Reuther Plan: How U. S. Can Produce 500 Planes a Day

The Full Text of How a Union Official Plans to Speed Up Our Defense Production

Walter P. Reuther, young official of the United Auto Workers Union, stirred a nationwide debate by drafting a plan which, he contended, would enable the U. S. A. to produce 500 planes a day. Although the plan has been widely discussed, no newspaper, to our knowledge, has printed its text. Today PM publishes the first of three installments embodying the full text of the proposal. We consider it a document of dramatic and first-rate importance. We believe it makes sound, impressive sense. We have so far heard no convincing objections to it. And we think it represents a major contribution—by organized labor—to the defense effort.

By WALTER P. REUTHER

England's battles, it used to be said, were won on the playing fields of Eton. **This plan is put forward in the belief that America's can be won on the assembly lines of Detroit.**

In an age of mechanized warfare, victory has become a production problem. The automotive workers for whom I speak think our industrial system a productive giant capable of any task, provided it is not forced into battle with one hand tied behind its back. They also believe that we need send no men to a future conflict with the Axis powers if we can supply enough machines now to our first line of defense in Britain. The machines we and the British need most are planes, and the survival of democracy depends on our ability to turn them out quickly.

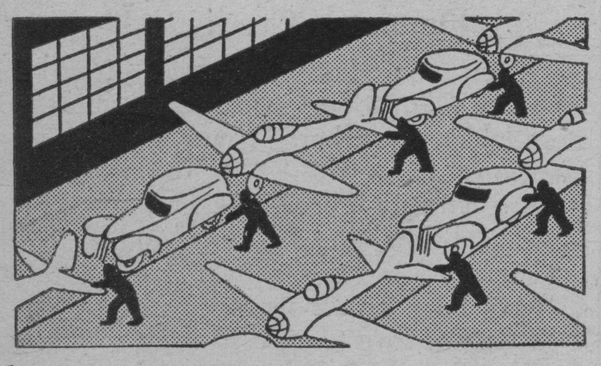
The workers in the automotive industry believe that the way to produce planes quickly is to manufacture them in automobile plants. The automotive industry today is operating at only half its potential capacity. This plan proposes that the unused potential of the industry in machines and men be utilized in the mass production of aircraft engines and planes. It is our considered opinion that it would be possible, within six months of preparation, to turn out 500 of the most modern fighting planes a day, if the idle machines and the idle men of the automotive industry were fully mobilized and private interests temporarily subordinated to the needs of this emergency.

No Time to Waste

Time, every moment of it precious, its tragic periods ticked off by bombs falling upon London and the Midlands, will not permit us to wait until new mass production factories for aircraft and aircraft engines finally swing into action late in 1942. Emergency requires short-cut solutions. This plan is Labor's answer to a crisis.

Mr. William F. Knudsen (Defense Commissioner) says that airplane production is 30 per cent behind schedule. It will continue to be behind schedule so long as we continue to rely on the expansion of existing aircraft plants, and on the construction of new plants. Expansion of existing aircraft plants means the expansion of plants utilizing the slow and costly methods of an industry geared to hand-tooled, custom made production.

New plants cannot be built and put into operation in less than 18 months. In 18 months Britain's battle, for all her people's



bravery, may be lost, and our own country left to face a totalitarian Europe alone. Packard and other companies are still digging the ditches and pouring the concrete for their new airplane engine factories. The Axis powers will not wait politely until these factories are finished.

New plants, when finally erected, must be filled with new machinery, and this new machinery largely duplicates machinery already available in our automobile plants. The machine industry is overtaxed. The emergency of war cannot be met in the normal time necessary to construct new plants and equip them with the required production machinery. We propose, instead of building entirely new machines, to make the tools required to adapt existing automotive machinery to aircraft manufacture.

We propose to transform the entire unused capacity of the automotive industry into one huge plane production unit. Production under this plan would not replace the output of the aircraft industry proper, which would continue to construct the large bombers and planes of special design.

50% of Automobile Industry's Potential Capacity Is Unused

No industry in the world has the tremendous unused potential productive capacity of the American automotive industry, and no industry is as easily adaptable to the mass production of planes. A careful survey will show that the automobile industry as a whole is not using more than 50 per cent of its maximum potential capacity if that capacity were properly coordinated and operated to the fullest degree.

The automotive industry could produce 8,000,000 cars a year. It is producing approximately 4,000,000. These unused plant reserves, as shown by the figures given in the Federal Trade Commission's report on the Motor Vehicle Industry, are greater than the total motor plant capacity of England, Germany, France, Italy, Russia and Japan combined. **Adapted to plane production, this unused potential capacity would give us world plane supremacy within a short time.**

At present the automotive industry never operates at more than 80 to 90 per cent of its maximum potential capacity, and then only for a few months each year. The rest of the year it operates on reduced schedules, and many plants shut down completely. If automobile production were spread evenly over a 12-month period, it would be possible, without reducing the total output of automobiles, to convert a large portion of this machinery to the manufacture of planes. During the automotive year ending last August, Nash used only 17 per cent of its productive capacity; Dodge used 36½ per cent.

Plenty of Capacity

Nash, working at maximum capacity, could have manufactured its total output for the 12 months in 49½ working days; Dodge, in 111 working days. Chevrolet, the largest single producer of motor cars, turned out over 1,000,000 cars during the last model year, and yet used less than 50 per cent of its potential productive capacity. The main Chevrolet Motor plant at Flint, Mich., produced 380 completed motors per hour at the peak of the 1937 production season, utilizing all four of its complete motor machining and assembly lines.

At the present time, at the peak of this year's production season, the Chevrolet Flint plant is producing 282 motors per hour, with one motor line standing completely idle, while the three remaining lines are operating on a two shift basis. Since 1937, Chevrolet has built a new motor plant in Tanawanda, New York, which at the present time is producing 65 complete motors per hour, with a plant capacity of 90 motors an hour. This would indicate that at the peak of the pro-

duction season Chevrolet is only building 347 motors per hour, with an actual capacity of 470 motors per hour. With an unused capacity of 123 motors per hour at the peak of the production season, it is obvious that Chevrolet has an unused reserve which becomes tremendous during the months of reduced operating schedules.

The availability of automotive production facilities for plane production in Chevrolet is again shown in the case of the Chevrolet Drop Forge plant in Detroit, the largest drop forge shop of its kind in the world. **If this shop were operated at full capacity, it could produce all the drop forgings required for the production of 500 airplane motors per day, and still supply the Chevrolet company with sufficient drop forgings for 1,000,000 Chevrolet cars a year.** Skilled labor to operate this shop at full capacity is available. Other forge shops, including the Buick and the Dodge forge shops, are also working at far less than capacity.

(Those who pooh-pooh the Reuther Plan say that auto manufacturing facilities cannot be adapted to plane making. The second instalment of the text of the plan, appearing exclusively in PM tomorrow, answers this objection.)

(For more labor news, turn the page.)

Facilities Available in Automobile Industry For Stamping Metal Sections for Wings and Fuselage

The following stamping presses in the Cleveland Fisher Body plant are at the present time, which is the peak of the body production season, operating at less than 50 per cent of capacity:

AVAILABLE EQUIPMENT

No. of Machines	*Type of Machines*
74	Double crank presses
19	Toggle presses
26	No. 78 Single Crank presses

Numerous small blanking and stamping presses.

To appreciate the full significance of the above list of equipment, one must realize the tremendous size of these presses, their cost, and the time it would require a new plant to get delivery of such presses. A big Toggle press, for example, stands 40 feet from the base to the top of the press and is large enough to hold and operate a draw or flange die which itself weighs from 70 to 80 tons. Such presses cost from $150,000 to $175,000 and it would require years to get delivery of the number and type of such press equipment that is now standing idle more than 50 per cent of the time at the Cleveland Fisher plant.

Present employment in the Cleveland Fisher press room reflects the extent to which the presses are now idle. There are 600 men on the day shift, 300 on the afternoon shift, and 67 on the midnight shift.

In addition to Cleveland Fisher Body, every major body plant in the automobile industry has unused press room capacity which can, with the necessary special dies, be adapted to plane production.

This Is the Author

Oldest of three brothers, all active unionists, Walter P. Reuther at 16 (pronounced Roo-ther) became an apprentice in a tool and die plant. Later as a skilled worker at the Briggs Manufacturing Co. he earned $1.40 an hour. In 1932 he was fired by Ford for campaigning for Norman Thomas. After visiting Europe, the USSR, China and Japan, Mr. Reuther returned to Detroit in 1936 and took part in the big auto organizing drive. Following his election as head of the West Side Local (20,000 members) of the United Auto Workers, CIO, he and two colleagues were seriously injured when they were attacked for distributing leaflets at the Ford plant. Only 34, he now heads the UAW General Motors Department (more than 100,000 members).

Lois learns how to behave like a human being . . . pictured in PM's Weekly, Sunday.

Ford, Forgive Him, Met With a Union

Special Correspondence

DETROIT, Jan. 8.—Workers and union officials engaged in the campaign to unionize the Ford Motor Co. awaited word today from Harry Bennett, company personnel director, on whether he intends to keep a pledge to the U. S. Government to reinstate several hundred laid-off River Rouge plant workers "after Jan. 1."

Mr. Bennett's pledge was given to James F. Dewey, chief labor conciliator of the Department of Labor, three weeks ago, when a protest by the United Auto Workers, CIO, against the layoffs brought the Government into the picture.

Mr. Dewey conferred with Mr. Bennett at his Ypsilanti estate yesterday, but all he could report to the union was that Mr. Bennett would have a statement to give today. This has caused leaders of the Ford organizing drive to ask: Is Harry Bennett going to play fast and loose with the Government of the U. S. A?

If the company hedges on its pledge, the union's heat will be on Mr. Dewey. The UAW is demanding that Mr. Dewey either prevail upon Mr. Bennett to keep his word or label the Ford spokesman a man who breaks a pledge to the Government.

The last 24 hours have brought still other answers to the question raised in a new series of Ford newspaper advertisements: "What's This About Labor Trouble at Ford's?" The ad's answer was "Outsiders."

Nevertheless, I. A. Cappizzi, general counsel to Ford, has met with a union delegation for the first time in the company's labor relations.

Mr. Cappizzi's conference, held Monday with a committee of four representing Lincoln workers, was followed by a declaration by him that it would never happen again. The Ford attorney says he was outsmarted by the Lincoln workmen, who he said requested the conference as individuals and then acted as spokesmen for the union's Lincoln members.

To this the Lincoln unionists reply:

"Since when does the high priced general counsel for the Ford Motor Co. meet mere workmen on individual grievances?"

Mr. Cappizzi's chagrin is indicated by the sweeping nature of his statement:

"In view of what happened Monday at the Lincoln plant, the company will not confer with any union committee or deal with the union. We will have nothing to do with the union because there is nothing to discuss. If the group had announced itself as a union committee, we would not have seen them."

Strike-Out

WASHINGTON: John P. Coyne, president of the AFL Building and Construction Trades Department, announced today that 19 more AFL unions, through their international officers, had agreed not to strike in defense industries.

Earlier this week 19 metal trades unions enunciated a similar policy.

On Labor's 'No' List: A Bay State Militia

Special Correspondence

BOSTON, Jan. 8—Organized labor and organized taxpayers became bedfellows today in leading a fight in Massachusetts against the establishment of a so-called State Guard.

For reasons of pocket-book, the Massachusetts Federation of Taxpayers is opposing a plan of Governor Saltonstall, re-elected socialite Republican, to create a state military organization, replacing the National Guard called into the federal service. For reasons of self-defense, the state AFL and CIO organizations condemn the proposal.

Governor Saltonstall in his inaugural on Jan. 2 asked the legislature for $350,000 to uniform and equip a new state guard of 7000 men, who would serve without pay except when out on duty. Their purpose, he said, would be "to preserve order and afford protection to persons and property in local emergencies." Rifles and bayonets will be provided by the War Department, the governor said. He requested that the money be appropriated in advance of the regular budget.

In the last World War, the Massachusetts State Guard helped Governor Calvin Coolidge break the strike of the Boston Police Force.

Arguments advanced by the taxpayers and labor jointly point out that Massachusetts has a state police force as well as local police, and that federal troops are in cantonments in the state not far from any scenes of possible emergencies.

20TH CENTURY FEUDALISM

Two hundred thousand New York workers labor under near-feudal conditions. They are called domestics. Although their hours and wages are incredible, opposition to remedial legislation is gathering. Tom O'Connor, in a series beginning tomorrow in PM, reveals the plight of domestics and unmasks their enemies.

Plane Strike Is Due Tomorrow

The case of 240 employes of the Ranger Engineering Corp., who are prepared to strike tomorrow to win raises, was presented yesterday by PM. As was explained, the company's side was omitted because company officials were not available for comment. A company spokesman, who wishes to remain anonymous, now makes a statement, which we are happy to print below. (An editorial on this subject, is on page 2.)

FARMINGDALE, L. I., Jan. 8.—As officers and members of Local 661, United Auto Workers, got picket signs and their soup kitchen ready for a strike, set for tomorrow, against the Ranger Engineering Corp., Government agents expressed hope that a last-minute conference might result in a settlement.

The meeting is scheduled for 5 p.m. tomorrow; if no compromise is reached the men will walk out at 7:45, when the night shift usually goes on duty.

A company official said today that Ranger is working on a $7,500,000 order (not an unlimited order as was reported) of six-cylinder in-line engines for Army training planes.

Replying to the union complaint that wages are lower than elsewhere in the industry, the spokesman said that the average wage is $26 for a 48-hour week, which, he says, is standard. The company has agreed to granting paid vacations and holidays, and to step up wages from 50 cents an hour for beginners to 55 cents after six months, and 60 cents after one year. This would amount to a ten per cent raise, according to the company.

Ranger insists that its product is the only successful one of its type, and is therefore needed for national defense. Army and Navy officials and Defense Commission representatives must also regard it as important, for they are working hard to prevent the walkout.

New York's Worn-Out School Houses

Principals Won't Talk; Pupils Tell of Defects

This is the third installment in a series. PM is telling this story because we believe the public should know under what conditions New York City children are being educated. We repeat our invitation to the public and to city officials to supply us with more facts on existing conditions.

On Monday we told how the Board of Education granted and then rescinded permission to take pictures of conditions in the schools. PM has taken the position that it has the right to go into the schools (outside of school hours) to find out the physical condition of the school buildings, and it has the right and the duty to make these conditions public in words and in pictures.

We said we would follow through by going into the schools with or without the permission of the Board of Education.

Today we tell you what happened when a PM reporter and photographer went into the schools, at noon and at 3 o'clock.

By Raymond Abrashkin

Morris Engel, PM photographer, and I arrived at P. S. 11, Washington, near Greene Aves., Brooklyn, just as the pupils were leaving the school for lunch. A teacher questioned us at the door. When I told her we were from PM and wanted to take pictures she let us pass.

We went to a second-floor classroom where Mr. Engel took a picture of the rolling doors that formed two walls of the room to illustrate an objectionable condition often found in older public school buildings. These doors can be rolled aside to create one large room that is used as an assembly hall.

As soon as Mr. Engel had taken his picture, a teacher ordered us to sit down, and said:

"Don't go any other place until you see the principal."

Soon Miss Anna E. McNeely, a dignified-looking, elderly woman who is assistant principal in charge of the school, came in. She told us we could not take pictures without the Board of Education's permission.

She insisted we leave, and told the school custodian, Dominick Froscella, to stay with us and make sure we did leave.

'Lots of Schools Worse'

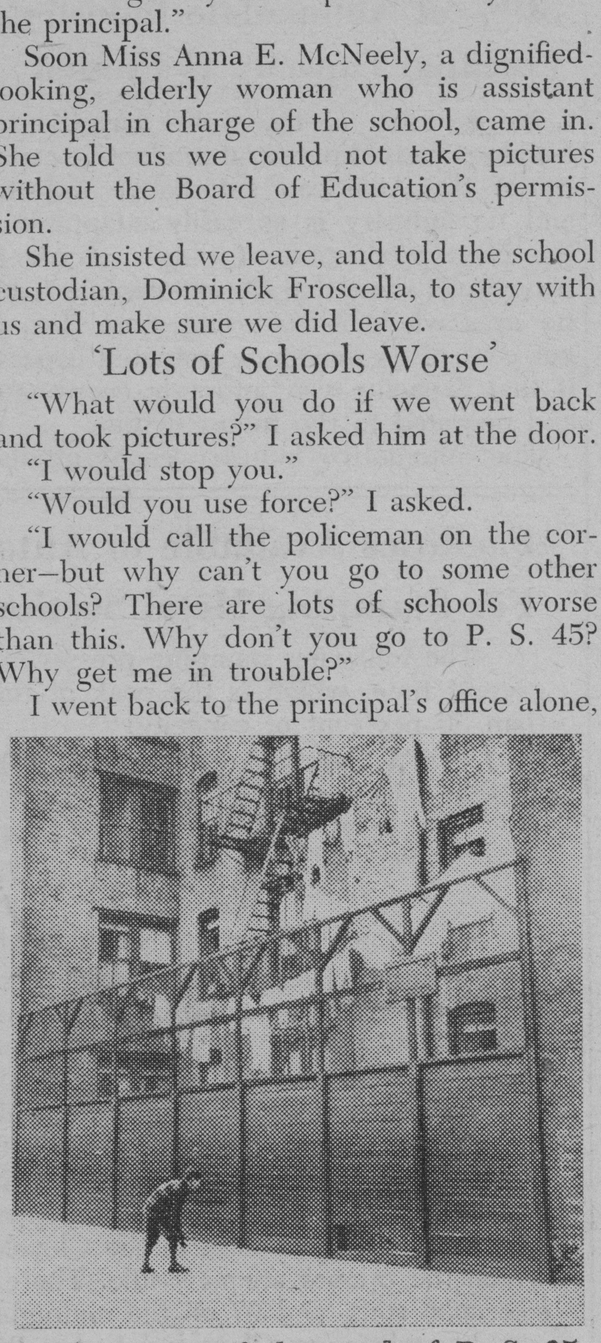
"What would you do if we went back and took pictures?" I asked him at the door.

"I would stop you."

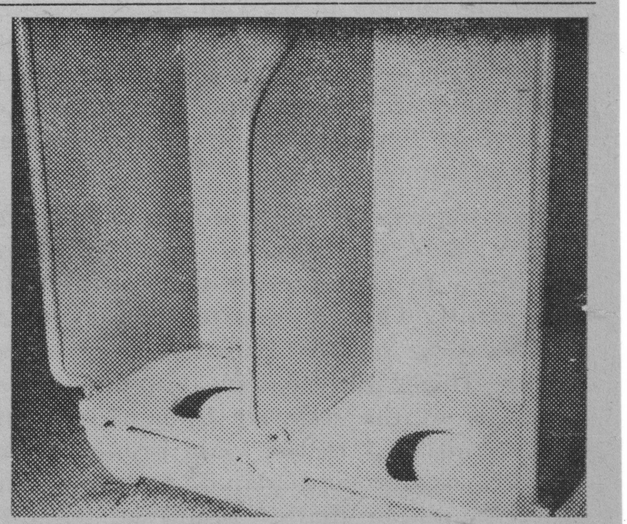
"Would you use force?" I asked.

"I would call the policeman on the corner—but why can't you go to some other schools? There are lots of schools worse than this. Why don't you go to P. S. 45? Why get me in trouble?"

I went back to the principal's office alone,



This is part of the yard of P. S. 25, Lafayette near Sumner Aves., Brooklyn. It's a non-fireproof school.



This is part of the girls' outside toilet at P. S. 94, 68th St. and Amsterdam Ave.

and asked for permission to inspect the building so that I could write about what I saw. Miss McNeely said she had just phoned the Board of Education and had been told we could not go through the building. She had been told, she said, that our paper's request for permission was being considered by the Board.

(*This is the first intimation we have had that our request is being reconsidered.*)

"Even as a private citizen, I can't walk through a school building outside of class hours to see under what conditions our children are being educated" I asked.

"No," Miss McNeely said.

I left. Mr. Engel and I went around the corner to the Waverly Annex of Boys' High School. The annex is housed in a building that was once part of P. S. 11.

Soon a group of boys gathered around, and I saw Dominick Froscella tear around the corner and go into a huddle with two teachers. One of the teachers blew a whistle, came over and shooed the boys away from us. I asked him if it were true that there was no lunchroom in the school.

Demands Credentials

"When you show credentials from the Board of Education," said this middle-aged, stern-looking teacher, "I will answer your questions."

"Are you in charge of the school?" I asked.

"I am."

"May I have your name?"

"I do not care to give it to you."

(*The Board of Education Directory for 1940 lists Henry E. Grimshaw as the teacher in charge of the annex.*)

As Mr. Engel and I started back for the

MORE

hours required to custom-build a Chevrolet car by hand and then multiply this figure by Chevrolet's daily production and use that tremendous figure to prove that Chevrolet could not possibly produce 6,000 cars a day. Custom-building of an automobile, it has been estimated, requires 1,100 man hours of work. This means that it would have required 4,400,000,000 man hours to produce the 4,000,000 cars of the 1939 model. To carry the contention of our critics on this score to their logical conclusion: it would have required 2,200,000 men working 40 hours a week fifty weeks a year to produce last year's 4,000,000 automobiles.

The persons who argue thus speak of mass production quantities but use the mathematics of custom-built production methods. It is an elementary fact that the number of hours spent doing things by hand as compared to the number of hours spent operating machines (machine-hours) varies in ever increasing proportion to the extent that mass production techniques are introduced into the production process. The number of hours spent in building an automobile is less than one-sixth of what it was when the industry started, and as the over-all man hours decrease the machine hours increase in percentage as compared to the work done by hand. One can go into a modern continuous strip steel mill and see this in its sharpest form.

FLOOR SPACE REQUIRED

This mistake of thinking of mass production of planes in the mathematics of custom-built hand production also raises the question of the practicality of providing the neecssary floor space for assembly work. Another elementary fact is that the number of days necessary to complete the production cycle (in machining and fabricating industries such as autos and aircraft) is shortened in proportion to the extent that mass production technique is applied. The shorter the production cycle the less floor space is needed. This is true because the number of jobs in the process of production is held at a minimum. If the Chevrolet Motor Company had to build 6,000 cars a day by the same methods that are now being used to build planes, the total man power and floor space of the entire automobile industry would not be adequate to turn out its present production.

Our original report cited the availability of floor space—785,000 feet—at the Hupmobile plant, in Detroit, for the assembling of motors. A further striking example of available floor space is the Reo plant at Lansing, Michigan, which has the following vacant space: Mt. Hope Avenue plant, 553,237 square feet; Building No. 4800, 247,931 square feet; Building No. 4700, 104,247 square feet. In Reo's main plant 500,000 square feet is fully equipped with production machinery. Starting January 13, 1941, Reo will be producing five motors per day in a plant that at one time produced 160 truck and 125 passenger cars in one eight-hour shift.

DIFFERENCES IN ENGINES

Doubts have been expressed on the adaptability of automobile production machinery to production of aircraft motors because of the reduced weight of aircraft motors. These doubts are without foundation.

The reduced weight of an aircraft motor per horsepower as compared with automobile motors is secured firstly by the difference in the design of the motor and secondly by the fact that all parts of an aircraft motor are reduced to a minimum weight by removing all surplus metal. This is done by a process of machining. The same basic machinery is used to machine parts for an aircraft motor as for an automobile motor, excepting that a more complete and precise machining job is done in the case of the aircraft motor. The available machinery in the automobile industry can be retooled to turn out aircraft motors of 1,000 or 2,000 horsepower of either the air-cooled or liquid-cooled design.

The objection has also been raised that aircraft engines must be made in more precise dimensions than automobile engines. As our program points out, more precise parts are obtained by more precise tooling.

SHORTAGE OF ARMAMENTS

Any possible bottlenecks in armaments, instruments, etc., is not a legitimate criticism of our plan. Such bottlenecks can be met if production of such armament, instruments, etc., is spread over existing industries whose machine capacities and production facilities are adaptable to such production. The pooling of such productive capacity with central assembly plants using the same approach we suggest for aircraft production will make it possible to eliminate any possible bottlenecks in armaments, instruments, etc.

SIMILARITY OF BASIC MACHINERY

In our program we state that basic machinery used for automobile production can be adapted for producing aircraft parts. We point out that precise and difficult parts of the Allison engine are being made in the old Cadillac plant in Detroit with machinery which duplicates existing unused automobile plant machinery. These statements have been challenged in some quarters. Herewith is a list of machinery, newly constructed and installed in the Allison division in Detroit, which duplicates existing automobile plant machinery:

Grinding machines: Cincinnati centerless, Exlo internal and external, Bland, Norton, Landis, Blanchard, Brown and Sharpe, (Bryant) and Held. (These machines are used to produce the following parts which are common to both aircraft and automobile motors: camshafts, crankshafts, bearings, connecting rods, wrist pins.) Milling machines: Milwaukee, Cincinnati, Sunstrand and Brown and Sharpe. Keller machines: Wickes lathes, Greenlee lathes and Cincinnati lathes. Spline machines: Sunstrand, and Brown and Sharpe. Hones: Exlo and Wickes.

PRESENT USE OF FACILITIES

It is argued that the facilities of the automobile industry are already being employed for production of aircraft parts. Our surveys indicate that not ten percent of the available facilities are being brought into play for defense purposes. The present plans do not contemplate the coordination and full use of facilities which alone can produce a large number of planes within a comparatively short period.

Packard and other companies are still digging the ditches and pouring the concrete for their new airplane engine factories. The Axis powers will not wait politely until these factories are finished.

New plants, when finally erected, must be filled with new machinery and this new equipment largely duplicates machinery already available in our automobile plants. The machine industry is overtaxed. The emergency of war cannot be met in the normal time necessary to construct new plants and equip them with the required production machinery.

We propose, instead of building entirely new machines, to make the tools required to adapt existing automotive machinery to aircraft manufacture.

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Automobile Motor Building Facilities Can Be Adapted to Make Plane Motors

Are the facilities used in manufacturing automobile motors adaptable to the manufacture of airplane motors? The answer is that they are.

Both the automobile and airplane motors are combustion engines, essentially the same mechanism for generating power by exploding gas. Both motors contain cylinders, carburetors, pistons, crankshafts, camshafts, valves, spark-plugs, ignition systems, etc.

The same basic machinery is utilized in the manufacture of these basic parts common to both motors. True, there are differences between the automobile and the airplane engine, as there are differences of a lesser degree between the engine of the Chevrolet and the engine of the Cadillac. These differences between different engines are produced by adding certain tools, dies, jigs or fixtures to the basic machine in order to make a difference in the product. The same "tooling" process adapts the same basic machinery to the production of the airplane engine. Graphic proof of this statement is even now being supplied by General Motors. Many of the most difficult and precise parts of the Allison aviation engine are being manufactured in the Cadillac plant in Detroit, much of it with retooled Cadillac machinery. The new Allison plant in Indianapolis, still in process of expansion, is being used largely for assembly.

The experience of General Motors in making Allison parts with retooled Cadillac machinery should also dispose of the bugaboo of "tolerances." "Tolerances" are the allowable fractional variations in size of engine parts, and they must be far finer in the plane engine than in the automobile engine. But these more precise dimensions can be obtained by more precise tooling.

When the contemplated airplane motor plants are completed, it will be necessary to equip them with the same kind of basic production machinery already standing idle half of the time in the nation's automotive factories. This basic machinery will be duplicated, and after it is duplicated it will still be necessary to construct the special tools, dies, jigs, and fixtures required to adapt this machinery to the manufacture of plane engines.

In the process of duplicating basic machinery, lies the most serious delay. This lag, which from all indications may continue, may well defeat our national defense program. An additional burden is placed on the already over-loaded machine tool industry. We propose to short-cut the process by building only the tools, dies, jigs, and fixtures necessary to convert idle automotive machinery into plane engine machinery. A few special machines will be necessary, but these will be but a small part of the total equipment. In this way a job that will otherwise take at least 18 months can be done in six months.

Certain basic machines are necessary to build both automobile and aircraft types of engines. These include gear cutters, gear shapers, screw machines, bullards, drill presses, punch presses, broaching machines, turret lathes, various types of milling machines, various types of lathes and Fay machines, lapping machines, various types of grinding machines, die casting machines, forge presses, header machines, foundry equipment, welding and riveting equipment.

Automobile Industry Adaptable for Stamping of Wings and Fuselage

The plane has three main parts: engine, wings and fuselage. Just as there is unused capacity for the production of motors, so there is unused capacity for the production of the wings and fuselage. The large body plants and the parts plants have metal stamping equipment now used for stamping out parts for the body of the automobile which can be adapted to stamping out the parts which make up the wings and fuselage of the plane. Proof of this is provided by the tentative plans being made by the automotive industry at the suggestion of Mr. Knudsen to manufacture parts of the wings and fuselages for large bombers.

A survey of the large body plants will show that their equipment for pressing and stamping metal parts are also not being used to full capacity. Murray Body, Briggs and the Fisher Body plants show a 50 percent overall unused capacity in their pressrooms. Striking is the example of the Fisher Body plant in Cleveland, which contains one of the largest pressrooms in the industry. At present it is operating at but 40 percent of capacity, although automobile body production is now at its peak. In 1936-37 this plant made all the stampings for Chevrolet bodies, employing 9200 employes. Today it employs but 3500, for Fisher has built a new plant at Grand Rapids, Michigan, further adding to body capacity. (See appendix for equipment in the Cleveland Fisher plant.)

Technical problems are involved, of course, in constructing new dies to stamp the lighter aluminum alloys used in plane production. That these problems are not insuperable is shown by the fact that Murray and Briggs are already stamping wing parts for Douglas bombers.

Skilled and Production Labor Available in the Automobile Industry

Skilled labor is necessary to turn out the tools and dies required to adapt these various types of automotive machinery to plane production. The auto industry has the largest reservoir of skilled labor in the world. More than 25,000 tool and die workers, jig and fixture men, pattern makers, draftsmen and designers, and allied craftsmen are employed in the auto industry at the peak of its tooling program.

Tooling is even more seasonal than production. Each year thousands of the industry's most skilled craftsmen work at top speed for a few months to complete the necessary tooling work to adapt the old machinery to the new models. When the tooling program is completed, only a skeleton crew of these skilled craftsmen are retained for maintenance and duplicate tooling. Three or four thousand skilled craftsmen are shifted to ordinary production jobs while more than 10,000 are laid off entirely until their labor is needed for the next tooling season. During the past five years more than half of the tool and die makers in the industry, or more than 10,000, averaged less than six months work per year. At the present time there are approximately 3,000 tool and die makers unemployed in the auto industry; some 2,500 have been transferred to ordinary machine-tending production jobs. Many of the remainder are on a short work week.

In addition to the men who are unemployed, those working on production and those employed only part time, there are at least 2,000 tool and die men who have permanently gone into production jobs because of the short work year in the tool and die industry. These mechanics could be combed out of production departments and made available again for tool and die work.

Thus in manpower, as in machines, we have unused capacity; the highly specialized and valuable skills of 7,500 tool and die workers are available to do the necessary tooling for the plane production program here outlined.

Fisher Body Corporation, a division of General Motors, is now working on wood models for a new body design. Chrysler also is working on new models, for which some die work is likewise under way. If the automobile industry goes ahead with plans for new models, it will absorb unemployed tool and die workers. However, if the introduction of new models in the auto industry could be delayed for six months, from 12,000 to 15,000 skilled mechanics could be made available to build the necessary tools, dies, jigs and fixtures for the production of an all metal pursuit ship on a mass production basis.

The tool and die shops of the automotive industry, like the tool and die workers themselves, are partially idle. The 90 tool and die jobbing shops in the Detroit area affiliated with the Automotive Tool and Die Manufacturers Association employ 7,000 tool and die workers when operated at full capacity. In addition to these shops in the Association, there are some 75 additional tool and die shops which employ 1,500 tool and die workers at capacity production. And, in addition to these independent enterprises, there are large tool and die departments within the auto, body and parts plants proper. These are known as "captive" tool and die shops. These great "captive" tool and die shops have

a capacity beyond the available manpower if all the skilled men in the entire industry were employed on a full-time basis.

A typical example of the tremendous unused capacity of these captive shops is that of Fisher Body No. 23 at Detroit. This is the largest tool and die shop in the world. It builds the sheet metal dies, welding bucks and fixtures, and special machinery for all Fisher Body plants in the General Motors Corporation. In 1931 Fisher Body Plant No. 23 employed 4,800 tool and die makers at the peak of the tooling program. In 1940 Fisher Body Plant No. 23 employed 1,400 tool and die makers at the peak of the tooling season. In December, 1940, this plant employed only 175 tool and die makers and even these few were on a reduced work week.

As important as the tool and die worker is the engineer who designs the tools and dies. Here, too, the same situation repeats itself. There are in the Detroit and metropolitan areas about 2,100 designing engineers. Their drawings would be needed for the new tools and dies required to adapt automotive machinery to plane production. Designing engineers, like tool and die workers, are largely unemployed between tooling seasons. Here, too, a six months delay in new automobile models would make available an ample supply of the necessary skilled men.

Just as there is no shortage of skilled labor in the automobile industry, so there is no shortage of unskilled labor. Despite the defense program, there is a minimum of 100,000 former automobile workers unemployed or on WPA, not to speak of the thousands of young people in automobile production areas who would welcome an opportunity to work in plane production.

The Program in Operation

We propose that the President of the United States appoint an aviation production board of nine members, three representing the government, three representing management and three representing labor. We propose that this board be given full authority to organize and supervise the mass production of airplanes in the automobile and automotive parts industry.

The first task of the board would be to organize a staff of production and tooling engineers and assign them to make a plant-by-plant survey of the industry to determine the capacity of each plant, and the extent to which it is being utilized. The next task of the board would be to break down a blueprint of the type of plane chosen for mass production into its constituent parts and allocate the various parts of the engine, wings and fuselage among the different automotive plants in accordance with their unused capacity and the kind of work to which that unused capacity is being adapted. Work is to be parcelled out with an eye to spreading it as widely as possible, for much quicker results will be obtained if each plant has to cope with but one or two probelms of design and tooling. As contrasted with the present method, which dumps half a hundred technical problems into the lap of one manufacturer who must build an entire engine or plane, this method has all the advantages of division of labor.

The production board should have power to allocate the tooling and designing necessary among the various tool and die shops in accordance with their capacity and their specialized qualifications.

Power to appoint inspectors for each plant in accordance with its part in the general plan should be given the production board and there should be close inspection of each part manufactured before its release.

We propose the establishment of a central motor assembly plant to which all complete parts shall be shipped after they pass inspection.

The automotive industry has unused floor space as it has unused men and machines. We suggest that the Hupmobile plant in Detroit (a plant which produced only 371 cars in 1939, and which at the present time is completely idle) be leased by the government for a central motor assembly plant. The plant is large enough for five assembly lines with a daily total production capacity of 500 complete aircraft engines a day. The plant could be operated on a three 7½ hour shift basis and the unused machinery now in the building could be placed in other plants in accordance with the general production plan.

Similar methods can be applied to the manufacture and assembly of the wings and fuselage, and here, too, there is ample unused floor space for new assembly lines. Six complete floors of a building one block long and a half block wide are available at Fisher Body Plant No. 21, Detroit, which formerly made bodies for Buick. (This work has now been transferred to Fisher Body Plant No. 1 at Flint, Michigan.) Several floors are also available at the Fisher Body Plant No. 23 in Detroit, and there is also floor space available at the Briggs Highland Park plant and at the old Ford Highland Park plant.

Outstanding example of idle floor space is the Murray Body Corporation in Detroit, the third largest body making corporation in America. Since its loss of the Ford body contract, Murray is not producing a *single* automobile body. There are 234,375 square feet of floor space in Building 107 in Murray Plant No. 1, 300,000 square feet available in Building No. 121 and 20,000 square feet available in Building No. 129. This available space will probably be needed for the contract Murray has obtained to stamp the metal parts and assemble the wing sections for Douglas bombers, but there is still 200,000 feet more of modern floor space in the Murray plant which is now being used for storage. This could be turned to the uses of this production program.

Similar is the situation at the Fisher Body plant in Cleveland. The third, fourth and fifth floors of this building are now being used for storage, and could easily be made available for assembly lines. This plant at one time made all metal stampings for Chevrolet bodies. Additional floor space is also available in the Cleveland area.

A final assembly plant would also be needed for the job of assembling the engine, wings and fuselage into the completed plane. For this purpose we suggest the construction of cheap flat hangars in the open space around the Wayne County airport. Completed engines, wings and fuselage would be

trucked from the sub-assembly plants to these hangars and the completed planes could be flown from the airport. Similar flat hangars could be erected for final assemblies at the Cleveland airport.

We suggest that the sub-assemblies and the final assemblies be placed under the control of men carefully selected upon the basis of skill and experience from the various assembly staffs in our motor car and body plants, and that these picked men be used as the core of the assembly staffs to be developed under this plan. Provisions for protecting the seniority of these men must be guaranteed.

The first few thousand planes produced will not meet 100 percent performance requirements, for in mass production of planes as in mass production of automobiles a few thousand jobs must always be run before the "bugs" (technical problems of machining and assembly) are worked out. This is not serious since the first few thousand planes will more than meet the requirements as training ships.

Management Responsibility and Labor Cooperation

The automotive industry workers believe that this plan is the only one which offers hope of quick production of planes. It seeks solution of our problem not in the costly and lengthy work of erecting entire new plants, but in the efficient organization of existing idle man-power, machines, skill and floor space.

By dividing the parts among many manufacturers, the greatest possible number of minds is brought to bear on the production problems involved.

Though we propose payment of a fair profit to each manufacturer in accordance with his share in the work, we can foresee the fears this plan may arouse on the part of some managements. They may prefer a method whereby the government finances entire new engines and aircraft plants. Aviation companies may look with misgiving on a production program that would inevitably cut the cost of planes by putting their production on a mass production basis. But we believe the average management executive would not put forward these selfish considerations at a time of crisis.

Labor offers its whole-hearted cooperation. All that Labor asks is intelligent planning, a voice in matters of policy and administration, recognition of its rights, and maintenance of its established standards.

The merit of our plan is that it saves time, and time is our problem. Normal methods can build all the planes we need—if we wait until 1942 and 1943 to get them. This plan is put forward in the belief that the need for planes is immediate, and terrifying. Precious moments pass away as we delay. We dare not invite the disaster that may come with further delay.

Appendix I

NUMBER OF CARS AND TRUCKS PRODUCED IN U. S. AND CANADA

NAME OF COMPANY	SEPT. '36 THRU AUG. '37	SEPT. '39 THRU AUG. '40
Chevrolet	1,149,662	1,044,100
Pontiac	235,065	224,475
Oldsmobile	199,569	196,732
Buick	220,214	291,021
Cadillac-LaSalle	45,668	38,032
General Motors Truck	56,410	52,275
Plymouth	552,610	412,545
Dodge	378,510	304,455
DeSoto	81,390	69,660
Chrysler	103,210	83,680
Ford-Mercury	1,279,003	913,900
Lincoln	32,803	22,681
Graham	21,067	2,547
Hudson-Terraplane	125,207	97,632
Hupmobile	300	371
Nash-Lafayette	86,695	57,216
Packard	121,301	90,674
Studebaker	104,931	114,682
White-Indiana	14,035	12,727
Willys	65,302	32,930
* Grand Total	5,068,803	4,228,706
Total General Motors	1,906,588	1,846,815
Total Chrysler	1,115,720	869,980
Total Ford	1,311,716	936,581
Total "Big 3"	4,334,204	3,653,376

* Grand total also includes production of Diamond T Truck, Federal Truck, Int'l Harvester, Mack Truck, Reo Truck, Stutz and miscellaneous not listed separately.
Source: Ward's Automotive Reports.
Note: Canadian production represents approximately 4% of the total production.

Appendix II

PRODUCTION POSSIBILITIES OF MAJOR PLANTS

Name of Plant	Percentage of Production Capacity From Sept. '39 thru Aug. '40	Possible Increased Output Over Year Ending August, 1940	Total Output at Peak Capacity on Basis of Two 8-Hour Shifts per Day 50 Weeks in Year	Work Days Needed to Build 12 Months Total Production on Basis of Two 8-Hour Shifts per Day at Peak Production	12 Months Total Production From Sept. '39, thru Aug. '40	Highest Past Production of Completed Motors Per Hour	Present Production of Completed Motors per Hour
Cadillac	22	134,768	172,800	66	38,032	36	36
Dodge	36½	530,745	835,200	108	304,455	174	174
Studebaker	31	221,318	336,000	103	114,682	70	70
Plymouth	43	552,255	964,800	128	412,545	201	172
Chrysler and DeSoto	24	494,660	648,000	75	153,340	135	87
Oldsmobile	54½	163,268	360,000	167	196,732	75	73
Willys-Overland	17	207,070	240,000	41	32,930	50	50
Hudson	40	118,368	216,000	135½	97,632	45	32
Pontiac	51	217,125	441,600	147	224,475	92	78
Nash	17	288,384	345,600	49½	57,216	72	63
Chevrolet	49	1,091,900	2,136,000	147	1,044,100	445	347
Buick	42	430,479	721,500*	121	291,021	185	179

* Note: On basis of 13-hour day.

Appendix III

FACILITIES AVAILABLE FOR PLANE PRODUCTION IN THE CHEVROLET FORGE PLANT, DETROIT

The following equipment in the Chevrolet Drop Forge plant at the present time—the peak of the plant production program—is operating at approximately 60% of capacity used.

Number of Machines	Size of Machines	Types of Machines
19	1,500 lbs.	Steam Hammer
29	2,500 lbs.	Steam Hammer
12	3,500 lbs.	Steam Hammer
9	5,000 lbs.	Steam Hammer
6	12,000 lbs.	Steam Hammer
15	1,000 lbs.	Board Hammers
11	2,000 lbs.	Board Hammers
5	3,000 lbs.	Board Hammers
1	250 ton	Forge Press (Hydraulic)
1	950 ton	Forge Press (Hydraulic)
2	1,000 ton	Forge Press (Hydraulic)
3	1,600 ton	Forge Press (Hydraulic)
11	1,500 lbs.	Board Hammers

In addition to the hammers and presses listed, numerous large and small upsetting (header) presses are available. If the above equipment were used at full capacity, this plant alone could produce all the necessary drop forgings required for the production of 500 airplane engines per day, and still supply the Chevrolet Motor Car Company with sufficient forgings for 1,000,000 Chevrolet cars in the coming year. Skilled hammermen are available to operate these forge hammers at full capacity.

In addition to the Chevrolet Forge plant, there are many other forge plants, such as the Buick Forge plant, Dodge Truck and Forge, etc., which have considerable unused capacity.

Appendix IV

FACILITIES AVAILABLE IN AUTOMOBILE INDUSTRY FOR STAMPING METAL SECTIONS FOR WINGS AND FUSELAGE

The following stamping presses in the Cleveland Fisher Body Plant are at the present time—the peak of the body production season—operating at less than 50 percent of capacity.

Number of Machines	Type of Machines
74	Double Crank Presses
19	Toggle Presses
26	No. 78 Single Crank Presses

Numerous small blanking and stamping presses

To appreciate the full significance of the above list of equipment, one must realize the tremendous size of these presses, their cost, and the time it would require a new plant to get delivery of such presses. A big Toggle press, for

example, stands 40 feet from the base to the top of the press and is large enough to hold and operate a draw or flange die which itself weights from 70 to 80 tons. Such presses cost from $150,000 to $175,000 and it would require years to get delivery of the number and type of such press equipment that is now standing idle more than 50 percent of the time at the Cleveland Fisher plant.

Present employment in the Fisher Cleveland press room reflects the extent to which the presses are now idle. There are 600 men on the day shift, 300 on the afternoon shift, and 67 on the midnight shift.

In addition to Cleveland Fisher Body, every major body plant in the automobile industry has unused press room capacity which can, with the necessary special dies, be adapted to plane production.

Appendix V

REPLY TO OBJECTIONS

Virtually all of the criticisms of the program have been anonymous—aircraft and automotive industry executives refusing, for some reason, to lend their names to their printed views. The criticisms do not in any case run against the feasibility of the program. By and large, they indicate either a sad lack of imagination or an insistence by automotive interests to continue with "business as usual." However, since some misconceptions of the program have gained credence it is advisable to discuss and dispose of these matters.

BOMBERS OR PURSUIT SHIPS

It has been wrongly assumed that the program contemplated the production only of pursuit ships. Our reference to the possible production of 500 fighting planes a day was used only to indicate the over-all productive capacity of an automobile industry whose idle machines and idle men were fully mobilized and whose private interests were temporarily subordinated. The productive capacity we have indicated can as readily be adapted to the production of medium-sized or heavy bombers. If these latter types are built rather than pursuit ships, the daily production would be scaled down in proportion to the increased amount of work required on each plane. Nevertheless, our program could build many more bombers, large or small, than are now being built or are contemplated, and in much shorter time.

MAN-HOURS REQUIRED

Some sources in the automobile industry assert our plan is impractical because of the relatively small percentage of machine hours in manufacturing an automobile as compared with the total man hours required to build a plane.

These sources contend that out of 18,000 man-hours necessary to build a pursuit ship, 10,000 are devoted to construction of air frames, work on which is usually done by hand. In attempting to prove their point, these sources simply multiply 10,000 man-hours by 500 planes a day which gives them a tremendous and impressive figure. It would be as logical to take the number of

FOREWORD

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The CIO's proposal was drafted at my request and the request of R. J. Thomas, president of the United Automobile Workers of America, affiliated with the CIO. It is the result of the experience of a group of skilled automobile workers, headed by Walter P. Reuther, who studied this problem for months and arrived at the conclusions contained in the report. Their findings bear the imprint of the unanimous approval of the Executive Board of the CIO.

Our program was born out of the CIO'S desire to make its utmost possible contribution to national defense. The specific program for mass production of defense aircraft indicates the great extent to which organized labor's knowledge and abilities may be utilized in our present national emergency. The program implements a general program already outlined by the CIO for a larger recognition of labor's responsibilities and prerogatives in this emergency.

The efforts of our country to preserve and perfect our democratic institutions finds no greater response than in the ranks of American labor. Our aircraft production program is concrete evidence of that fact; and it also bespeaks the logic of our desire for a greater recognition of organized labor's role in national defense.

PHILIP MURRAY, *President*
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AUTHOR'S NOTE

This program is an outgrowth of the American automobile workers' conviction that the future of democracy and all that our people hold dear are dependent upon the speedy and successful prosecution of our national defense.

I have discussed the general outlines of the program with Assistant Secretary of War Robert Patterson; Philip Murray, President of the Congress of Industrial Organizations; Sidney Hillman, member of the National Defense Advisory Commission; and R. J. Thomas, President of the UAW-CIO.

Upon being urged by these leaders of government and labor to complete the survey, I consulted with a number of highly-skilled designing engineers, tool and die makers, jig and fixture men, and pattern and model makers, employed for years by General Motors, Chrysler, Packard, Hudson, Briggs, Murray Body and other automobile companies. Individually and jointly, we made first-hand studies of aircraft motor parts and wing and fuselage assemblies. All of these men are members of the UAW-CIO and are recognized by managements as well as by the union as master technicians. They have contributed to the formulation of this program which we now present as part of labor's contribution toward the solution of a grave national problem.

500 PLANES A DAY

A Program for the Utilization of the Automobile Industry for Mass Production of Defense Planes

By WALTER P. REUTHER*

England's battles, it used to be said, were won on the playing fields of Eton. This plan is put forward in the belief that America's can be won on the assembly lines of Detroit.

In an age of mechanized warfare, victory has become a production problem. The automotive workers for whom I speak think our industrial system a productive giant capable of any task, provided it is not forced into battle with one hand tied behind its back. They also believe that we need send no men to a future conflict with the Axis powers if we can supply enough machines now to our first line of defense in Britain. The machines we and the British need most are planes, and the survival of democracy depends on our ability to turn them out quickly.

The workers in the automotive industry believe that the way to produce planes quickly is to manufacture them in automobile plants. The automotive industry today is operating at only half its potential capacity. This plan proposes that the unused potential of the industry in machines and men be utilized in the mass production of aircraft engines and planes. It is our considered opinion that it would be possible, after six months of preparation, to turn out 500 of the most modern fighting planes a day, if the idle machines and the idle men of the automotive industry were fully mobilized and private interests temporarily subordinated to the needs of this emergency.

Time, every moment of it precious, its tragic periods ticked off by bombs falling upon London and the Midlands, will not permit us to wait until new mass production factories for aircraft and aircraft engines finally swing into action late in 1942. Emergency requires short-cut solutions. This plan is Labor's answer to a crisis.

Mr. William F. Knudsen says that airplane production is 30 percent behind schedule. It will continue to be behind schedule so long as we continue to rely on the expansion of existing aircraft plants, and on the construction of new plants. Expansion of existing aircraft plants means the expansion of plants utilizing the slow and costly methods of an industry geared to hand-tooled, custom-made production.

New plants cannot be built and put into operation in less than 18 months. In 18 months Britain's battle, for all her people's bravery, may be lost, and our own country left to face a totalitarian Europe alone.

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FOREWORD by PHILIP MURRAY

INTRODUCTION by GEORGE SOULE

American Council On Public Affairs
WASHINGTON, D. C.

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INTRODUCTION

By GEORGE SOULE*

Here is a plan to speed up warplane production to aid the defense of Britain and the United States. It asserts that within six months the automobile industry could be turning out 500 fighting planes a day, in addition to whatever the airplane industry itself may be able to do. Such a plan is certainly worth careful investigation.

The plan is sponsored by men who have an intimate technical knowledge of the automobile industry. It is proposed by Walter P. Reuther, an official of the United Automobile Workers of America, after consultation with designing engineers and highly skilled specialists employed in numerous auto plants. Any proposal by such a body of men deserves a hearing. Again and again it has been demonstrated in American industry that suggestions arising from those who do the work, and through long personal experience understand industrial problems, are immensely valuable.

The plan points out indubitable facts that few Americans know. The automobile industry is operating at only about 50 percent of capacity, largely because of seasonal production. If its output were spread evenly throughout the year, half its plant and manpower could be used for something else. Could this something else be warplanes? Here is where serious disagreement arises. Some connected with the plane industry say it could not, because plane engines and bodies are more complicated and require more exact and refined processes. This report answers the objection by detailed facts and figures. Machinery, plant and manpower, it asserts, are available to do the necessary jobs. To the layman, it offers convincing evidence that if we want mass production of warplanes, the automobile industry can give it to us.

The layman, of course, is not qualified to decide the technical questions at issue. But all of us, as American citizens, have a right and duty to insist that the questions be carefully investigated and decided by those competent to judge, without the influence of private interest or prejudice. We cannot be satisfied with a negative response on the part of the aircraft industry itself, which has an obvious interest in avoiding competition. Nor can we be satisfied with the judgment of army experts who through experience only with special production of frequently changed models do not understand the quality potentialities of mass production. Nor, finally, can we be satisfied with a reluctance of certain automobile employers to sacrifice competitive advantage by planning production for the whole industry as a unit.

It would seem that little could be lost even if the plan were unsuccessful. At present half our productive capacity in automobiles is going to waste. Let us not permit this plan to be shoved aside by the inertia of vested interests.

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* Editor, *New Republic*; Chairman, National Economic and Social Planning Association; Director-at-Large, National Bureau of Economic Research.

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Packard and other companies are still digging the ditches and pouring the concrete for their new airplane engine factories. The Axis powers will not wait politely until these factories are finished.

New plants, when finally erected, must be filled with new machinery and this new equipment largely duplicates machinery already available in our automobile plants. The machine industry is overtaxed. The emergency of war cannot be met in the normal time necessary to construct new plants and equip them with the required production machinery.

We propose, instead of building entirely new machines, to make the tools required to adapt existing automotive machinery to aircraft manufacture.

We propose to transform the entire unused capacity of the automotive industry into one huge plane production unit. Production under this plan would not replace the output of the aircraft industry proper, which would continue to construct the large bombers and planes of special design.

Fifty Percent of Automobile Industry's Potential Capacity Is Unused

No industry in the world has the tremendous unused potential productive capacity of the American automotive industry, and no industry is as easily adaptable to the mass production of planes. A careful survey will show that the automobile industry as a whole is not using more than 50 percent of its maximum potential capacity if that capacity were properly coordinated and operated to the fullest degree.

The automotive industry could produce 8,000,000 cars a year. It is producing approximately 4,000,000. These unused plant reserves, as shown by the figures given in the Federal Trade Commission's report on the motor vehicle industry, are greater than the total motor plant capacity of England, Germany, France, Italy, Russia and Japan combined. Adapted to plane production, this unused potential capacity would give us world plane supremacy within a short time.

At present the automotive industry never operates at more than 80 to 90 percent of its maximum potential capacity, and then only for a few months each year. The rest of the year it operates on reduced schedules, and many plants shut down completely. If automobile production were spread evenly over a 12-month period, it would be possible, without reducing the total output of automobiles, to convert a large portion of this machinery to the manufacture of planes.

During the automotive year ending August, 1940, Nash used only 17 percent of its productive capacity; Dodge used 36½ percent. Nash, working at maximum capacity, could have manufactured its total output for the 12 months in 49½ working days; Dodge, in 111 working days. Chevrolet, the largest single producer of motor cars, turned out over a million cars during the last model year, and yet used less than 50 percent of its potential productive capacity. The main Chevrolet Motor plant at Flint, Michigan, produced 380 completed motors per hour at the peak of the 1937 production season, utilizing all four of its complete motor machining and assembly lines. At the present time, at the peak of the 1940 production season, the Chevrolet

Flint plant is producing 282 motors per hour, with one motor line standing completely idle, while the three remaining lines are operating on a two-shift basis. Since 1937, Chevrolet has built a new motor plant in Tonawanda, New York, which at the present time is producing 65 complete motors per hour, with a plant capacity of 90 motors per hour. This would indicate that at the peak of the production season Chevrolet is only building 347 motors per hour, with an actual capacity of 470 motors per hour. With an unused capacity of 123 motors per hour at the peak of the production season, it is obvious that Chevrolet has an unused reserve which becomes tremendous during the month of reduced operating schedules.

The availability of automotive production facilities for plane production in Chevrolet is again shown in the case of the Chevrolet drop forge plant in Detroit, the largest drop forge shop of its kind in the world. If this shop were operated at full capacity, it could produce all the drop forgings required for the production of 500 airplane motors per day, and still supply the Chevrolet company with sufficient drop forgings for 1,000,000 Chevrolet cars a year. Skilled labor to operate this shop at full capacity is available. Other forge shops, including the Buick and the Dodge forge shops, are also working at far less than capacity. (See appendix for shop equipment and production schedules.)

Automobile Motor Building Facilities Can Be Adapted to Make Plane Motors

Are the facilities used in manufacturing automobile motors adaptable to the manufacture of airplane motors? The answer is that they are.

Both the automobile and airplane motors are combustion engines, essentially the same mechanism for generating power by exploding gas. Both motors contain cylinders, carburetors, pistons, crankshafts, camshafts, valves, spark-plugs, ignition systems, etc.

The same basic machinery is utilized in the manufacture of these basic parts common to both motors. True, there are differences between the automobile and the airplane engine, as there are differences of a lesser degree between the engine of the Chevrolet and the engine of the Cadillac. These differences between different engines are produced by adding certain tools, dies, jigs or fixtures to the basic machine in order to make a difference in the product. The same "tooling" process adapts the same basic machinery to the production of the airplane engine. Graphic proof of this statement is even now being supplied by General Motors. Many of the most difficult and precise parts of the Allison aviation engine are being manufactured in the Cadillac plant in Detroit, much of it with retooled Cadillac machinery. The new Allison plant in Indianapolis, still in process of expansion, is being used largely for assembly.

The experience of General Motors in making Allison parts with retooled Cadillac machinery should also dispose of the bugaboo of "tolerances." "Tolerances" are the allowable fractional variations in size of engine parts, and they must be far finer in the plane engine than in the automobile engine. But these more precise dimensions can be obtained by more precise tooling.

When the contemplated airplane motor plants are completed, it will be necessary to equip them with the same kind of basic production machinery already standing idle half of the time in the nation's automotive factories. This basic machinery will be duplicated, and after it is duplicated it will still be necessary to construct the special tools, dies, jigs, and fixtures required to adapt this machinery to the manufacture of plane engines.

In the process of duplicating basic machinery, lies the most serious delay. This lag, which from all indications may continue, may well defeat our national defense program. An additional burden is placed on the already over-loaded machine tool industry. We propose to short-cut the process by building only the tools, dies, jigs, and fixtures necessary to convert idle automotive machinery into plane engine machinery. A few special machines will be necessary, but these will be but a small part of the total equipment. In this way a job that will otherwise take at least 18 months can be done in six months.

Certain basic machines are necessary to build both automobile and aircraft types of engines. These include gear cutters, gear shapers, screw machines, bullards, drill presses, punch presses, broaching machines, turret lathes, various types of milling machines, various types of lathes and Fay machines, lapping machines, various types of grinding machines, die casting machines, forge presses, header machines, foundry equipment, welding and riveting equipment.

Automobile Industry Adaptable for Stamping of Wings and Fuselage

The plane has three main parts: engine, wings and fuselage. Just as there is unused capacity for the production of motors, so there is unused capacity for the production of the wings and fuselage. The large body plants and the parts plants have metal stamping equipment now used for stamping out parts for the body of the automobile which can be adapted to stamping out the parts which make up the wings and fuselage of the plane. Proof of this is provided by the tentative plans being made by the automotive industry at the suggestion of Mr. Knudsen to manufacture parts of the wings and fuselages for large bombers.

A survey of the large body plants will show that their equipment for pressing and stamping metal parts are also not being used to full capacity. Murray Body, Briggs and the Fisher Body plants show a 50 percent overall unused capacity in their pressrooms. Striking is the example of the Fisher Body plant in Cleveland, which contains one of the largest pressrooms in the industry. At present it is operating at but 40 percent of capacity, although automobile body production is now at its peak. In 1936-37 this plant made all the stampings for Chevrolet bodies, employing 9200 employes. Today it employs but 3500, for Fisher has built a new plant at Grand Rapids, Michigan, further adding to body capacity. (See appendix for equipment in the Cleveland Fisher plant.)

Technical problems are involved, of course, in constructing new dies to stamp the lighter aluminum alloys used in plane production. That these problems are not insuperable is shown by the fact that Murray and Briggs are already stamping wing parts for Douglas bombers.

Skilled and Production Labor Available in the Automobile Industry

Skilled labor is necessary to turn out the tools and dies required to adapt these various types of automotive machinery to plane production. The auto industry has the largest reservoir of skilled labor in the world. More than 25,000 tool and die workers, jig and fixture men, pattern makers, draftsmen and designers, and allied craftsmen are employed in the auto industry at the peak of its tooling program.

Tooling is even more seasonal than production. Each year thousands of the industry's most skilled craftsmen work at top speed for a few months to complete the necessary tooling work to adapt the old machinery to the new models. When the tooling program is completed, only a skeleton crew of these skilled craftsmen are retained for maintenance and duplicate tooling. Three or four thousand skilled craftsmen are shifted to ordinary production jobs while more than 10,000 are laid off entirely until their labor is needed for the next tooling season. During the past five years more than half of the tool and die makers in the industry, or more than 10,000, averaged less than six months work per year. At the present time there are approximately 3,000 tool and die makers unemployed in the auto industry; some 2,500 have been transferred to ordinary machine-tending production jobs. Many of the remainder are on a short work week.

In addition to the men who are unemployed, those working on production and those employed only part time, there are at least 2,000 tool and die men who have permanently gone into production jobs because of the short work year in the tool and die industry. These mechanics could be combed out of production departments and made available again for tool and die work.

Thus in manpower, as in machines, we have unused capacity; the highly specialized and valuable skills of 7,500 tool and die workers are available to do the necessary tooling for the plane production program here outlined.

Fisher Body Corporation, a division of General Motors, is now working on wood models for a new body design. Chrysler also is working on new models, for which some die work is likewise under way. If the automobile industry goes ahead with plans for new models, it will absorb unemployed tool and die workers. However, if the introduction of new models in the auto industry could be delayed for six months, from 12,000 to 15,000 skilled mechanics could be made available to build the necessary tools, dies, jigs and fixtures for the production of an all metal pursuit ship on a mass production basis.

The tool and die shops of the automotive industry, like the tool and die workers themselves, are partially idle. The 90 tool and die jobbing shops in the Detroit area affiliated with the Automotive Tool and Die Manufacturers Association employ 7,000 tool and die workers when operated at full capacity. In addition to these shops in the Association, there are some 75 additional tool and die shops which employ 1,500 tool and die workers at capacity production. And, in addition to these independent enterprises, there are large tool and die departments within the auto, body and parts plants proper. These are known as "captive" tool and die shops. These great "captive" tool and die shops have

a capacity beyond the available manpower if all the skilled men in the entire industry were employed on a full-time basis.

A typical example of the tremendous unused capacity of these captive shops is that of Fisher Body No. 23 at Detroit. This is the largest tool and die shop in the world. It builds the sheet metal dies, welding bucks and fixtures, and special machinery for all Fisher Body plants in the General Motors Corporation. In 1931 Fisher Body Plant No. 23 employed 4,800 tool and die makers at the peak of the tooling program. In 1940 Fisher Body Plant No. 23 employed 1,400 tool and die makers at the peak of the tooling season. In December, 1940, this plant employed only 175 tool and die makers and even these few were on a reduced work week.

As important as the tool and die worker is the engineer who designs the tools and dies. Here, too, the same situation repeats itself. There are in the Detroit and metropolitan areas about 2,100 designing engineers. Their drawings would be needed for the new tools and dies required to adapt automotive machinery to plane production. Designing engineers, like tool and die workers, are largely unemployed between tooling seasons. Here, too, a six months delay in new automobile models would make available an ample supply of the necessary skilled men.

Just as there is no shortage of skilled labor in the automobile industry, so there is no shortage of unskilled labor. Despite the defense program, there is a minimum of 100,000 former automobile workers unemployed or on WPA, not to speak of the thousands of young people in automobile production areas who would welcome an opportunity to work in plane production.

The Program in Operation

We propose that the President of the United States appoint an aviation production board of nine members, three representing the government, three representing management and three representing labor. We propose that this board be given full authority to organize and supervise the mass production of airplanes in the automobile and automotive parts industry.

The first task of the board would be to organize a staff of production and tooling engineers and assign them to make a plant-by-plant survey of the industry to determine the capacity of each plant, and the extent to which it is being utilized. The next task of the board would be to break down a blueprint of the type of plane chosen for mass production into its constituent parts and allocate the various parts of the engine, wings and fuselage among the different automotive plants in accordance with their unused capacity and the kind of work to which that unused capacity is being adapted. Work is to be parcelled out with an eye to spreading it as widely as possible, for much quicker results will be obtained if each plant has to cope with but one or two probelms of design and tooling. As contrasted with the present method, which dumps half a hundred technical problems into the lap of one manufacturer who must build an entire engine or plane, this method has all the advantages of division of labor.

The production board should have power to allocate the tooling and designing necessary among the various tool and die shops in accordance with their capacity and their specialized qualifications.

Power to appoint inspectors for each plant in accordance with its part in the general plan should be given the production board and there should be close inspection of each part manufactured before its release.

We propose the establishment of a central motor assembly plant to which all complete parts shall be shipped after they pass inspection.

The automotive industry has unused floor space as it has unused men and machines. We suggest that the Hupmobile plant in Detroit (a plant which produced only 371 cars in 1939, and which at the present time is completely idle) be leased by the government for a central motor assembly plant. The plant is large enough for five assembly lines with a daily total production capacity of 500 complete aircraft engines a day. The plant could be operated on a three 7½ hour shift basis and the unused machinery now in the building could be placed in other plants in accordance with the general production plan.

Similar methods can be applied to the manufacture and assembly of the wings and fuselage, and here, too, there is ample unused floor space for new assembly lines. Six complete floors of a building one block long and a half block wide are available at Fisher Body Plant No. 21, Detroit, which formerly made bodies for Buick. (This work has now been transferred to Fisher Body Plant No. 1 at Flint, Michigan.) Several floors are also available at the Fisher Body Plant No. 23 in Detroit, and there is also floor space available at the Briggs Highland Park plant and at the old Ford Highland Park plant.

Outstanding example of idle floor space is the Murray Body Corporation in Detroit, the third largest body making corporation in America. Since its loss of the Ford body contract, Murray is not producing a *single* automobile body. There are 234,375 square feet of floor space in Building 107 in Murray Plant No. 1, 300,000 square feet available in Building No. 121 and 20,000 square feet available in Building No. 129. This available space will probably be needed for the contract Murray has obtained to stamp the metal parts and assemble the wing sections for Douglas bombers, but there is still 200,000 feet more of modern floor space in the Murray plant which is now being used for storage. This could be turned to the uses of this production program.

Similar is the situation at the Fisher Body plant in Cleveland. The third, fourth and fifth floors of this building are now being used for storage, and could easily be made available for assembly lines. This plant at one time made all metal stampings for Chevrolet bodies. Additional floor space is also available in the Cleveland area.

A final assembly plant would also be needed for the job of assembling the engine, wings and fuselage into the completed plane. For this purpose we suggest the construction of cheap flat hangars in the open space around the Wayne County airport. Completed engines, wings and fuselage would be

trucked from the sub-assembly plants to these hangars and the completed planes could be flown from the airport. Similar flat hangars could be erected for final assemblies at the Cleveland airport.

We suggest that the sub-assemblies and the final assemblies be placed under the control of men carefully selected upon the basis of skill and experience from the various assembly staffs in our motor car and body plants, and that these picked men be used as the core of the assembly staffs to be developed under this plan. Provisions for protecting the seniority of these men must be guaranteed.

The first few thousand planes produced will not meet 100 percent performance requirements, for in mass production of planes as in mass production of automobiles a few thousand jobs must always be run before the "bugs" (technical problems of machining and assembly) are worked out. This is not serious since the first few thousand planes will more than meet the requirements as training ships.

Management Responsibility and Labor Cooperation

The automotive industry workers believe that this plan is the only one which offers hope of quick production of planes. It seeks solution of our problem not in the costly and lengthy work of erecting entire new plants, but in the efficient organization of existing idle man-power, machines, skill and floor space.

By dividing the parts among many manufacturers, the greatest possible number of minds is brought to bear on the production problems involved.

Though we propose payment of a fair profit to each manufacturer in accordance with his share in the work, we can foresee the fears this plan may arouse on the part of some managements. They may prefer a method whereby the government finances entire new engines and aircraft plants. Aviation companies may look with misgiving on a production program that would inevitably cut the cost of planes by putting their production on a mass production basis. But we believe the average management executive would not put forward these selfish considerations at a time of crisis.

Labor offers its whole-hearted cooperation. All that Labor asks is intelligent planning, a voice in matters of policy and administration, recognition of its rights, and maintenance of its established standards.

The merit of our plan is that it saves time, and time is our problem. Normal methods can build all the planes we need—if we wait until 1942 and 1943 to get them. This plan is put forward in the belief that the need for planes is immediate, and terrifying. Precious moments pass away as we delay. We dare not invite the disaster that may come with further delay.

Appendix I

NUMBER OF CARS AND TRUCKS PRODUCED IN U. S. AND CANADA

NAME OF COMPANY	SEPT. '36 THRU AUG. '37	SEPT. '39 THRU AUG. '40
Chevrolet	1,149,662	1,044,100
Pontiac	235,065	224,475
Oldsmobile	199,569	196,732
Buick	220,214	291,021
Cadillac-LaSalle	45,668	38,032
General Motors Truck	56,410	52,275
Plymouth	552,610	412,545
Dodge	378,510	304,455
DeSoto	81,390	69,660
Chrysler	103,210	83,680
Ford-Mercury	1,279,003	913,900
Lincoln	32,803	22,681
Graham	21,067	2,547
Hudson-Terraplane	125,207	97,632
Hupmobile	300	371
Nash-Lafayette	86,695	57,216
Packard	121,301	90,674
Studebaker	104,931	114,682
White-Indiana	14,035	12,727
Willys	65,302	32,930
* Grand Total	5,068,803	4,228,706
Total General Motors	1,906,588	1,846,815
Total Chrysler	1,115,720	869,980
Total Ford	1,311,716	936,581
Total "Big 3"	4,334,204	3,653,376

* Grand total also includes production of Diamond T Truck, Federal Truck, Int'l Harvester, Mack Truck, Reo Truck, Stutz and miscellaneous not listed separately.
Source: Ward's Automotive Reports.
Note: Canadian production represents approximately 4% of the total production.

Appendix II

PRODUCTION POSSIBILITIES OF MAJOR PLANTS

Name of Plant	Percentage of Production Capacity From Sept. '39 thru Aug. '40	Possible Increased Output Over Year Ending August, 1940	Total Output at Peak Capacity on Basis of Two 8-Hour Shifts per Day 50 Weeks in Year	Work Days Needed to Build 12 Months Total Production on Basis of Two 8-Hour Shifts per Day at Peak Production	12 Months Total Production From Sept. '39, thru Aug. '40	Highest Past Production of Completed Motors Per Hour	Present Production of Completed Motors per Hour
Cadillac	22	134,768	172,800	66	38,032	36	36
Dodge	36½	530,745	835,200	108	304,455	174	174
Studebaker	31	221,318	336,000	103	114,682	70	70
Plymouth	43	552,255	964,800	128	412,545	201	172
Chrysler and DeSoto	24	494,660	648,000	75	153,340	135	87
Oldsmobile	54½	163,268	360,000	167	196,732	75	73
Willys-Overland	17	207,070	240,000	41	32,930	50	50
Hudson	40	118,368	216,000	135½	97,632	45	32
Pontiac	51	217,125	441,600	147	224,475	92	78
Nash	17	288,384	345,600	49½	57,216	72	63
Chevrolet	49	1,091,900	2,136,000	147	1,044,100	445	347
Buick	42	430,479	721,500*	121	291,021	185	179

* Note: On basis of 13-hour day.

Appendix III

FACILITIES AVAILABLE FOR PLANE PRODUCTION IN THE CHEVROLET FORGE PLANT, DETROIT

The following equipment in the Chevrolet Drop Forge plant at the present time—the peak of the plant production program—is operating at approximately 60% of capacity used.

Number of Machines	Size of Machines	Types of Machines
19	1,500 lbs.	Steam Hammer
29	2,500 lbs.	Steam Hammer
12	3,500 lbs.	Steam Hammer
9	5,000 lbs.	Steam Hammer
6	12,000 lbs.	Steam Hammer
15	1,000 lbs.	Board Hammers
11	2,000 lbs.	Board Hammers
5	3,000 lbs.	Board Hammers
1	250 ton	Forge Press (Hydraulic)
1	950 ton	Forge Press (Hydraulic)
2	1,000 ton	Forge Press (Hydraulic)
3	1,600 ton	Forge Press (Hydraulic)
11	1,500 lbs.	Board Hammers

In addition to the hammers and presses listed, numerous large and small upsetting (header) presses are available. If the above equipment were used at full capacity, this plant alone could produce all the necessary drop forgings required for the production of 500 airplane engines per day, and still supply the Chevrolet Motor Car Company with sufficient forgings for 1,000,000 Chevrolet cars in the coming year. Skilled hammermen are available to operate these forge hammers at full capacity.

In addition to the Chevrolet Forge plant, there are many other forge plants, such as the Buick Forge plant, Dodge Truck and Forge, etc., which have considerable unused capacity.

Appendix IV

FACILITIES AVAILABLE IN AUTOMOBILE INDUSTRY FOR STAMPING METAL SECTIONS FOR WINGS AND FUSELAGE

The following stamping presses in the Cleveland Fisher Body Plant are at the present time—the peak of the body production season—operating at less than 50 percent of capacity.

Number of Machines	Type of Machines
74	Double Crank Presses
19	Toggle Presses
26	No. 78 Single Crank Presses

Numerous small blanking and stamping presses

To appreciate the full significance of the above list of equipment, one must realize the tremendous size of these presses, their cost, and the time it would require a new plant to get delivery of such presses. A big Toggle press, for

example, stands 40 feet from the base to the top of the press and is large enough to hold and operate a draw or flange die which itself weights from 70 to 80 tons. Such presses cost from $150,000 to $175,000 and it would require years to get delivery of the number and type of such press equipment that is now standing idle more than 50 percent of the time at the Cleveland Fisher plant.

Present employment in the Fisher Cleveland press room reflects the extent to which the presses are now idle. There are 600 men on the day shift, 300 on the afternoon shift, and 67 on the midnight shift.

In addition to Cleveland Fisher Body, every major body plant in the automobile industry has unused press room capacity which can, with the necessary special dies, be adapted to plane production.

Appendix V

REPLY TO OBJECTIONS

Virtually all of the criticisms of the program have been anonymous—aircraft and automotive industry executives refusing, for some reason, to lend their names to their printed views. The criticisms do not in any case run against the feasibility of the program. By and large, they indicate either a sad lack of imagination or an insistence by automotive interests to continue with "business as usual." However, since some misconceptions of the program have gained credence it is advisable to discuss and dispose of these matters.

BOMBERS OR PURSUIT SHIPS

It has been wrongly assumed that the program contemplated the production only of pursuit ships. Our reference to the possible production of 500 fighting planes a day was used only to indicate the over-all productive capacity of an automobile industry whose idle machines and idle men were fully mobilized and whose private interests were temporarily subordinated. The productive capacity we have indicated can as readily be adapted to the production of medium-sized or heavy bombers. If these latter types are built rather than pursuit ships, the daily production would be scaled down in proportion to the increased amount of work required on each plane. Nevertheless, our program could build many more bombers, large or small, than are now being built or are contemplated, and in much shorter time.

MAN-HOURS REQUIRED

Some sources in the automobile industry assert our plan is impractical because of the relatively small percentage of machine hours in manufacturing an automobile as compared with the total man hours required to build a plane.

These sources contend that out of 18,000 man-hours necessary to build a pursuit ship, 10,000 are devoted to construction of air frames, work on which is usually done by hand. In attempting to prove their point, these sources simply multiply 10,000 man-hours by 500 planes a day which gives them a tremendous and impressive figure. It would be as logical to take the number of

hours required to custom-build a Chevrolet car by hand and then multiply this figure by Chevrolet's daily production and use that tremendous figure to prove that Chevrolet could not possibly produce 6,000 cars a day. Custom-building of an automobile, it has been estimated, requires 1,100 man hours of work. This means that it would have required 4,400,000,000 man hours to produce the 4,000,000 cars of the 1939 model. To carry the contention of our critics on this score to their logical conclusion: it would have required 2,200,000 men working 40 hours a week fifty weeks a year to produce last year's 4,000,000 automobiles.

The persons who argue thus speak of mass production quantities but use the mathematics of custom-built production methods. It is an elementary fact that the number of hours spent doing things by hand as compared to the number of hours spent operating machines (machine-hours) varies in ever increasing proportion to the extent that mass production techniques are introduced into the production process. The number of hours spent in building an automobile is less than one-sixth of what it was when the industry started, and as the over-all man hours decrease the machine hours increase in percentage as compared to the work done by hand. One can go into a modern continuous strip steel mill and see this in its sharpest form.

FLOOR SPACE REQUIRED

This mistake of thinking of mass production of planes in the mathematics of custom-built hand production also raises the question of the practicality of providing the neecssary floor space for assembly work. Another elementary fact is that the number of days necessary to complete the production cycle (in machining and fabricating industries such as autos and aircraft) is shortened in proportion to the extent that mass production technique is applied. The shorter the production cycle the less floor space is needed. This is true because the number of jobs in the process of production is held at a minimum. If the Chevrolet Motor Company had to build 6,000 cars a day by the same methods that are now being used to build planes, the total man power and floor space of the entire automobile industry would not be adequate to turn out its present production.

Our original report cited the availability of floor space—785,000 feet—at the Hupmobile plant, in Detroit, for the assembling of motors. A further striking example of available floor space is the Reo plant at Lansing, Michigan, which has the following vacant space: Mt. Hope Avenue plant, 553,237 square feet; Building No. 4800, 247,931 square feet; Building No. 4700, 104,247 square feet. In Reo's main plant 500,000 square feet is fully equipped with production machinery. Starting January 13, 1941, Reo will be producing five motors per day in a plant that at one time produced 160 truck and 125 passenger cars in one eight-hour shift.

DIFFERENCES IN ENGINES

Doubts have been expressed on the adaptability of automobile production machinery to production of aircraft motors because of the reduced weight of aircraft motors. These doubts are without foundation.

The reduced weight of an aircraft motor per horsepower as compared with automobile motors is secured firstly by the difference in the design of the motor and secondly by the fact that all parts of an aircraft motor are reduced to a minimum weight by removing all surplus metal. This is done by a process of machining. The same basic machinery is used to machine parts for an aircraft motor as for an automobile motor, excepting that a more complete and precise machining job is done in the case of the aircraft motor. The available machinery in the automobile industry can be retooled to turn out aircraft motors of 1,000 or 2,000 horsepower of either the air-cooled or liquid-cooled design.

The objection has also been raised that aircraft engines must be made in more precise dimensions than automobile engines. As our program points out, more precise parts are obtained by more precise tooling.

SHORTAGE OF ARMAMENTS

Any possible bottlenecks in armaments, instruments, etc., is not a legitimate criticism of our plan. Such bottlenecks can be met if production of such armament, instruments, etc., is spread over existing industries whose machine capacities and production facilities are adaptable to such production. The pooling of such productive capacity with central assembly plants using the same approach we suggest for aircraft production will make it possible to eliminate any possible bottlenecks in armaments, instruments, etc.

SIMILARITY OF BASIC MACHINERY

In our program we state that basic machinery used for automobile production can be adapted for producing aircraft parts. We point out that precise and difficult parts of the Allison engine are being made in the old Cadillac plant in Detroit with machinery which duplicates existing unused automobile plant machinery. These statements have been challenged in some quarters. Herewith is a list of machinery, newly constructed and installed in the Allison division in Detroit, which duplicates existing automobile plant machinery:

Grinding machines: Cincinnati centerless, Exlo internal and external, Bland, Norton, Landis, Blanchard, Brown and Sharpe, (Bryant) and Held. (These machines are used to produce the following parts which are common to both aircraft and automobile motors: camshafts, crankshafts, bearings, connecting rods, wrist pins.) Milling machines: Milwaukee, Cincinnati, Sunstrand and Brown and Sharpe. Keller machines: Wickes lathes, Greenlee lathes and Cincinnati lathes. Spline machines: Sunstrand, and Brown and Sharpe. Hones: Exlo and Wickes.

PRESENT USE OF FACILITIES

It is argued that the facilities of the automobile industry are already being employed for production of aircraft parts. Our surveys indicate that not ten percent of the available facilities are being brought into play for defense purposes. The present plans do not contemplate the coordination and full use of facilities which alone can produce a large number of planes within a comparatively short period.

[Dec. 1940]

A PROGRAM FOR UTILIZATION OF THE AUTOMOBILE INDUSTRY FOR MASS PRODUCTION OF DEFENSE PLANES

By Walter P. Reuther

Director, General Motors Department, United Automobile Workers of America, CIO; Member, Committee on Training in Industry, National Defense Advisory Commission.

This program is an outgrowth of the American automobile workers' conviction that the future of democracy and all that our people hold dear are dependent upon the speedy and successful prosecution of our national defense program.

I have discussed the general outlines of the program with Assistant Secretary of War Robert Patterson, and with Philip Murray, President of the Congress of Industrial Organizations; Sidney Hillman, member of the National Defense Advisory Commission; and R. J. Thomas, President of the United Automobile Workers of America, CIO.

Upon being urged by these leaders of government and labor to complete the survey, I consulted with a number of highly-skilled designing engineers, tool and die makers, jig and fixture men, and pattern and model makers employed for years by General Motors, Chrysler, Packard, Hudson, Briggs, Murray Body and other automobile companies. Individually and jointly we made first-hand studies of aircraft motor parts and wing and fuselage assemblies. All of these men are members of the UAW-CIO and are recognized by managements as well as by the union as master technicians. They have contributed to the formulation of this program which we now present as part of labor's contribution toward the solution of a grave national problem.

W.P.R.

United Automobile Workers of America, CIO, 281 West Grand Blvd.
Detroit, Michigan

A PROGRAM FOR UTILIZATION OF THE AUTOMOBILE INDUSTRY FOR MASS PRODUCTION OF DEFENSE PLANES.

England's battles, it used to be said, were won on the playing fields of Eton. This plan is put forward in the belief that America's can be won on the assembly lines of Detroit.

In an age of mechanized warfare, victory has become a production problem. The automotive workers for whom I speak think our industrial system a productive giant capable of any task, provided it is not forced into battle with one hand tied behind its back. They also believe that we need send no men to a future conflict with the Axis powers if we can supply enough machines now to our first line of defense in Britain. The machines we and the British need most are planes, and the survival of democracy depends on our ability to turn them out quickly.

The workers in the automotive industry believe that the way to produce planes quickly is to manufacture them in automobile plants. The automotive industry today is operating at only half its potential capacity. This plan proposes that the unused potential of the industry in machines and men be utilized in the mass production of aircraft engines and planes. [It is our considered opinion that it would be possible, after six months of preparation, to turn out 500 of the most modern fighting planes a day, if the idle machines and the idle men of the automotive industry were fully mobilized and private interests temporarily subordinated to the needs of this] emergency.

Time, every moment of it precious, its tragic periods ticked off by bombs falling upon London and the Midlands, will not permit us to wait until new mass production factories for aircraft and aircraft

engines finally swing into action late in 1942. Emergency requires short-cut solutions. This plan is Labor's answer to a crisis.

Mr. William F. Knudsen says that airplane production is 30 percent behind schedule. It will continue to be behind schedule so long as we continue to rely on the expansion of existing aircraft plants, and on the construction of new plants. Expansion of existing aircraft plants means the expansion of plants utilizing the slow and costly methods of an industry geared to hand-tooled, custom made production.

New plants cannot be built and put into operation in less than 18 months. In 18 months Britains's battle, for all her people's bravery, may be lost, and our own country left to face a totalitarian Europe alone.

Packard and other companies are still digging the ditches and pouring the concrete for their new airplane engine factories. The Axis powers will not wait politely until these factories are finished.

New plants, when finally erected, must be filled with new machinery, and this new machinery largely duplicates machinery already available in our automobile plants. The machine industry is overtaxed. The emergency of war cannot be met in the normal time necessary to construct new plants and equip them with the required production machinery.

We propose, instead of building entirely new machines, to make the tools required to adapt existing automotive machinery to aircraft manufacture.

We propose to transform the entire unused capacity of the automotive industry into one huge plane production unit. Production under this

plan would not replace the output of the Aircraft Industry proper, which would continue to construct the large bombers and planes of special design.

FIFTY PERCENT OF AUTOMOBILE INDUSTRY'S POTENTIAL CAPACITY IS UNUSED.

No industry in the world has the tremendous unused potential productive capacity of the American automotive industry, and no industry is as easily adaptable to the mass production of planes. A careful survey will show that the automobile industry as a whole is not using more than 50 percent of its maximum potential capacity if that capacity were properly coordinated and operated to the fullest degree.

The automotive industry could produce 8,000,000 cars a year. It is producing approximately 4,000,000. These unused plant reserves, as shown by the figures given in the Federal Trade Commission's report on the Motor Vehicle Industry, are greater than the total motor plant capacity of England, Germany, France, Italy, Russia and Japan combined. Adapted to plane production, this unused potential capacity would give us world plane supremacy within a short time.

At present the automotive industry never operates at more than 80 to 90 percent of its maximum potential capacity, and then only for a few months each year. The rest of the year it operates on reduced schedules, and many plants shut down completely. If automobile production were spread evenly over a 12-month period, it would be possible, without reducing the total output of automobiles, to convert a large portion of this machinery to the manufacture of planes.

During the automotive year ending last August, Nash used only 17 percent of its productive capacity; Dodge used 36½ percent.

Nash, working at maximum capacity, could have manufactured its total output for the 12 months in 49½ working days; Dodge, in 111 working days. Chevrolet, the largest single producer of motor cars, turned out over a million cars during the last model year, and yet used less than 50 percent of its potential productive capacity. The main Chevrolet Motor plant at Flint, Michigan, produced 380 completed motors per hour at the peak of the 1937 production season, utilizing all four of its complete motor machining and assembly lines. At the present time, at the peak of this year's production season, the Chevrolet Flint plant is producing 282 motors per hour, with one motor line standing completely idle, while the three remaining lines are operating on a two shift basis. Since 1937, Chevrolet has built a new motor plant in Tanawanda, New York, which at the present time is producing 65 complete motors per hour, with a plant capacity of 90 motors an hour. This would indicate that at the peak of the production season Chevrolet is only building 347 motors per hour, with an actual capacity of 470 motors per hour. With an unused capacity of 123 motors per hour at the peak of the production season, it is obvious that Chevrolet has an unused reserve which becomes tremendous during the months of reduced operating schedules.

The availability of automotive production facilities for plane production in Chevrolet is again shown in the case of the Chevrolet Drop Forge plant in Detroit, the largest drop forge shop of its kind in the world. If this shop were operated at full capacity, it could produce all the drop forgings required for the production of 500 airplane motors per day, and still supply the Chevrolet company with sufficient drop forgings for 1,000,000 Chevrolet cars a year. Skilled labor to operate this shop at full capacity is available. Other forge shops, including the Buick and the Dodge forge shops, are also

working at far less than capacity. (See appendix for shop equipment and production schedules.)

AUTOMOBILE MOTOR BUILDING FACILITIES CAN BE ADAPTED TO MAKE PLANE MOTORS

Are the facilities used in manufacturing automobile motors adaptable to the manufacture of airplane motors?

The answer is that they are.

Both the automobile and airplane motor are combustion engines, essentially the same mechanism for generating power by exploding gas. Both motors contain cylinders, carburetors, pistons, crankshafts, camshafts, valves, sparkplugs, ignition systems, etc.

The same basic machinery is utilized in the manufacture of these basic parts common to both motors. True, there are differences between the automobile and the airplane engine, as there are differences of a lesser degree between the engine of the Chevrolet and the engine of the Cadillac. These differences between different engines are produced by adding certain tools, dies, jigs or fixtures to the basic machine in order to make a difference in the product. The same "tooling" process adapts the same basic machinery to the production of the airplane engine.

Graphic proof of this statement is even now being supplied by General Motors. Many of the most difficult and precise parts of the Allison aviation engine are being manufactured in the Cadillac plant in Detroit, much of it with retooled Cadillac machinery. The new Allison plant in Indianapolis, still in process of expansion, is being used largely for assembly.

The experience of General Motors in making Allison parts with retooled

Cadillac machinery should also dispose of the bugaboo of "tolerances". "Tolerances" are the allowable fractional variations in size of engine parts, and they must be far finer in the plane engine than in the automobile engine. But these more precise dimensions can be obtained by more precise tooling.

When the contemplated airplane motor plants are completed, it will be necessary to equip them with the same kind of basic production machinery already standing idle half of the time in the nation's automotive factories. This basic machinery will be duplicated, and after it is duplicated it will still be necessary to construct the special tools, dies, jigs and fixtures required to adapt this machinery to the manufacture of plane engines.

In this process of duplicating basic machinery,lies the most serious delay. This lag, which from all indications may continue, may well defeat our national defense program. An additional burden is placed on the already overloaded machine tool industry. We propose to shortcut the process by building only the tools, dies, jigs and fixtures necessary to convert idle automotive machinery into plane engine machinery. A few special machines will be necessary, but these will be but a small part of the total equipment. In this way a job that will otherwise take at least 18 months can be done in six months.

Certain basic machines are necessary to build both automobile and aircraft types of engines. These include gear cutters, gear shapers, screw machines, bullards, drill presses, punch presses, broaching machines, turret lathes, various types of milling machines, various types of lathes and Fay machines, lapping machines, various types of grinding machines, die casting machines, forge presses, header machines, foundry equipment, welding and riveting equipment.

7-program

AUTOMOBILE INDUSTRY ADAPTABLE FOR STAMPING OF WINGS AND FUSELAGE

The plane has three main parts: engine, wings and fuselage. Just as there is unused capacity for the production of motors, so there is unused capacity for the production of the wings and fuselage. The large body plants and the parts plants have metal stamping equipment now used for stamping out parts for the body of the automobile which can be adapted to stamping out the parts which make up the wings and fuselage of the plane.

Proof of this is provided by the tentative plans being made by the automotive industry at the suggestion of Mr. Knudsen to manufacture parts of the wings and fuselages for large bombers.

A survey of the large body pla nts will show that their equipment for pressing and stamping metal parts are also not being used to full capacity. Murray Body, Briggs and the Fisher Body plants show a 50 percent overall unused capacity in their pressrooms.

Striking is the example of the Fisher Body plant in Cleveland, which contains one of the largest pressrooms in the industry. At present it is operating at but 40 percent of capacity, although automobile body production is now at its peak. In 1936-37 this plant made all the stampings for Chevrolet bodies, employing 9200 employes. Today it employs but 3500, for Fisher has built a new plant at Grand Rapids, Michigan, further adding to body capacity. (See appendix for equipment in the Cleveland Fisher plant.)

Technical problems are involved, of course, in constructing new dies to stamp the lighter aluminum alloys used in plane production. That these problems are not insuperable is shown by the fact that Murray and Briggs are already stamping wing parts for Douglas bombers.

8-program

SKILLED AND PRODUCTION LABOR AVAILABLE IN THE AUTOMOBILE INDUSTRY

Skilled labor is necessary to turn out the tools and dies required to adapt these various types of automotive machinery to plane production. The auto industry has the largest reservoir of skilled labor in the world. More than 25,000 tool and die workers, jig and fixture men, pattern makers, draftsmen and designers, and allied craftsmen are employed in the auto industry at the peak of its tooling program.

Tooling is even more seasonal than production. Each year thousands of the industry's most skilled craftsmen work at top speed for a few months to complete the necessary tooling work to adapt the old machinery to the new models. When the tooling program is completed, only a skeleton crew of these skilled craftsmen are retained for maintenance and duplicate tooling. Three or four thousand skilled craftsmen are shifted to ordinary production jobs while more than 10,000 are laid off entirely until their labor is needed for the next tooling season.

During the past five years more than half of the tool and die makers in the industry, or more than 10,000, averaged less than six months work per year. At the present time there are approximately 3,000 tool and die makers unemployed in the auto industry; some 2,500 have been transferred to ordinary machine-tending production jobs. Many of the remainder are on a short work week.

In addition to the men who are unemployed, those working on production and those employed only part time, there are at least 2,000 tool and die men who have permanently gone into production jobs because of the short work year in the tool and die industry. These mechanics could be combed out of production departments and made available again for tool and die work.

Thus in manpower, as in machines, we have unused capacity; the highly specialized and valuable skills of 7,500 tool and die workers are available to do the necessary tooling for the plane production program here outlined.

Fisher Body Corporation, a division of General Motors, is now working on wood models for a new body design. Chrysler also is working on new models, for which some die work is likewise under way. If the automobile industry goes ahead with plans for new models, it will absorb these unemployed tool and die workers. However, if the introduction of new models in the auto industry could be delayed for six months, from 12,000 to 15,000 skilled mechanics could be made available to build the necessary tools, dies, jigs and fixtures for the production of an all metal pursuit ship on a mass production basis.

The tool and die shops of the automotive industry, like the tool and die workers themselves, are partially idle. The 90 tool and die jobbing shops in the Detroit area affiliated with the Automotive Tool and Die Manufacturers Association employ 7,000 tool and die workers when operated at full capacity. In addition to these shops in the Association, there are some 75 additional tool and die shops which employ 1,500 tool and die workers at capacity production.

In addition to these independent enterprises, there are large tool and die departments within the auto, body and parts plants proper. These are known as "captive" tool and die shops. These great "captive" tool and die shops have a capacity beyond the available manpower if all the skilled men in the entire industry were employed on a full time basis.

A typical example of the tremendous unused capacity of these captive shops is that of Fisher Body No. 23 at Detroit. This is the largest

tool and die shop in the world. It builds the sheet metal dies, welding bucks and fixtures, and special machinery for all Fisher Body plants in the General Motors Corporation. In 1931 Fisher Body Plant No. 23 employed 4,800 tool and die makers at the peak of the tooling program. In 1940 Fisher Body Plant No. 23 employed 1,400 tool and die makers at the peak of the tooling season. At the present time (December 13, 1940) this plant employs only 175 tool and die makers, and even these few are on a reduced work week.

As important as the tool and die worker is the engineer who designs the tools and dies. Here, too, the same situation repeats itself. There are in the Detroit and metropolitan area about 2,100 designing engineers. Their drawings would be needed for the new tools and dies required to adapt automotive machinery to plane production. Designing engineers, like tool and die workers, are largely unemployed between tooling seasons. Here, too, a six months delay in new automobile models would make available an ample supply of these highly necessary skilled men.

Just as there is no shortage of skilled labor in the automobile industry, so there is no shortage of unskilled labor. Despite the defense program, there is a minimum of 100,000 former automobile workers unemployed or on WPA, not to speak of the thousands of young people in automobile production areas who would welcome an opportunity to work in plane production.

THE PROGRAM IN OPERATION

We propose that the President of the United States appoint an aviation production board of nine members, three representing the government, three representing management and three representing labor. We propose that this board be given full authority to organize and super-

vise the mass production of airplanes in the automobile and automotive parts industry.

The first task of the board would be to organize a staff of production and tooling engineers and assign them to make a plant-by-plant survey of the industry to determine the capacity of each plant, and the extent to which it is being utilized.

The next task of the board would be to break down a blueprint of the type of plane chosen for mass production into its cons tituent parts and allocate the various parts of the engine, wings and fuselage among the different automotive plants in accordance with their unused capacity and the kind of work to which that unused capacity is best adapted. Work is to be parcelled out with an eye to spreading it as widely as possible, for much quicker results will be obtained if each plant has to cope with but one or two problems of design and tooling. As contrasted with the present method, which dumps half a hundred technical problems into the lap of one manufacturer who must build an entire engine or plane, this method has all the advantages of division of labor.

The production board should have power to allocate the tooling and designing necessary among the various tool and die shops in accordance with their capacity and their specialized qualifications.

Power to appoint inspectors for each plant in accordance with its part in the general plan should be given the production board and there should be close inspection of each part manufactured before its release.

We propose the establishment of a central motor assembly plant to which all completed parts shall be shipped after they pass inspection.

The automotive industry has unused floor space as it has unused men and machines. We suggest that the Hupmobile plant in Detroit (a plant which produced only 371 cars last year, and which at the present time is completely idle) be leased by the government for a central motor assembly plant. The plant is large enough for five assembly lines with a daily total production capacity of 500 complete aircraft engines a day. The plant could be operated on a three $7\frac{1}{2}$ hour shift basis and the unused machinery now in the building could be placed in other plants in accordance with the general production plan.

Similar methods can be applied to the manufacture and assembly of the wings and fuselage, and here too there is ample unused floor space for new assembly lines. Six complete floors of a building one block long and a half block wide are available at Fisher Body Plant No. 21, Detroit, which formerly made bodies for Buick. (This work has now been transferred to Fisher Body Plant No. 1 at Flint, Michigan.) Several floors are also available at the Fisher Body Plant No. 23 in Detroit, and there is also floor space available at the Briggs Highland Park plant and at the old Ford Highland Park plant.

Outstanding example of idle floor space is the Murray Body Corporation in Detroit, the third largest body making corporation in America. Since its loss of the Ford body contract, Murray is not producing a single automobile body. There are 234,375 square feet of floor space in Building 107 in Murray Plant No. 1, 300,000 square feet available in Building No. 121 and 20,000 square feet available in Building No. 129. This available space will probably be needed for the contract Murray has obtained to stamp the metal parts and assemble the wing sections for Douglas bombers, but there is still 200,000 feet more of modern floor space in the Murray plant which is now being used for storage. This could be turned to the uses of this production program.

Similar is the situation at the Fisher Body plant in Cleveland. The third, fourth and fifth floors of this building are now being used for storage, and could easily be made available for assembly lines. This plant at one time made all metal stampings for Chevrolet bodies. Additional floor space is also available in the Cleveland area.

A final assembly plant would also be needed for the job of assembling the engine, wings and fuselage into the completed plane. For this purpose we suggest the construction of cheap flat hangars in the open space around the Wayne County airport. Completed engines, wings and fuselage would be trucked from the sub-assembly plants to these hangars and the completed planes could be flown from the airport. Similar flat hangars could be erected for final assemblies at the Cleveland airport.

We suggest that the sub assemblies and the final assemblies be placed under the control of men carefully selected upon the basis of skill and experience from the various assembly staffs in our motor car and body plants, and that these picked men be used as the core of the assembly staffs to be developed under this plan. Provisions for protecting the seniority of these men must be guaranteed.

The first few thousand planes produced will not meet 100 percent performance requirements, for in mass production of planes as in mass production of automobiles a few thousand jobs must always be run before the "bugs" (technical problems of machining and assembly) are worked out. This is not serious since the first few thousand planes will more than meet the requirements as training ships.

The automotive industry workers believe that this plan is the only one which offers hope of quick production of planes. It seeks solution of our problem not in the costly and lengthy work of erecting entire

new plants but in the efficient organization of existing idle man-power, machines, skills and floor space.

By dividing the parts among many manufacturers, the greatest possible number of minds is brought to bear on the production problems involved.

Though we propose payment of a fair profit to each manufacturer in accordance with his share in the work, we can foresee the fears this plan may arouse on the part of some managements. They may prefer a method whereby the government finances entire new engines and aircraft plants. Aviation companies may look with misgiving on a production program that would inevitably cut the cost of planes by putting their production on a mass production basis. But we believe the average management executive would not put forward these selfish considerations at a time of crisis.

Labor offers its whole-hearted cooperation. All that labor asks is intelligent planning, a voice in matters of policy and administration, recognition of its rights and maintenance of its established standards.

The merit of our plan is that it saves time, and time is our problem. Normal methods can build all the planes we need - if we wait until 1942 and 1943 to get them. This plan is put forward in the belief that the need for planes is immediate, and terrifying. Precious moments pass away as we delay. We dare not invite the disaster that may come with further delay.

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APPENDIX I

NUMBER OF CARS AND TRUCKS PRODUCED IN UNITED STATES AND CANADA FROM SEPTEMBER 1936 through AUGUST 1937 AND FROM SEPTEMBER 1939 through AUGUST 1940.

NAME OF COMPANY	SEPT. '36 thru AUG. '37	SEPT. '39 thru AUG. '40
Chevrolet	1,149,662	1,044.100
Pontiac	235,065	224,475
Oldsmobile	199,569	196,732
Buick	220,214	291,021
Cadillac-LaSalle	45,668	38,032
General Motors Truck	56,410	52,275
Plymouth	552,610	412,545
Dodge	378,510	304,455
DeSoto	81,390	69,660
Chrysler	103,210	83,680
Ford-Mercury	1,279,003	913,900
Lincoln	32,803	22,681
Graham	21,067	2,547
Hudson-Terraplane	125,207	97,632
Hupmobile	300	371
Nash-Lafayette	86,695	57,216
Packard	121,301	90,674
Studebaker	104,931	114,682
White-Indiana	14,035	12,727
Willys	65,302	32,930
*GRAND TOTAL-	5,068,803	4,228,706
Total General Motors	1,906,588	1,846,815
Total Chrysler	1,115,720	869,980
Total Ford	1,311,716	936,581
Total "Big 3"	4,334,204	3,653,376

*Grand total also includes production of Diamond T Truck, Federal Truck, Int'l Harvester, Ma ck Truck, Reo Truck, Stutz and miscellaneous which are not listed separately.

Source: Ward's Automotive Reports

Note: Canadian production represents approximately 4% of the total production.

SPPENDIX III

FACILITIES AVAILABLE FOR PLANE PRODUCTION IN THE CHEVROLET FORGE PLANT, DETROIT.

The following equipment in the Chevrolet Drop Forge plant at the present time, which is the peak of the plant production program, is operating at approximately 60% of capacity.

EQUIPMENT AVAILABLE

NUMBER OF MACHINES	SIZE OF MACHINES	TYPE OF MACHINES
19	1500 lbs.	Steam Hammer
29	2500 lbs.	Steam Hammer
12	3500 lbs.	Steam Hammer
9	5000 lbs.	Steam Hammer
6	12,000 lbs.	Steam Hammer
15	1000 lbs.	Board Hammers
11	2000 lbs.	Board Hammers
5	3000 lbs.	Board Hammers
1	250 ton	Forge Press (Hydraulic)
1	950 ton	Forge Press (Hydraulic)
2	1000 ton	Forge Press (Hydraulic)
3	1600 ton	Forge Press (Hydraulic)
11	1500 lbs.	Board Hammers

In addition to the above Hammers and Presses, numerous large and small upsetting (Header) presses are available. If the above equipment were used at full capacity, this plant alone could produce all the necessary drop forgings required for the production of 500 airplane engines per day, and still supply the Chevrolet Motor Car Company with sufficient forgings for a 1,000,000 Chevrolet cars in the coming year. Skilled hammermen are available to operate these forge hammers at full capacity.

In addition to the Chevrolet Forge plant, there are many other forge plants, such as the Buick Forge plant, Dodge Truck and Forge, etc., which have considerable unused capacity.

APPENDIX IIII

FACILITIES AVAILABLE IN AUTOMOBILE INDUSTRY FOR STAMPING METAL SECTIONS FOR WINGS AND FUSELAGE.

The following stamping presses in the Cleveland Fisher Body plant are at the present time, which is the peak of the body production season, operating at less than 50 percent of capacity.

Available Equipment

No. of Machines	Tyoe of Machines
74	Double crank presses
19	Toggle presses
26	No. 78 Single Crank presses

Numerous small blanking and stamping presses.

To appreciate the full significance of the above list of equipment, one must realize the tremendous size of these presses, their cost, and the time it would require a new plant to get delivery of such presses. A big Toggle press, for example, stands 40 feet from the base to the top of the press and is large enough to hold and operate a draw or flange die which itself weighs from 70 to 80 tons. Such presses cost from $150,000 to $175,000 and it would require years to get delivery of the number and type of such press equipment that is now standing idle more than 50 percent of the time at the Cleveland Fisher plant.

Present employment in the Fisher Cleveland press room reflects the extent to which the presses are now idle. There are 600 men on the day shift, 300 on the afternoon shift, and 67 on the midnight shift.

In addition to Cleveland Fisher Body, every major body plant in the automobile industry has unused press room capacity which can, with the necessary special dies, be adapted to plane production.

APPENDIX II

NAME OF PLANT.	Present production of complete motors per hour.	Highest past production of completed motors per hour.	12 months total production from Sept., 1939, through August, 1940.	Work days needed to build 12 months total production on basis of two 8-hour shifts per day at peak production.	Total output at peak capacity on basis of two 8-hour shifts per day. 50 weeks in year.	Possible increased output over year ending August, 1940.	Percentage of production capacity used from Sept. 39-Aug. 40
Cadillac	36	38,032	66	172,800	134,768	22	
Dodge	174	304,455	108	835,200	530,745	36½	
Studebaker	70	114,682	103	336,000	221,318	31	
Plymouth	201	412,545	128	964,800	552,255	43	
Chrysler & DeSoto	135	153,340	75	648,000	494,660	24	
Oldsmobile	75	196,732	167	360,000	163,268	54½	
Willys-Overland	50	32,930	41	240,000	207,070	17	
Hudson	45	97,632	135½	216,000	118,368	40	
Pontiac	92	224,475	147	441,600	217,125	51	
Nash	72	57,216	49½	345,600	288,384	17	
Chevrolet	445	1,044,100	147	2,136,000	1,091,900	49	
Buick	185	291,021	121	721,500*	430,479	42	

* Note: On basis of 13 hr. day.

Wakter RReuther's proposal evolved from his conviction, ~~from the outbreak of hostilities in Europe~~, that the war against Hitler was our war, and that victory would go to the nations which won the battle of production. His technical knowledge of the automobile industry came from his mastery of the trade of tool and die maker; at the age of 22 he was already in charge of a group of sixty skilled die makers in Henry Ford's vast River Rouge plant. In the top councils of the auto workers union, Reuther had become accustomed to the role of strategist. He had foresight and a faculty for translating it into ~~f~~ a specific porgrams, whether the need was for executing a strike against the nation's mightiest industrialists or for working out a ~~harmonious~~ harmonious labor relations with the same people.

There were three basic elements in Reuther's plan: conversion of the ~~machinery~~ facilities of the automobile industry to ~~for~~ production of materials of war; pooling of the plants, machinery and man-power of the entire industry into a single, co-ordinated defense production ~~under management~~ organization; and a voice for labor, jointly with management and government in the direction of such a collassal enterprise. The plan was spelled out in terms of aircraft production because planes seemed the most vital need of the ~~democracies-at-war~~. As a seasoned campaigner for new ideas, Reuther also realized the need for a dramatic approach to public and governmental attention.

Conversion of the industry was to be achieved by designing new tools and dies, jigs and fixtures for existing basic machinery. The industry was to abandon any idea of making '42 models and which would thus free 12,000 to 15,000 skilled mechanics for the job of building the new tools and dies. Reuther spelled out his plan in terms of aircraft production because planes seemed the most vital need of the democracies-at-war and because, a seasoned campaigner for new ideas he realized the need for a dramatic approach to public and governmental attention.

job of building the new
tools and dies
The idea of conversion, pooling and joint labor-management control could have been applied in even simpler terms to the production of tanks, heavy guns, trucks, jeeps and boops. Conversion of the industry by designing new tools, dies, jigs and fixtures with planes, it could assuredly be feasible for less complicated existing basic machinery. items. There were to be no 'A2 models so that the industries could, in fact, DDD skilled mechanics could be freed for the

Courting the resentment of the isolatinist who then held high place in the C.I.O. and inviting the Communist inevitable cry of "war-monger," Reuther quietly carried forward his general research. Before he was ready with the details, but already confident of the soundness of his basic principles, conversion, Reuther took the project up informally with Sidney Hillman, labor's right hand then associate director of OPM. That was in the late summer of 1940, eighteen months ago. The plan appealed to Hillman. He then discussed it with his partner, Mr. Knudsen. Subsequently, Hillman reported Mr. Knudsen's verdict to the UAW plan man. "We can't get the automobile industry to move that fast," the former president of General Motors said. Nobody, obviously, could be in a better position to understand the industry and reflect its views.

The refusal of the difficulty of budging the automobile industry from its accustomed ways was not a new phenomenon to the UAW; in fact, they might be called specialists at the job. The industry's labor relations attitude had undergone a complete face about since 1936. Reuther was willing to try it again. Under his direction, UAW shop chairmen and local union officers began making a survey. They turned into Reuther's office data on production capacities, on idle machines, on available skilled help. Tool and die makers were consulted on the technical problems. Ben Blackwood, one of GM's ablest tool and die makers, a shrewd craftsman, was Reuther's chief technical assistant. Together they labored for months, far into the

nights. By November of 1940 they felt themselves on sure ground.

In a classroom at Cass Technical High School on Detroit's grimy West side, Reuther convened an unofficial production council. There were about twenty-five in the group,

nights. By November of 1940 they felt themselves on sure ground.

One night they gathered in a classroom at Cass Technical High School on Detroit's grimy West Side. There were about 25 in the group, designing engineers, tool and die makers, men who had labored for years in the shops of GM, Chrysler, Ford, Murray Body, Briggs, Hudson and Packard. Reuther reported the results of his survey and his recommendations. The men got their backs up when Reuther reported Knudsen's dictum, "The industry doesn't move that fast." With Reuther at the blackboard, chalk in hand, he outlined the various stages through which, he averred, the industry could turn out planes by converting its machinery, much of it idle a large part of the time because of the peaks and valleys in the industry's production year. He said that the first planes could be flown away in six months; some were conservative and held it would take at least seven months. The seminar recessed adjourned to inspect airplane motors mounted in one of an adjacent room of the high school building, where all-night vocational training classes were in progress. The Rolls Royce and other motors they saw presented no insurmountable difficulties. The men re-convened in the class room.

"Well, what do you think? Can we go ahead with this idea?" Reuther put the proposition.

Among the 25, only two dissented. One thought airplane motors were two tough to fool around with; the other couldn't see what "we should help the bosses run their plants more efficiently." The rest agreed it could be done.

Reuther spent the next few weeks putting the plan down in paper. He carefully documented his claim that there was tremendous idle machime capacity in the plants of the industry. Here again

the men in the shops turned production experts, using the entire auto industry as their laboratory. Here, ~~as in the conferences of the skilled~~ workers ~~drawn all the companies~~, Reuther had an advantage. GM certainly knew its own plants and capacities; Ford knew his, and Chrysler knew their plants, but the UAW planners could hurle corporate lines and draw on ~~and combine~~ the experiences of all of them, including the ~~large and small~~ independent tool and die shops and parts plants.

The story of the Reuther plan now moves to the "ashington stage; it is largely a dismal chapter, but not without its lightening ~~features~~ moments. Extremely discurging, amounting to virtually obstruction, was the ~~resistance given~~ by Mr. Knudsen and OPM's dollar-a-year men. Immensely encouraging was the independence of the larger part of the press, ~~particularly the columnists~~, and of a few men in government who, although they could not bluntly tell Mr. Knudsen, the President's choice, that he was playing a short-sighted, narrow role, nevertheless gave Reuther encouragement enough to keep his ~~together, with the progressive committee, kept~~ the idea from suffocation. Judge Patterson, under-secretary of war, and Col. Robert Lovett, in charge of the army's aircraft production were continuously helpful to the union from the C.I.O.

Formally, the proposal saw the light of day when Philip Murray, president of the Congress of Industrial Organizations, and R.J. Thomas, head of the UAW-CIO, fowarded it to ~~the~~ President Roosevelt. ~~That was on December 22.~~ The President, ~~promptly sent it to OPM, at the same time~~ tossing labor a public bouquet for its constructive attitude, sent the brochure to OPM. It was several months before Mr. Knudsen got around to discussing the program accross the table with Reuther and some of his colleagues. Meanwhile ~~the automobile industry, largely through unnamed "spokesmen", and the aircraft industry applauded~~ had handed down the ~~decision~~ decision that the plan, however worthy its ~~intent~~, was an impractical notion.

Meanwhile, the automobile and the aircraft industries, with a valueable assist from ~~one of the dollar-a-year men at OPM~~, had attempted to discredit the proposal. The automobile industry ~~spokesmen~~ hesitated to speak out directly. They aired their skepticism largely through inspired articles in trade publications. ~~In~~ a suspiciously well-timed article ~~published by~~ the Saturday Evening Post, by Charles F. Kettering, president of the General Motors Research Corporation, pleaded for patience with the industry. "Guns are Not Windshield Wipers," was the theme of this effort to belittle the Reuther plan without giving it the ~~benefit~~ of direct mention. "Tanks are different," ~~the~~ most eminent automotive engineer asserted, "so the plants must be different. When the gong rang no tank making plant was in existence." Kettering admitted that when the automobile industry got into mass production of war materials the amount of material turned out would be "staggering," but, he added, "for a long time, while we are 'making Ready', the speed is going to be anything but ~~xxx~~ blinding." ~~These words were written in December, 1940.~~ It was to be at least another year before the industry began to "make ready."

The airplane industry was ~~xxx~~ somewhat more ~~frank~~ in its criticism. Perhaps the Wall Street Journal of Dec. 24, 1940, explained why when it reported that "holders of airraft shares are not particularly pleased at the prospect that the automobile industry may use some of its facilities for mass production of planes." At any rate, the Aeronautical Chamber of Commerce, through its president, Col. John H. Jouett ~~began~~ the most vigorous ~~open~~ critic of the plan. His technique was to take the number of man-hours, the amount of the plant-space to make a plane by custom or hand-built methods, muliply them by 500 a day. This of course produced astronomical figures ~~that made~~ the labor proposal ~~sound ridiculous and fantastic~~. It was a neat trick and it ~~served the purpose of the Aeronautical Chamber of Commerce luncheon speakers~~ to convince Rotary luncheons how ~~silly~~ it was for labor to venture into the field of management. ~~However, moments thought might have exploded Col. Jouett's thesis.~~ What Reuther was proposing was not the aircraft industry's ~~custom~~ way of working but rather the

automobile industry's mass production methods. Mass production means fewer workers, less man-hours and far less plant space. What Col. Jouett had done was to speak in terms of mass production quantities in the mathematics of custom-built production methods. For the rest Col. Jouett circulated the covertly inspired contention of the automobile industry, now definitely repudiated, that only ten per cent at most of the existing basic machinery in the automobile plants could be converted, by re-tooling, for aircraft prduction.

The most effective stab at the Reuther proposals ~~back in January, 1941,~~ was ~~relayed by~~ circulated by courtesy of the Associated Press. On January 1st, quoted OPM "experts", ~~authorities,~~ although reluctantly, again unnamed, to the effect that their plan had been turned down as impractical. ~~When this report was checked with Mr. Knudsen he hastened to add that OPM had not yet had the opportunity to study Reuther's suggestions. However, the AP's anonymous story did its work.~~ For a year therafter, until ~~December~~ January, 1942, it was taken for granted that the plan had been thoroughly analyzed by OPM and found wanting. More responsible newspapermen ~~took the trouble to attempt~~ tried to locate the "OPM ~~authorities~~ experts" who had torpedoed the proposal but finally gave it up, ~~in the hunt.~~ anonymously The evidence pointed directly to one of the most however, prominent of the dollar a year men loaned to the government by industry, ~~but it could not~~ be ~~tied to him. Town Hall of the Air felt that it might be helpful to present a discussion of the subject to its tremendius audience~~ Following appearance of the OPM's inspired story, ~~the plan was again given the~~ silent treatment. Town Hall of the Air felt it might be interesting and perhaps helpful to have the merits of the program discussed publicly. Reuther agreed to speak, but ~~it~~ could not prevail on any automobile or aircraft company executive to take part, and the program had to be cancelled.

~~Reuther found once~~

an AP dispatch from Washington

a concerted effort was made to bury the plan in silence.

Although venturing timidly into a field preempted by industry's ~~big-wigs~~ oracles, ~~some of them then in government~~, the nation's political commentators thought the plan had some ~~in~~ merit. Walter Lippmann, Dorothy Thompson, Ernest Lindley and Raymond Clapper, among others, argued for a fair hearing. A wide circle of New Dealers ~~were of the same opinion~~ took the same position. Jerome Frank, then chairman of the Securities and Exchange Commission, convened a Sunday morning breakfast at in the capitol's Cosmos Club. There for several hours, Reuther ~~met the questions~~ outlined his program to John H. Carmody, Laghlin Currie, Paul McNutt, Tom Corcoran, ~~Edward F. McGrady~~ President Roosevelt's ~~Pres of U of~~ U. of Wisconsin, ~~and others~~ Leon Henderson and several others. Henderson gave the program his ~~blanket~~ enthusiastic approval; Carmody, an engineer, was satisfied with Reuther's answers to his stiffest ~~technical~~ questions. Quickly the group sensed the great difficulty that would confront adoption and ~~application~~ of the plan: how to overcome the resistance of the automobile ~~infustry~~ corporations. Edward F. McGrady, with his usual bluntness, said: "It can probably be done, but who the hell will pay ~~any~~ attention to a squirt of a labor leader?" White, aid of ~~Ross~~ the Secretary of the Treasury, was so impressed he asked Reuther to meet the secretary that very day. A Sunday afternoon conference followed at Mr. Morganthau's home. He ~~was impressed~~, and agreed to place the plan before the President ~~that~~ the next day.

"There is only one thing wrong with your program," Morganthau ~~said~~ warned, "It comes from the 'wrong' source.'"

(Hoe)

On March 1st,

Several months ~~back~~ after the "OPM experts" has rejected the plan, Mr. Knudsen sat down with Reuther, R.J. Thomas and Ben Bloechwood to discuss it. ~~The original group had met and crossed swords before~~ "Mr. Knudsen and I had previously met, ~~met before~~," Reuther was later to relate, ~~"on opposites sides of the table,"~~ "I thought on this matter of national defense we might sit on the same side. I was mistaken." The young labor leader and ~~the auto industry's~~ automobile managements greatest production man came to ~~grips~~ grips almost immediately. But Knudsen insisted that only a very small percentage of the industry'd ~~existing~~ plants could be adapted for making of parts of an airplane motor. On wings and fuselage there wasn't much disagreement. ~~Reuther~~ Reuther dissented

Reuther finally proposed: "Suppose we go through an auto plant with you, go over the machines, and see what we can use and what he can't use." Mr. Knudsen, although the director of the nation's defense production, asserted he didn't have any authority to take Reuther through a plant. Sidney Hillman, who was also present, thought that such an expedition might be arranged without too much diffuculty. His partner didn't agree.

Finally Mr. Knudsen offered to give Reuther a set of blue prints of a standard airplane motor. Reuther was to break down the job and indicate what available machinery could be used. Reuther agreed. Weeks later Knudsen sent word that the prints were military secrets and could not be studied except at the OPM office. Reuther would be given an opportunity at some future date to come up to OPM and work on the blue prints there. When Mr. Knudsen left OPM ten months later Reuther was still waiting for the invitation to see the prints.

Before the conference at OPM broke up Reuther raised the question of civilian production of automobiles. An important objective of his plan was to avoid unemployment of the auto workers. It was obvious to him and to many others that there would not be sufficient steel for normal automobile production plus national defense production. Mr. Knudsen hastened to reassure him on this score. He said he knew exactly how many 1942 models could be turned out - 4,500,000 was his figure. There would be plenty of steel. He assured the skeptical labor men.

Mr. Knudsen now holds the title of Lieutenant General in the U.S. Army, but he is specifically assigned to the war departments multitude of complicated production problems. He has eminent standing as a technician and as an American. In view of his position it is difficult to characterize the version of the March meeting which he subsequently circulated through the medium of his conference with the men from the CIO. His version was given in an interview with the press and the questions and answers are printed in the March 25th, 1941, issue of Defense, organ of the Office for Emergency

Here is a portion of the transcript:

The issue is a delocate one and Management. ~~Delizate xas xthe xissue xisx it might be best to let Mr. Knudsen sprak for himsrlf.~~

"Q. Can you tell us whether you have accepted or rejected the Reuther Plan, or accepted it in part?"

"A. Well we had him in here and talked to him you know. It was claimed that he could make fixtures to standard machines, but that proved to be slightly incorrect in the case of Cadillac. They wanted to go into the shop as a union committee and try to design fixtures for the present machinery...We had to stall on that one and say that it couldn't be handled. He agreed to get us drawings and come down and study them - a set of drawings for one motor to look over and get into a little closer."

~~The drawings or blue prints were naturally to be the blue prints of a standard motor, which was what Reuther was proposing to duplicate in the auto industry's plants. How anybody outside of OPM, the army or the aircraft manufacturers might be expected to have such a plan is a still hard to understand.~~ That was what Reuther was proposing was difficult

Through the summer and fall of 1941 the war came closer ~~thanx over~~ to the United States. Britain's needs for fighting planes and war materials became more acute as the Nazi war machine ~~rumbled~~ crushed ~~all~~ resistance on the continent and in Africa. ~~However, labor had been given a brush off.~~ Nevertheless, although a haunting one. The Reuther plan was permitted to become a vague memory. Toward the end of the summer, however, it began to win some important new support. Before the forum provided by Representative John H. Tolan and his investigating committee, Donald M. Nelson and Alex Taub, one of Britain's best known automotive engineers, began to revive the subject the question: why isn't the automobile industry working for national defense?

"A great deal of the present machinery can be converted to making defense materials," Mr. Nelson, then director of the Supplies, Priorities and Allocations Board, told the committee. "When we see the size of the new (defense) program, our ideas will completely change as to what we can do with present machines rather than buying

will completely change as to what we can do with present machines rather than buying new tools."

Taub testified that in October whereas the auto industry had insisted ten months previous, ~~when the Reuther plan was first broached~~, that only 15 per cent of its facilities were available for defense production, "today, with curtailment on the premises, it is freely admitted that 50 per cent can be used for defense, with a possibility in some areas of 70 per cent."

~~Taub himself has had some illuminating experience with OPM.~~ After ten years with the engine division of Chevrolet, General Motors had sent him to England at the outbreak of the war to design engines for Vauxhall, Ltd., GM's British subsidiary. He was loaned to the British Mechanization Board as a consultant on engines and carburetion. He built and designed the Churchill tank engine and was so helpful to British defense production that Lord Beaverbrook sent him to the United States to help get the Napier Sabre Engine, Britain's best airplane motor, into production. He was loaned to OPM, where Mr. Knudsen quickly decided to let Mr. Hillman have him as a technical consultant. Assigned by the OPM labor division to work on conversion with Odlum of OPM's sub-contracting division, Mr. Taub, aggressive and independent, found that Mr. Odlum would grant him neither authority nor ~~a technical staff. He remained with the Odlum division for less than a day~~. Before long Mr. Taub's as well as Walter Reuther's views were being thrown at Mr. Knudsen in congressional hearings and by newsmen. "Taub" and "Reuther" became names which were certain to ruffle the otherwise gentle production giant. Asked by the Tolan committee to comment on Mr. Taub's estimate of convertible machinery, Mr. Knudsen growled: "Mr. Taub used to be

an employee of mine."

Meanwhile a tremendous row was brewing within the ranks of those entrusted with responsibility for national defense. There came promises of a huge "victory program" in which all-out conversion was to be a basic plank. Donald M. Nelson was its chief advocate and he was steadily gathering support among the more aggressive of the men around the President. But there was no budging Mr. Knudsen. The nation was losing the battle of production but he was holding his own at OPM.

What was the automobile industry doing while labor was pounding away for its Reuther plan? A conference of the leading car manufacturers met in October, 1940, and resolved "to subordinate work on automotive model changes to the necessities of the defense program," ~~specifically to aviation procurement."~~ Sixteen months later, ~~the manufacturers, through~~ the Automobile Manufacturers Association, made another public pledge of production for defense. Between the issuance of these promissory press releases, the industry produced and sold more than 4,300,000 pleasure cars and commercial trucks, all '41 models. Civilian car production in the calendar year 1941 was the highest of any year save one. Profits of three large automotive companies for the first nine months of 1941 rose to $430,604,778, a tidy increase over their profit of $408,212,589 in all of 1940.

C. E. Wilson, president of General Motors, has estimated that his corporation's dollar volume of non-defense production in 1941 was "just under $2,000,000,000," which, Mr. Wilson added, was "an all-time record." During the same period the corporation produced some $330,000,000 worth of defense articles - much of it army trucks, which required no essential conversion. Mr. Wilson ~~conceded~~ agreed that with re-tooling and conversion the corporation

could, within ten months, be producing defense materials at the rate of $2,000,000,000 a year. He assured reporters at a Washington interview that defense materials would be rolling out of General Motors plants at that rate by the end of 1942.

"We were sort of doing the automobile business with our left hand (in 1941) and going ahead with anything we could get to do," said the president of General Motors.

"You mean you were doing your greatest business with your left hand?"

"Yes sir."

"That is a pretty good hand to keep in operation, isn't it?"

One can hope that the automobile industry had seen fit to apply its left hand to war production in 1941, ~~but the facts are conclusive that both hands were extremely busy reaping the benefits of a boom year in urban cars.~~ If the plants were not busy with defense, the corporations' ~~sales experts~~ and press agents were exceedingly active. One handout offered by the AMA in the spring of 1941 announced that the annual national auto show, the coming out party for '42 models, had been cancelled. This turned out to mean merely that the new models were to make a cautious appearance.

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Instead of making their debut at a showy New York ~~exhibit~~ ~~which would have been certain to arouse unfriendly attention~~, the new models were placed on view at "open house" staged shows ~~put on~~ by dealers throughout the country; and there was something to show. There were as many new models ~~the usual changes~~ as usual and a profusion of "bright work" such as the nation had never seen. Their production had consumed time that tool and die makers might have spent "making ready" for defense production, and materials for whose lack the nation has already paid dear and will yet pay more.

The industry ~~also announced, as a contribution to national defense,~~ did not announce, that there would be no '43 models. The '42 models, said Mr. Sloan, ~~hopefully~~, last spring, would be frozen and manufactured through 1943. He proved to be too hopeful.

The industry's dream of business only slightly different than usual soon began to be disturbed by suggestions that it might not be possible to superimpose an adequate defense program on a boom business curtain year. Talk of enforced curtailment ~~began to be~~ was heard. The industry promptly suggested voluntary "curtailment." By agreement with Mr. Knudsen, it announced that it would reduce production of '42 models to 4,224,152 vehicles. "Curtailment", as the auto industry planned it, would permit the manufacture of more cars and commerical trucks than was turned out in the '40 model year, when 4,094,354 vehicles were produced. This "curtailed" schedule was arrived at by "estimating" that the

industry would "probably" sell 5,289,974 of '41 models. This imposed on the industry an "estimated" 20 per cent cut on its "estimated" ~~probable~~ '41 output. It was not until the War Department and Leon Henderson intervened that "curtailment" began to mean what it says. The Office of Price Administration and Civilian Supply was compelled to announce on August, September, October, and November, and a 50 per cent cut for the entire '42 model year. There followed a decree directing a 48 per cent for December.

These enforced curtailment orders, as Mr. ~~Tout~~ noted, ~~began~~ to improve the outlook for defense production. Business Week observed that it would soon be more profitable for the industry to engage in defense production. Nevertheless, there was no indication that the industry would agree to wholesale conversion; of pooling there was no mention; for the idea of giving labor's ideas a bearing, there was nothing but resentment.

Then came Pearl Harbor.

intervened that "curtailment" began to mean what it says. Then the Office of Price Administration and Civilian Supply was compelled to announce on August 21st (1941) that there would be a 26 per cent cut in production for August, September, October and November, and a 50 per cent cut for the entire '42 model year; there followed a decree directing a 48 per per cent for December. These enforced curtailment orders, as Mr. Tolk noted, began to improve the outlook for defense production. Business Week observed that it would soon be more profitable for the industry to engage in defense production. Nevertheless, there was no indication that the industry would agree to wholesale conversion; of pooling there was no mention; for the idea of giving labor's ideas a hearing to function, there was nothing but resentment.

Then came Pearl Harbor. (Mood)

As Japanese shells fell on Honolulu, Wake Island and the Phillipines, verbal bombs of resentment began to crash around the business of the automobile industry and Mr. Knudsen representative at OPM. The Tolan Committee came forth with the finding that "only a negligible part of this great capacity (of the automobile industry) is presently employed in the war effort." It declared that the industry could and "must be fully converted to military production."

> "Two major obstacles impede war production," the Tolan committee declared. "Manufacturers have been reluctant to convert their production facilities from civilian to military production; and the defense agencies of the Federal Government have not required such conversion."

(Major Incident)

The Truman committee was even more severe in its indictment of the industry. Reuther's (1940) statement that the industry had thousands of machine tools available for defense production had been ignored, the committee found, with the result that "instead of requiring the

utilization of such tools for the defense program, further announcements were made to the effect that automobile plants could not produce tanks and airplanes, and that it was advisable and necessary to build new plants...." Defense, for the automobile industry, it found, "was largely a separate but very important (and profitable) sideline." Excluding cars and trucks, the entire industry, had produced in 1941 only $266,303,000 worth of defense materials. Under secretary of war Robert P. Patterson had been falsely informed (by OPM and the industry) that only ten per cent of the imdustry's tools for could be used to make airplane engines. ..."In plain language the conversion job was not even well started."

With the nation arosed by the ~~plight fate~~ and plight of its men in the Pacific outposts, the CIO seized the moment to re-open the issue of what had happened to ~~the year old~~ Reuther's proposals. A bitter open letter addressed to "MR. ~~Green~~ OPM" appeared in all the Washington dailies. It demanded to know what OPM now proposed for the automobile industry.

Clumsily, before a nation which wanted planes and tanks, and wanted to know why they had not been forthcoming, the automobile manufacturers replied that CIO was interested only in muscling in on management prerogatives ~~in the industry - a far fetched red herring which even Congressman Dies disdained to dignify.~~ To meet the ~~outcry for a change~~ public demand for action, OPM summoned a large conference of automotive management, labor and governmental experts. The conduct of the conference sealed OPM's doom and brought about the appointment of Mr. Nelson. ~~Before~~ At the gathering OPM Reuther presented a coordinated program for re-tooling, bringing his original thsis up to date. ~~There~~ Nobody arose publicly to challange him. Then Mr. Wilson offered his contribution. ~~Strangely unaware of~~ Unaware of the ~~public~~ clamor outside the doors of OPM, Mr. Wilson discussed the need for an esclator clause ~~to safeguard profits on~~ in defense contracts, and asked for the right to make 200,000 cars more than had been ~~specified~~ allowed in the quotas for February, 1942. Later five spokesmen of industry met (under OPM auspices) with an equal number from the

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~~UAWx~~ labor, four from the UAW-CIO and one from the A.F. of L. ~~machinists union.~~ Mr. Wilson ~~challenged~~ questioned Mr. Reuther's right to participate in discussions of production techniques. "If you are interested in production, I'll give you a job ~~to work for~~ with us," Mr. Reuther was told. ~~The latter promptly~~ The offer was politely declined, ~~the offer~~. The conference ended on a dismal note, although ~~Messers~~ Mr. Knudsen and Hillman agreed to ~~evolved~~ a compromise by which a joint management-labor ~~committee~~ sub committee of one would have the right to "assist" in converting the industry. When the first meeting of the sub-committee ~~met~~ convened it was obviously to all concerned that it had no power nor any explicit instructions from OPM. By the time the committee sat down for its second academic discussion, OPM itself was virtually non-existant; and Mr. Nelson ~~had indicated~~ was indicating that he would have no ~~time~~ use for "debating socities."

Meanwhile the ~~principle~~ issue of conversion had been decided: "There is nothing else to do now," Mr. Knudsen admitted plaintively. ~~How fast conversion would take place was largely a matter in the hands of Reuther's~~ second proposal that the industry's facilities be pooled for a great, cooperative defense effort was still ~~not~~ in the air; ~~the respective corporation~~ corporate spokesmen agreed to "pool ideas" and "information." Coordinated exchange of facilities and men, Mr. Wilson maintained, would be "socialization." Labor's plea for a voice in production was completely ignored. The ~~facility~~ faculty of the industry and ~~Mr. Knudsen~~ Mr. Knudsen for running around in circles was indicated by the reception given a War and Navy ~~announcement~~ request that the automobile ~~industry was being asked to undertake~~ take on an additional $4,000,000,000 worth of defense orders, more than twice as much work as it had ~~been given or had accepted in 1941~~ previously undertaken. Back in October, 1940, Mr. Knudsen had asked the industry, and it had agreed, to volunteer offers on production on airplane parts. On January 8th, 1942, Knudsen called the attention of

~~Actually~~ However, ~~these indications that Mr. Nelson would not be influenced by~~ made it plain he was not influenced by scare-heads.

the industry to the army and navy's shopping list for $4,000,000,000 worth of war articles.

"We want to know where some of these things will flow from," Mr. Knudsen told the heads of the industry. "We want to know if you can make them or want to try to make them. If you can't, do you know anyone who can?"

The Truman committee has pointedly given notice that in time it will seek to place personal responsibility for the failure to convert the automobile industry's facilities to war production. Such an inquiry will make interesting reading, perhaps bring some practical advantages. More immediately necessary, however, is an evaluation of patterns of thought, of the clash of ideas, which for more than a year stymied the President's hope that we become an arsenal of democracy. The war will not be a short one. Old rivalries, outmoded systems and unjustified fears cannot be easily eradicated. Yet an attempt must be made if more precious time is to be lost.

The Reuther plan, it can be argued, lifted the curtain on certain definitely obstructive yet basic tenets of the automobile industry; on the orher hand it asked that labor be given a voice which a concession which labor must justify by its positive contributions as well as through its valueable critical approach.

The industry's resistance to conversion cannot be explained except otherwise than by reference to its desire to continue the boom-year profits on manufacture of civilian cars and commercial trucks. It did not have to be told by labor that it was possible to convert; its own engineers knew that to be a fact. It knew as well as labor that there would be a shortage of steel, aluminum and other critical products. These things it does not now

deny. Aside from its red-herring of "labor control," ~~which mire in a moment,~~ its current alibi that places the blame on the War Department and OPM. "There were no orders available that would have justified conversion," the industry maintains, "The government did not know what it wanted." When it accuses OPM and the army, however, the industry is merely accusing itself. OPM production was in the hands of Mr. Knudsen. The War Department could act only on what the industry told it was possible; and conversion, the industry insisted a year ago, although guardedly, was not feasible except in a small way. There is no reason why the industry could not have acted at least as boldly as labor, why it could not have said, "here are our tremendous facilities, we can produce planes and tanks and motors and guns without waiting for new plants." The nation would not have thought twice about such an offer.

(11) The Reuther plan's second plank, pooling, ~~strikes with explosive forces against~~ struck against a ~~rock-bottom foundation~~ principle of the ~~automobile industry strike~~ equally as fundamental as the ~~idea that profits come first.~~ Pooling of machines and men ~~means~~ eliminating ~~scrapping of the~~ normal competive boundaries. It would take such ~~individualists as Henry Ford~~ and such an empire as the du Pont's General Motors ~~Corporation~~ and ~~say~~ tell ~~you have got to~~ them they must work together. Practically, this would have meant, in January of this year, that the Ford program for construction of heavy bombers would not be waiting for completion of some 4,000 new dies while General Motor's Fisher 23, the biggest and best tool and die shop in the world, ~~is~~ was engaged in a purely production job - ~~producing~~ making gun-mounts which ~~can be made~~ could be produced elsewhere. ~~It~~ Pooling would ~~have meant~~ mean that tool

and die makers would not be idle or working on production or maintanance jobs, while other companies engaged in defense work would pooling of the industry's efforts might assign to the Ford Motor Company the casting of cylinder blocks for all aircraft motors, for which it is best equipped, thus freeing other plants and machinery for other defense work scheduled to be made. Ford, GM and Chrysler are to turn out complete identical tanks. Pooling would break down the job, sub-divide it, thus making possible a vast increase in production. Generally speaking the automotive industry now has three large pools: GM, Ford, Chrysler and their respective suppliers. The only argument raised against combining them into one mammoth, co-ordinated pool is that the traditional competitive set-up must be maintained. The nation will have to decide between two threats - the threat to traditional, peace-time competive habits and the threat of a victorious Hitlerism.

We come now to the bugaboo of "labor domination of industry." The Basic concept of the Murray plan, and of the Reuther plans call for tri-partite management, composed of labor and government - with government having the deisive voice. They provide that labor shall not be granted only the "mopping up" jobs, the chores of labor supply, of adjusting wages and hours, of meeting the unemployment problem. Labor's plans ask also that labor shall be given a creative voice, and that its suggestions shall not be subject to veto because of pre-conveived prejudices or a fear to let labor demonstrate that it is able to make a contribution to production. In a longer war, labor morale will be an important factor. There is no better way to establish and maintain that

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morale than to grant labor ~~accept~~ the share of responsibility for which it is asking. ~~has been pleading~~.

By comparison with industry's record, labor's role in the defense effort to date ~~has been~~ is almost heroic. Yet ~~labor~~ labor's statesmen ~~responsible labor leaders would be~~ are among the first to grant that the enlarged role for which labor asks will entail a continuous display of responsibility and maturity. Labor must continuously ~~clearxxxxxxx~~ make clear its single allegiance to democracy and our own nation, no matter what military alliances the changing tides of war may bring. Under the leadership of Philip Murray and William Green it cannot be doubted that ~~this~~ such will be ~~the course of labor.~~ labor's course. Labor must realize the imperative ~~necessity~~ need for uninterrupted production; establishment of the War Labor Board and ~~its~~ labor's voluntary no-strike pledge indicate that this realization exists. Concretely, labor must understand that if it is to play a part in ~~production beyond its traditional defense production~~ defense production forming policies ~~for~~ and executing ~~defense production~~ them, it cannot ~~merely~~ rely on slogans and generalizations: it must be able to contribute ~~exact~~ concrete technical experience and proposals. The Reuther plan is convincing proof that labor is prepared to make such contributions.

new tools."

Taub testified that ~~whereas~~ in October that whereas the ten months previous, when the Reuther plan was first broached, ~~the~~ auto industry had insisted that only 15 per cent of its facilities were available for defense production, "today, with curtailment on the premises, it is freely admitted that 50 per cent can be used for defense, with a possibility in some areas of 70 per cent."

~~Taub's fantastic adventures w th OPM are themselves an indication of how receptive the~~

Taub himself has had some experience with OPM which are illuminating. After ten years with the engine division of Chevrolet, General Motors - had sent him to England to design engines for Vauxhall, Ltd., at the outbreak of the war GM's British subsidiary. He was loaned to the British Mechanization Board as a consultant on engines and carburetion. He built and designed the Churchill tank engine and was so successful in British defense production that Lord Beaverbrook sent him to the United States to help get the Napier Sabre Engine, Britain's best airplane motor, into production here. He was loaned to OPM, where Mr. Knudsen quickly decided to let Mr. Hillman have him as a technical consultant. Assigned by the OPM labor division to work with Odlum of at OPM's sub-contracting division, on conversion, Mr. Taub, aggressive and independent, found that Mr. Odlum would grant him neither authority nor a technical staff. cooperation. He remained with the Odlum division for less than a day after his program for conversion by production engineering, pooling and substitution had been rejected. ~~and a staff to push such a program, have been denied.~~ Before long Mr. Taub's as well as Walter Reuther's views were being throughout ~~quoted to~~ Mr. Knudsen in congressional hearings and by newsmen. "Taub" and "Reuther" became names ~~two words~~ which were certain to ruffle the otherwise gentle production giant. Asked by the Tolan committee to comment on Taub's estimate of convertible machinery, Mr. Knudsen's ~~only response was~~ growled; "Mr. Taub

used to be an employee of mine."

Meanwhile a tremendous row was brewing within the ranks of those entrusted with national defense. One day there was a promise of a huge "victory program" in which all-out conversion was to be a basic plank. Donald M. Nelson was its chief advocate and he was steadily gathering support among the more aggressive of the men around the President. But there was no budging Mr. Knudsen. He appeared to be winning out while the nation was losing the battle of production. But he was holding his own at OPM.

Then came Pearl Harbor.

The first shot to shatter the complanency of Mr. Knudsen and his supporters came from the Tolan committee, with not a radical or liberal on it. On December 19th it delivered a special report on utilization of America's industrial capacity. Its main fire was concentrated on the automobile industry:

"The facilities of our greatest industries and especially of the automobile industry, because of its premier position as a warx producer a mass-prodicer, must be fully converted to to military

What was the automobile industry doing during the year when labor was pounding away with its Reuther plan? The In October, 1940, A conference of the leading car manufacturers met in a New York hotel and resolved "to subordinate work on automotive model changes to the necessities of the defense program, and specifically to aviation procurement." Sixteen months later, the manufacturers, through the Automobile Manufacturers Association, issued another pledge of production for defense. Between the issuance of these high-flown promises the industry produced and sold more than 7,000,000 pleasure cars and

trucks, ~~for commercial purposes~~. Civilian car production in the calendar year 1941 was the highest of any year save one. Automotive ~~industry profits for~~ the first nine months of 1941 rose to $430,604,778, ~~General Motors~~ C.E. Wilson, president of General Motors, has ~~reluctantly admitted that the~~ corporation's dollar volume of non-defense production in 1941 was "just under $2,000,000,000," which, Mr Wilson added, was "an all-time record." During the same period the corporation produced some $330,000,000 worth of defense articles - much of it army trucks which required no essential conversion. Mr. Wilson conceded, ~~at the same press conference~~, that with re-tooling and conversion the corporation could, within ten months, be producing defense materials at the rate of $2,000,000,000 a year. He assured the reporters that defense materials would be rolling out of General Motors plants at that rate by the end of 1942, ~~- which will be sold comfort indeed to the families of our soldiers who will die from a war prolonged needlessly by at least a year. The irony of the picture did not escape Mr. Wilson's interrogators.~~

"We were sort of doing the automobile business with our left hand (in 1941)," and going ahead with anything we could get to do," said the president of General Motors.

"You mean you were doing your greatest business with your left hand?"

"Yes sir."

"That is a pretty good hand to keep in operation, isn't it?"

One can ~~only~~ hope that the automobile industry had seen fit to apply its left hand to war production in 1941, but the facts are conclusive that both hands were extremely busy reaping the benefits of a boom year. ~~Only occasionally did the industry take time out, while waiting for new plants, to give some aid and comfort to the defense prpgram. Some of the aid was in the form of mimeographed handOouts containing large promises, One, by the AMA, promised there would be no~~

turned out to mean

announced that the annual ~~New York~~ national auto show, the coming out party for '42 models, had been cancelled. This ~~meant~~ merely that the new models were to make a cautious appearance.

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annual automobile show in New York city, in 1941. There were no fewer 1942 models, however, and instead of making their bow at a showy New York exhibit which would have been certain to arouse unfriendly attention, the new models made their appearances at automobile shows put on by dealers throughout the country; and There was something to show. Model changes and a profusion of "bright work" such as the nation had never seen, a costly time and materials; time that tool and die makers have spent on "making ready" for defense production, and materials for which the nation gives it eye teeth. Betraying some guilt, the industry announced that there would be no 1943 models. The '42 models, said Mr. Sloan, would be frozen and manufactured through 1943.

The dreams of Messrs. Knudsen, Wilson, Sloan, W. T. Keller, et al, of business only slightly different from usual were rudely disturbed in the spring of 1941, by suggestions that it might not be possible to superimpose on a boom business year an adequate defense program. Talk of forced curtailment began to be heard. The industry promptly suggested "voluntary" curtailment.

By agreement with Mr. Knudsen the industry announced that it would reduce production of '42 models down to 4,224,152 vehicles. This "curtailment," as the Auto industry planned it, would permit the manufacture of more cars and commercial trucks than was turned out in the the '40 model year. This "curtailed" schedule of the industry's "curtailment" which permitted the industry to planned to further its output of '42 models make more cars than in the previous year was arrived at by "estimating" that the industry would probably sell 5,289,974 '41 models. This on the industry an "estimated" 20 per cent cut from the "estimated" probable '41 output. as the industry planned the cut would certainly have been only if things had gone found.

It was not until the War Deprtment and Leon Henderson

1,094,354 vehicles were produced.

will completely change as to what we can do with present machines rather than buying new tools."

Taub testified that in October whereas the auto industry had insisted ten months previous, when the Reuther plan was first broached, that only 15 per cent of its facilities were available for defense production, "today, with curtailment on the premises, it is freely admitted that 50 per cent can be used for defense, with a possibility in some areas of 70 per cent."

Taub himself has had some illuminating experience with OPM. After ten years with the engine division of Chevrolet, General Motors had sent him to England at the outbreak of the war to design engines for Vauxhall, Ltd., GM's British subsidiary. He was loaned to the British Mechanization Board as a consultant on engines and carburetion. He built and designed the Churchill tank engine and was so helpful to British defense production that Lord Beaverbrook sent him to the United States to help get the Napier Sabre Engine, Britain's best airplane motor, into production. He was loaned to OPM, where Mr. Knudsen quickly decided to let Mr. Hillman have him as a technical consultant. Assigned by the OPM labor division to work on conversion with Odlum of at ? OPM's sub-contracting division, Mr. Taub, aggressive and independent, found that Mr. Odlum would grant him neither authority nor a technical staff. He remained with the Odlum division for less than a day. Before long Mr. Taub's as well as Walter Reuther's views were being thrown at Mr. Knudsen in congressional hearings and by newsmen. "Taub" and "Reuther" became names which were certain to ruffle the otherwise gentle production giant. Asked by the Tolan committee to comment on Mr. Taub's estimate of convertible machinery, Mr. Knudsen growled: "Mr. Taub used to be

an employee of mine."

Meanwhile a tremendous row was brewing within the ranks of those entrusted with responsibility for national defense. There came promises of a huge "victory program" in which all-out conversion was to be a basic plank. Donald M. Nelson was its chief advocate and he was steadily gathering support among the more aggressive of the men around the President. But there was no budging Mr. Knudsen. The nation was losing the battle of production but he was holding his own at OPM.

What was the automobile industry doing while labor was pounding away for its Reuther plan? A conference of the leading car manufacturers met in October 1940 and resolved "to subordinate work on automotive model changes to the necessities of the defense program, specifically to aviation procurement." Sixteen months later, the manufacturers, through the Automobile Manufacturers Association, made another public pledge of production for defense. Between the issuance of these promissory press releases, the industry produced and sold more than 4,300,000 pleasure cars and commercial trucks, all '41 models. Civilian car production in the calendar year 1941 was the highest of any year save one. Profits of three large automotive companies for the first nine months of 1941 rose to $430,604,778, a tidy increase over their profit of $408,212,589 in all of 1940.

C. E. Wilson, president of General Motors, has estimated that his corporation's dollar volume of non-defense production in 1941 was "just under $2,000,000,000," which, Mr. Wilson adds, was "an all-time record." During the same period the corporation produced some $330,000,000 worth of defense articles - much of it army trucks which required no essential conversion. Mr. Wilson conceded that with re-tooling and conversion the corporation

could, within ten months, be producing defense materials at the rate of $2,000,000,000 a year. He assured reporters at a Washington interview that defense materials would be rolling out of General Motors plants at that rate by the end of 1942.

"We were sort of doing the automobile business with our left hand (in 1941) and going ahead with anything we could get to do," said the president of General Motors.

"You mean you were doing your greatest business with your left hand?"

"Yes sir."

"That is a pretty good hand to keep in operation, isn't it?"

One can hope that the automobile industry had seen fit to apply its left hand to war production in 1941, but the facts are conclusive that both hands were extremely busy reaping the benefits of a boom year in urban cars. If the plants were not busy with defense, the corporations' sales experts and press agents were exceedingly active. One handout offered by the AMA in the spring of 1941 announced that the annual national auto show, the coming out party for '42 models, had been cancelled. This turned out to mean merely that the new models were to make a cautious appearance.

Instead of making their debut at a showy New York exhibit which would have been certain to arouse unfriendly attention, the new models were placed on view at "open house" shows put on by dealers throughout the country; and here was something to show. There were the usual model changes and a profusion of "bright work" such as the nation had never seen. Their production had consumed time that tool and die makers might have spent "making ready" for defense production, and materials for whose lack the nation has paid dear and will yet pay more.

The industry also announced, as a contribution to national defense, that there would be no '43 models. The '42 models, said Mr. Sloan, hopefully, would be frozen and manufactured through 1943.

The industry's dream of business only slightly different than usual began to be disturbed by suggestions that it might not be possible to superimpose an adequate defense program on a boom business year. Talk of enforced curtailment began to be heard. The industry promptly suggested voluntary "curtailment." By agreement with Mr. Knudsen it announced that it would reduce production of '42 models to 4,224,152 vehicles. "Curtailment", as the auto industry planned it, would permit the manufacture of more cars and commerical trucks than was turned out in the '40 model year when 4,094,354 vehicles were produced. This "curtailed" schedule was arrived at by "estimating" that the

industry would "probably" sell 5,289,974 of '41 models. This imposed on the industry an "estimated" 20 per cent cut on its "estimal" probable '41 output. It was not until the War Department and Leon Henderson intervened that "curtailment" began to mean what it says. The Office of Price Administration and Civilian Supply was compelled to announce on August, , September, October, and November, and a 50 per cent cut for the entire '42 model year: there followed a decree directing a 48 per cent for December.

These enforced curtailment orders, as Mr. Touf noted, began to improve the outlook for defense production. Business week observed that it would soon be more profitable for the industry to engage in defense production. Nevertheless, there was no indication that the industry would agree to wholesale conversion; of pooling there was no mention; for the idea of giving labor's ideas a bearing, there was nothing but resentment.

Then came Pearl Harbor.

500 PLANES A DAY

A Program for the Utilization of the Automobile Industry for Mass Production of Defense Planes

By WALTER P. REUTHER

FOREWORD by PHILIP MURRAY

INTRODUCTION by GEORGE SOULE

American Council On Public Affairs
WASHINGTON, D. C.

FOREWORD

The Congress of Industrial Organizations has given to the Government a proposal for mass production of defense aircraft. The immediate affect has been an encouraging lift for national defense—through widespread publication and discussion. Valuable as this is, we are convinced that the program merits more than verbal praise and piece-meal application.

The CIO's proposal was drafted at my request and the request of R. J. Thomas, president of the United Automobile Workers of America, affiliated with the CIO. It is the result of the experience of a group of skilled automobile workers, headed by Walter P. Reuther, who studied this problem for months and arrived at the conclusions contained in the report. Their findings bear the imprint of the unanimous approval of the Executive Board of the CIO.

Our program was born out of the CIO'S desire to make its utmost possible contribution to national defense. The specific program for mass production of defense aircraft indicates the great extent to which organized labor's knowledge and abilities may be utilized in our present national emergency. The program implements a general program already outlined by the CIO for a larger recognition of labor's responsibilities and prerogatives in this emergency.

The efforts of our country to preserve and perfect our democratic institutions finds no greater response than in the ranks of American labor. Our aircraft production program is concrete evidence of that fact; and it also bespeaks the logic of our desire for a greater recognition of organized labor's role in national defense.

PHILIP MURRAY, *President*
Congress of Industrial Organizations

AUTHOR'S NOTE

This program is an outgrowth of the American automobile workers' conviction that the future of democracy and all that our people hold dear are dependent upon the speedy and successful prosecution of our national defense.

I have discussed the general outlines of the program with Assistant Secretary of War Robert Patterson; Philip Murray, President of the Congress of Industrial Organizations; Sidney Hillman, member of the National Defense Advisory Commission; and R. J. Thomas, President of the UAW-CIO.

Upon being urged by these leaders of government and labor to complete the survey, I consulted with a number of highly-skilled designing engineers, tool and die makers, jig and fixture men, and pattern and model makers, employed for years by General Motors, Chrysler, Packard, Hudson, Briggs, Murray Body and other automobile companies. Individually and jointly, we made first-hand studies of aircraft motor parts and wing and fuselage assemblies. All of these men are members of the UAW-CIO and are recognized by managements as well as by the union as master technicians. They have contributed to the formulation of this program which we now present as part of labor's contribution toward the solution of a grave national problem.

WALTER P. REUTHER

INTRODUCTION

By GEORGE SOULE*

Here is a plan to speed up warplane production to aid the defense of Britain and the United States. It asserts that within six months the automobile industry could be turning out 500 fighting planes a day, in addition to whatever the airplane industry itself may be able to do. Such a plan is certainly worth careful investigation.

The plan is sponsored by men who have an intimate technical knowledge of the automobile industry. It is proposed by Walter P. Reuther, an official of the United Automobile Workers of America, after consultation with designing engineers and highly skilled specialists employed in numerous auto plants. Any proposal by such a body of men deserves a hearing. Again and again it has been demonstrated in American industry that suggestions arising from those who do the work, and through long personal experience understand industrial problems, are immensely valuable.

The plan points out indubitable facts that few Americans know. The automobile industry is operating at only about 50 percent of capacity, largely because of seasonal production. If its output were spread evenly throughout the year, half its plant and manpower could be used for something else. Could this something else be warplanes? Here is where serious disagreement arises. Some connected with the plane industry say it could not, because plane engines and bodies are more complicated and require more exact and refined processes. This report answers the objection by detailed facts and figures. Machinery, plant and manpower, it asserts, are available to do the necessary jobs. To the layman, it offers convincing evidence that if we want mass production of warplanes, the automobile industry can give it to us.

The layman, of course, is not qualified to decide the technical questions at issue. But all of us, as American citizens, have a right and duty to insist that the questions be carefully investigated and decided by those competent to judge, without the influence of private interest or prejudice. We cannot be satisfied with a negative response on the part of the aircraft industry itself, which has an obvious interest in avoiding competition. Nor can we be satisfied with the judgment of army experts who through experience only with special production of frequently changed models do not understand the quality potentialities of mass production. Nor, finally, can we be satisfied with a reluctance of certain automobile employers to sacrifice competitive advantage by planning production for the whole industry as a unit.

It would seem that little could be lost even if the plan were unsuccessful. At present half our productive capacity in automobiles is going to waste. Let us not permit this plan to be shoved aside by the inertia of vested interests.

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* Editor, *New Republic*; Chairman, National Economic and Social Planning Association; Director-at-Large, National Bureau of Economic Research.

500 PLANES A DAY

A Program for the Utilization of the Automobile Industry for Mass Production of Defense Planes

By WALTER P. REUTHER*

England's battles, it used to be said, were won on the playing fields of Eton. This plan is put forward in the belief that America's can be won on the assembly lines of Detroit.

In an age of mechanized warfare, victory has become a production problem. The automotive workers for whom I speak think our industrial system a productive giant capable of any task, provided it is not forced into battle with one hand tied behind its back. They also believe that we need send no men to a future conflict with the Axis powers if we can supply enough machines now to our first line of defense in Britain. The machines we and the British need most are planes, and the survival of democracy depends on our ability to turn them out quickly.

The workers in the automotive industry believe that the way to produce planes quickly is to manufacture them in automobile plants. The automotive industry today is operating at only half its potential capacity. This plan proposes that the unused potential of the industry in machines and men be utilized in the mass production of aircraft engines and planes. It is our considered opinion that it would be possible, after six months of preparation, to turn out 500 of the most modern fighting planes a day, if the idle machines and the idle men of the automotive industry were fully mobilized and private interests temporarily subordinated to the needs of this emergency.

Time, every moment of it precious, its tragic periods ticked off by bombs falling upon London and the Midlands, will not permit us to wait until new mass production factories for aircraft and aircraft engines finally swing into action late in 1942. Emergency requires short-cut solutions. This plan is Labor's answer to a crisis.

Mr. William F. Knudsen says that airplane production is 30 percent behind schedule. It will continue to be behind schedule so long as we continue to rely on the expansion of existing aircraft plants, and on the construction of new plants. Expansion of existing aircraft plants means the expansion of plants utilizing the slow and costly methods of an industry geared to hand-tooled, custom-made production.

New plants cannot be built and put into operation in less than 18 months. In 18 months Britain's battle, for all her people's bravery, may be lost, and our own country left to face a totalitarian Europe alone.

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* Director, General Motors Department, United Automobile Workers of America, CIO; member, Committee on Training in Industry, National Defense Advisory Commission.

Packard and other companies are still digging the ditches and pouring the concrete for their new airplane engine factories. The Axis powers will not wait politely until these factories are finished.

New plants, when finally erected, must be filled with new machinery and this new equipment largely duplicates machinery already available in our automobile plants. The machine industry is overtaxed. The emergency of war cannot be met in the normal time necessary to construct new plants and equip them with the required production machinery.

We propose, instead of building entirely new machines, to make the tools required to adapt existing automotive machinery to aircraft manufacture.

We propose to transform the entire unused capacity of the automotive industry into one huge plane production unit. Production under this plan would not replace the output of the aircraft industry proper, which would continue to construct the large bombers and planes of special design.

Fifty Percent of Automobile Industry's Potential Capacity Is Unused

No industry in the world has the tremendous unused potential productive capacity of the American automotive industry, and no industry is as easily adaptable to the mass production of planes. A careful survey will show that the automobile industry as a whole is not using more than 50 percent of its maximum potential capacity if that capacity were properly coordinated and operated to the fullest degree.

The automotive industry could produce 8,000,000 cars a year. It is producing approximately 4,000,000. These unused plant reserves, as shown by the figures given in the Federal Trade Commission's report on the motor vehicle industry, are greater than the total motor plant capacity of England, Germany, France, Italy, Russia and Japan combined. Adapted to plane production, this unused potential capacity would give us world plane supremacy within a short time.

At present the automotive industry never operates at more than 80 to 90 percent of its maximum potential capacity, and then only for a few months each year. The rest of the year it operates on reduced schedules, and many plants shut down completely. If automobile production were spread evenly over a 12-month period, it would be possible, without reducing the total output of automobiles, to convert a large portion of this machinery to the manufacture of planes.

During the automotive year ending August, 1940, Nash used only 17 percent of its productive capacity; Dodge used 36½ percent. Nash, working at maximum capacity, could have manufactured its total output for the 12 months in 49½ working days; Dodge, in 111 working days. Chevrolet, the largest single producer of motor cars, turned out over a million cars during the last model year, and yet used less than 50 percent of its potential productive capacity. The main Chevrolet Motor plant at Flint, Michigan, produced 380 completed motors per hour at the peak of the 1937 production season, utilizing all four of its complete motor machining and assembly lines. At the present time, at the peak of the 1940 production season, the Chevrolet

Flint plant is producing 282 motors per hour, with one motor line standing completely idle, while the three remaining lines are operating on a two-shift basis. Since 1937, Chevrolet has built a new motor plant in Tonawanda, New York, which at the present time is producing 65 complete motors per hour, with a plant capacity of 90 motors per hour. This would indicate that at the peak of the production season Chevrolet is only building 347 motors per hour, with an actual capacity of 470 motors per hour. With an unused capacity of 123 motors per hour at the peak of the production season, it is obvious that Chevrolet has an unused reserve which becomes tremendous during the month of reduced operating schedules.

The availability of automotive production facilities for plane production in Chevrolet is again shown in the case of the Chevrolet drop forge plant in Detroit, the largest drop forge shop of its kind in the world. If this shop were operated at full capacity, it could produce all the drop forgings required for the production of 500 airplane motors per day, and still supply the Chevrolet company with sufficient drop forgings for 1,000,000 Chevrolet cars a year. Skilled labor to operate this shop at full capacity is available. Other forge shops, including the Buick and the Dodge forge shops, are also working at far less than capacity. (See appendix for shop equipment and production schedules.)

Automobile Motor Building Facilities Can Be Adapted to Make Plane Motors

Are the facilities used in manufacturing automobile motors adaptable to the manufacture of airplane motors? The answer is that they are.

Both the automobile and airplane motors are combustion engines, essentially the same mechanism for generating power by exploding gas. Both motors contain cylinders, carburetors, pistons, crankshafts, camshafts, valves, spark-plugs, ignition systems, etc.

The same basic machinery is utilized in the manufacture of these basic parts common to both motors. True, there are differences between the automobile and the airplane engine, as there are differences of a lesser degree between the engine of the Chevrolet and the engine of the Cadillac. These differences between different engines are produced by adding certain tools, dies, jigs or fixtures to the basic machine in order to make a difference in the product. The same "tooling" process adapts the same basic machinery to the production of the airplane engine. Graphic proof of this statement is even now being supplied by General Motors. Many of the most difficult and precise parts of the Allison aviation engine are being manufactured in the Cadillac plant in Detroit, much of it with retooled Cadillac machinery. The new Allison plant in Indianapolis, still in process of expansion, is being used largely for assembly.

The experience of General Motors in making Allison parts with retooled Cadillac machinery should also dispose of the bugaboo of "tolerances." "Tolerances" are the allowable fractional variations in size of engine parts, and they must be far finer in the plane engine than in the automobile engine. But these more precise dimensions can be obtained by more precise tooling.

When the contemplated airplane motor plants are completed, it will be necessary to equip them with the same kind of basic production machinery already standing idle half of the time in the nation's automotive factories. This basic machinery will be duplicated, and after it is duplicated it will still be necessary to construct the special tools, dies, jigs, and fixtures required to adapt this machinery to the manufacture of plane engines.

In the process of duplicating basic machinery, lies the most serious delay. This lag, which from all indications may continue, may well defeat our national defense program. An additional burden is placed on the already over-loaded machine tool industry. We propose to short-cut the process by building only the tools, dies, jigs, and fixtures necessary to convert idle automotive machinery into plane engine machinery. A few special machines will be necessary, but these will be but a small part of the total equipment. In this way a job that will otherwise take at least 18 months can be done in six months.

Certain basic machines are necessary to build both automobile and aircraft types of engines. These include gear cutters, gear shapers, screw machines, bullards, drill presses, punch presses, broaching machines, turret lathes, various types of milling machines, various types of lathes and Fay machines, lapping machines, various types of grinding machines, die casting machines, forge presses, header machines, foundry equipment, welding and riveting equipment.

Automobile Industry Adaptable for Stamping of Wings and Fuselage

The plane has three main parts: engine, wings and fuselage. Just as there is unused capacity for the production of motors, so there is unused capacity for the production of the wings and fuselage. The large body plants and the parts plants have metal stamping equipment now used for stamping out parts for the body of the automobile which can be adapted to stamping out the parts which make up the wings and fuselage of the plane. Proof of this is provided by the tentative plans being made by the automotive industry at the suggestion of Mr. Knudsen to manufacture parts of the wings and fuselages for large bombers.

A survey of the large body plants will show that their equipment for pressing and stamping metal parts are also not being used to full capacity. Murray Body, Briggs and the Fisher Body plants show a 50 percent overall unused capacity in their pressrooms. Striking is the example of the Fisher Body plant in Cleveland, which contains one of the largest pressrooms in the industry. At present it is operating at but 40 percent of capacity, although automobile body production is now at its peak. In 1936-37 this plant made all the stampings for Chevrolet bodies, employing 9200 employes. Today it employs but 3500, for Fisher has built a new plant at Grand Rapids, Michigan, further adding to body capacity. (See appendix for equipment in the Cleveland Fisher plant.)

Technical problems are involved, of course, in constructing new dies to stamp the lighter aluminum alloys used in plane production. That these problems are not insuperable is shown by the fact that Murray and Briggs are already stamping wing parts for Douglas bombers.

Skilled and Production Labor Available in the Automobile Industry

Skilled labor is necessary to turn out the tools and dies required to adapt these various types of automotive machinery to plane production. The auto industry has the largest reservoir of skilled labor in the world. More than 25,000 tool and die workers, jig and fixture men, pattern makers, draftsmen and designers, and allied craftsmen are employed in the auto industry at the peak of its tooling program.

Tooling is even more seasonal than production. Each year thousands of the industry's most skilled craftsmen work at top speed for a few months to complete the necessary tooling work to adapt the old machinery to the new models. When the tooling program is completed, only a skeleton crew of these skilled craftsmen are retained for maintenance and duplicate tooling. Three or four thousand skilled craftsmen are shifted to ordinary production jobs while more than 10,000 are laid off entirely until their labor is needed for the next tooling season. During the past five years more than half of the tool and die makers in the industry, or more than 10,000, averaged less than six months work per year. At the present time there are approximately 3,000 tool and die makers unemployed in the auto industry; some 2,500 have been transferred to ordinary machine-tending production jobs. Many of the remainder are on a short work week.

In addition to the men who are unemployed, those working on production and those employed only part time, there are at least 2,000 tool and die men who have permanently gone into production jobs because of the short work year in the tool and die industry. These mechanics could be combed out of production departments and made available again for tool and die work.

Thus in manpower, as in machines, we have unused capacity; the highly specialized and valuable skills of 7,500 tool and die workers are available to do the necessary tooling for the plane production program here outlined.

Fisher Body Corporation, a division of General Motors, is now working on wood models for a new body design. Chrysler also is working on new models, for which some die work is likewise under way. If the automobile industry goes ahead with plans for new models, it will absorb unemployed tool and die workers. However, if the introduction of new models in the auto industry could be delayed for six months, from 12,000 to 15,000 skilled mechanics could be made available to build the necessary tools, dies, jigs and fixtures for the production of an all metal pursuit ship on a mass production basis.

The tool and die shops of the automotive industry, like the tool and die workers themselves, are partially idle. The 90 tool and die jobbing shops in the Detroit area affiliated with the Automotive Tool and Die Manufacturers Association employ 7,000 tool and die workers when operated at full capacity. In addition to these shops in the Association, there are some 75 additional tool and die shops which employ 1,500 tool and die workers at capacity production. And, in addition to these independent enterprises, there are large tool and die departments within the auto, body and parts plants proper. These are known as "captive" tool and die shops. These great "captive" tool and die shops have

a capacity beyond the available manpower if all the skilled men in the entire industry were employed on a full-time basis.

A typical example of the tremendous unused capacity of these captive shops is that of Fisher Body No. 23 at Detroit. This is the largest tool and die shop in the world. It builds the sheet metal dies, welding bucks and fixtures, and special machinery for all Fisher Body plants in the General Motors Corporation. In 1931 Fisher Body Plant No. 23 employed 4,800 tool and die makers at the peak of the tooling program. In 1940 Fisher Body Plant No. 23 employed 1,400 tool and die makers at the peak of the tooling season. In December, 1940, this plant employed only 175 tool and die makers and even these few were on a reduced work week.

As important as the tool and die worker is the engineer who designs the tools and dies. Here, too, the same situation repeats itself. There are in the Detroit and metropolitan areas about 2,100 designing engineers. Their drawings would be needed for the new tools and dies required to adapt automotive machinery to plane production. Designing engineers, like tool and die workers, are largely unemployed between tooling seasons. Here, too, a six months delay in new automobile models would make available an ample supply of the necessary skilled men.

Just as there is no shortage of skilled labor in the automobile industry, so there is no shortage of unskilled labor. Despite the defense program, there is a minimum of 100,000 former automobile workers unemployed or on WPA, not to speak of the thousands of young people in automobile production areas who would welcome an opportunity to work in plane production.

The Program in Operation

We propose that the President of the United States appoint an aviation production board of nine members, three representing the government, three representing management and three representing labor. We propose that this board be given full authority to organize and supervise the mass production of airplanes in the automobile and automotive parts industry.

The first task of the board would be to organize a staff of production and tooling engineers and assign them to make a plant-by-plant survey of the industry to determine the capacity of each plant, and the extent to which it is being utilized. The next task of the board would be to break down a blueprint of the type of plane chosen for mass production into its constituent parts and allocate the various parts of the engine, wings and fuselage among the different automotive plants in accordance with their unused capacity and the kind of work to which that unused capacity is being adapted. Work is to be parcelled out with an eye to spreading it as widely as possible, for much quicker results will be obtained if each plant has to cope with but one or two probelms of design and tooling. As contrasted with the present method, which dumps half a hundred technical problems into the lap of one manufacturer who must build an entire engine or plane, this method has all the advantages of division of labor.

The production board should have power to allocate the tooling and designing necessary among the various tool and die shops in accordance with their capacity and their specialized qualifications.

Power to appoint inspectors for each plant in accordance with its part in the general plan should be given the production board and there should be close inspection of each part manufactured before its release.

We propose the establishment of a central motor assembly plant to which all complete parts shall be shipped after they pass inspection.

The automotive industry has unused floor space as it has unused men and machines. We suggest that the Hupmobile plant in Detroit (a plant which produced only 371 cars in 1939, and which at the present time is completely idle) be leased by the government for a central motor assembly plant. The plant is large enough for five assembly lines with a daily total production capacity of 500 complete aircraft engines a day. The plant could be operated on a three 7½ hour shift basis and the unused machinery now in the building could be placed in other plants in accordance with the general production plan.

Similar methods can be applied to the manufacture and assembly of the wings and fuselage, and here, too, there is ample unused floor space for new assembly lines. Six complete floors of a building one block long and a half block wide are available at Fisher Body Plant No. 21, Detroit, which formerly made bodies for Buick. (This work has now been transferred to Fisher Body Plant No. 1 at Flint, Michigan.) Several floors are also available at the Fisher Body Plant No. 23 in Detroit, and there is also floor space available at the Briggs Highland Park plant and at the old Ford Highland Park plant.

Outstanding example of idle floor space is the Murray Body Corporation in Detroit, the third largest body making corporation in America. Since its loss of the Ford body contract, Murray is not producing a *single* automobile body. There are 234,375 square feet of floor space in Building 107 in Murray Plant No. 1, 300,000 square feet available in Building No. 121 and 20,000 square feet available in Building No. 129. This available space will probably be needed for the contract Murray has obtained to stamp the metal parts and assemble the wing sections for Douglas bombers, but there is still 200,000 feet more of modern floor space in the Murray plant which is now being used for storage. This could be turned to the uses of this production program.

Similar is the situation at the Fisher Body plant in Cleveland. The third, fourth and fifth floors of this building are now being used for storage, and could easily be made available for assembly lines. This plant at one time made all metal stampings for Chevrolet bodies. Additional floor space is also available in the Cleveland area.

A final assembly plant would also be needed for the job of assembling the engine, wings and fuselage into the completed plane. For this purpose we suggest the construction of cheap flat hangars in the open space around the Wayne County airport. Completed engines, wings and fuselage would be

trucked from the sub-assembly plants to these hangars and the completed planes could be flown from the airport. Similar flat hangars could be erected for final assemblies at the Cleveland airport.

We suggest that the sub-assemblies and the final assemblies be placed under the control of men carefully selected upon the basis of skill and experience from the various assembly staffs in our motor car and body plants, and that these picked men be used as the core of the assembly staffs to be developed under this plan. Provisions for protecting the seniority of these men must be guaranteed.

The first few thousand planes produced will not meet 100 percent performance requirements, for in mass production of planes as in mass production of automobiles a few thousand jobs must always be run before the "bugs" (technical problems of machining and assembly) are worked out. This is not serious since the first few thousand planes will more than meet the requirements as training ships.

Management Responsibility and Labor Cooperation

The automotive industry workers believe that this plan is the only one which offers hope of quick production of planes. It seeks solution of our problem not in the costly and lengthy work of erecting entire new plants, but in the efficient organization of existing idle man-power, machines, skill and floor space.

By dividing the parts among many manufacturers, the greatest possible number of minds is brought to bear on the production problems involved.

Though we propose payment of a fair profit to each manufacturer in accordance with his share in the work, we can foresee the fears this plan may arouse on the part of some managements. They may prefer a method whereby the government finances entire new engines and aircraft plants. Aviation companies may look with misgiving on a production program that would inevitably cut the cost of planes by putting their production on a mass production basis. But we believe the average management executive would not put forward these selfish considerations at a time of crisis.

Labor offers its whole-hearted cooperation. All that Labor asks is intelligent planning, a voice in matters of policy and administration, recognition of its rights, and maintenance of its established standards.

The merit of our plan is that it saves time, and time is our problem. Normal methods can build all the planes we need—if we wait until 1942 and 1943 to get them. This plan is put forward in the belief that the need for planes is immediate, and terrifying. Precious moments pass away as we delay. We dare not invite the disaster that may come with further delay.

Appendix I

NUMBER OF CARS AND TRUCKS PRODUCED IN U. S. AND CANADA

NAME OF COMPANY	SEPT. '36 THRU AUG. '37	SEPT. '39 THRU AUG. '40
Chevrolet	1,149,662	1,044,100
Pontiac	235,065	224,475
Oldsmobile	199,569	196,732
Buick	220,214	291,021
Cadillac-LaSalle	45,668	38,032
General Motors Truck	56,410	52,275
Plymouth	552,610	412,545
Dodge	378,510	304,455
DeSoto	81,390	69,660
Chrysler	103,210	83,680
Ford-Mercury	1,279,003	913,900
Lincoln	32,803	22,681
Graham	21,067	2,547
Hudson-Terraplane	125,207	97,632
Hupmobile	300	371
Nash-Lafayette	86,695	57,216
Packard	121,301	90,674
Studebaker	104,931	114,682
White-Indiana	14,035	12,727
Willys	65,302	32,930
* Grand Total	5,068,803	4,228,706
Total General Motors	1,906,588	1,846,815
Total Chrysler	1,115,720	869,980
Total Ford	1,311,716	936,581
Total "Big 3"	4,334,204	3,653,376

* Grand total also includes production of Diamond T Truck, Federal Truck, Int'l Harvester, Mack Truck, Reo Truck, Stutz and miscellaneous not listed separately.
Source: Ward's Automotive Reports.
Note: Canadian production represents approximately 4% of the total production.

Appendix II

PRODUCTION POSSIBILITIES OF MAJOR PLANTS

Name of Plant	Percentage of Production Capacity From Sept. '39 thru Aug. '40	Possible Increased Output Over Year Ending August, 1940	Total Output at Peak Capacity on Basis of Two 8-Hour Shifts per Day 50 Weeks in Year	Work Days Needed to Build 12 Months Total Production on Basis of Two 8-Hour Shifts per Day at Peak Production	12 Months Total Production From Sept. '39, thru Aug. '40	Highest Past Production of Completed Motors Per Hour	Present Production of Completed Motors per Hour
Cadillac	22	134,768	172,800	66	38,032	36	36
Dodge	36½	530,745	835,200	108	304,455	174	174
Studebaker	31	221,318	336,000	103	114,682	70	70
Plymouth	43	552,255	964,800	128	412,545	201	172
Chrysler and DeSoto	24	494,660	648,000	75	153,340	135	87
Oldsmobile	54½	163,268	360,000	167	196,732	75	73
Willys-Overland	17	207,070	240,000	41	32,930	50	50
Hudson	40	118,368	216,000	135½	97,632	45	32
Pontiac	51	217,125	441,600	147	224,475	92	78
Nash	17	288,384	345,600	49½	57,216	72	63
Chevrolet	49	1,091,900	2,136,000	147	1,044,100	445	347
Buick	42	430,479	721,500*	121	291,021	185	179

* Note: On basis of 13-hour day.

Appendix III

FACILITIES AVAILABLE FOR PLANE PRODUCTION IN THE CHEVROLET FORGE PLANT, DETROIT

The following equipment in the Chevrolet Drop Forge plant at the present time—the peak of the plant production program—is operating at approximately 60% of capacity used.

Number of Machines	Size of Machines	Types of Machines
19	1,500 lbs.	Steam Hammer
29	2,500 lbs.	Steam Hammer
12	3,500 lbs.	Steam Hammer
9	5,000 lbs.	Steam Hammer
6	12,000 lbs.	Steam Hammer
15	1,000 lbs.	Board Hammers
11	2,000 lbs.	Board Hammers
5	3,000 lbs.	Board Hammers
1	250 ton	Forge Press (Hydraulic)
1	950 ton	Forge Press (Hydraulic)
2	1,000 ton	Forge Press (Hydraulic)
3	1,600 ton	Forge Press (Hydraulic)
11	1,500 lbs.	Board Hammers

In addition to the hammers and presses listed, numerous large and small upsetting (header) presses are available. If the above equipment were used at full capacity, this plant alone could produce all the necessary drop forgings required for the production of 500 airplane engines per day, and still supply the Chevrolet Motor Car Company with sufficient forgings for 1,000,000 Chevrolet cars in the coming year. Skilled hammermen are available to operate these forge hammers at full capacity.

In addition to the Chevrolet Forge plant, there are many other forge plants, such as the Buick Forge plant, Dodge Truck and Forge, etc., which have considerable unused capacity.

Appendix IV

FACILITIES AVAILABLE IN AUTOMOBILE INDUSTRY FOR STAMPING METAL SECTIONS FOR WINGS AND FUSELAGE

The following stamping presses in the Cleveland Fisher Body Plant are at the present time—the peak of the body production season—operating at less than 50 percent of capacity.

Number of Machines	Type of Machines
74	Double Crank Presses
19	Toggle Presses
26	No. 78 Single Crank Presses

Numerous small blanking and stamping presses

To appreciate the full significance of the above list of equipment, one must realize the tremendous size of these presses, their cost, and the time it would require a new plant to get delivery of such presses. A big Toggle press, for

example, stands 40 feet from the base to the top of the press and is large enough to hold and operate a draw or flange die which itself weights from 70 to 80 tons. Such presses cost from $150,000 to $175,000 and it would require years to get delivery of the number and type of such press equipment that is now standing idle more than 50 percent of the time at the Cleveland Fisher plant.

Present employment in the Fisher Cleveland press room reflects the extent to which the presses are now idle. There are 600 men on the day shift, 300 on the afternoon shift, and 67 on the midnight shift.

In addition to Cleveland Fisher Body, every major body plant in the automobile industry has unused press room capacity which can, with the necessary special dies, be adapted to plane production.

Appendix V

REPLY TO OBJECTIONS

Virtually all of the criticisms of the program have been anonymous—aircraft and automotive industry executives refusing, for some reason, to lend their names to their printed views. The criticisms do not in any case run against the feasibility of the program. By and large, they indicate either a sad lack of imagination or an insistence by automotive interests to continue with "business as usual." However, since some misconceptions of the program have gained credence it is advisable to discuss and dispose of these matters.

BOMBERS OR PURSUIT SHIPS

It has been wrongly assumed that the program contemplated the production only of pursuit ships. Our reference to the possible production of 500 fighting planes a day was used only to indicate the over-all productive capacity of an automobile industry whose idle machines and idle men were fully mobilized and whose private interests were temporarily subordinated. The productive capacity we have indicated can as readily be adapted to the production of medium-sized or heavy bombers. If these latter types are built rather than pursuit ships, the daily production would be scaled down in proportion to the increased amount of work required on each plane. Nevertheless, our program could build many more bombers, large or small, than are now being built or are contemplated, and in much shorter time.

MAN-HOURS REQUIRED

Some sources in the automobile industry assert our plan is impractical because of the relatively small percentage of machine hours in manufacturing an automobile as compared with the total man hours required to build a plane.

These sources contend that out of 18,000 man-hours necessary to build a pursuit ship, 10,000 are devoted to construction of air frames, work on which is usually done by hand. In attempting to prove their point, these sources simply multiply 10,000 man-hours by 500 planes a day which gives them a tremendous and impressive figure. It would be as logical to take the number of

hours required to custom-build a Chevrolet car by hand and then multiply this figure by Chevrolet's daily production and use that tremendous figure to prove that Chevrolet could not possibly produce 6,000 cars a day. Custom-building of an automobile, it has been estimated, requires 1,100 man hours of work. This means that it would have required 4,400,000,000 man hours to produce the 4,000,000 cars of the 1939 model. To carry the contention of our critics on this score to their logical conclusion: it would have required 2,200,000 men working 40 hours a week fifty weeks a year to produce last year's 4,000,000 automobiles.

The persons who argue thus speak of mass production quantities but use the mathematics of custom-built production methods. It is an elementary fact that the number of hours spent doing things by hand as compared to the number of hours spent operating machines (machine-hours) varies in ever increasing proportion to the extent that mass production techniques are introduced into the production process. The number of hours spent in building an automobile is less than one-sixth of what it was when the industry started, and as the over-all man hours decrease the machine hours increase in percentage as compared to the work done by hand. One can go into a modern continuous strip steel mill and see this in its sharpest form.

FLOOR SPACE REQUIRED

This mistake of thinking of mass production of planes in the mathematics of custom-built hand production also raises the question of the practicality of providing the neecssary floor space for assembly work. Another elementary fact is that the number of days necessary to complete the production cycle (in machining and fabricating industries such as autos and aircraft) is shortened in proportion to the extent that mass production technique is applied. The shorter the production cycle the less floor space is needed. This is true because the number of jobs in the process of production is held at a minimum. If the Chevrolet Motor Company had to build 6,000 cars a day by the same methods that are now being used to build planes, the total man power and floor space of the entire automobile industry would not be adequate to turn out its present production.

Our original report cited the availability of floor space—785,000 feet—at the Hupmobile plant, in Detroit, for the assembling of motors. A further striking example of available floor space is the Reo plant at Lansing, Michigan, which has the following vacant space: Mt. Hope Avenue plant, 553,237 square feet; Building No. 4800, 247,931 square feet; Building No. 4700, 104,247 square feet. In Reo's main plant 500,000 square feet is fully equipped with production machinery. Starting January 13, 1941, Reo will be producing five motors per day in a plant that at one time produced 160 truck and 125 passenger cars in one eight-hour shift.

DIFFERENCES IN ENGINES

Doubts have been expressed on the adaptability of automobile production machinery to production of aircraft motors because of the reduced weight of aircraft motors. These doubts are without foundation.

The reduced weight of an aircraft motor per horsepower as compared with automobile motors is secured firstly by the difference in the design of the motor and secondly by the fact that all parts of an aircraft motor are reduced to a minimum weight by removing all surplus metal. This is done by a process of machining. The same basic machinery is used to machine parts for an aircraft motor as for an automobile motor, excepting that a more complete and precise machining job is done in the case of the aircraft motor. The available machinery in the automobile industry can be retooled to turn out aircraft motors of 1,000 or 2,000 horsepower of either the air-cooled or liquid-cooled design.

The objection has also been raised that aircraft engines must be made in more precise dimensions than automobile engines. As our program points out, more precise parts are obtained by more precise tooling.

SHORTAGE OF ARMAMENTS

Any possible bottlenecks in armaments, instruments, etc., is not a legitimate criticism of our plan. Such bottlenecks can be met if production of such armament, instruments, etc., is spread over existing industries whose machine capacities and production facilities are adaptable to such production. The pooling of such productive capacity with central assembly plants using the same approach we suggest for aircraft production will make it possible to eliminate any possible bottlenecks in armaments, instruments, etc.

SIMILARITY OF BASIC MACHINERY

In our program we state that basic machinery used for automobile production can be adapted for producing aircraft parts. We point out that precise and difficult parts of the Allison engine are being made in the old Cadillac plant in Detroit with machinery which duplicates existing unused automobile plant machinery. These statements have been challenged in some quarters. Herewith is a list of machinery, newly constructed and installed in the Allison division in Detroit, which duplicates existing automobile plant machinery:

Grinding machines: Cincinnati centerless, Exlo internal and external, Bland, Norton, Landis, Blanchard, Brown and Sharpe, (Bryant) and Held. (These machines are used to produce the following parts which are common to both aircraft and automobile motors: camshafts, crankshafts, bearings, connecting rods, wrist pins.) Milling machines: Milwaukee, Cincinnati, Sunstrand and Brown and Sharpe. Keller machines: Wickes lathes, Greenlee lathes and Cincinnati lathes. Spline machines: Sunstrand, and Brown and Sharpe. Hones: Exlo and Wickes.

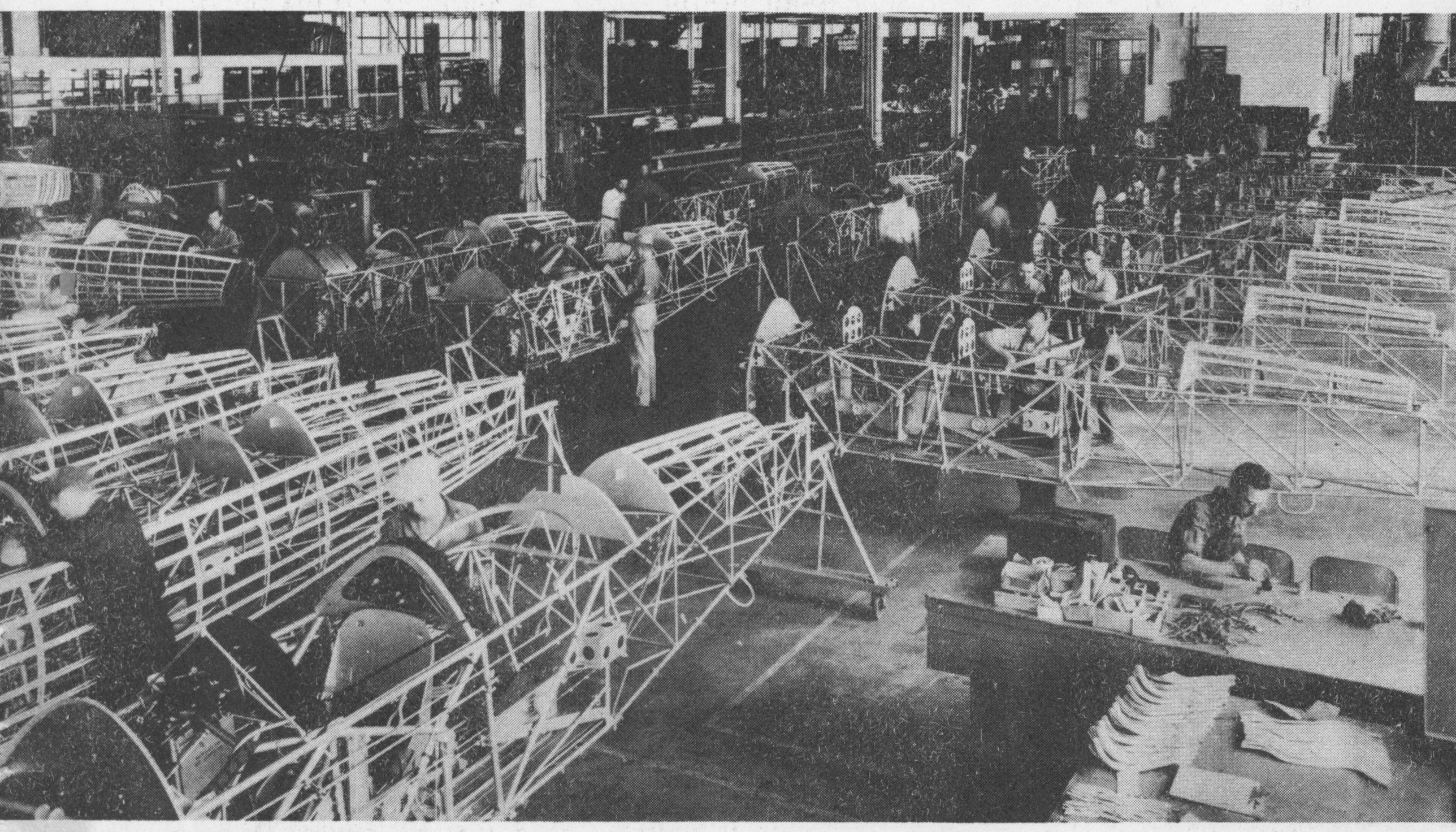
PRESENT USE OF FACILITIES

It is argued that the facilities of the automobile industry are already being employed for production of aircraft parts. Our surveys indicate that not ten percent of the available facilities are being brought into play for defense purposes. The present plans do not contemplate the coordination and full use of facilities which alone can produce a large number of planes within a comparatively short period.

500 PLANES A DAY

A Program for the Utilization of the Automobile Industry for Mass Production of Defense Planes

By WALTER P. REUTHER



FOREWORD By PHILIP MURRAY

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UAW-CIO
International Education Department
Detroit, Michigan

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Packard and other companies are still digging the ditches and pouring the concrete for their new airplane engine factories. The Axis powers will not wait politely until these factories are finished.

New plants, when finally erected, must be filled with new machinery and this new equipment largely duplicates machinery already available in our automobile plants. The machine industry is overtaxed. The emergency of war cannot be met in the normal time necessary to construct new plants and equip them with the required production machinery.

We propose, instead of building entirely new machines, to make the tools required to adapt existing automotive machinery to aircraft manufacture.

We propose to transform the entire unused capacity of the automotive industry into one huge plane production unit. Production under this plan would not replace the output of the aircraft industry proper, which would continue to construct the large bombers and planes of special design.

Fifty Percent of Automobile Industry's Potential Capacity Is Unused

No industry in the world has the tremendous unused potential productive capacity of the American automotive industry, and no industry is as easily adaptable to the mass production of planes. A careful survey will show that the automobile industry as a whole is not using more than 50 percent of its maximum potential capacity if that capacity were properly coordinated and operated to the fullest degree.

The automotive industry could produce 8,000,000 cars a year. It is producing approximately 4,000,000. These unused plant reserves, as shown by the figures given in the Federal Trade Commission's report on the motor vehicle industry, are greater than the total motor plant capacity of England, Germany, France, Italy, Russia and Japan combined. Adapted to plane production, this unused potential capacity would give us world plane supremacy within a short time.

At present the automotive industry never operates at more than 80 to 90 percent of its maximum potential capacity, and then only for a few months each year. The rest of the year it operates on reduced schedules, and many plants shut down completely. If automobile production were spread evenly over a 12-month period, it would be possible, without reducing the total output of automobiles, to convert a large portion of this machinery to the manufacture of planes.

During the automotive year ending August, 1940, Nash used only 17 percent of its productive capacity; Dodge used 36½ percent. Nash, working at maximum capacity, could have manufactured its total output for the 12 months in 49½ working days; Dodge, in 111 working days. Chevrolet, the largest single producer of motor cars, turned out over a million cars during the last model year, and yet used less than 50 percent of its potential productive capacity. The main Chevrolet Motor plant at Flint, Michigan, produced 380 completed motors per hour at the peak of the 1937 production season, utilizing all four of its complete motor machining and assembly lines. At the present time, at the peak of the 1940 production season, the Chevrolet

Flint plant is producing 282 motors per hour, with one motor line standing completely idle, while the three remaining lines are operating on a two-shift basis. Since 1937, Chevrolet has built a new motor plant in Tonawanda, New York, which at the present time is producing 65 complete motors per hour, with a plant capacity of 90 motors per hour. This would indicate that at the peak of the production season Chevrolet is only building 347 motors per hour, with an actual capacity of 470 motors per hour. With an unused capacity of 123 motors per hour at the peak of the production season, it is obvious that Chevrolet has an unused reserve which becomes tremendous during the month of reduced operating schedules.

The availability of automotive production facilities for plane production in Chevrolet is again shown in the case of the Chevrolet drop forge plant in Detroit, the largest drop forge shop of its kind in the world. If this shop were operated at full capacity, it could produce all the drop forgings required for the production of 500 airplane motors per day, and still supply the Chevrolet company with sufficient drop forgings for 1,000,000 Chevrolet cars a year. Skilled labor to operate this shop at full capacity is available. Other forge shops, including the Buick and the Dodge forge shops, are also working at far less than capacity. (See appendix for shop equipment and production schedules.)

Automobile Motor Building Facilities Can Be Adapted to Make Plane Motors

Are the facilities used in manufacturing automobile motors adaptable to the manufacture of airplane motors? The answer is that they are.

Both the automobile and airplane motors are combustion engines, essentially the same mechanism for generating power by exploding gas. Both motors contain cylinders, carburetors, pistons, crankshafts, camshafts, valves, spark-plugs, ignition systems, etc.

The same basic machinery is utilized in the manufacture of these basic parts common to both motors. True, there are differences between the automobile and the airplane engine, as there are differences of a lesser degree between the engine of the Chevrolet and the engine of the Cadillac. These differences between different engines are produced by adding certain tools, dies, jigs or fixtures to the basic machine in order to make a difference in the product. The same "tooling" process adapts the same basic machinery to the production of the airplane engine. Graphic proof of this statement is even now being supplied by General Motors. Many of the most difficult and precise parts of the Allison aviation engine are being manufactured in the Cadillac plant in Detroit, much of it with retooled Cadillac machinery. The new Allison plant in Indianapolis, still in process of expansion, is being used largely for assembly.

The experience of General Motors in making Allison parts with retooled Cadillac machinery should also dispose of the bugaboo of "tolerances." "Tolerances" are the allowable fractional variations in size of engine parts, and they must be far finer in the plane engine than in the automobile engine. But these more precise dimensions can be obtained by more precise tooling.

When the contemplated airplane motor plants are completed, it will be necessary to equip them with the same kind of basic production machinery already standing idle half of the time in the nation's automotive factories. This basic machinery will be duplicated, and after it is duplicated it will still be necessary to construct the special tools, dies, jigs, and fixtures required to adapt this machinery to the manufacture of plane engines.

In the process of duplicating basic machinery, lies the most serious delay. This lag, which from all indications may continue, may well defeat our national defense program. An additional burden is placed on the already over-loaded machine tool industry. We propose to short-cut the process by building only the tools, dies, jigs, and fixtures necessary to convert idle automotive machinery into plane engine machinery. A few special machines will be necessary, but these will be but a small part of the total equipment. In this way a job that will otherwise take at least 18 months can be done in six months.

Certain basic machines are necessary to build both automobile and aircraft types of engines. These include gear cutters, gear shapers, screw machines, bullards, drill presses, punch presses, broaching machines, turret lathes, various types of milling machines, various types of lathes and Fay machines, lapping machines, various types of grinding machines, die casting machines, forge presses, header machines, foundry equipment, welding and riveting equipment.

Automobile Industry Adaptable for Stamping of Wings and Fuselage

The plane has three main parts: engine, wings and fuselage. Just as there is unused capacity for the production of motors, so there is unused capacity for the production of the wings and fuselage. The large body plants and the parts plants have metal stamping equipment now used for stamping out parts for the body of the automobile which can be adapted to stamping out the parts which make up the wings and fuselage of the plane. Proof of this is provided by the tentative plans being made by the automotive industry at the suggestion of Mr. Knudsen to manufacture parts of the wings and fuselages for large bombers.

A survey of the large body plants will show that their equipment for pressing and stamping metal parts are also not being used to full capacity. Murray Body, Briggs and the Fisher Body plants show a 50 percent overall unused capacity in their pressrooms. Striking is the example of the Fisher Body plant in Cleveland, which contains one of the largest pressrooms in the industry. At present it is operating at but 40 percent of capacity, although automobile body production is now at its peak. In 1936-37 this plant made all the stampings for Chevrolet bodies, employing 9200 employes. Today it employs but 3500, for Fisher has built a new plant at Grand Rapids, Michigan, further adding to body capacity. (See appendix for equipment in the Cleveland Fisher plant.)

Technical problems are involved, of course, in constructing new dies to stamp the lighter aluminum alloys used in plane production. That these problems are not insuperable is shown by the fact that Murray and Briggs are already stamping wing parts for Douglas bombers.

Skilled and Production Labor Available in the Automobile Industry

Skilled labor is necessary to turn out the tools and dies required to adapt these various types of automotive machinery to plane production. The auto industry has the largest reservoir of skilled labor in the world. More than 25,000 tool and die workers, jig and fixture men, pattern makers, draftsmen and designers, and allied craftsmen are employed in the auto industry at the peak of its tooling program.

Tooling is even more seasonal than production. Each year thousands of the industry's most skilled craftsmen work at top speed for a few months to complete the necessary tooling work to adapt the old machinery to the new models. When the tooling program is completed, only a skeleton crew of these skilled craftsmen are retained for maintenance and duplicate tooling. Three or four thousand skilled craftsmen are shifted to ordinary production jobs while more than 10,000 are laid off entirely until their labor is needed for the next tooling season. During the past five years more than half of the tool and die makers in the industry, or more than 10,000, averaged less than six months work per year. At the present time there are approximately 3,000 tool and die makers unemployed in the auto industry; some 2,500 have been transferred to ordinary machine-tending production jobs. Many of the remainder are on a short work week.

In addition to the men who are unemployed, those working on production and those employed only part time, there are at least 2,000 tool and die men who have permanently gone into production jobs because of the short work year in the tool and die industry. These mechanics could be combed out of production departments and made available again for tool and die work.

Thus in manpower, as in machines, we have unused capacity; the highly specialized and valuable skills of 7,500 tool and die workers are available to do the necessary tooling for the plane production program here outlined.

Fisher Body Corporation, a division of General Motors, is now working on wood models for a new body design. Chrysler also is working on new models, for which some die work is likewise under way. If the automobile industry goes ahead with plans for new models, it will absorb unemployed tool and die workers. However, if the introduction of new models in the auto industry could be delayed for six months, from 12,000 to 15,000 skilled mechanics could be made available to build the necessary tools, dies, jigs and fixtures for the production of an all metal pursuit ship on a mass production basis.

The tool and die shops of the automotive industry, like the tool and die workers themselves, are partially idle. The 90 tool and die jobbing shops in the Detroit area affiliated with the Automotive Tool and Die Manufacturers Association employ 7,000 tool and die workers when operated at full capacity. In addition to these shops in the Association, there are some 75 additional tool and die shops which employ 1,500 tool and die workers at capacity production. And, in addition to these independent enterprises, there are large tool and die departments within the auto, body and parts plants proper. These are known as "captive" tool and die shops. These great "captive" tool and die shops have

a capacity beyond the available manpower if all the skilled men in the entire industry were employed on a full-time basis.

A typical example of the tremendous unused capacity of these captive shops is that of Fisher Body No. 23 at Detroit. This is the largest tool and die shop in the world. It builds the sheet metal dies, welding bucks and fixtures, and special machinery for all Fisher Body plants in the General Motors Corporation. In 1931 Fisher Body Plant No. 23 employed 4,800 tool and die makers at the peak of the tooling program. In 1940 Fisher Body Plant No. 23 employed 1,400 tool and die makers at the peak of the tooling season. In December, 1940, this plant employed only 175 tool and die makers and even these few were on a reduced work week.

As important as the tool and die worker is the engineer who designs the tools and dies. Here, too, the same situation repeats itself. There are in the Detroit and metropolitan areas about 2,100 designing engineers. Their drawings would be needed for the new tools and dies required to adapt automotive machinery to plane production. Designing engineers, like tool and die workers, are largely unemployed between tooling seasons. Here, too, a six months delay in new automobile models would make available an ample supply of the necessary skilled men.

Just as there is no shortage of skilled labor in the automobile industry, so there is no shortage of unskilled labor. Despite the defense program, there is a minimum of 100,000 former automobile workers unemployed or on WPA, not to speak of the thousands of young people in automobile production areas who would welcome an opportunity to work in plane production.

The Program in Operation

We propose that the President of the United States appoint an aviation production board of nine members, three representing the government, three representing management and three representing labor. We propose that this board be given full authority to organize and supervise the mass production of airplanes in the automobile and automotive parts industry.

The first task of the board would be to organize a staff of production and tooling engineers and assign them to make a plant-by-plant survey of the industry to determine the capacity of each plant, and the extent to which it is being utilized. The next task of the board would be to break down a blueprint of the type of plane chosen for mass production into its constituent parts and allocate the various parts of the engine, wings and fuselage among the different automotive plants in accordance with their unused capacity and the kind of work to which that unused capacity is being adapted. Work is to be parcelled out with an eye to spreading it as widely as possible, for much quicker results will be obtained if each plant has to cope with but one or two probelms of design and tooling. As contrasted with the present method, which dumps half a hundred technical problems into the lap of one manufacturer who must build an entire engine or plane, this method has all the advantages of division of labor.

The production board should have power to allocate the tooling and designing necessary among the various tool and die shops in accordance with their capacity and their specialized qualifications.

Power to appoint inspectors for each plant in accordance with its part in the general plan should be given the production board and there should be close inspection of each part manufactured before its release.

We propose the establishment of a central motor assembly plant to which all complete parts shall be shipped after they pass inspection.

The automotive industry has unused floor space as it has unused men and machines. We suggest that the Hupmobile plant in Detroit (a plant which produced only 371 cars in 1939, and which at the present time is completely idle) be leased by the government for a central motor assembly plant. The plant is large enough for five assembly lines with a daily total production capacity of 500 complete aircraft engines a day. The plant could be operated on a three 7½ hour shift basis and the unused machinery now in the building could be placed in other plants in accordance with the general production plan.

Similar methods can be applied to the manufacture and assembly of the wings and fuselage, and here, too, there is ample unused floor space for new assembly lines. Six complete floors of a building one block long and a half block wide are available at Fisher Body Plant No. 21, Detroit, which formerly made bodies for Buick. (This work has now been transferred to Fisher Body Plant No. 1 at Flint, Michigan.) Several floors are also available at the Fisher Body Plant No. 23 in Detroit, and there is also floor space available at the Briggs Highland Park plant and at the old Ford Highland Park plant.

Outstanding example of idle floor space is the Murray Body Corporation in Detroit, the third largest body making corporation in America. Since its loss of the Ford body contract, Murray is not producing a *single* automobile body. There are 234,375 square feet of floor space in Building 107 in Murray Plant No. 1, 300,000 square feet available in Building No. 121 and 20,000 square feet available in Building No. 129. This available space will probably be needed for the contract Murray has obtained to stamp the metal parts and assemble the wing sections for Douglas bombers, but there is still 200,000 feet more of modern floor space in the Murray plant which is now being used for storage. This could be turned to the uses of this production program.

Similar is the situation at the Fisher Body plant in Cleveland. The third, fourth and fifth floors of this building are now being used for storage, and could easily be made available for assembly lines. This plant at one time made all metal stampings for Chevrolet bodies. Additional floor space is also available in the Cleveland area.

A final assembly plant would also be needed for the job of assembling the engine, wings and fuselage into the completed plane. For this purpose we suggest the construction of cheap flat hangars in the open space around the Wayne County airport. Completed engines, wings and fuselage would be

trucked from the sub-assembly plants to these hangars and the completed planes could be flown from the airport. Similar flat hangars could be erected for final assemblies at the Cleveland airport.

We suggest that the sub-assemblies and the final assemblies be placed under the control of men carefully selected upon the basis of skill and experience from the various assembly staffs in our motor car and body plants, and that these picked men be used as the core of the assembly staffs to be developed under this plan. Provisions for protecting the seniority of these men must be guaranteed.

The first few thousand planes produced will not meet 100 percent performance requirements, for in mass production of planes as in mass production of automobiles a few thousand jobs must always be run before the "bugs" (technical problems of machining and assembly) are worked out. This is not serious since the first few thousand planes will more than meet the requirements as training ships.

Management Responsibility and Labor Cooperation

The automotive industry workers believe that this plan is the only one which offers hope of quick production of planes. It seeks solution of our problem not in the costly and lengthy work of erecting entire new plants, but in the efficient organization of existing idle man-power, machines, skill and floor space.

By dividing the parts among many manufacturers, the greatest possible number of minds is brought to bear on the production problems involved.

Though we propose payment of a fair profit to each manufacturer in accordance with his share in the work, we can foresee the fears this plan may arouse on the part of some managements. They may prefer a method whereby the government finances entire new engines and aircraft plants. Aviation companies may look with misgiving on a production program that would inevitably cut the cost of planes by putting their production on a mass production basis. But we believe the average management executive would not put forward these selfish considerations at a time of crisis.

Labor offers its whole-hearted cooperation. All that Labor asks is intelligent planning, a voice in matters of policy and administration, recognition of its rights, and maintenance of its established standards.

The merit of our plan is that it saves time, and time is our problem. Normal methods can build all the planes we need—if we wait until 1942 and 1943 to get them. This plan is put forward in the belief that the need for planes is immediate, and terrifying. Precious moments pass away as we delay. We dare not invite the disaster that may come with further delay.

Appendix I

NUMBER OF CARS AND TRUCKS PRODUCED IN U. S. AND CANADA

NAME OF COMPANY	SEPT. '36 THRU AUG. '37	SEPT. '39 THRU AUG. '40
Chevrolet	1,149,662	1,044,100
Pontiac	235,065	224,475
Oldsmobile	199,569	196,732
Buick	220,214	291,021
Cadillac-LaSalle	45,668	38,032
General Motors Truck	56,410	52,275
Plymouth	552,610	412,545
Dodge	378,510	304,455
DeSoto	81,390	69,660
Chrysler	103,210	83,680
Ford-Mercury	1,279,003	913,900
Lincoln	32,803	22,681
Graham	21,067	2,547
Hudson-Terraplane	125,207	97,632
Hupmobile	300	371
Nash-Lafayette	86,695	57,216
Packard	121,301	90,674
Studebaker	104,931	114,682
White-Indiana	14,035	12,727
Willys	65,302	32,930
* Grand Total	5,068,803	4,228,706
Total General Motors	1,906,588	1,846,815
Total Chrysler	1,115,720	869,980
Total Ford	1,311,716	936,581
Total "Big 3"	4,334,204	3,653,376

* Grand total also includes production of Diamond T Truck, Federal Truck, Int'l Harvester, Mack Truck, Reo Truck, Stutz and miscellaneous not listed separately.
Source: Ward's Automotive Reports.
Note: Canadian production represents approximately 4% of the total production.

Appendix II

PRODUCTION POSSIBILITIES OF MAJOR PLANTS

Name of Plant	Percentage of Production Capacity From Sept. '39 thru Aug. '40	Possible Increased Output Over Year Ending August, 1940	Total Output at Peak Capacity on Basis of Two 8-Hour Shifts per Day 50 Weeks in Year	Work Days Needed to Build 12 Months Total Production on Basis of Two 8-Hour Shifts per Day at Peak Production	12 Months Total Production From Sept. '39, thru Aug. '40	Highest Past Production of Completed Motors Per Hour	Present Production of Completed Motors per Hour
Cadillac	22	134,768	172,800	66	38,032	36	36
Dodge	36½	530,745	835,200	108	304,455	174	174
Studebaker	31	221,318	336,000	103	114,682	70	70
Plymouth	43	552,255	964,800	128	412,545	201	172
Chrysler and DeSoto	24	494,660	648,000	75	153,340	135	87
Oldsmobile	54½	163,268	360,000	167	196,732	75	73
Willys-Overland	17	207,070	240,000	41	32,930	50	50
Hudson	40	118,368	216,000	135½	97,632	45	32
Pontiac	51	217,125	441,600	147	224,475	92	78
Nash	17	288,384	345,600	49½	57,216	72	63
Chevrolet	49	1,091,900	2,136,000	147	1,044,100	445	347
Buick	42	430,479	721,500*	121	291,021	185	179

* Note: On basis of 13-hour day.

Appendix III

FACILITIES AVAILABLE FOR PLANE PRODUCTION IN THE CHEVROLET FORGE PLANT, DETROIT

The following equipment in the Chevrolet Drop Forge plant at the present time—the peak of the plant production program—is operating at approximately 60% of capacity used.

Number of Machines	Size of Machines	Types of Machines
19	1,500 lbs.	Steam Hammer
29	2,500 lbs.	Steam Hammer
12	3,500 lbs.	Steam Hammer
9	5,000 lbs.	Steam Hammer
6	12,000 lbs.	Steam Hammer
15	1,000 lbs.	Board Hammers
11	2,000 lbs.	Board Hammers
5	3,000 lbs.	Board Hammers
1	250 ton	Forge Press (Hydraulic)
1	950 ton	Forge Press (Hydraulic)
2	1,000 ton	Forge Press (Hydraulic)
3	1,600 ton	Forge Press (Hydraulic)
11	1,500 lbs.	Board Hammers

In addition to the hammers and presses listed, numerous large and small upsetting (header) presses are available. If the above equipment were used at full capacity, this plant alone could produce all the necessary drop forgings required for the production of 500 airplane engines per day, and still supply the Chevrolet Motor Car Company with sufficient forgings for 1,000,000 Chevrolet cars in the coming year. Skilled hammermen are available to operate these forge hammers at full capacity.

In addition to the Chevrolet Forge plant, there are many other forge plants, such as the Buick Forge plant, Dodge Truck and Forge, etc., which have considerable unused capacity.

Appendix IV

FACILITIES AVAILABLE IN AUTOMOBILE INDUSTRY FOR STAMPING METAL SECTIONS FOR WINGS AND FUSELAGE

The following stamping presses in the Cleveland Fisher Body Plant are at the present time—the peak of the body production season—operating at less than 50 percent of capacity.

Number of Machines	Type of Machines
74	Double Crank Presses
19	Toggle Presses
26	No. 78 Single Crank Presses

Numerous small blanking and stamping presses

To appreciate the full significance of the above list of equipment, one must realize the tremendous size of these presses, their cost, and the time it would require a new plant to get delivery of such presses. A big Toggle press, for

example, stands 40 feet from the base to the top of the press and is large enough to hold and operate a draw or flange die which itself weights from 70 to 80 tons. Such presses cost from $150,000 to $175,000 and it would require years to get delivery of the number and type of such press equipment that is now standing idle more than 50 percent of the time at the Cleveland Fisher plant.

Present employment in the Fisher Cleveland press room reflects the extent to which the presses are now idle. There are 600 men on the day shift, 300 on the afternoon shift, and 67 on the midnight shift.

In addition to Cleveland Fisher Body, every major body plant in the automobile industry has unused press room capacity which can, with the necessary special dies, be adapted to plane production.

Appendix V

REPLY TO OBJECTIONS

Virtually all of the criticisms of the program have been anonymous—aircraft and automotive industry executives refusing, for some reason, to lend their names to their printed views. The criticisms do not in any case run against the feasibility of the program. By and large, they indicate either a sad lack of imagination or an insistence by automotive interests to continue with "business as usual." However, since some misconceptions of the program have gained credence it is advisable to discuss and dispose of these matters.

BOMBERS OR PURSUIT SHIPS

It has been wrongly assumed that the program contemplated the production only of pursuit ships. Our reference to the possible production of 500 fighting planes a day was used only to indicate the over-all productive capacity of an automobile industry whose idle machines and idle men were fully mobilized and whose private interests were temporarily subordinated. The productive capacity we have indicated can as readily be adapted to the production of medium-sized or heavy bombers. If these latter types are built rather than pursuit ships, the daily production would be scaled down in proportion to the increased amount of work required on each plane. Nevertheless, our program could build many more bombers, large or small, than are now being built or are contemplated, and in much shorter time.

MAN-HOURS REQUIRED

Some sources in the automobile industry assert our plan is impractical because of the relatively small percentage of machine hours in manufacturing an automobile as compared with the total man hours required to build a plane.

These sources contend that out of 18,000 man-hours necessary to build a pursuit ship, 10,000 are devoted to construction of air frames, work on which is usually done by hand. In attempting to prove their point, these sources simply multiply 10,000 man-hours by 500 planes a day which gives them a tremendous and impressive figure. It would be as logical to take the number of

FOREWORD

The Congress of Industrial Organizations has given to the Government a proposal for mass production of defense aircraft. The immediate affect has been an encouraging lift for national defense—through widespread publication and discussion. Valuable as this is, we are convinced that the program merits more than verbal praise and piece-meal application.

The CIO's proposal was drafted at my request and the request of R. J. Thomas, president of the United Automobile Workers of America, affiliated with the CIO. It is the result of the experience of a group of skilled automobile workers, headed by Walter P. Reuther, who studied this problem for months and arrived at the conclusions contained in the report. Their findings bear the imprint of the unanimous approval of the Executive Board of the CIO.

Our program was born out of the CIO'S desire to make its utmost possible contribution to national defense. The specific program for mass production of defense aircraft indicates the great extent to which organized labor's knowledge and abilities may be utilized in our present national emergency. The program implements a general program already outlined by the CIO for a larger recognition of labor's responsibilities and prerogatives in this emergency.

The efforts of our country to preserve and perfect our democratic institutions finds no greater response than in the ranks of American labor. Our aircraft production program is concrete evidence of that fact; and it also bespeaks the logic of our desire for a greater recognition of organized labor's role in national defense.

PHILIP MURRAY, *President*
Congress of Industrial Organizations

AUTHOR'S NOTE

This program is an outgrowth of the American automobile workers' conviction that the future of democracy and all that our people hold dear are dependent upon the speedy and successful prosecution of our national defense.

I have discussed the general outlines of the program with Assistant Secretary of War Robert Patterson; Philip Murray, President of the Congress of Industrial Organizations; Sidney Hillman, member of the National Defense Advisory Commission; and R. J. Thomas, President of the UAW-CIO.

Upon being urged by these leaders of government and labor to complete the survey, I consulted with a number of highly-skilled designing engineers, tool and die makers, jig and fixture men, and pattern and model makers, employed for years by General Motors, Chrysler, Packard, Hudson, Briggs, Murray Body and other automobile companies. Individually and jointly, we made first-hand studies of aircraft motor parts and wing and fuselage assemblies. All of these men are members of the UAW-CIO and are recognized by managements as well as by the union as master technicians. They have contributed to the formulation of this program which we now present as part of labor's contribution toward the solution of a grave national problem.

500 PLANES A DAY

A Program for the Utilization of the Automobile Industry for Mass Production of Defense Planes

By WALTER P. REUTHER*

England's battles, it used to be said, were won on the playing fields of Eton. This plan is put forward in the belief that America's can be won on the assembly lines of Detroit.

In an age of mechanized warfare, victory has become a production problem. The automotive workers for whom I speak think our industrial system a productive giant capable of any task, provided it is not forced into battle with one hand tied behind its back. They also believe that we need send no men to a future conflict with the Axis powers if we can supply enough machines now to our first line of defense in Britain. The machines we and the British need most are planes, and the survival of democracy depends on our ability to turn them out quickly.

The workers in the automotive industry believe that the way to produce planes quickly is to manufacture them in automobile plants. The automotive industry today is operating at only half its potential capacity. This plan proposes that the unused potential of the industry in machines and men be utilized in the mass production of aircraft engines and planes. It is our considered opinion that it would be possible, after six months of preparation, to turn out 500 of the most modern fighting planes a day, if the idle machines and the idle men of the automotive industry were fully mobilized and private interests temporarily subordinated to the needs of this emergency.

Time, every moment of it precious, its tragic periods ticked off by bombs falling upon London and the Midlands, will not permit us to wait until new mass production factories for aircraft and aircraft engines finally swing into action late in 1942. Emergency requires short-cut solutions. This plan is Labor's answer to a crisis.

Mr. William F. Knudsen says that airplane production is 30 percent behind schedule. It will continue to be behind schedule so long as we continue to rely on the expansion of existing aircraft plants, and on the construction of new plants. Expansion of existing aircraft plants means the expansion of plants utilizing the slow and costly methods of an industry geared to hand-tooled, custom-made production.

New plants cannot be built and put into operation in less than 18 months. In 18 months Britain's battle, for all her people's bravery, may be lost, and our own country left to face a totalitarian Europe alone.

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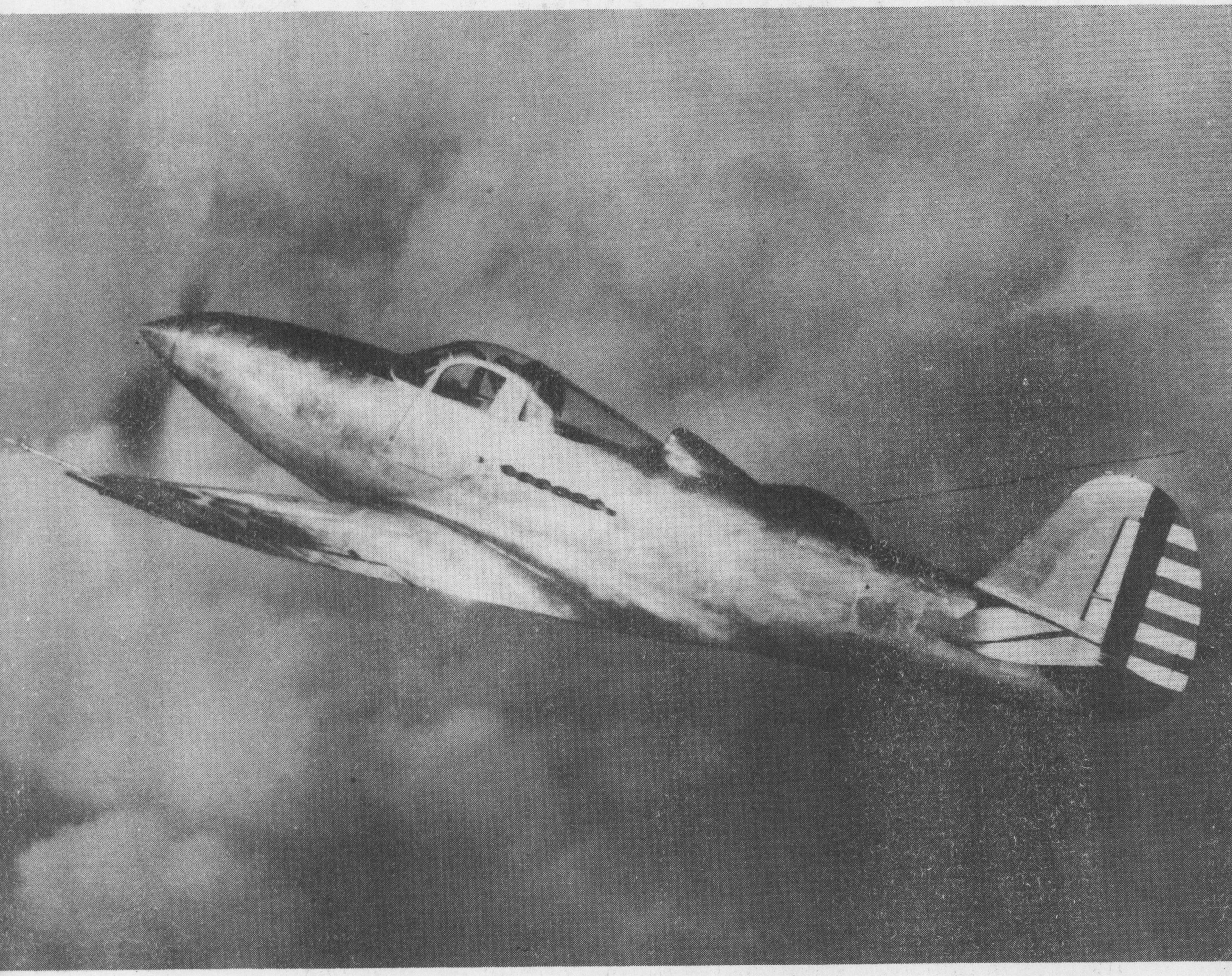
* Director, General Motors Department, United Automobile Workers of America, CIO; member, Committee on Training in Industry, National Defense Advisory Commission.



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