	37,300	–	–	–	–	–
12.0-13.9	25,900	38,700	32,300	52,200	50,900	–	–
14.0-15.9	18,600	35,400	47,800	48,800	54,500	–	–
16.0-17.9	16,000	–	49,600	54,500	–	–	7,800
18.0-19.9	36,200	51,900	43,800	58,800	56,600	–	–
20.0-21.9	45,000	46,100	41,400	55,500	46,600	–	–
22.0-23.9	48,300	48,700	46,000	60,600	52,200	–	–
24.0-25.9	44,900	46,500	46,800	57,400	51,600	–	33,800
26.0-27.9	45,500	46,800	50,500	56,700	53,400	–	27,400
28.0-29.9	47,000	45,700	47,300	55,700	53,200	45,900	–
30.0-31.9	47,800	47,100	51,400	52,600	54,400	–	38,800
32.0-33.9	47,700	47,300	49,000	53,000	55,100	50,700	39,000
34.0-35.9	47,700	47,400	48,600	53,000	55,700	30,200	48,800
36.0-37.9	46,000	47,300	51,200	56,400	56,600	25,500	38,600
38.0-39.9	46,200	47,200	49,700	56,000	59,000	36,300	40,800
40.0-41.9	46,000	48,300	48,800	52,400	55,800	46,800	41,200
42.0-43.9	46,300	48,500	55,100	55,400	56,300	32,600	–
44.0-45.9	46,400	49,100	43,200	59,000	58,400	13,600	–
46.0-47.9	43,500	47,000	54,700	51,800	58,700	–	–
48.0-49.9	36,500	46,600	46,700	62,400	65,800	–	34,200
50.0-51.9	37,900	48,700	46,400	–	67,800	47,400	–
52 and over	36,400	57,200	44,800	–	–	27,400	–
Weighted avg.	47,200	47,300	48,500	54,600	55,300	36,900	38,700
No. weighed	4,396	25,752	321	1,526	3,896	54	49
				(c) 3-S2			
Under 10.0	63,400	62,200	–	–	70,900	–	–
10.0-11.9	62,600	–	36,700	–	–	–	–
12.0-13.9	–	36,900	–	–	–	–	–
14.0-15.9	–	20,500	60,700	–	–	–	–
16.0-17.9	–	20,500	–	–	–	–	–
18.0-19.9	–	20,500	83,600	67,600	–	–	–
20.0-21.9	66,800	51,900	62,100	71,000	–	–	–
22.0-23.9	64,300	60,600	64,900	69,500	–	–	–
24.0-25.9	68,000	59,800	–	65,200	67,100	–	–
26.0-27.9	65,500	62,100	67,100	69,300	66,400	–	–
28.0-29.9	55,200	60,300	70,400	68,900	59,200	–	41,700
30.0-31.9	52,600	55,900	71,500	71,500	60,600	–	43,100
32.0-33.9	55,700	53,300	70,100	65,700	64,800	–	58,300
34.0-35.9	58,100	57,800	68,900	64,900	66,900	–	57,800
36.0-37.9	59,200	58,100	70,600	66,800	66,900	–	65,300
38.0-39.9	60,000	57,000	69,600	65,800	66,500	–	81,200
40.0-41.9	62,700	57,100	70,200	65,800	65,700	–	–
42.0-43.9	61,900	59,000	70,700	66,800	66,500	–	84,100
44.0-45.9	63,100	57,100	70,300	61,700	66,000	–	–
46.0-47.9	74,600	50,700	67,900	70,600	58,300	–	–
48.0-49.9	62,200	56,800	64,300	64,800	61,900	–	–
50.0-51.9	68,600	56,000	62,000	–	–	–	–
52 and over	62,600	59,200	60,200	–	–	–	–
Weighted avg.	58,800	57,100	70,000	68,500	66,300	–	61,400
No. weighed	1,041	8,071	657	481	1,089	–	22

TABLE 8

AVERAGE LOADED WEIGHTS OF TRAILER COMBINATIONS BY LENGTH AND TYPE OF CARGO BODY

Trailer Body Length (ft)	Body Types (wt. in lb)				
	Flatbed	Van	Log	Dump	Tank
			(a) 3-2		
Under 10.0	–	20,500	–	74,700	75,700
10.0-11.9	–	–	69,400	–	69,900
12.0-13.9	50,800	–	78,400	57,600	62,300
14.0-15. 9	63,700	30,500	66,900	–	70,600
16.0-17.9	64,600	48,400	74,400	68,300	67,200
18.0-19.9	68,700	62,000	71,900	75,200	66,000
20.0-21.9	68,900	57,000	73,400	77,200	72,200
22.0-23.9	62,100	51,600	65,200	74,800	71,200
24.0-25.9	57,600	61,300	74,600	88,700	72,800
26.0-27.9	63,000	67,500	–	–	72,600
28.0-29.9	71,800	68,700	–	–	72,300
30.0-31.9	46,100	16,400	–	–	76,000
32.0-33.9	–	50,100	73,800	–	78,500
34.0-35.9	–	47,000	–	–	76,000
36.0-37.9	–	74,500	–	–	–
38.0-39.9	–	59,500	–	60,400	–
40.0-41.9	–	20,500	–	–	–
42.0-43.9	–	–	–	–	–
44.0-45.9	–	–	–	68,800	73,400
46.0-47.9	–	–	67,800	–	55,700
48.0-49.9	63,800	–	64,500	–	–
50.0-51.9	–	45,500	–	–	–
52 and over	61,800	23,800	70,000	–	66,600
Weighted avg.	66,100	56,700	71,800	75,200	71,500
No. weighed	322	111	31	49	527
			(b) 2-S1-2		
10.0-11.9	78,000	–	–	–	–
12.0-13.9	66,800	72,200	–	74,000	58,600
14.0-15.9	66,300	61,700	–	77,000	51,100
16.0-17.9	72,600	48,500	–	78,000	70,200
18.0-19.9	65,200	62,200	–	78,600	83,000
20.0-21.9	56,200	59,000	–	75,700	70,800
22.0-23.9	67,600	57,100	–	88,700	80,200
24.0-25.9	64,500	59,400	–	–	80,600
26.0-27.9	62,600	69,400	–	–	–
28.0-29.9	–	47,700	–	–	40,400
30.0-31.9	–	–	–	–	–
32.0-33.9	–	–	–	–	–
34.0-35.9	–	46,500	–	–	–
36.0-37.9	–	–	–	71,400	–
38.0-39.9	–	59,100	–	–	–
– –	–	–	–	–	–
50.0-51.9	–	–	–	–	55,600
52 and over	84,300	69,300	–	–	–
Weighted avg.	61,600	58,600	–	78,300	74,600
No. weighed	185	317	–	125	79

TABLE 9

AVERAGE PAYLOAD WEIGHTS OF TRAILER COMBINATIONS BY LENGTH AND TYPE OF CARGO BODY

Trailer Body Length (ft)	Body Types (wt. in lb)						
	Flatbed	Van	Log	Dump	Tank	Auto	Utility
			(a) 2-S1				
10.0-11.9	–	–	19,600	–	–	–	–
12.0-13.9	–	–	25,200	18,800	–	–	–
14.0-15.9	20,700	13,500	23,400	27,000	–	–	–
16.0-17.9	17,400	15,100	23,500	27,300	9,700	14,000	–
18.0-19.9	13,100	11,900	23,000	24,700	15,200	–	17,900
20.0-21.9	16,600	14,000	28,500	23,300	15,800	–	13,100
22.0-23.9	14,500	12,500	26,100	22,200	15,900	–	–
24.0-25.9	15,500	10,500	16,800	23,200	19,500	12,200	9,200
26.0-27.9	17,200	11,000	18,000	21,200	20,200	7,800	7,100
28.0-29.9	14,600	11,400	–	21,000	22,500	14,500	12,800
30.0-31.9	15,000	10,100	9,000	15,100	18,200	15,400	4,400
32.0-33.9	15,400	10,200	17,700	12,400	21,200	12,500	10,600
34.0-35.9	12,800	10,800	24,500	–	21,900	14,300	–
36.0-37.9	13,000	11,700	25,400	19,000	–	15,100	–
38.0-39.9	13,500	11,600	23,700	–	14,500	14,500	5,000
40.0-41.9	14,200	10,800	12,700	–	–	13,100	19,800
42.0-43.9	9,600	11,700	–	–	–	13,600	–
44.0-45.9	–	20,600	–	–	–	16,600	–
46.0-47.9	–	14,100	7,700	–	–	16,100	–
48.0-49.9	–	–	6,600	–	–	13,200	–
50.0-51.9	–	–	–	–	–	17,900	–
52 and over	–	–	–	–	–	17,500	–
Weighted avg.	15,000	10,800	23,100	24,100	18,800	14,600	9,300
No. weighed	1,306	8,705	252	450	490	2,257	40
			(b) 2-S2				
16.0-17.9	–	–	35,000	33,300	–	–	–
18.0-19.9	–	32,900	27,600	35,500	–	–	–
20.0-21.9	30,000	19,100	28,400	32,200	–	–	–
22.0-23.9	22,900	24,400	29,100	34,900	–	–	–
24.0-25.9	20,500	21,000	29,300	31,200	–	–	–
26.0-27.9	23,200	23,700	30,800	31,900	–	–	–
28.0-29.9	23,100	21,300	28,000	31,900	27,500	–	–
30.0-31.9	25,700	23,000	31,200	28,600	–	–	–
32.0-33.9	25,400	23,100	30,300	28,300	30,700	–	–
34.0-35.9	25,200	22,300	28,200	30,500	31,000	8,600	–
36.0-37.9	23,700	21,900	30,900	33,000	–	5,400	–
38.0-39.9	23,300	21,800	31,700	33,600	34,000	13,900	–
40.0-41.9	23,700	22,400	29,700	31,000	30,200	22,400	–
42.0-43.9	24,600	27,200	–	33,800	32,700	–	–
44.0-45.9	23,200	23,300	–	39,200	–	–	–
46.0-47.9	18,200	23,000	–	30,600	–	–	–
Weighted avg.	24,700	22,500	30,700	30,700	30,800	15,100	–
No. weighed	4,363	25,712	271	1,519	2,918	39	–
			(c) 3-S2				
18.0-19.9	–	–	–	41,300	–	–	–
20.0-21.9	28,800	28,500	40,000	42,700	–	–	–
22.0-23.9	35,900	33,300	–	41,600	–	–	–
24.0-25.9	32,400	29,000	–	34,700	–	–	–
26.0-27.9	33,900	39,800	42,500	40,000	34,200	–	–
28.0-29.9	22,900	34,900	–	34,000	30,000	–	8,800
30.0-31.9	23,500	25,900	51,700	44,200	27,600	–	17,600
32.0-33.9	24,900	25,300	–	38,300	33,900	–	25,300
34.0-35.9	27,100	26,800	44,400	35,600	39,300	–	32,000
36.0-37.9	26,700	27,600	48,100	39,300	31,800	–	–
38.0-39.9	29,700	25,600	45,600	37,600	38,800	–	–
40.0-41.9	34,200	25,600	–	38,600	40,700	–	–
42.0-43.9	30,000	25,700	–	40,200	39,800	–	–
44.0-45.9	32,000	26,500	–	36,100	40,200	–	–
46.0-47.9	44,100	20,200	–	39,600	–	–	–
48.0-49.9	–	22,400	–	41,800	–	–	–
50.0-51.9	–	16,400	–	–	–	–	–
52 and over	–	25,900	–	–	–	–	–
Weighted avg.	27,800	26,400	46,500	40,000	38,500	–	22,700
No. weighed	1,022	8,059	384	481	1,084	–	11
			(d) 3-2				
14.0-15.9	35,500	–	–	–	–	–	–
16.0-17.9	35,000	22,400	46,600	40,000	36,400	–	–
18.0-19.9	41,300	37,400	44,700	46,700	38,600	–	–
20.0-21.9	40,700	33,200	48,800	44,300	42,600	–	–
22.0-23.9	30,200	26,600	–	45,800	42,900	–	–
24.0-25.9	28,500	29,900	–	51,700	45,800	–	–
26.0-27.9	34,800	31,200	–	–	47,800	–	–
28.0-29.9	36,400	34,400	–	–	42,500	–	–
30.0-31.9	–	–	–	–	49,000	–	–
32.0-33.9	–	–	–	–	53,900	–	–
34.0-35.9	–	–	–	–	46,500	–	–
Weighted avg.	36,700	28,100	45,500	44,000	43,100	–	–
No. weighed	315	91	14	43	515	–	–
			(e) 2-S1-2				
16.0-17.9	47,200	–	–	52,700	40,500	–	–
18.0-19.9	39,300	32,700	–	49,900	48,600	–	–
20.0-21.9	27,900	25,500	–	45,400	39,100	–	–
24.0-25.9	39,700	27,300	–	55,000	46,900	–	–
24,0-25.9	39,700	25,100	–	–	49,100	–	–
26.0-27.9	–	33,600	–	–	–	–	–
Weighted avg.	33,600	25,600	–	49,500	41,800	–	–
No. weighed	163	300	–	122	74	–	–

TRAILER CARGO BODY LENGTHS CHOSEN BY INDUSTRY FOR DIFFERENT LOADED GROSS WEIGHTS, 1959

An analysis was made to determine whether any significant difference existed in lengths of trailer cargo bodies for different gross weights. For this purpose, the gross weights of the various combination classes, broken down by cargo body types, were arrayed in 10,000-lb intervals of gross vehicle weight. Each 10,000-lb interval was further arrayed as to length of cargo body (Figs. 15, 16, 17) for the three main combination classes—the 2-S1, 2-S2, and 3-S2 tractor semitrailer combinations having van cargo bodies. The configurations are similar in weight intervals from 20,000 to 70,000-lb gross weights. No significant increase in lengths of cargo bodies as gross weights increased can be detected. The median of cargo body lengths of 2-S1 combinations for 10,000-lb weight intervals between 20,000 and 60,000 lb was 32 ft, and for the 2-S2 combination the median cargo body length was 35 ft.

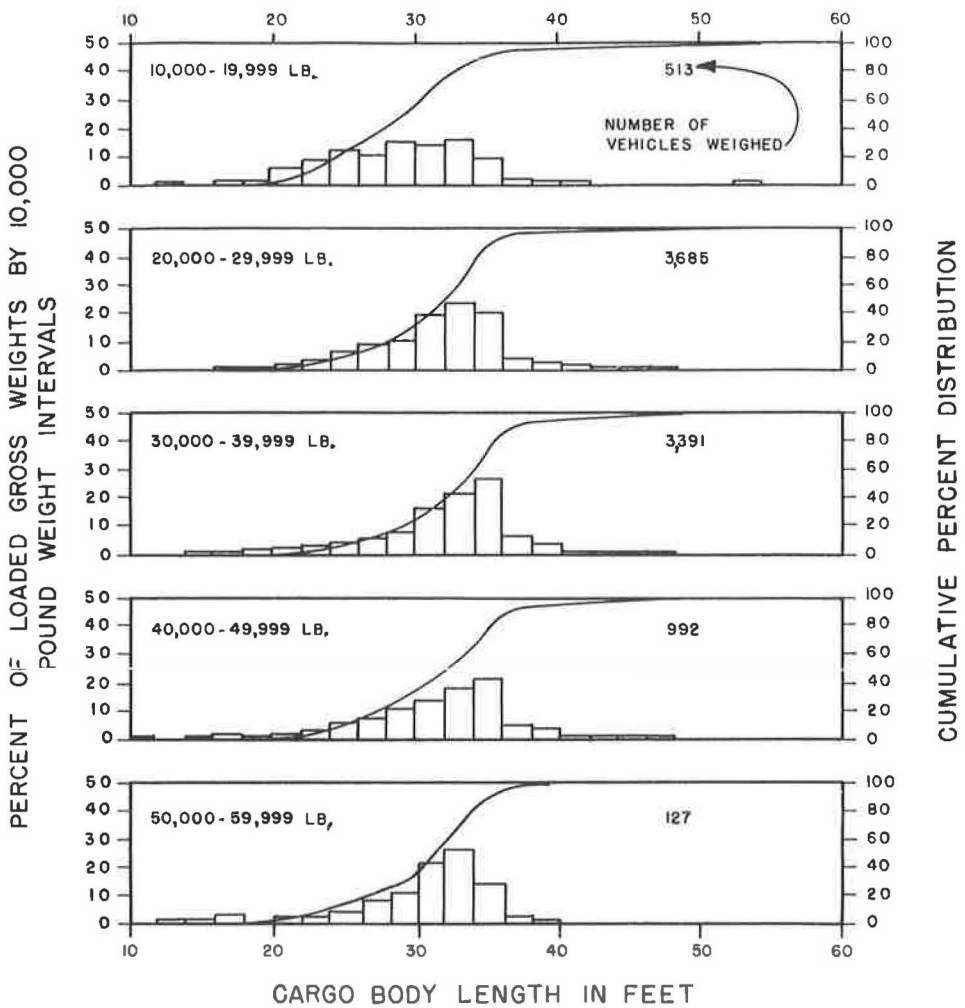

Figure 15. Percent distribution of loaded gross weights of 3-axle tractor semitrailers (2-S1) with van cargo bodies, in 10,000-lb weight group and by lengths of cargo bodies.

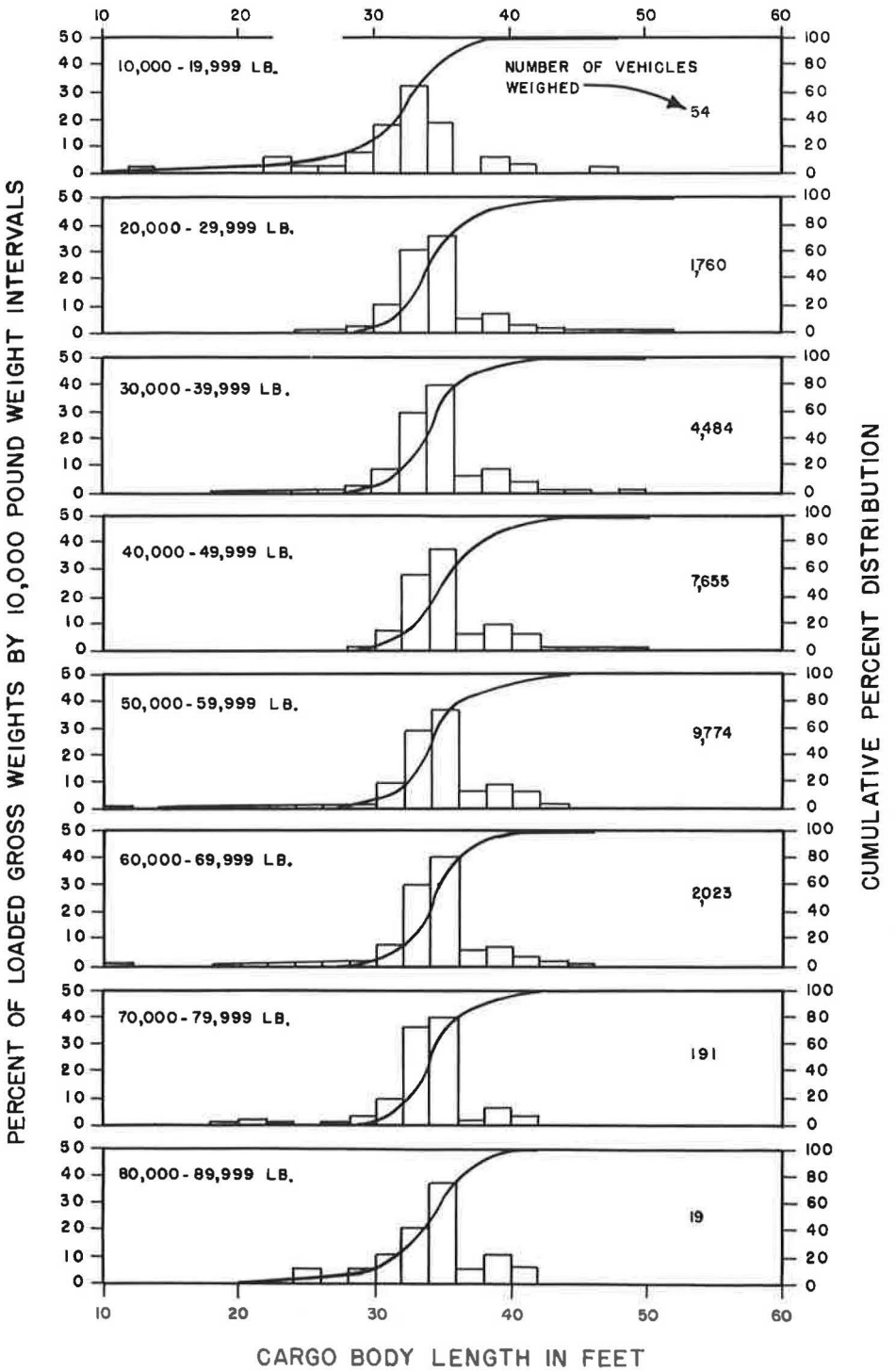

Figure 16. Percent distribution of loaded gross weights of 4-axle tractor semitrailers (2-S2) with van cargo bodies, in 10,000-lb weight group and by lengths of cargo bodies.

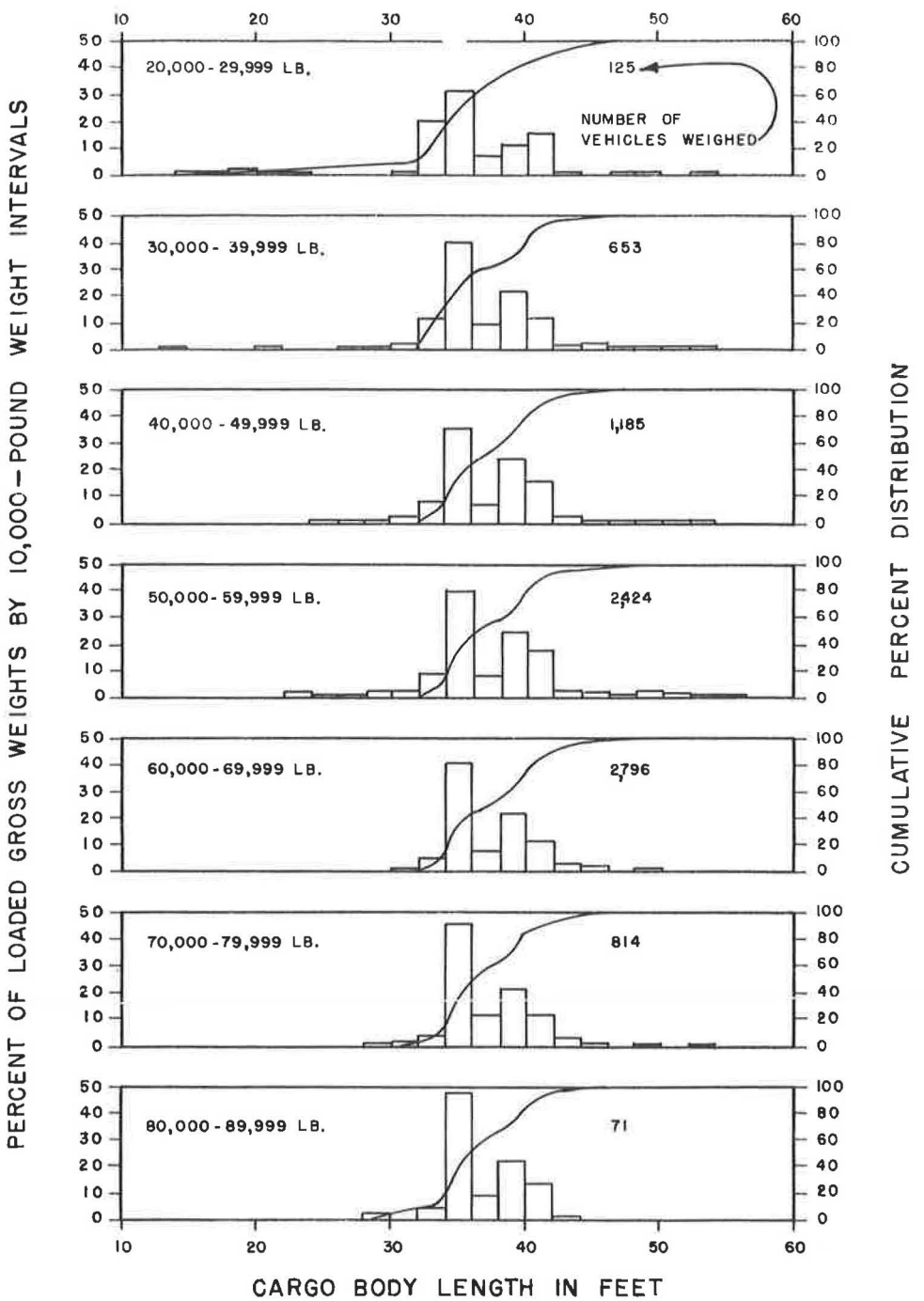

Figure 17. Percent distribution of loaded gross weights of 5-axle tractor semitrailers (3-S2) with van cargo bodies, in 10,000-lb weight group and by lengths of cargo bodies.

Commodity data, not collected in this study, would be needed to further analyze choice of trailer body lengths made by industry.

EFFECT OF GROSS WEIGHT LIMITS ON LOADED GROSS WEIGHTS

Of the 45 States and District of Columbia, which made weight studies in 1959, 7 prescribed maximum gross weight limits for permitted classes of trailer combination in

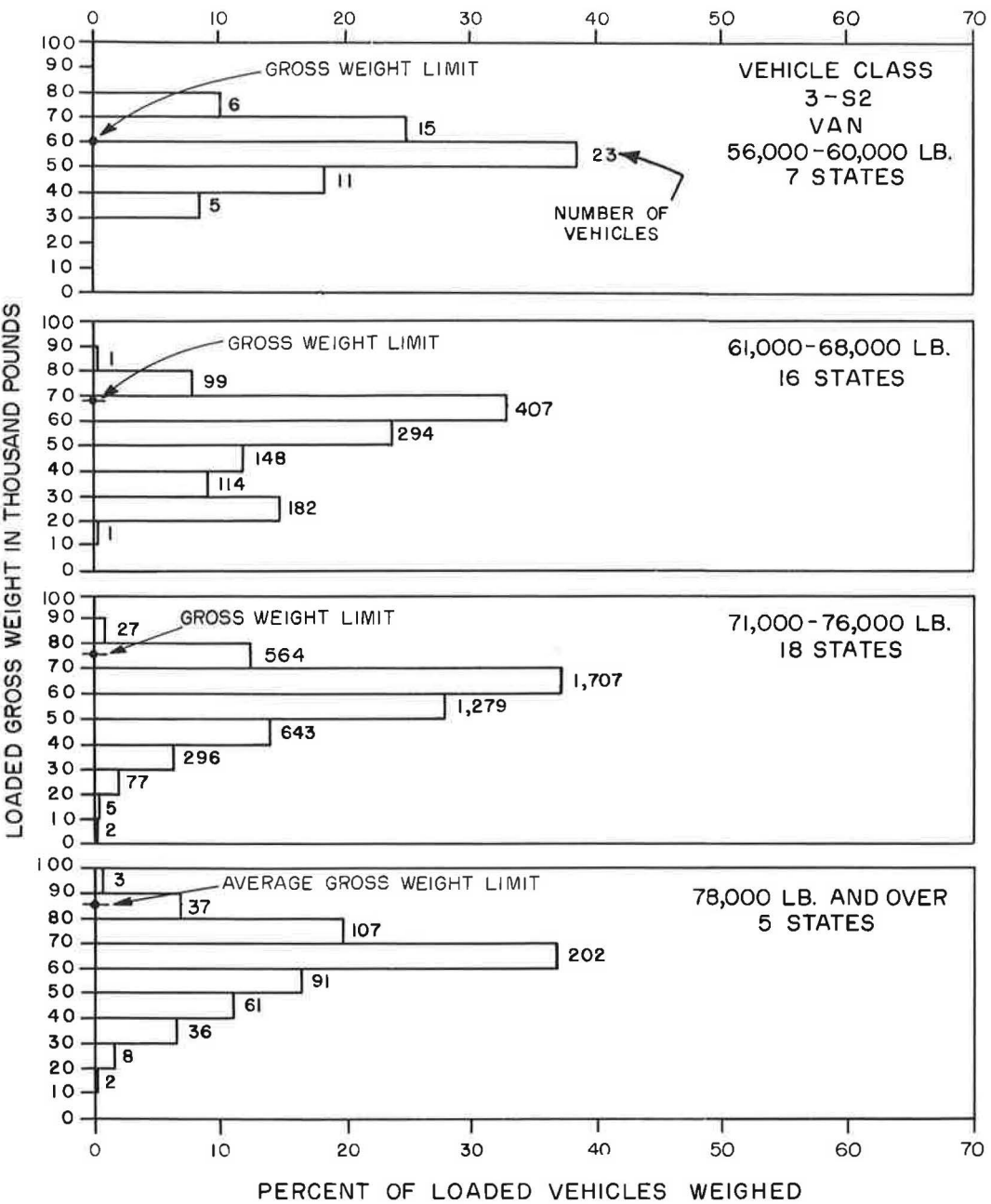

Figure 18. Percent distribution of gross weights by body type and axle classification in relation to permitted weight limits.

the range of 56,000 to 60,000 lb; 16 in the range of 60,000 to 68,000 lb; 18 in the range of 71,000 to 76,000 lb; and 5 in the range of 78,000 lb and over. The loaded trailer combinations were grouped by their loaded gross weights into these four weight categories. The combinations in each weight category were arranged in 10,000-lb class intervals of gross vehicle weight, and the number of loaded combinations observed in each weight category were converted to percentage of total loaded combinations observed.

Weights of 3-S2 Tractor Semitrailer Combinations

Depending upon the axle limits allowed, the 3-S2 combination can legally operate at a gross vehicle weight of 72,000 lb where 32,000-lb tandem axles are specified and at about 80,000 lb where 36,000-lb tandem axles are specified. Figure 18 shows the percentages of loaded trailer combinations for the 3-S2 combination having van cargo bodies. As gross weight limits increased, a higher percentage of the loads was more than 60,000 lb. For example, the percentages of combinations above and the maximum gross weights permitted by the States were 35 percent and 60,000-lb, nearly 41 percent and 68,000-lb, 50 percent and 76,000-lb, and nearly 64 percent and 78,000-lb or more.

These figures would seem to indicate from the freight standpoint that there was a demand for heavier permitted gross weight in the States limiting it to 60,000 lb and that this demand was held in check by the permitted low weight limits. The greatest percentage of loaded gross weights in the States having maximum limits of 56,000 to 60,000 lb occurred in the 50,000- to 60,000-lb weight bracket, and in the other three groups of States a preference was shown for 60,000- to 70,000-lb gross loads. In a similar analysis of the data for 3-S2 flatbed loaded vehicles (Fig. 19), the findings were parallel.

Tractor, Semitrailer, Full Trailer Combination 2-S1-2, and Tractive Truck Full Trailer Combination 3-2

The 2-S1-2 trailer combination, if operating at single-axle limitations of 18,000 lb, would have a gross weight of about 80,000 lb; and if operating at single-axle limitations of 22,400 lb, would have a gross weight of about 98,000 lb. The 3-2 trailer combinations, if operating with 18,000-lb single axles and 32,000-lb tandem axles, would have a maximum gross weight of about 77,000 lb. The 3-2 combination, if operating with 22,400-lb single axles and 36,000-lb tandem axles, would have a maximum gross weight of about 91,000 lb.

The 2-S1-2 tractor, semitrailer, full trailer combinations and the 3-2 tractive truck full trailers combinations were observed chiefly in two groups of States; 18 States that have maximum weight limits of 71,000 to 76,000 lb and 5 States that have maximum weight limits of 78,000 lb and over.

The percentage of 2-S1-2 trailer combinations having gross weights of 80,000 lb or more was higher in the 5 States having weight limits of 78,000 lb and over than in the 18 States having maximum weight limits of 71,000 to 76,000 lb (Fig. 20). The same trend existed in percentage relationship for the three major body types — flatbed, van, and tank. Similar trends in the relationship of gross weights and the permitted weights were noted for the 3-2 tractive truck full trailer combination (Fig. 21). The percentages for gross weights of combinations of more than 80,000 lb are given in Table 10.

The data (Figs. 20 and 21 and Table 10) indicated that tank cargo body combinations can most consistently use the maximum permitted, or higher, gross weights. The two other cargo body types of combinations regularly carried loads that weighed much below the maximum permitted weights. Hence, it may be concluded that not all freight carriers could use to advantage any increase in permitted gross weights. This situation presents a difficult problem in allocating any increased highway construction and maintenance costs for higher load-capacity roadways only to those vehicles that could and would use such increased load-carrying capacities built into a road system. Enough use might not be made of vehicles to carry heavier loads to pay for the increased roadway costs occasioned by permitting heavier axle and larger gross-weight limits.

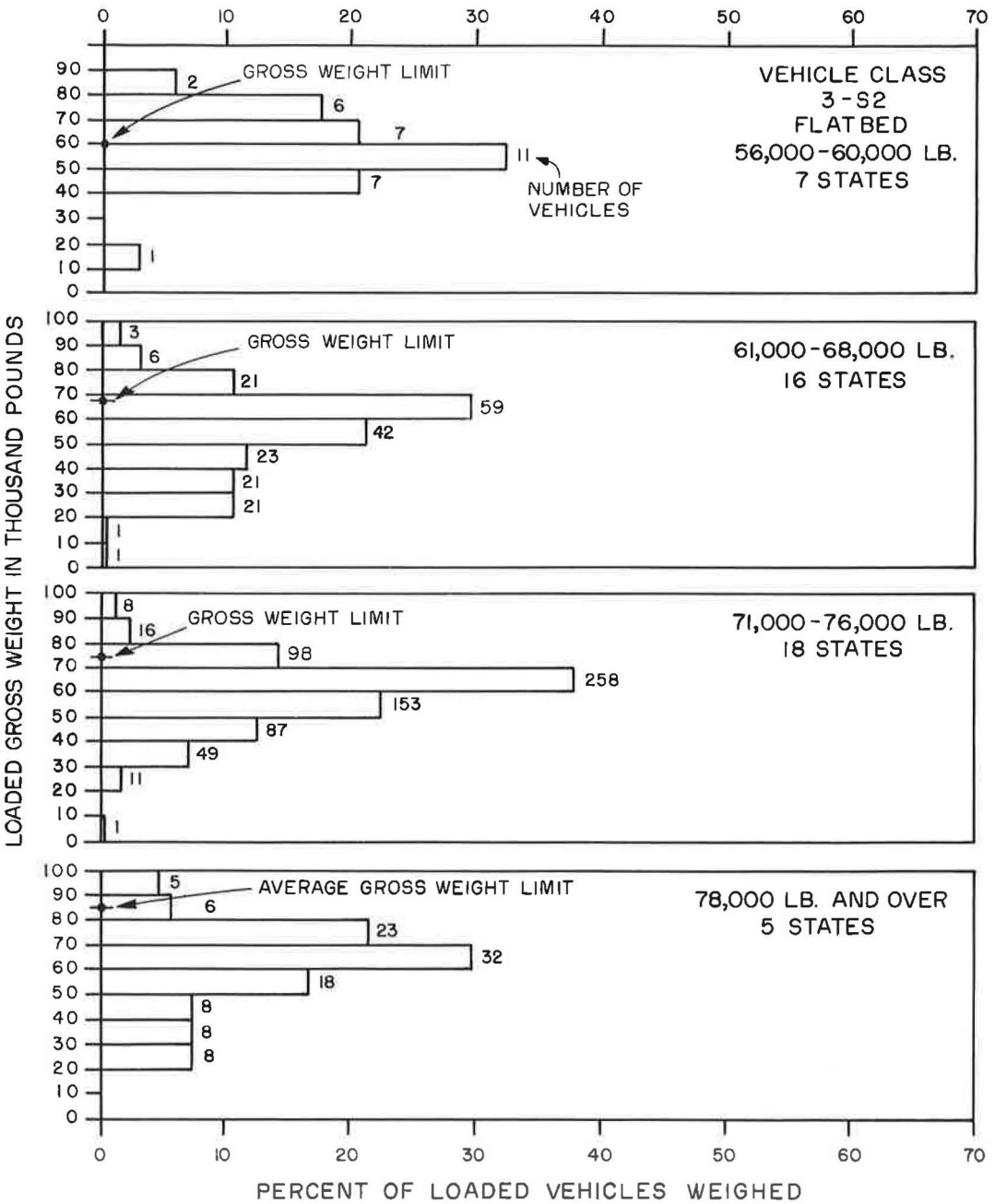

Figure 19. Percent distribution of gross weights by body type and axle classification in relation to permitted weight limits.

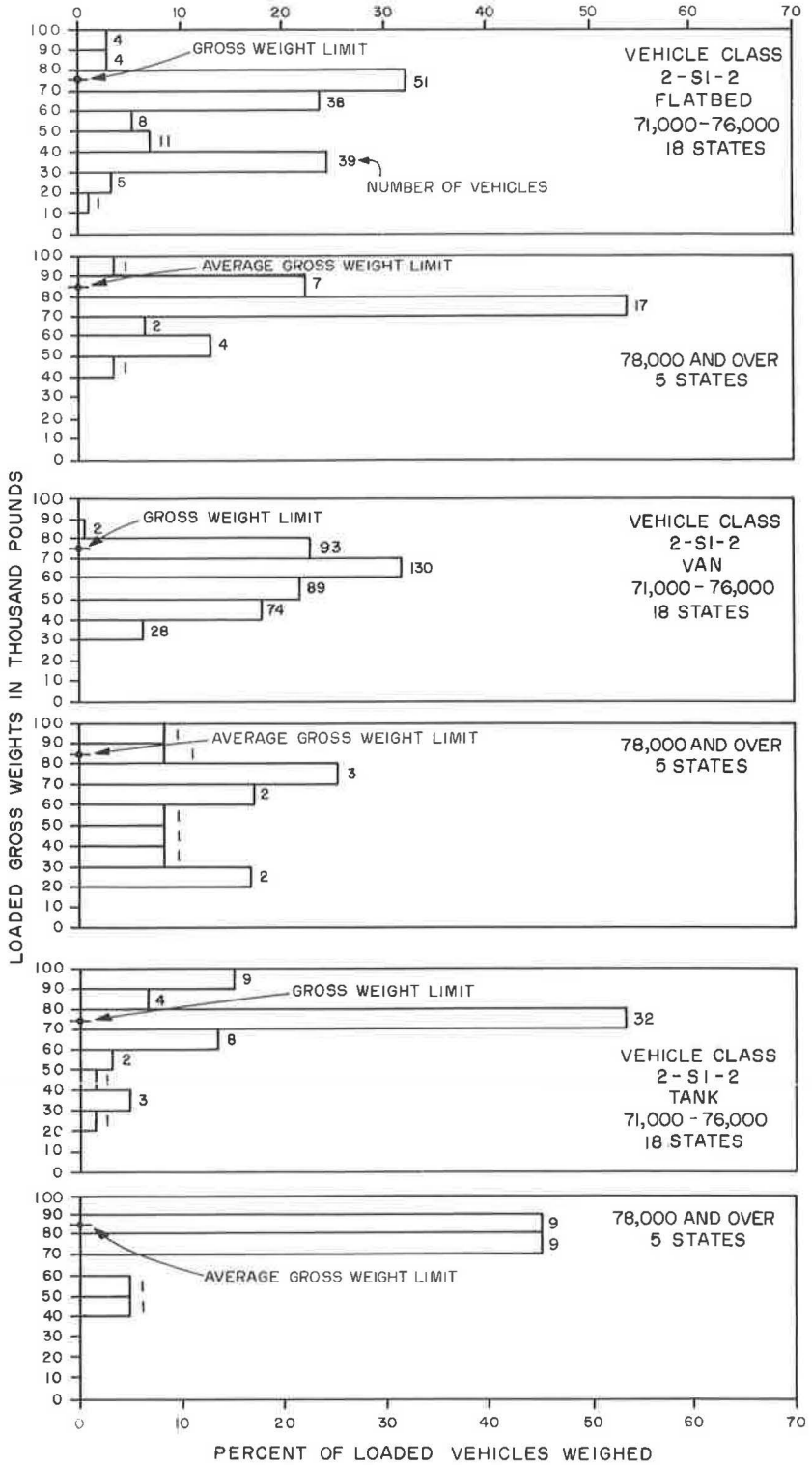

Figure 20. Percent distribution of gross weights by body and axle classification in relation to permitted weight limits.

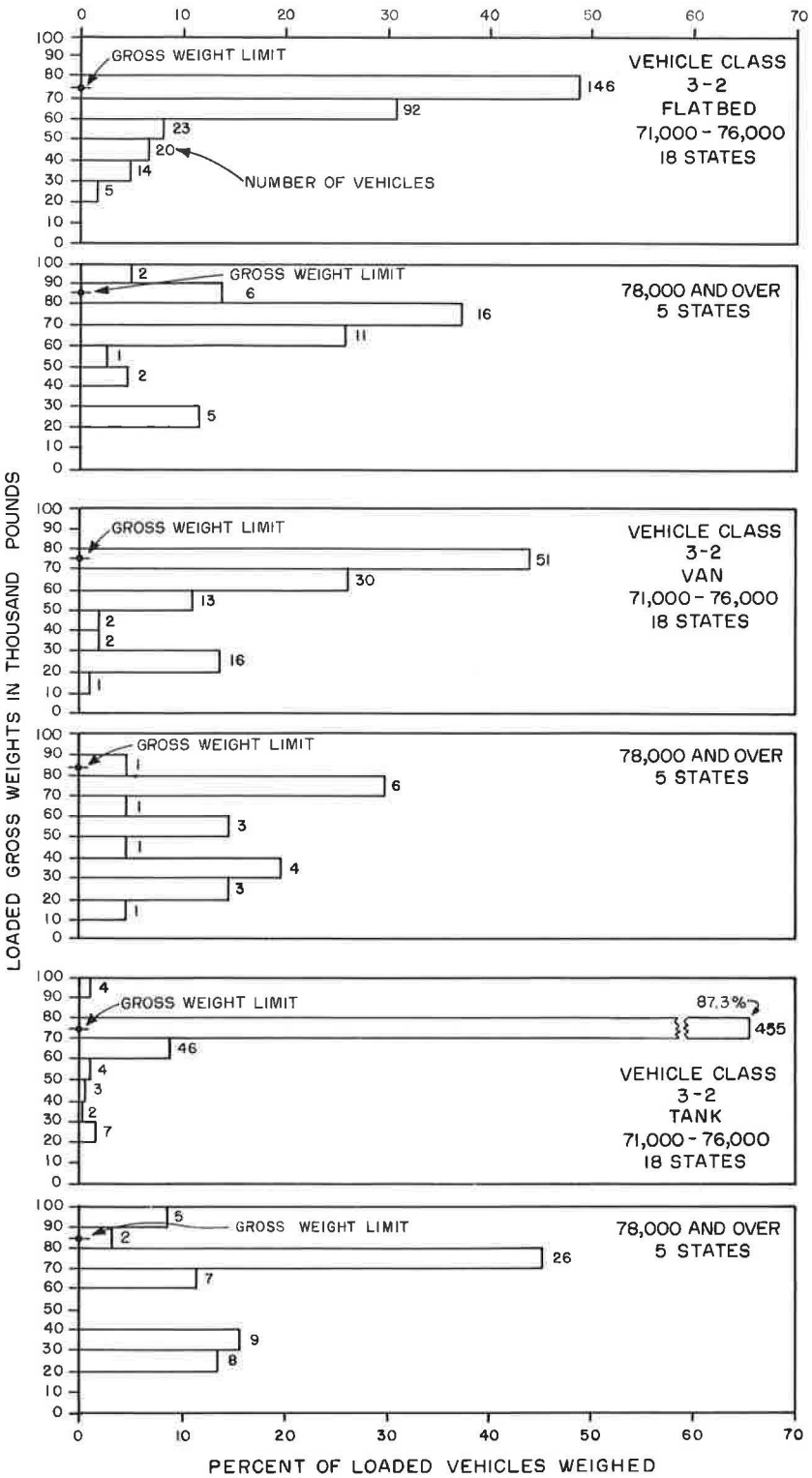

Figure 21. Percent distribution of gross weight by body and axle classification in relation to permitted weight limits.

TABLE 10

PERCENTAGES OF 2-S1-2 AND 3-2 TRAILER COMBINATIONS THAT WEIGHED MORE THAN 80,000-LB GROSS WEIGHT

Body Type	18 States 71,000 - 76,000 Lb Maximum (%)	5 States 78,000 Lb and Above Maximum (%)
2-S1-2 trailer combination:		
Flatbed cargo	6	25
Van cargo	1	16
Tank cargo	7	45
3-2 trailer combination:		
Flatbed cargo	0	23
Van cargo	0	5
Tank cargo	1	12

OBSERVED WIDTHS AND HEIGHTS

During the 1959 truck weight study, cargo vehicles less than 7 ft wide or less than 10 ft high were not recorded in most States. Measurements were recorded for cargo vehicle of these dimensions and larger.

Connecticut and Rhode Island permitted widths of 8.5 ft in 1959, but all other continental States limited widths to 8 ft exclusive of safety equipment. In 1959, of the continental States, 2 had no height limitations; 2 specified 14.0 ft; 26, 13.5 ft; 2, 13.0 ft; an 17, 12.5 ft. Thus, in 1959, 30 States permitted heights of 13.5 ft or more. As of Decem ber 31, 1961, 44 of the continental States had height limitations of 13.5 ft or more and retained limitation of 12.5 ft.

Because of the trend toward the 8-ft width and 13.5-ft height, measurements taken a truck weight stations were tabulated to show measurements in excess of these two moda figures. Some of the figures showing measurements greater than the permitted widths and heights probably may be ascribed to special permit loads and to mounting tires larg than the 10.00 x 20 size. When 11.00 x 20 and larger size tires are placed on highway freight vehicles having body widths of exactly 8 ft, frequently a projection of as much a 2 in. of tire beyond the body frame may occur on each side. With this in mind, width measurements were separated into intervals of 8.0 to 8.3 ft (8 ft 3.6 in.), 8.4 to 8.5 ft 8.6 to 9.0 ft, and 9.1 ft and over. Although approximately 10 percent of the total truck having six or more tires and the trailer combinations exceeded the 8-ft width limitation only about 1 percent of the total of these vehicles exceeded the width of 8 ft 3.6 inches, (Table 11).

Approximately 0.3 percent of all trailer combinations and trucks having six or more tires were more than 13.5 ft high. More of the 3-S2 combinations exceeded this height than any other type of vehicle (Table 12).

ACKNOWLEDGMENT

Instructions and procedures for obtaining the data as part of the 1959 truck weights study were developed by Alexander French of the Planning Services Branch. Mildred M Milazzo, Madaline Kendall, and Kathleen V. Toole of the Vehicle Performance Branch assisted in the arrangement of the field data, preparation of data for machine analysis, and in the development of summary tables and charts. John H. Jones of the Data Proc essing Branch made the machine tabulations of the data.

TABLE 11

NUMBER AND PERCENT OF SINGLE-UNIT TRUCKS AND TRAILER COMBINATIONS MEASURED AND FOUND TO EXCEED 8.0 FT IN WIDTH

Body Width (ft)	Body Type								
	Flatbed	Van	Log	Dump	Tank	Auto	Concrete	Utility	Total
2-axle, 6 tires, truck:									
8.1-8.3	712	1,905	10	255	87	–	8	66	3,043
8.4-8.5	61	84	3	9	10	–	3	7	177
8.6-9.0	57	41	1	13	6	–	0	4	122
9.1 and over	32	8	0	5	3	–	0	1	49
Total over 8.0	862	2,038	14	282	106	–	11	78	3,391
Total over 8.3	150	133	4	27	19	–	3	12	348
Total units	11,354	31,146	573	7,081	3,151	–	87	1,531	54,923
Percent over 8.0	7.6	6.5	2.4	4.0	3.3	–	12.6	5.0	6.1
Percent over 8.3	1.3	0.4	0.7	0.4	0.6	–	3.4	0.8	0.6
3-axle truck, single unit:									
8.1-8.3	146	125	55	339	11	–	143	24	843
8.4-8.5	14	5	7	17	3	–	24	15	85
8.6-9.0	17	1	1	19	15	–	18	8	79
9.1 and over	7	1	0	1	0	–	1	2	12
Total over 8.0	184	132	63	376	29	–	186	49	1,019
Total over 8.3	38	7	8	37	18	–	43	25	176
Total units	1,215	1,523	418	2,685	261	–	923	232	7,257
Percent over 8.0	19.2	8.7	15.1	14.0	11.2	–	20.2	21.1	14.6
Percent over 8.3	4.0	0.5	1.9	1.4	6.9	–	4.7	10.8	2.5
2-S1 combination:									
8.1-8.3	229	1,148	42	65	104	360	–	6	1,954
8.4-8.5	18	43	6	0	9	11	–	1	88
8.6-9.0	23	20	2	2	1	7	–	0	55
9.1 and over	17	5	3	0	0	0	–	0	25
Total over 8.0	287	1,216	53	67	114	378	–	7	2,122
Total over 8.3	58	68	11	2	10	18	–	1	168
Total units	2,189	12,167	488	794	892	3,943	–	71	20,544
Percent over 8.0	13.1	10.1	10.9	8.4	12.8	9.6	–	9.9	10.3
Percent over 8.3	2.6	0.6	2.3	0.3	1.1	0.5	–	1.4	0.8
2-S2 combination:									
8.1-8.3	807	3,161	74	225	895	7	–	5	5,174
8.4-8.5	67	85	16	6	64	2	–	1	241
8.6-9.0	37	51	5	4	28	0	–	1	126
9.1 and over	27	8	3	1	2	1	–	4	46
Total over 8.0	938	3,305	98	236	989	10	–	11	5,587
Total over 8.3	131	144	24	11	94	3	–	6	413
Total units	7,321	34,405	487	2,411	7,073	79	–	49	51,825
Percent over 8.0	12.8	9.6	20.2	9.8	14.0	12.7	–	22.4	10.8
Percent over 8.3	1.8	0.4	5.0	0.5	1.3	3.8	–	12.2	0.8
3-S2 combination:									
8.1-8.3	278	890	90	68	97	–	–	3	1,426
8.4-8.5	15	10	15	7	6	–	–	0	53
8.6-9.0	22	8	21	0	2	–	–	1	54
9.1 and over	27	3	6	2	1	–	–	5	44
Total over 8.0	342	911	132	77	106	–	–	9	1,577
Total over 8.3	64	21	42	9	9	–	–	6	151
Total units	1,652	9,593	671	693	2,065	–	–	30	14,704
Percent over 8.0	20.7	9.5	20.1	11.1	5.1	–	–	40.9	10.7
Percent over 8.3	3.9	0.2	6.4	1.3	0.4	–	–	27.3	1.0
2-S1-2 combination:									
8.1-8.3	36	70	–	32	46	–	–	–	184
8.4-8.5	5	1	–	1	0	–	–	–	7
8.6-9.0	4	0	–	0	3	–	–	–	7
9.1 and over	0	0	–	0	0	–	–	–	0
Total over 8.0	45	71	–	33	49	–	–	–	198
Total over 8.3	9	1	–	1	3	–	–	–	14
Total units	265	394	–	223	152	–	–	–	1,034
Percent over 8.0	17.0	18.0	–	14.8	32.2	–	–	–	19.1
Percent over 8.3	3.4	0.3	–	0.4	2.0	–	–	–	1.4
3-2 combination:									
8.1-8.3	105	30	2	33	164	–	–	–	334
8.4-8.5	1	0	1	0	4	–	–	–	6
8.6-9.0	1	0	2	0	0	–	–	–	3
9.1 and over	1	0	0	1	0	–	–	–	2
Total over 8.0	108	30	5	34	168	–	–	–	345
Total over 8.3	3	0	3	1	4	–	–	–	11
Total units	478	200	37	76	942	–	–	–	1,733
Percent over 8.0	22.6	15.0	13.5	44.7	17.8	–	–	–	19.3
Percent over 8.3	0.6	–	8.1	1.3	0.4	–	–	–	0.6
Other trucks:									
Panels, pickups, 4 tires	268	614	0	0	0	0	0	252	1,134
Other, 2-axles, 4 tires	201	1,598	0	0	0	0	0	0	1,799
Other combinations:									
2-1	75	–	–	–	–	–	–	–	75
2-2	78	–	–	–	–	–	–	–	78
2-S2-2	–	53	–	–	–	–	–	–	53
3-S1-1	–	54	–	–	–	–	–	–	54
3-S3-2	–	55	–	–	–	–	–	–	55
Total units	25,096	91,802	2,674	13,963	14,536	4,022	1,010	2,165	155,268
Total 7 vehicle classes	24,474	89,428	2,674	13,963	14,536	4,022	1,010	1,913	152,020
Total over 8.0	2,766	7,703	365	1,105	1,561	388	197	154	14,239
Total over 8.3	453	374	92	88	157	21	46	50	1,281
Percent over 8.0	11.3	8.6	13.6	7.9	10.7	9.6	19.5	8.1	9.4
Percent over 8.3	1.9	0.4	3.4	0.6	1.1	0.5	4.6	2.6	0.8

TABLE 12

NUMBER AND PERCENT OF SINGLE-UNIT TRUCKS AND TRAILER COMBINATIONS MEASURED AND FOUND TO EXCEED 13.5 FT IN HEIGHT

Body Height (ft)	Body Type								
	Flatbed	Van	Log	Dump	Tank	Auto	Concrete	Utility	Total
2-axles, 6 tires, truck:									
13.6 to 14.0	17	0	0	2	0	–	0	0	19
14.1 to 14.5	7	1	0	0	0	–	0	0	8
14.6 and over	5	1	0	0	0	–	0	0	6
Total 13.6 and over	29	2	0	2	0	–	0	0	33
Total units	11,354	31,146	573	7,081	3,151	–	87	1,531	54,923
Percent 13.6 and over	0.3	0.0	–	0.0	–	–	–	–	0.1
3-axle truck:									
13.6 to 14.0	1	2	2	0	0	–	0	3	8
14.1 to 14.5	0	0	0	0	0	–	0	0	0
14.6 and over	0	0	0	1	0	–	0	0	1
Total 13.6 and over	1	2	2	1	0	–	0	3	9
Total units	1,215	1,523	418	2,685	261	–	923	232	7,257
Percent 13.6 and over	0.1	0.1	0.5	0.0	–	–	–	1.3	0.1
2-S1 combinations:									
13.6 to 14.0	14	6	0	0	0	34	–	1	55
14.1 to 14.5	1	0	0	0	0	10	–	0	11
14.6 and over	3	2	0	0	0	1	–	0	6
Total 13.6 and over	18	8	0	0	0	45	–	1	72
Total units	2,189	12,167	488	794	892	3,943	–	71	20,544
Percent 13.6 and over	0.8	0.1	–	–	–	1.1	–	1.4	0.4
2-S2 combinations:									
13.6 to 14.0	38	11	3	1	0	5	–	0	58
14.1 to 14.5	12	0	0	0	0	2	–	0	14
14.6 and over	8	14	0	0	0	0	–	0	22
Total 13.6 and over	58	25	3	1	0	7	–	0	94
Total units	7,321	34,405	487	2,411	7,073	79	–	49	51,825
Percent 13.6 and over	0.8	0.1	0.6	0.0	–	8.9	–	–	0.2
3-S2 combinations:									
13.6 to 14.0	34	105	11	3	1	–	–	1	155
14.1 to 14.5	8	3	3	0	0	–	–	0	14
14.6 and over	21	5	3	1	0	–	–	1	31
Total 13.6 and over	63	113	17	4	1	–	–	2	200
Total units	1,652	9,593	671	693	2,065	–	–	30	14,704
Percent 13.6 and over	3.8	1.2	2.6	0.6	0.0	–	–	9.1	1.4
2-S1-2 combinations:									
13.6 to 14.0	3	26	–	0	0	–	–	–	29
14.1 to 14.5	1	2	–	0	0	–	–	–	3
14.6 and over	0	0	–	0	0	–	–	–	0
Total 13.6 and over	4	28	–	0	0	–	–	–	32
Total units	265	394	–	223	152	–	–	–	1,034
Percent 13.6 and over	1.5	7.1	–	–	–	–	–	–	3.1
3-2 combinations:									
13.6 to 14.0	0	1	0	0	0	–	–	–	1
14.1 to 14.5	0	2	0	0	0	–	–	–	2
14.6 and over	0	0	0	0	0	–	–	–	0
Total 13.6 and over	0	3	0	0	0	–	–	–	3
Total units	478	200	37	76	942	–	–	–	1,733
Percent 13.6 and over	–	1.5	–	–	–	–	–	–	0.2
Other trucks:									
Panels, pickups, 4 tires	268	614	0	0	0	–	0	252	1,134
Other, 2-axles, 4 tires	201	1,598	0	0	0	–	0	0	1,799
Other combinations:									
2-1	75	–	–	–	–	–	–	–	75
2-2	78	–	–	–	–	–	–	–	78
2-S2-2	–	53	–	–	–	–	–	–	53
3-S1-1	–	54	–	–	–	–	–	–	54
3-S3-2	–	55	–	–	–	–	–	–	55
Total units	25,096	91,802	2,674	13,963	14,536	4,022	1,010	2,165	155,268
Total, 7 vehicle classes	24,474	89,428	2,674	13,963	14,536	4,022	1,010	1,913	152,020
Total 13.6 and over	173	181	22	8	1	52	0	6	443
Percent 13.6 and over	0.7	0.2	0.8	0.1	0.0	1.3	–	0.3	0.3

REFERENCES

1. Kent, M. F., "The Freight's the Weight." HRB Proc. 37:21-43 (1958).
2. "Line-Haul Trucking Costs in Relation to Vehicle Gross Weights." HRB Bull. 301, 136 pp. (1961).
3. "SAE Handbook, 1961, Commercial Motor Vehicle Nomenclature." Soc. of Automotive Engrs., New York (1961).
4. Neumann, F., "Trailer Manufacturing Leader Notes Trend Toward Larger Truck Trailers." Traffic World, p. 31-32 (Nov. 17, 1962).

Appendix

SUMMARY OF LEGALLY PERMISSIBLE[1] LENGTHS OF SEMITRAILERS, CONTINENTAL UNITED STATES[2]

Vehicle Type	Legal Length (ft)	No. of States	
		May 1, 1957[3]	July 1, 1962[4]
Semitrailer	35	15	1[5]
Semitrailer	39½	1	1[6]
Semitrailer	40	6	12
Semitrailer	42	1	1
Semitrailer	45	3	1
Semitrailer	50	0	1
Semitrailer	55	1	1
Tractor semitrailer	45	2	-
Tractor semitrailer	48	1	-
Tractor semitrailer	50	13	17
Tractor semitrailer	55	-	5
Tractor semitrailer	60	4	6
Tractor semitrailer	65	1	2
Tractor semitrailer	(No. Restr.)[7]	1	1
Permitted 40 ft	-	6	12
Permitted over 40 ft	-	25	35

[1] In States where there are no restrictions on length of semitrailers the maximum possible length (van bodies) is assumed 7 ft less than the permitted tractor semitrailer combination length. Automobile transporter bodies may exceed these lengths when an automobile is carried above the tractor cab, a practice which is permitted in most States.
[2] Includes District of Columbin.
[3] From "Summary of Size and Weight Limits and Reciprocity Authority (By Regions), in effect as of May 1, 1957." American Trucking Assoc.
[4] From "Summary of Size and Weight Limits and Reciprocity Authority (By Regions) in effect as of July 1, 1962." American Trucking Assoc.
[5] West Virginia.
[6] Georgia.
[7] Nevada.