

## INDIANA WAR TIME TRAFFIC SPEEDS

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## SYNOPSIS

This paper is a progress report of one of the cooperative investigations of the Joint Highway Research Project, Purdue University. The purpose of the report is to trace the trend in Indiana traffic speeds during the country's first two years of war. The report presents results of the speeds of 15,615 cars and 5,055 trucks at 15 different locations in Indiana. The speeds of all cars and trucks, from the various locations, have been combined and sorted into the various "speed influencing" periods. These periods are: (1) The no speed limit period; (2) the 45 m. p. h. speed limit; (3) the 40 m. p. h. limit; (4) the 35 m. p. h. limit; (5) the 35 m. p. h. limit together with 4-gal. gas rationing for "A", "B", and "C" cars; (6) the 35 m. p. h. limit and 3-gal. rationing for "A", "B", and "C" cars, (7) the 35 m. p. h. limit and 3-gal. rationing for "A" cars and 2-gal. rationing for "B" and "C" cars.

During each of these periods, except the first, speeds were recorded for Indiana cars, foreign cars, and trucks and during the ration periods speeds were further divided into ration groups with data for "A", "B", and "C" cars.

The report presents a series of curves showing the speeds of the various vehicle classes during each of these periods. In addition, a table is included that compares percentages of vehicles going less than any speed for each vehicular class during each of the speed influencing periods. (1) Before the 45 m. p. h. speed limit period, cars averaged 49.92 m. p. h. and trucks 41.58 m. p. h. (2) The 45 m. p. h. limit had no effect on the speeds of either cars or trucks. (3) During the 40 m. p. h. limit, car speeds dropped 3 m. p. h. and truck speeds 1 m. p. h. (4) The 35 m. p. h. limit brought average car and truck speeds to 42 and 39 m. p. h. respectively. (5) The 4-gal. rationing program had no effect on the speeds of cars or trucks. (A one per cent drop in the number of cars exceeding 35 m. p. h. was noted.) (6) The reduction of "A", "B", and "C" coupon values to 3-gal. caused average car speeds to drop less than one-half mile per hour. Truck speeds remained at 39 m. p. h. (7) The most recent data show that during the present rationing period ("A" coupons worth 3 gal. and "B" and "C" worth 2) car and truck speeds have increased one mile per hour.

## OBJECT OF STUDY

In response to a need for a more refined piece of equipment that could be used in traffic research, the Photo-Velaxometer was developed in the Highway Research Laboratories at Purdue University.<sup>1</sup> This apparatus is designed to measure and record small time intervals and sequences of small time intervals. This instrument may be used to determine drivers' reactions to objects or hazards along the highway that may influence traffic speeds as well as the effectiveness of warning and regulatory signs. These reactions can easily be studied by obtaining a series of positive or negative acceleration patterns thus showing in

detail the influence and effective range of the object being studied. The Photo-Velaxometer has been used in conducting research to determine drivers' reactions to narrow bridges, steep hills, sharp curves, pavement widths, number of traffic lanes, day and night driving, "signed" speed zones, weather and pavement conditions, types and sizes of traffic signs, railroad crossings, transverse position of vehicles, urban speed conditions, and the war-time emergency.

Soon after December 7, 1941, the current study of war-time traffic speeds was undertaken to find the effect of the war on driving speeds. The purpose of this paper is to present this phase of the traffic studies and to trace the trends in vehicular speeds on Indiana's highways from the time of no speed

<sup>1</sup> "An Automatic Speed Recorder" by A. K. Branham, *Proceedings, Highway Research Board*, Vol 21, p 348, 1941.

limit, through the various speed-limit periods, and the various gas rationing periods. The report covers the period February 9, 1942 to November 18, 1943.<sup>2</sup>

#### SPEED INFLUENCING PERIODS

The war-time speed study includes data obtained from 15 locations in Indiana (Fig. 1) with records of 15,768 cars and 5,183 trucks.

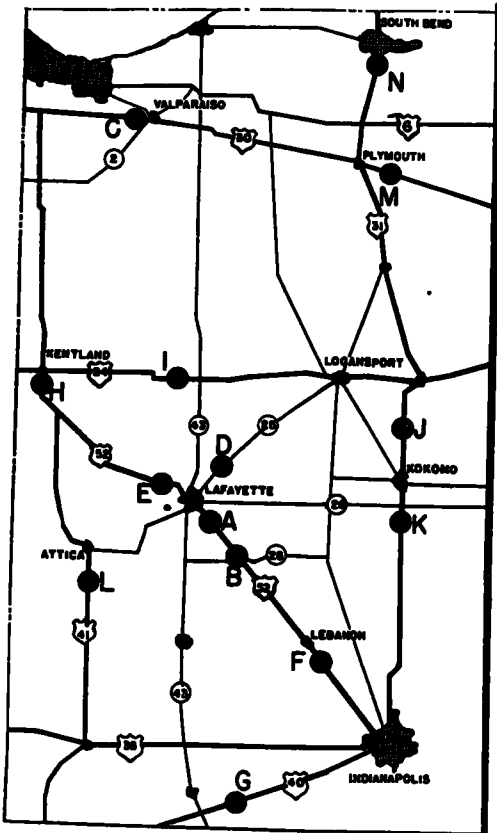


Figure 1. Locations of Speed Studies Included in the War-Time Speed Survey

The data from each of these locations have been combined into seven "Speed Influencing" periods. These periods are:

1. The No Speed Limit Period (before March 18, 1942).<sup>3</sup>
2. The 45 m.p.h. Speed Limit Period (March 18, 1942 to July 25, 1942). This was in the form of a Governor's request to a Presidential appeal to the Nation.
3. The 40 m.p.h. Speed Limit Period (July 26, 1942 to September 30, 1942). This was also in the form of a Governor's request.
4. The 35 m.p.h. Period (October 1, 1942 to November 30, 1942). This nationwide speed limit was established by the Office of Defense Transportation.
5. The 35 m.p.h. Limit together with four gallon gas rationing for "A", "B", and "C" cars (December 1, 1942 to August 15, 1943). Gas rationing became nationwide on December 1, 1942.
6. The 35 m.p.h. Limit and three gallon rationing for "A", "B", and "C" cars (August 16, 1943 to September 30, 1943).
7. The 35 m.p.h. Limit and three gallon rationing for "A" cars and two gallon rationing for "B" and "C" cars. (Data since October 1, 1943).

During each of the "speed influencing" periods, the public was kept informed by means of radio and newspaper publicity

#### TRAFFIC SPEEDS

Before the war, the speed limit in Indiana was "reasonable speed". However, the Nation's entry into war, the increased load on gasoline transportation facilities, and the loss of the source of the rubber supply brought about the necessity for the President of the United States, on March 14, 1942, to suggest that in order to conserve rubber, vehicular speeds in each state be restricted to a 40 m.p.h. maximum. Following this, the Governor of Indiana requested that vehicular speeds within the state should not exceed 45 m.p.h., effective March 18, 1942. No legislative action was taken. Violators of the limit were given warning tickets and severity of punishment depended on the speed over the requested limit. Figure 2 represents car and truck speeds before the restriction was in effect. During this period, average car and truck

<sup>2</sup> The data from February 9, 1942 to December 1, 1942 were analyzed and presented at the Purdue Road School in January, 1943. See "Indiana Wartime Traffic Speeds" by R. E. Frost, *Proceedings, 29th Annual Purdue Road School*, Vol 27, No 2, 1943.

<sup>3</sup> All dates for the various speed restrictions, gas rationing and changes in rationing apply to conditions in Indiana.

speeds were 49.56 and 41.20 m p h , respectively The maximum speeds recorded were 92.14 m p h for a car and 69.59 for a truck.

With the institution of the requested 45 m p h limit on March 18, 1942, the study was continued in order to find the effect of this restriction The study was made beginning March 18 and ending July 25, 1942, at which time speeds were further restricted Figure 3 covers speed conditions during the 45 m.p.h. speed limit period and represents speeds of all cars, trucks, Indiana cars, and foreign cars (Cars were not classed by states until April

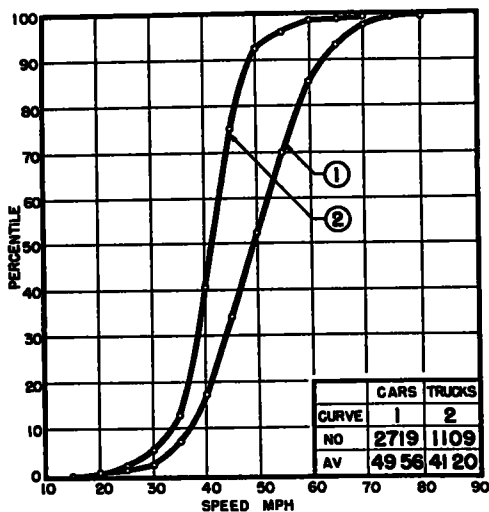


Figure 2. The "No Speed Limit" Period Before March 18, 1942

16, 1942) During this period, cars averaged 49.92 against 41.58 for trucks Indiana cars averaged 49.16 and foreign cars 51.58 m p h The highest speeds recorded during this period were 100.21 for a car and 68.22 for a truck This maximum car speed was observed on March 19, the second day of the new speed limit. In addition to these high speeds, one interstate passenger bus was observed going 74.11 m p h The curve further shows that during the 45 m p h period, 68 per cent of the cars and 27 per cent of the trucks were exceeding the 45 m p h limit. Also, 55 per cent of the Indiana cars and 77 per cent of the foreign cars exceeded the limit In other words, comparing the records of the 45 m p h. period and the preceding "no limit" period, the curves show that car and truck speeds did

not change, indicating that the "voluntary" restriction had no measurable effect on driving speeds

With the reduction of the speed limit to 40 m p h. the State Highway Commission of Indiana erected over 600, 4 by 4 ft "patriotic speed" signs on all of Indiana's principal highways These signs were posted at the edges of towns for outbound traffic. The 40 m p h. period lasted from July 26 to September 30, 1942, at which time the entire Nation was placed on a 35 m p h. speed limit program. Figure 4 shows the type of 40 m p h signs

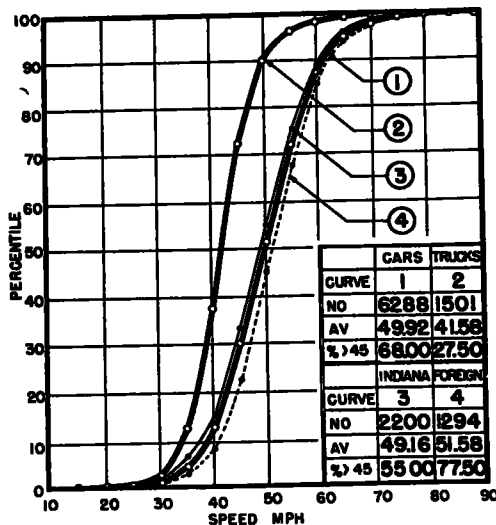


Figure 3. 45 m.p.h. Speed Limit Period March 18, 1942 to July 25, 1942

posted on Indiana highways Figure 5 represents speed conditions during the 40 m.p.h. speed limit, during which time average car and truck speeds were 46.74 m p h. and 40.26 m p h, respectively Indiana cars averaged 45.62 against 48.82 for foreign cars The highest speeds were 86.31 for cars and 67.50 for trucks In addition, the curve shows that 78 per cent of the cars and 52 per cent of the trucks exceeded the 40 m p h limit. Seventy-three per cent of the Indiana cars and 87 per cent of the foreign cars exceeded the limit.

The data collected during this period further show that the 40 m p h signs were effective to the extent of lowering average car speeds 3 m p h. and truck speeds 1 m p h

During the 40 m.p.h period, a separate two-

day survey was conducted<sup>4</sup> using one of the regular 4 by 4 ft., 40 m.p.h. "patriotic speed"

type of sign Observations were made with the sign placed 400 ft. in advance of the speed

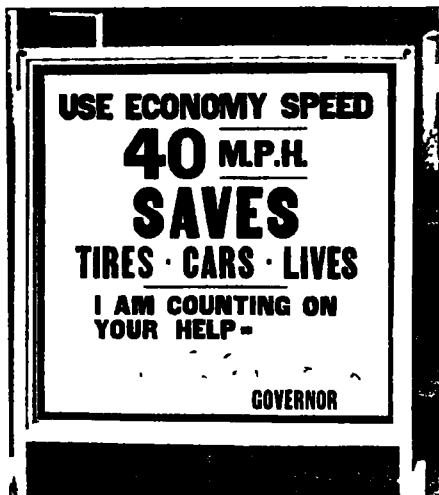


Fig. 4. One of the 600, 4 by 4 ft. 40 m.p.h. "Patriotic Speed" Signs That were Placed on All of Indiana's Highways

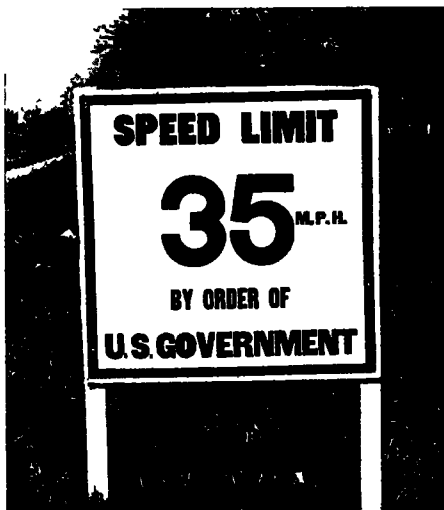


Fig. 6. The Type of 35 m.p.h. Speed Limit Sign Placed on All of Indiana's Principal Highways. These signs are 4 ft. square

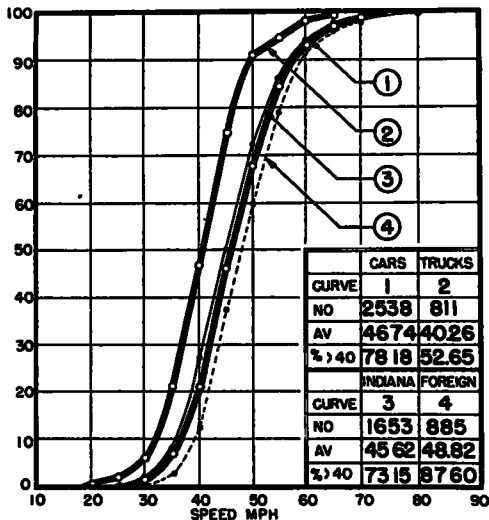


Figure 5. 40 m.p.h. Speed Limit Period July 26, 1942 to September 30, 1942

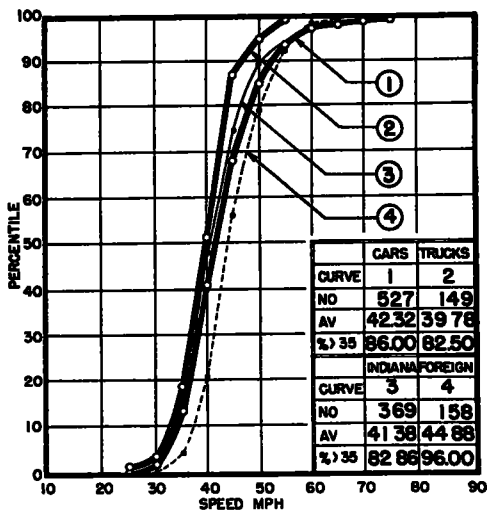


Figure 7. 35 m.p.h. Speed Limit Period October 1, 1942 to November 30, 1942

signs on portable standards (Fig 4) for the purpose of finding the immediate effect of this

check section and with the sign removed Comparing the two sets of data brought out the very interesting fact that the presence of the 40 m p h sign caused a 16 per cent drop in

<sup>4</sup> On US 52 near SR 28, about 15 miles south-east of Lafayette

the percentage of both cars and trucks exceeding the posted limit.

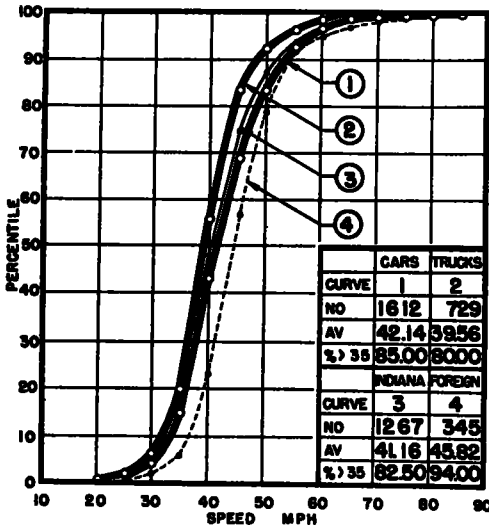


Figure 8. Gas Rationing. 35 m.p.h. Limit 4 Gallons for "A", "B" & "C" December 1, 1942 to August 15, 1943.

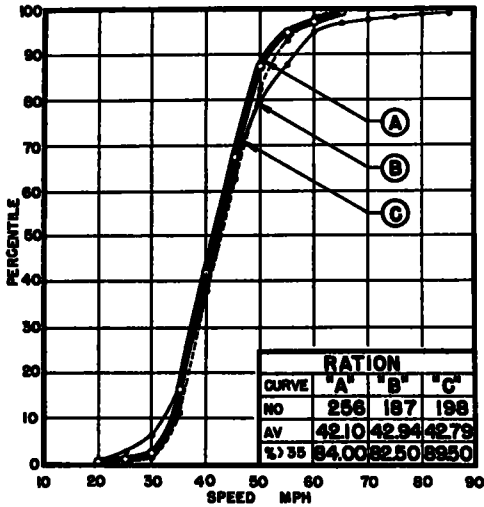


Figure 9. Gas Rationing. 35 m.p.h. Limit 4 gallons for "A", "B" & "C" December 1, 1942 to August 15, 1943.

At the recommendation of the Baruch Rubber Committee, the Office of Defense Transportation established a nationwide 35 m.p.h. speed limit, effective October 1, 1942, for the

purpose of conserving tires and gasoline. With the reduction in the speed limit, the 40 m.p.h. speed signs were replaced by 4 by 4 ft. 35 m.p.h. speed signs (Fig. 6). This period lasted from October 1 to November 30, 1942, at which time the gasoline rationing program was made nationwide. Figure 7 shows that during the 35 m.p.h. period, car speeds averaged 42.32 m.p.h. and truck speeds averaged 39.78 m.p.h. Indiana cars averaged 41.38 against 44.88 for foreign cars. Eighty-six per cent of the cars and 82.5 per cent of the trucks exceeded the 35 m.p.h. limit. Eighty-three per cent of the Indiana cars and 96 per cent of the foreign cars exceeded the limit. The highest speeds recorded during the period were 74.11 for cars and 54.10 for trucks.

Comparing speeds of this period with the previous 40 m.p.h. period shows that average car speeds dropped 4.4 m.p.h. and that truck speeds dropped less than one-half m.p.h. Foreign cars were still moving three m.p.h. faster than Indiana cars.

The next "speed influencing" period lasted from December 1, 1942 to August 15, 1943, during which period, gasoline rationing was extended to include the entire nation with Midwest "A", "B", and "C" gas ration coupons each having 4 gal values. The truck, or "T" coupons were each worth 5 gal. The 35 m.p.h. speed limit remained unchanged. With the initiation of gas rationing in Indiana, one of the methods of enforcing the speed limit, in addition to fines, has been to forward copies of warning tickets to the offender's local tire and gasoline rationing board. The speeds during this period (Figs. 8 and 9) were as follows: All cars averaged 42.14; trucks, 39.56; Indiana cars, 41.16; foreign cars, 45.82; "A" cars, 42.10; "B" cars, 42.94; and "C" cars, 42.79. The percentage of cases exceeding the 35 m.p.h. limit in each of the various vehicle classes were: All cars, 85; trucks, 80; Indiana cars, 82.5; foreign cars, 94; "A" cars, 84; "B" cars, 82.5, and "C" cars, 89.5.

These data show that adding gas rationing to the existing 35 m.p.h. speed limit had no effect on the average speeds of cars or trucks. (However, foreign car speeds increased one m.p.h.) Even the percentage of cases exceeding the limit in each of these two 35 m.p.h. periods remained unchanged. In comparing the speeds of "A", "B", and "C" cars, the data

show that there was no appreciable difference in speeds among these classes.

On August 16, 1943, the Midwest "A", "B", and "C" gas coupons were reduced in

which lasted from August 16 to September 30, 1943, when "B" and "C" coupons were further reduced in value. Figures 10 and 11 show speed conditions during the 3-gal. ration

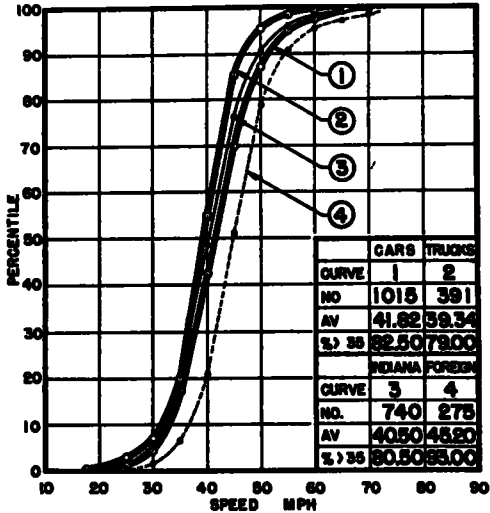


Figure 10. Gas Rationing. 35 m.p.h. Limit 3 Gallons for "A", "B" & "C" August 16, 1943 to September 30, 1943.

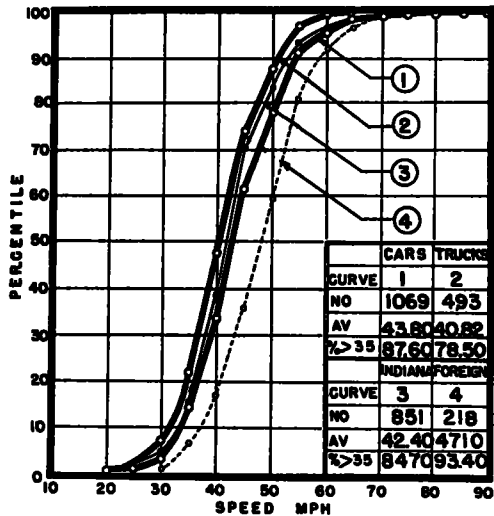


Figure 12. Gas Rationing. 35 m.p.h. Limit 3 Gallons for "A", 2 for "B" & "C" Since October 1, 1943.

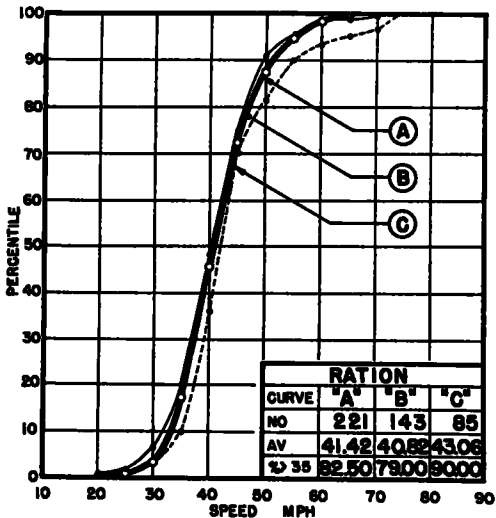


Figure 11. Gas Rationing. 35 m.p.h. Limit 3 Gallons for "A", "B" & "C" August 16, 1943 to September 30, 1943.

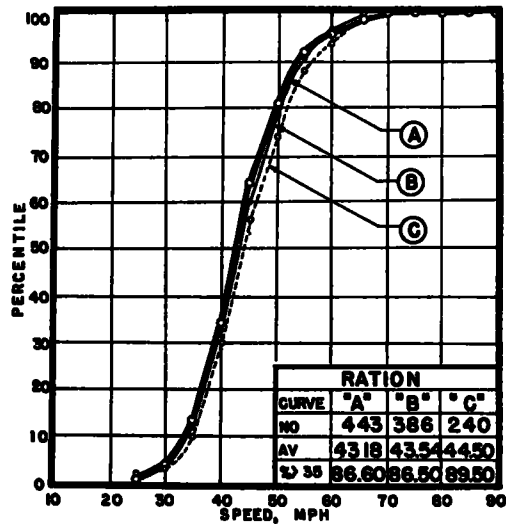


Figure 13. Gas Rationing. 35 m.p.h. Limit 3 Gallons for "A", 2 for "B" & "C" Since October 1, 1943.

value from four to three gallons ("T" coupons remained at five gallons). This was taken as a basis for a new "speed influencing" period,

period. During this period, average speeds were. All cars, 41.82; trucks, 39.34; Indiana cars, 40.50; foreign cars, 45.20; "A" cars, 41.42;

"B" cars, 40.82, and "C" cars, 43.06. The percentage of cases exceeding the 35 m p h. limit were All cars, 82.5; trucks, 79; Indiana cars, 80.5; foreign cars, 93; "A" cars, 82.5; "B" cars, 79; and "C" cars, 90.

These data show that the reduction in "A", "B", and "C" gas coupon values from four to three gallons accomplished little in the way of speed reductions. Average car speeds dropped three-tenths m.p.h. and truck speeds

ing this period. The data show the following averages: 43.80 for cars; 40.82 for trucks; 42.40 for Indiana cars; 47.10 for foreign cars; 43.18 for "A" cars; 43.54 for "B" cars; and 44.50 for "C" cars. The percentage of cases in each of the various vehicle groups that were found to be exceeding the 35 m.p.h. limit were: All cars, 87.6; trucks, 78.5; Indiana cars, 84.7; foreign cars, 93.4; "A" cars, 86.6; "B" cars, 86.5, and "C" cars, 89.5.

TABLE 1  
INDIANA WAR TIME TRAFFIC SPEEDS  
(Shows the Percentage of Cases Going Less Than the Stated Speeds)

Speed, m p h.	No speed limit To Mar 18, 1942		45 m p h Mar 18 to July 26, 1942		40 m p h July 26 to Oct 1, 1942		35 m p h Oct 1 to Dec 1, 1942		35 m p h - 4 gal Dec 1, '41 to Aug 16, '43		35 m p h - 3 gal Aug 16 to Oct 1, 1943		35 m p h - 3, A, 2, B & C Oct 1, 1943	
	All Cars	Trucks	All Cars	Trucks	All Cars	Trucks	All Cars	Trucks	All Cars	Trucks	All Cars	Trucks	All Cars	Trucks
80	99+	100	99+	100	99+	100	100	100	99+	100	100	100	99+	100
70	97+	99	95	99	99	100	98	100	99+	100	99+	100	99+	99+
60	85	98	87	98	83	99	96	100	97	99+	97	99	96	99
50	51	92	51	90	68	92	85	95	85	95	87	96	78	86
40	16	40	13	39	22	47	41	51	43	56	41	54	34	47
30	2	4	2	4	1	6	2	3	3	5	5	7	4	7
20	1-	1-	0	1-	0	1	0	0	1-	1-	1-	1-	1-	4
			Indiana	Foreign	Indiana	Foreign	Indiana	Foreign	Indiana	Foreign	Indiana	Foreign	Indiana	Foreign
80			99+	99+	99+	99+	100	100	99+	100	100	100	99+	100
70			98	98	99	95	99	100	99+	99+	99+	99+	99	99+
60			88	84	94	91	87	99	97	95	98	95	96	92
50			55	45	72	60	87	79	88	73	90	79	83	89
40			14	8	27	12	50	22	49	24	49	21	38	16
30			2	1	2	1	3	0	4	2	6	2	4	1-
20			0	0	0	0	0	0	1-	1-	1-	0	1-	0
			"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"
80			100	100	99+	100	100	100	100	100	100	99+	100	100
70			100	100	98	100	97	99	97	98	98	94	96	99
60			97	98	95	98	98	98	97	95	98	96	96	95
50			87	82	82	88	92	82	87	82	82	79	80	74
40			42	39	39	46	49	36	42	39	40	34	33	30
30			2	3	6	4	7	3	2	3	3	4	4	3
20			0	1-	1-	1-	0	0	1-	0	0	0	0	0

dropped two-tenths. Likewise, these data show that Indiana and foreign speeds remained unchanged. However, of the three automobile ration classes, the average speeds of "C" cars increased slightly, "B" cars decreased 2 m p h and "A" cars decreased less than 1 m.p.h.

On October 1, 1943, the values of "B" and "C" coupons were reduced from 3 to 2 gal. each with the values of "A" and "T" remaining unchanged. (3 and 5 gal., respectively). At the present writing (Nov. 1943), these values have not been reduced further, and Figures 12 and 13 show speed conditions dur-

The trend in speeds during these various "speed influencing" periods, is recapitulated in Table 1. This table shows the percentage of cases in each vehicular class going less than 10 m.p.h. interval speeds for the various "speed influencing" periods. To illustrate this method of comparison, note the percentage of cases going less than 50 m.p.h. in each period for cars. It follows that before March 18, 1942, 51 per cent were going less than 50 m p h ; during the 45 m p h. period, 51 per cent, during the 40 m p h. period, 68 per cent, during the 35 m p h. period, 85 per cent; during the three gallon ration period, 87 per cent; and,

during the present period, 78 per cent less than 50 m p.h.

In summarizing this speed survey, the most significant facts are

1. Average car speeds on Indiana's highways dropped from 49.56 m.p.h. to 42.32 during the first year of war, and increased slightly during the second year to 43.80 m.p.h.
2. Foreign cars averaged from 3 to 5 m.p.h. faster than Indiana cars during each of the "speed influencing" periods
3. The 45 m.p.h. limit had no effect on the speeds of either cars or trucks
4. During the 40 m.p.h. limit, average car speeds dropped from 49.92 to 46.74 m.p.h. and truck speeds from 41.58 to 40.26 m.p.h., thus showing some effect in reducing speeds.
5. The 35 m.p.h. limit was effective in reducing average car and truck speeds to 42.32 m p h. and 39.78 m p h., respectively.
6. The 4 gal. rationing program had no effect on the speeds of cars or trucks (A one per cent drop in the number of cars exceeding 35 m.p.h. was noted.)
7. There was very little difference between

"A", "B", and "C" ration speeds in the four gallon ration period. These speeds were: 42.10, 42.94, and 42.79, respectively.

8. The reduction of "A", "B", and "C" coupon values to three gallons caused average car speeds to drop less than one-half mile per hour with no change in truck speeds. Average car speeds were 41.82 m.p.h. and truck speeds, 39.34.
9. During the three gallon period, the speeds of "A" and "B" cars dropped while "C" car speeds increased slightly. Average "A" speeds dropped from 42.10 m.p.h. to 41.42. Average "B" speeds dropped from 42.94 to 40.82 m.p.h. Average "C" speeds increased from 42.79 to 43.06 m.p.h.
10. The most recent data show that during the present rationing program, average car speeds have increased from 41.82 m.p.h. to 43.80 m p h. and truck speeds from 39.34 to 40.82. The data also show that "A" ration speeds have increased from 41.42 m p h. to 43.18 m.p.h.; "B" speeds increased from 40.82 to 43.54; and "C" speeds increased from 43.06 to 44.50 m.p.h.