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*Aircraft Industries Association*

Shoreham Bldg. Research Service Washington 5, D. C.

**POSTWAR SIZE OF  
AIRFRAME PRIME CONTRACTORS**

REPORT ON A QUESTIONNAIRE

**August, 1945**

8.6

COPY No. 25 NAME E. W. Norris

POSTWAR SIZE OF AIRFRAME  
INDUSTRY

8.6

Project 41  
August 10, 1945

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Summary of Questionnaire on  
POSTWAR SIZE OF AIRFRAME INDUSTRY

Who is represented?

The 15 largest basic prime airframe manufacturers, representing 85.3 percent of the total 1944 floor space. (13.9 percent were occupied by temporary prime airframe manufacturers, .8 percent by other basic prime manufacturers not represented).

What is shown?

Total operations (military and civil) at different procurement levels for the 12 months beginning 6 months after the end of the war.

What military procurement levels were assumed?

The levels were 15, 10, 8, 6 and 4 percent of 1944 -- corresponding to military airframe sales of 1000, 660, 530, 400 and 265 million dollars. This in turn, corresponds roughly to a total aircraft procurement of 2000, 1320, 1060, 800, and 530 million dollars.

What are the results of the questionnaire?

Floor Space: Will vary from 49.2 percent to 26.7 percent of 1944 peak of 88.7 million square feet.

Facilities: Number of facilities will drop almost immediately to prewar levels with industry tending to return to prewar states of operation.

Subcontracting: Outside production which reached 35 percent in 1944 will drop to about 7.5 percent.

Employment: Gross employment will range from 228,000 down to 113,000 depending on the level of military procurement.

Research, Design,

Development: Will represent about one third of gross employment.

Operations: Nearly all companies will work a 1 shift, 40 hour week.

Lease of government-

owned facilities: Nine companies consider lease at percentage of sales, two prefer flat rate.

## THE QUESTIONNAIRE

### The Interdepartmental Committee

In May, 1945 the aircraft industry was informed that an Interdepartmental Committee consisting of representatives of the War, Navy, and Commerce Departments was studying the size of the post-war aircraft industry and the volume of military production necessary to safeguard the continued existence of an aircraft industry able to

1. Provide replacements of superior design and performance,
2. Carry on research and development,
3. Expand rapidly in an emergency.

The Harvard Business School was reported as aiding the Committee in its study.

### Position of Aircraft Industry

Interest in a sound Airpower Policy and self-interest made any study of this kind significant to the aircraft industry. The Regional Executive Committees of the Aircraft Manufacturers Council had expressed themselves previously (February 28 and March 28, 1945) that close cooperation should be offered to impartial outside agencies in their efforts to preserve a healthy, progressive aircraft industry.

### A Joint Effort

After discussions between representatives of the Aircraft Industries Association, the Army Air Forces, and the Harvard School of Business Administration it was felt that the best contribution the AIA could make to the studies of the Interdepartmental Committee would be to ascertain the opinion of the leading aircraft manufacturers as to the effect different levels of military procurement would have on their total (military and civil) operations. Five different levels of military procurement were selected because the actual level of military procurement was not known at the time.

### Testing the Questionnaire

The questionnaire was developed by the Research Service of the AIA. It was reviewed by the Air Forces, the Harvard Business School and several industry executives. It was tested in three aircraft companies and again revised after conferences with several aircraft company presidents.

The final draft of the questionnaire was completed in June, 1945.

### Time of Questionnaire

All companies reporting filled out the questionnaire during July, 1945.

Confidential Nature of Questionnaire

Individual companies were assured that the content of their replies would not be made known to anybody outside the Research Staffs of the AIA and the Harvard Business School. Only industry totals will be made available to the Interdepartmental Committee.

This confidential treatment of individual replies enabled companies to give a true picture of the effect of their expected civil sales on their employment and floor space without fear that such a disclosure might influence the allocation of military orders.

Part of Industry Covered

The questionnaire was answered by all 15 major basic airframe prime contractors.

These are:

- |                       |                  |
|-----------------------|------------------|
| Beech ✓               | Grumman ✓        |
| Bell ✓                | Lockheed ✓       |
| Boeing ✓              | Martin ✓         |
| Chance Vought         | North American ✓ |
| Consolidated Vultee ✓ | Northrop ✓       |
| Curtiss               | Republic ✓       |
| Douglas ✓             | Ryan             |
| Fairchild ✓           |                  |

These 15 basic prime contractors give a truly representative picture of the entire postwar industry. In December, 1944 they reported 85.3 percent of the entire floor space reported by prime contractors. As an additional 13.9 percent was reported by non-basic industries who will not stay in aircraft production (Eastern Aircraft, Ford, Goodyear, and Nash), this leaves only basic prime contractors with .8 percent of the floor space excluded from this survey.

On the basis of average gross employment in 1944 the coverage is similarly complete.

	Percent of Gross Employment
15 BASIC AIRCRAFT PRIME CONTRACTORS	85.4
Basic prime contractors not covered	1.3
Non-basic prime contractors (Eastern Aircraft, Fisher Body, Ford, Goodyear, Nash-Kelvinator)	<u>13.3</u>
Total	100.0

HOW TO USE THE RESULTS OF THIS QUESTIONNAIRE

The assumptions on which this questionnaire is based necessarily do not fit all companies equally well. The answers, correspondingly contain distortions and although such distortions will tend to balance each other, the results should not be taken as facts but only as expectations based on the best present knowledge.

Particular attention should be given to the fact that the replies cover the airframe companies only. All prime airframe manufacturers produced about 8,750 million dollars worth of products in 1944 (AAF Report RC327). The 15 basic companies produced about 7,250 million dollars of this total. These figures compare with a total aircraft production in 1944 of more than 16 billion dollars as reported by WPB. The difference is accounted for by the value of engines and propellers and their parts, government furnished equipment, different accounting methods, lighter-than-air aircraft, etc. Very roughly, the reported airframe dollars can be doubled to arrive at the aircraft dollars.

It is important to keep in mind that, when this questionnaire speaks of a certain level of operation, the amounts of military AIRFRAME sales have to be doubled to arrive at the expected military AIRCRAFT budget, e.g., a 400 million dollar military AIRFRAME sale will require an 800 million dollar AIRCRAFT budget (and a military AVIATION budget several times as large to allow for gasoline, airports, etc.).

QUESTIONNAIRE ON

Postwar Six of Airframe Prime Contractors

The following assumptions should be made in answering this questionnaire:

1. Complete cessation of hostilities.
2. Adjustment period (about 6 months following war contract cancellation) has ended and operations are at relatively stable postwar level.
3. The period to be covered by your replies should be the 12 months after completion of the adjustment period described under Assumption 2.
4. (a) Half of your future military business will be production of designs already in production or ready for production. (Base your decision on how many different models to include in this calculation on (1) the knowledge that there will be no production of models of which a sufficient number is already in existence; (2) the number of different models you actually had in process in 1944; and (3) the dollar volume of military business which the different projected "levels of operations" permit you.)  
(b) Half of your future military business will be on development of new designs.
5. Hourly wages at 1944 level.
6. 40 hour week.
7. One-shift operation.
8. Excess Profits Tax repealed.
9. Federal Tax carryback provision currently available.
10. Government-owned plant, equipment and tooling may be leased on the basis of a percentage of the sales dollar.

Before answering any of the questions below, be sure to read the comment and suggestions prepared for each LINE of the questionnaire.

	1939	1941	1942	1943	1944	Projected Level of Operations				
	Column 1	Column 2	Column 3	Column 4	Column 5	15 Percent Column 6	10 Percent Column 7	8 Percent Column 8	6 Percent Column 9	4 Percent Column 10
Line 1 Military Airframe Sales (in 000's of dollars)										
Line 2 Civil Airframe Sales (in 000's of dollars)										
Line 3 Total Sales (in 000's of dollars)										
Line 4 Total Floor Space (in 000's of square feet)										
Line 5 Number of Facilities										
Line 6 Airframe Weight Produced (in 000,000's of pounds)										
Line 7 Percent of Outside Production										
Line 8 Average Gross Employment										
Line 9 Average Employment in Research, Design and Development										
Line 10 Name of State(s) in Which Operations Were or Will Be Maintained										

- Line 11 Assumptions 6 and 7 are based on a one-shift, 40 hour week. How many hours per week do you actually plan to operate your plants? ..... hours
- Line 12 At what rate did you calculate the percentage of the sales dollar for lease of government-owned facilities? (Assumption 10) ..... percent
- Line 13 Would you prefer any other arrangement to obtain use of government-owned facilities (for instance, payment of a percentage of the appraised replacement value of the facility)? If so, specify:  
.....
- Line 14 How many different military models will you produce? At 15% level:..... at 10%:..... at 8%:..... at 6%:..... at 4%:.....  
(Line 1, Assumption 4a)

COMMENT AND SUGGESTIONS

- Line 1 Use actual airframe sales, fixed-price and CPFF (including spares, but excluding G.F.E.) data for 1939-1944 as reported in your Annual Report (or as available in other records). Calculate Columns 6-10 in Line 1 as follows:  
Column 6: 15 percent of Column 5 in Line 1  
" 7: 10 " " " 5 " " 1  
" 8: 8 " " " 5 " " 1  
" 9: 6 " " " 5 " " 1  
" 10: 4 " " " 5 " " 1
- Line 2 Use actual data for 1939-1944 as reported in your Annual Report (or as available in your records). List your expected civil airframe sales for the 12-month period under Assumption 3 above in Columns 6,7,8,9, and 10. If you do not want to disclose your expected civil sales, do not fill in Columns 6-10 in the questionnaire which you return to the Association, but use it as basis for your calculations.
- Line 3 Total of Lines 1 and 2. If you do not want to disclose your expected civil airframe sales, do not fill in Columns 6-10 in the questionnaire which you return to the Association, but be sure to use this total as the basis for the calculations in the following Lines.
- Line 4 Total floor space as defined in AMPR Supplement QR-1. Use your own records for 1939. Give estimate of how much you would use at sales levels indicated in Columns 6-10 of Line 3.
- Line 5 A facility represents a single plant fabricating a complete airframe or different plants working under the same corporate management and together as a unit fabricating the complete airframe. Use actual data for 1939-1944 and estimate how many of your facilities you would use at the sales levels indicated in Columns 6-10 of Line 3. If you would close down entirely under some of the conditions indicated, list 0 as number of facilities.
- Line 6 Airframe weight as defined in AMPR Supplement QR-1. Include spares in total.
- Line 7 Percent of outside production as defined in AMPR #2.
- Line 8 Gross employment as defined in AMPR #2.
- Line 9 Include all employees engaged in these activities. This covers engineering, drafting, tool design and construction, construction of three prototypes and one static test article, flight and static tests, accelerated service tests, and all clerical and supporting labor pertaining to above.

RM:rbw, Project #41, 7/3/45

Date \_\_\_\_\_ President \_\_\_\_\_  
Company \_\_\_\_\_

Please Airmail the completed questionnaire to: Rudolf Modley  
Aircraft Industries Association  
610 Shoreham Bldg.  
Washington 5, D.C.

POSTWAR SIZE OF AIRFRAME INDUSTRY

	1939	1941	1942	1943	1944	Military Sales at Following Levels of 1944:				
						15%	10%	8%	6%	4%
Line 1 Military Airframe Sales (in millions of dollars)	135.4	893.7	3,071.3	5,830.5	6,640.8	995.2	663.9	532.0	398.5	265.6
Line 2 Civil Airframe Sales (in millions of dollars)	22.2	40.5	21.8	15.0	6.5	( Not Disclosed ) a/				
Line 3 Total Sales (in millions of dollars)	157.6	934.2	3,093.1	5,845.5	6,647.3	( Not Disclosed ) a/				
Line 4 Total Floor Space (in millions of square feet)	6.8	25.3	51.2	75.2	88.7	41.7	33.1	30.4	27.2	23.7
Line 5 Number of Facilities	22	26	33	39	39	25	23	23	21	20
Line 6 Airframe Weight Produced (in millions of pounds)	13.9	85.5	284.6	646.9	905.6	93.8	70.7	61.6	51.1	42.9
Line 7 Percent of Outside Production (Weighted Averages)	8.0	13.0	23.9	34.0	35.0	7.7	7.5	7.4	7.5	7.4
Line 8 Average Gross Employment (in thousands)	43.9	201.9	429.4	696.4	684.3	228.2	177.0	155.5	134.6	112.8
Line 9 Average Employment in Research, Design & Development (in thousands)	8.1	29.2	46.6	67.3	66.9	79.4	60.5	52.2	43.6	33.3

a/ While civil sales are not disclosed, Lines 4 - 9 are based on total (civil and military) sales.



Line 10 States in Which Operations Were or Will Be Maintained

By Census Division	1939	1941	1942	1943	1944	Military Sales at Following Percent of 1944				
						15%	10%	8%	6%	4%
New England	1	1	1	1	1	1	1	1	1	1
Middle Atlantic	1	1	1	2	2	1	1	1	1	1
East North Central	1	2	4	5	5	3 a/	2 a/	2 a/	1	1
West North Central	2	2	2	2	2	1	1	1	1	1
South Atlantic	1	1	1	2	2	2 b/	2 b/	2 b/	2 a/	2 a/
South Central	-	2	4	5	5	3 a/	3 a/	3 a/	2	1
Pacific	2	2	2	2	2	2	2	2	2	2
Total	8	11	15	19	19	12a/b/	11a/b/	11a/b/	9-10a/	8-9a/

a/ One company is undecided if it will operate a facility in one state of this Division or in one in another Division.

b/ One company says it will "probably" operate in one state in this Division.

Line 11. Assumptions 6 and 7 are based on a one-shift, 40 hour week. How many hours per week do you actually plan to operate your plants?

Hours per Week (15 companies reporting):

13 companies plan a 40 hour week

1 company plans a 44 hour week

1 company plans an 80 hour week

Shifts (15 companies reporting):

12 companies plan 1 shift only

1 company plans 1 shift with 2 shifts in some  
departments

1 company plans 1 shift at 8, 6 and 4 percent  
level, 2 shifts at higher  
levels

1 company plans 2 shifts

Line 12. At what rate did you calculate the percentage of the sales dollar for lease of government-owned facilities?

(Assumption 10)

Percentage of sales dollar considered for lease of government-owned facilities. (Only 9 companies answered this question directly. a/)

3 b/ companies consider  $\frac{1}{2}$  percent of sales

2 companies consider 1 percent of sales

1 company considers  $1-1\frac{1}{4}$  percent of sales

1 c/ company considers  $1\frac{1}{2}$  percent of sales

1 company considers 1.77 percent of sales

1 company considers 2 percent of sales

a/ This is the response of the other six: 1 reported, "No opinion", 1 reported sufficient company owned facilities to make consideration of this question at present unnecessary, 1 has another arrangement in force already, 1 proposes another solution, 2 did not answer (See replies to Line 13).

b/ One of the three companies would consider such a rate for sales in excess of 4 million dollars. Four million dollars represent the volume of production in the contractor-owned facility of this company.

c/  $1\frac{1}{2}$  percent is given as "maximum (including machinery and equipment)".

Line 13. Would you prefer any other arrangement to obtain use of government-owned facilities (for instance, payment of a percentage of the appraised replacement value of the facility)? If so, specify:

1 prefers "flat rate"

1 would "consider 5 percent of replacement cost of plant alone, without machinery and equipment"

1 "satisfied with present lease"

1 would use wholly owned facilities for civil aircraft, government-owned facilities for military aircraft

1 owns large part of present facilities, will discuss arrangements in the future

1 would consider lease with flat minimum if use of government-owned facilities warranted by level of operations

3 would not prefer another arrangement

1 "no opinion"

5 no answer

Line 14. How many different military models will you produce?

Number of Military Models (15 companies reporting)

(military sales at following % of 1944)

	<u>15%</u>	<u>10%</u>	<u>8%</u>	<u>6%</u>	<u>4%</u>
Number of models	<u>46</u>	<u>42</u>	<u>38</u>	<u>34</u>	<u>31</u>

THE ASSUMPTIONS AND WHY THEY WERE MADE

Assumption 1. Complete cessation of hostilities.

This being a survey of postwar size of the industry the assumption is self-evident. No definite date was set as to when to assume the end of the war. This was done to permit judgement by the individual companies at the latest possible date. January 1, 1946 or July 1, 1946 were assumed as dates of cessation by the companies which indicated their choice.

Assumption 2. Adjustment period (about 6 months following war contract cancellation) has ended and operations are at relatively stable postwar level.

For a certain period after the war contract cancellation will cause a rapid shrinkage of operations. Measurements taken during that time would be useless. The survey wants to measure the size and operations of the industry as soon as a stable level has been reached. The adjustment period was assumed to take 6 months after the end of hostilities.

Assumption 3. The period to be covered by your replies should be the 12 months after completion of the adjustment period described under Assumption 2.

Emphasis on this was necessary to avoid replies based on backlog of orders.

Assumption 4. (a) Half of your future military business will be production of designs already in production or ready for production. (Base your decision on how many different models to include in this calculation on (1) the knowledge that there will be no production of models of which a sufficient number is already in existence; (2) the number of different models you actually had in process in 1944; and (3) the dollar volume of military business which the different projected "levels of operations" permit you.) (b) Half of your future military business will be on development of new designs.

Heavy emphasis has been put on new designs. While this may not correspond with the expectations of some companies it was felt that it expressed a realistic approach.

Military procurement will probably be on a 75-25 or even 80-20 basis as between "production" contracts and "experimental" contracts. Yet, we do not expect designs already in production or ready for production in July, 1945 to make up more than half of the total military business during the 1946-47 period covered by this questionnaire.

We expect manufacturers at that time to be devoting about half their efforts on the development stage of "production"

contracts, of designs not now ready for production and on "experimental" contracts.

Assumption 5. Hourly wages at 1944 level.

The assumption is self-evident. Adjustments can be made for expected wage fluctuations as desired.

Assumption 6. 40 hour week.

and

Assumption 7. One-shift operation.

A one shift 40 hour week was assumed. To check this assumption with actual plans a special question was inserted (Line 11). All but one company will operate only 1 shift, with two other companies using 2 shifts in some departments or under certain conditions (see replies to Line 11).

Assumption 8. Excess Profits Tax Repealed.

and

Assumption 9. Federal Tax carryback provision currently available.

The financial survival of some companies will depend on the realization of these assumptions. At the time of planning the questionnaire prospects for the repeal of the excess profits tax and the current availability of the Federal Tax carryback in the postwar period looked promising.

Assumption 10. Government-owned plant, equipment and tooling may be leased on the basis of a percentage of the sales dollar.

Disposal of government-owned surplus aircraft facilities is one of the unsolved problems facing this country. Government agencies are trying to find a way to keep these facilities available to the aircraft industry (for national defense purposes) while at the same time assuring the greatest contribution to full employment. Industry opinion as to the best way in which surplus plant could be made available to industry was required.

Companies were given an opportunity to express their ideas on the rates which they felt fair as payment for use of government-owned plants. They were also asked to state their ideas as to any other arrangement desired (Lines 12 and 13).

Definitions

Total Floor Space, Airframe Weight, Outside Production, and Gross Employment were defined according to the Aeronautical Monthly Progress Reports which the contractors submit to the Air Technical Service Command.

A Facility represents a single plant fabricating a complete airframe or different plants working under the same corporate management and together as a unit fabricating the complete airframe.

Employment in Research, Design and Development covers engineering, drafting, tool design and construction, construction of three prototypes and one static test article, flight and static tests, accelerated service tests, and all clerical and supporting labor pertaining to above. In some companies the organization structure made it impossible to follow this description closely. The figures are therefore less reliable than those in other lines of the questionnaire.

RM:bw  
8/10/45



