

"THE FUTURE AUTOMOTIVE BATTERY MARKET"

Talk by Dr. F. J. Port, President AABM
Before the
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The Association of American Battery Manufacturers appreciates the invitation you customarily and courteously extend to its President to talk to you about the outlook for automotive storage batteries. The fact that I have asked Mr. Robert Gettier to read this short paper for me should not be interpreted as lack of regard for the Lead Industries Association or the honor implicit in being invited to address you. I should very much like to be with you today and to do this personally. However, for the second consecutive year the person who sets the date for your meeting and the person who sets the date for ESB's Spring Management Conference seem to see eye-to-eye on what is really the one best week in all the year to hold a meeting. This means I must resolve the conflict between what would be my duty and pleasure as President of AABM and what is my duty (and pleasure) as an employee of ESB; this choice is simplified somewhat by the difference in pay scales for the two jobs.

Mr. Ziegfeld knew in advance that my acceptance was contingent upon having someone else present the material for me. Mr. Gettier is Director of Purchases and Distribution in the Automotive Division of ESB and is regularly involved and deeply interested in forecasting techniques and their application to forecasting battery demands by type, month, and location.

In approaching this subject matter we will first examine the recent historical data

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for the replacement battery market and attempt to correlate factory shipments with an appropriately defined concept of vehicle population.

Secondly, by leaning heavily on professional forecasters and the opinions expressed by business leaders in the automotive industry, we will try to look ahead at new vehicle production and future vehicle population.

The third step will be to integrate these forecasts with the relationship discussed in the first step to yield separate forecasts for replacement batteries and original equipment batteries.

My approach to this subject will be somewhat different from that used by others who have spoken to you on the subject in years past.

One departure from past practice will be to deemphasize the effort usually devoted to making a precise forecast of how many automotive batteries will be shipped this year and to substitute for this (at least in terms of emphasis) an admittedly less accurate look at what is likely to occur in the next five years. We probably should not have to justify doing this, beyond remarking that it ought to be an interesting exercise and that even a somewhat inaccurate forecast that far into the future is better than none at all. Many of our business decisions, especially in the areas of finance and facilities, are necessarily made with assumptions (either stated or unstated) as to what the demand for our product will be five years hence.

A second departure from past practice will be, in looking at the replacement battery market, to discard the calendar year as the statistical unit. The calendar year begins and ends very inappropriately right in the middle of the peak retail selling season

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for automotive batteries. Data for any calendar year are subject to variations in two different winters -- variations as to whether the business-producing storms occur early or late, particularly in the most populous regions of the country.

The period March 1 to February 28 is at least a more natural and a more logical year, not subject to this important variation; all the important storms in one winter fall in one year's data. Examination of the historical data shows that, when recast in this fashion, the data are, in fact, much smoother than calendar-year data; trends are much more clear-cut. It follows that the probable accuracy of extrapolations into the future is improved.

In a few moments we will take a look at the historical data on automotive battery shipments, recast in this fashion. In so doing we will want to relate these replacement data to the number of vehicles they serve, and that latter concept (the number of vehicles they serve) is a little hard to define. Certainly it is not logical to relate replacement battery shipments to vehicle registrations as of the end of the year, because, except to a very minor degree, automobiles built in the last couple of years are not potential customers for new replacement batteries today. There is considerable room, both for honest argument and for a lot of mathematical analysis, as to what is the one best way to calculate the actual vehicle population that should be logically related to replacement battery sales March-through-February. A fairly good choice would seem to be to remove the growth in registrations for the one year and two months preceding the start of the battery year. In other words, relate the replacement battery sales from March 1, 1964 to February 28, 1965 to the reported vehicle registrations as of December 31, 1963.

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In the light of how long batteries last in an automobile, it may seem illogical at first blush to move backward only 14 months to get a vehicle population to relate to battery sales. Actually we are stretching backward farther than it first appears.

Of all the new cars added to total registrations during 1962, half of them are six months old or older on December 31. Also, of all the replacement batteries to be shipped from factories in the year starting March 1, 1965, the average will probably be some eight or nine months in the future when the winter season strikes. Thirdly, an additional three to four months elapses (on average) between the date a factory shipment occurs and the date the retail sale occurs. Considering these three factors, it seems fairly logical to look for a relationship between vehicle population on December 31 and the factory shipments in the year beginning 14 months later.

Regardless of the logic or the lack of it, a more relevant point is whether the assumption leads empirically to a good correlation. This you will be able to judge for yourself in a few moments.

If this approach works out (i.e. if there really is good correlation between vehicle population so defined and the number of replacement batteries shipped from factories during the natural battery year beginning 14 months later), then we will have a useful tool for short-term battery forecasting as well. After all, those vehicles 30 months old, or older, are out there -- they are out there numbering in the tens of millions -- and every single day those batteries get one single day older. For a fellow who enjoys making and selling good replacement batteries, that's a comforting thought!

The first slide shows replacement battery shipments, back to 1952, converted to this

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natural battery year. It also has a line depicting total vehicle registrations for the end of each calendar year, offset in the manner just described. The upper scale shows the years for the vehicle population curve.

The raw data are not very smooth and the expected logical relationship is not very apparent.

However, for the second slide we have calculated and plotted the ratio between the replacement battery shipments for the natural year to the vehicle population one year and two months earlier.

Here are some very interesting relationships! The ratios for the years 1952 through 1956 are almost identical, one replacement battery shipped for every 0.454 vehicles registered as of that earlier date. The correlation is extremely accurate.

Also interesting is the fact that the ratios for the year 1957 through 1964 also very accurately fit a straight horizontal line, but at a lower level. During this period one replacement battery was shipped for every 0.400 vehicles registered as of the earlier date.

Each group of points fits a horizontal line so precisely that we cannot help but feel that there is considerable validity in treating the data this way.

We cannot avoid trying to explain why the sudden change occurred in 1957. Any explanation I might attempt would be very speculative but here, at least, are some comments. The data tell us that beginning in 1957 batteries did not have to be replaced as often as in prior years. Why? We would have to seek the underlying reasons for

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this is something done to the batteries and/or to the cars back around 1954 and 1955. With hindsight it is not hard to find speculative theories because at that time a lot of changes were occurring in the industry. Just to list a few -- change from 6 volt to 12 volt systems -- change to lower antimony grid alloys -- rapid shift from wet charge to dry charge -- change from wood separators to synthetic separators. These are all valid and logical reasons for explaining the size and direction of the change but they hardly explain the suddenness of the change. However, part of the suddenness is explained by the unusually large growth in registrations in 1955, the record new car year. This helps to sharpen the break that occurs in the data in the 1957 battery year. So it appears that maybe we are on a new plateau for the ratio of replacement batteries sold to the size of the vehicle population. But are we? What about the future? You don't want just hindsight -- you want a little insight and foresight.

The most significant new factor present today is the substitution of alternators for the generator. There is no question but that this improves the environment in which the battery must function, particularly those batteries subjected to a lot of stop-and-go slow speed driving. Also, some batteries have always been replaced somewhat earlier than they needed to be, simply because they were discharged. This will happen less frequently with alternators. Again, it is speculative to say quantitatively how much average battery life will be extended when the large bulk of our car population is equipped with alternators -- and I have no actual data that are in any sense definitive. Moreover, we cannot duck the issue and still make a 5-year forecast. In making a no-data judgment, we must bear in mind that a lot of other adverse factors affecting

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battery life are still at work, such as overcharge conditions, high ambient temperatures in crowded engine compartments, vibration, improperly set voltage regulators, neglect, and just plain time itself, inexorably taking its toll on some very highly reactive, finely divided chemical agents imbedded in the battery plates. I will place my bet on 10% as being very adequate for measuring the effective improvement in battery life in the average passenger car, due to alternators. In the terms used in the second slide, this is tantamount to saying that in 1969, about 0.36 batteries will be shipped per vehicle. We needed to settle on some such number in order to make the 1969 forecast of replacement battery shipments.

Of course, we also need to forecast future vehicle registrations and this is the subject matter of the third slide. The historical data need no particular comment; the estimates of the future are a composite of many different forecasters.

This slide includes projections of all the components that affect total vehicle registrations, such as new car production, truck and bus production, exports, imports, and vehicle scrappage rates. All of the forecasters I have been exposed to seem to agree substantially upon how many new cars and trucks will be built during these coming five years. The net result of all this is a projection that in 1967, which you will remember is the basis for our 1969 battery year forecast, our total vehicle registrations will be somewhere around 96 million vehicles.

The fourth slide is similar to the first, except that it now includes also projections into 1969. Replacement batteries are mathematically arrived at by using ratio figures from slide 2, that gradually change from the 0.400 of recent years to 0.360 in 1969,

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applied against anticipated vehicle population in the future.

The original equipment battery projections are drawn directly from the data on the third slide for new domestic car production and new truck and bus production. The curve for total battery production is, of course, the sum of OE and replacement, plus the small amount of export. The conclusion works out to a probable battery production of about 45 million units in 1969 vs. about 39 million units in 1964.

One cannot help wondering how accurate this is. The business cycle does not seem to affect replacement battery sales very much (remember the second slide) but it certainly affects new car and new truck sales -- and few people would be so foolhardy as to say now whether 1969 will be a boom year or a recession year. On the point of accuracy, the best I could hope for would be acceptance of this number as a reasonable estimate of the probable level of battery production five years hence. A range of plus-and-minus 5% is shown for all the forecasts; the probability that the actual figures will fall within this range is probably quite high.

So much for batteries, which are dear to my heart! But your prime interest is lead consumption -- and this is also affected by another factor, the amount of lead used per battery. Battery manufacturers will continue to use lead more effectively; witness the one-piece cover battery, now being built in large volume. Of greater importance, though, is the size of the battery required to crank the engines and to support the accessory load now including more and more air conditioners.

The current trend is strongly toward bigger engines and, therefore, bigger batteries in original equipment. Much of the magic in the compact car seems to have disappeared -

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personally, I don't think it's going to come back. The average American is now more affluent — and likely to become even more so — and I think more and more of them will want and buy air-conditioned comfort of the large car which can do justice to our better high speed roads and turnpikes.

Thus, we end on a happy note for the future — not only substantially more batteries but also more lead per battery. It is gratifying to know that what I objectively believe will happen is exactly what you would like to have come to pass. Let's hope we are both correct.

FJP:MC
4/9/66

**TABLE #1 RELATIONSHIP BETWEEN TOTAL VEHICLE
REGISTRATIONS AND REPLACEMENT
BATTERY SHIPMENTS**

<u>Total Vehicle Registrations</u>		<u>Replacement Battery Shipments</u>		<u>Ratio Batteries to Registrations</u>	
<u>Vehicle Year</u>	<u>Registration (A) Millions</u>	<u>Battery Year</u>	<u>Battery (B) Shipments (Millions)</u>		
1950	49.2	1952	22.2	.451	Average .454
1961	51.9	1953	24.1	.464	
1952	53.3	1954	23.6	.443	
1953	56.3	1955	26.0	.462	
1954	58.6	1956	26.2	.447	
1955	62.8	1957	25.2	.401	Average .400
1956	65.2	1958	25.9	.397	
1957	67.2	1959	26.5	.394	
1958	68.3	1960	27.9	.408	
1959	71.5	1961	28.9	.404	
1960	73.9	1962	31.2	.422	
1961	75.8	1963	30.2	.398	
1962	79.0	1964	29.5 est.	.373 est.	
1963	82.7 est.	1965	32.4 est.	.392 est.	
1964	86.3 est.	1966	33.1 est.	.384 est.	
1965	89.9 est.	1967	33.8 est.	.376 est.	
1966	93.0 est.	1968	34.2 est.	.368 est.	
1967	96.4 est.	1969	34.7 est.	.360 est.	

(A)

Source: U.S. Bureau of Public Roads

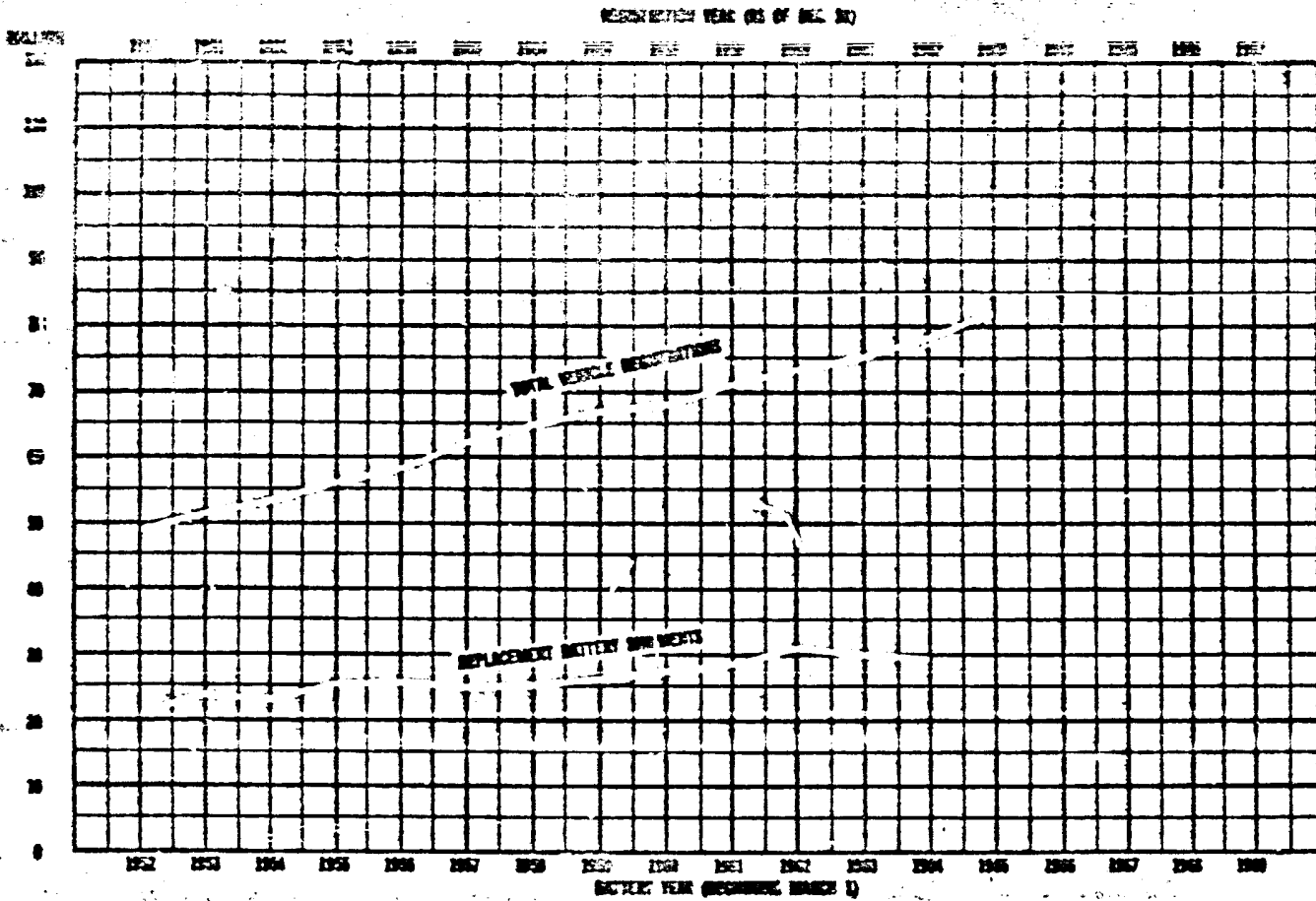
(B)

Source: The Association of American Battery Manufacturers, Inc.

See Chart I and II

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CHART I - Total Vehicle Registrations - Replacement Battery Registrations



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CHART H - Body Replacement Library Summary by Volume

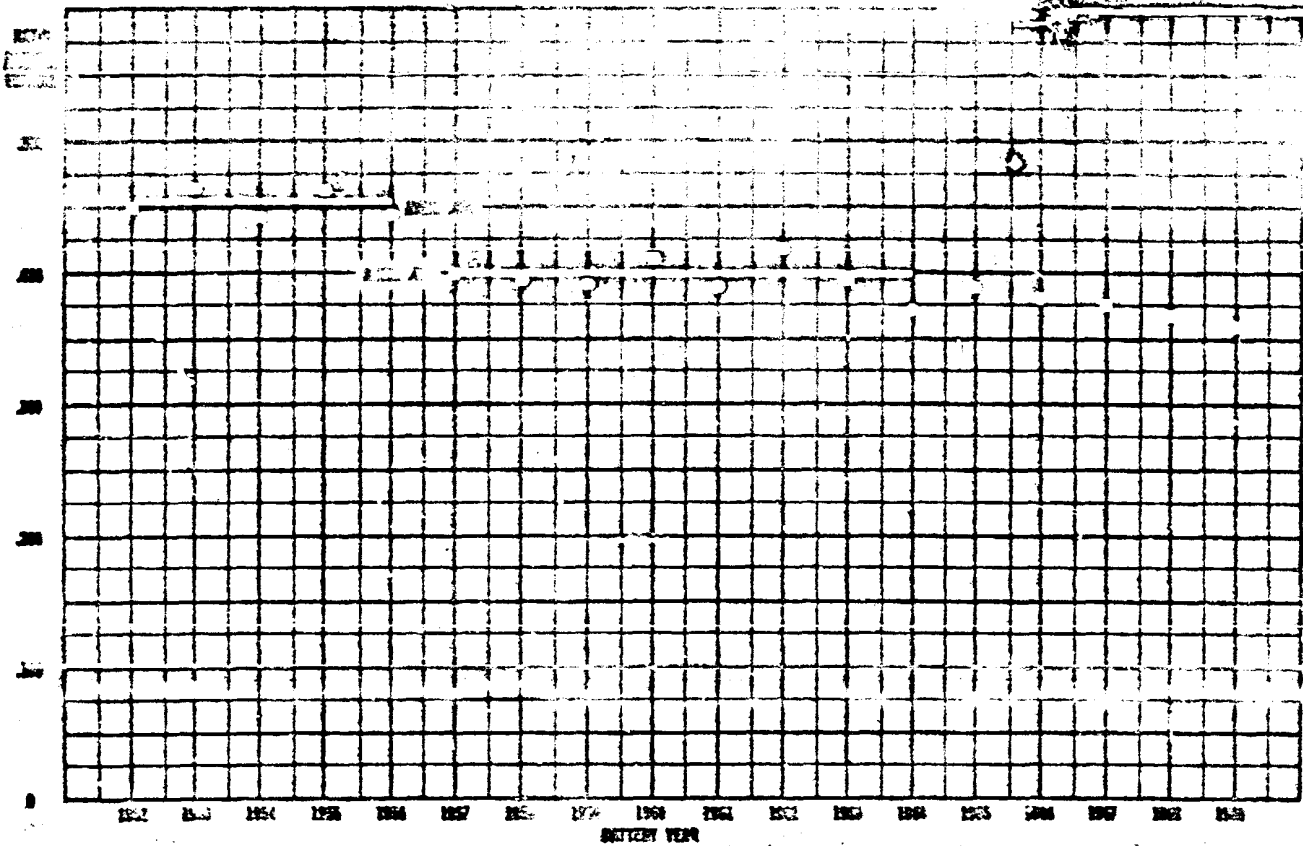


TABLE VII VEHICLE REGISTRATION TRENDS

Vehicle Year	Domestic Cars (-000)	Domestic Truck & Bus (-000)	Total (A) Vehicle Imports (-000)	Total (A) New Registrations (-000)	Total (C) Vehicle Scrappage (-000)	Total (B) Vehicle Exports (-000)	Total Registrations (as of Dec. 31) (Million)
1952	4,124	812	34	4,970	2,787	N/A	83.3
1953	5,708	930	31	6,669	4,054	289	84.3
1954	5,500	828	36	6,364	4,353	358	89.6
1955	7,112	956	59	8,127	4,392	369	82.8
1956	8,846	891	112	9,849	4,948	373	85.2
1957	8,718	850	272	9,840	4,265	336	87.2
1958	4,211	712	459	5,382	4,177	270	88.3
1959	5,344	920	719	6,983	5,339	267	71.5
1960	6,106	919	495	7,520	4,794	322	73.9
1961	5,566	910	296	6,774	5,018	259	75.8
1962	6,555	1,057	396	8,008	4,808 (D)	232	79.0
1963	7,123	1,226	442	8,801	5,101 (D)	268	82.7
1964 (D)	7,864	1,411	485	9,760	5,831 (D)	325	86.3

Forecasts

1965	7,910	1,400	515	9,825	6,230	260	89.9
1966	7,655	1,315	540	9,510	6,370	355	93.0
1967	8,000	1,375	565	9,940	6,560	360	96.4
1968	8,195	1,440	590	10,225	6,760	365	99.9
1969	8,415	1,495	615	10,525	6,960	370	103.5

- (A) Source: U.S. Department of Commerce
 (B) Source: Automotive Industries March 1964
 (C) Source: Automobile Manufacturers Association
 (D) Estimated

See Chart III

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Chart II - Annual Vehicle Registration Trends

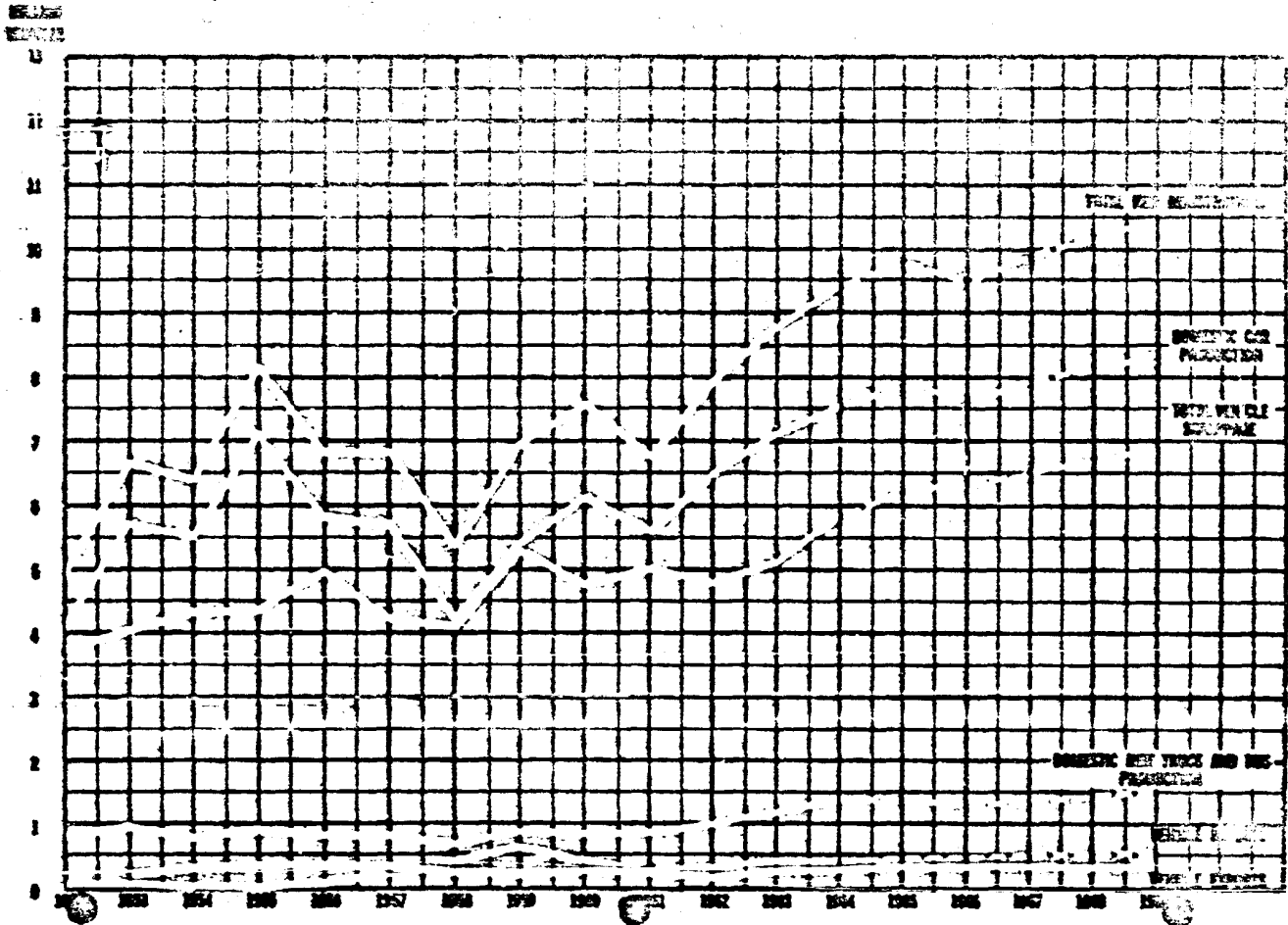


TABLE III BATTERY SHIPMENT FORECASTS

<u>Total Vehicles</u>		<u>B A T T E R I E S</u>				
<u>Vehicle</u>	<u>Registrations</u>	<u>Battery</u>	<u>Replacement</u>	<u>O.E.</u>	<u>Export</u>	<u>Total</u>
<u>Year</u>	<u>(Million)</u>	<u>Year</u>	<u>Shipments</u>	<u>Shipments</u>	<u>Shipments</u>	<u>Shipments</u>
			<u>(Million)</u>	<u>(Million)</u>	<u>(Million)</u>	<u>(Million)</u>
1950	49.2 (A)	1952	22.2 (A)	5.5 (A)	.4 (A)	28.1 (A)
1951	51.9	1953	24.1	7.3	.4	31.8
1952	53.2	1954	23.6	6.6	.4	30.6
1953	54.3	1955	26.0	9.2	.4	35.6
1954	58.6	1956	26.2	6.9	.4	33.5
1955	62.8	1957	25.2	7.2	.3	32.7
1956	65.2	1958	25.9	5.1	.2	31.2
1957	67.2	1959	26.5	6.7	.2	33.4
1958	68.3	1960	27.9	7.9	.2	36.0
1959	71.5	1961	28.9	6.7	.2	35.8
1960	73.9	1962	31.2	8.2	.3	39.7
1961	75.8	1963	30.2	9.1	.2	39.5
1962	79.0	1964	29.5	9.2	.2	39.0
<u>Forecasts</u>						
1963	82.7	1965	32.4 (B)	9.7	.2	42.3
1964	86.3	1966	33.1	9.3	.2	42.6
1965	89.9	1967	33.8	9.7	.2	43.7
1966	93.0	1968	34.2	10.0	.2	44.4
1967	96.4	1969	34.7	10.3	.2	45.2

(A) 1950 - 1963 Actual 1964 Estimated

(B) Computed from Ratios (Table D)

Note: Upper and Lower Range $\pm 5\%$

See Chart IV

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CHART IV - TIRE SHIPMENT REQUIREMENTS
 1950 - 1967

