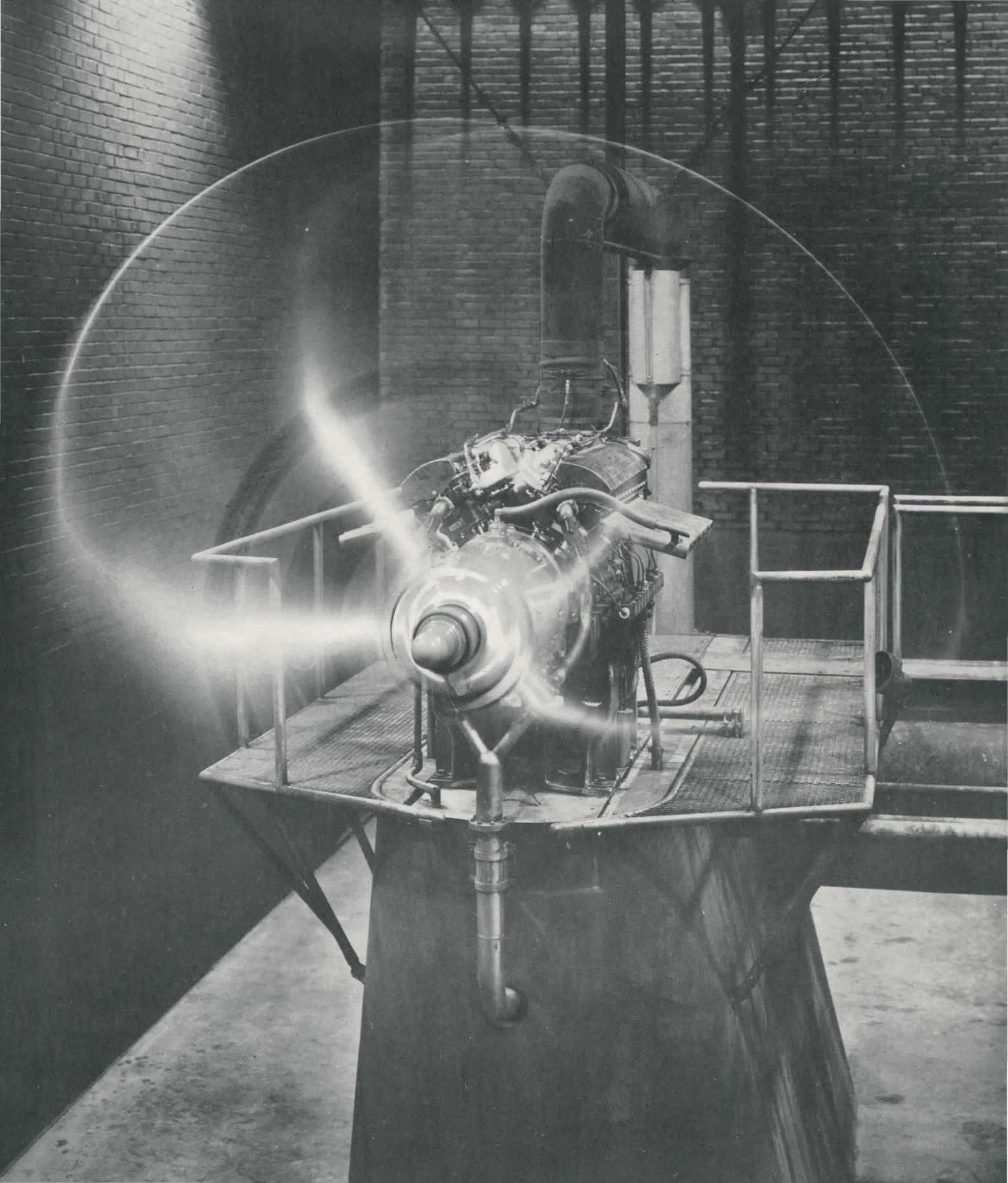


*Allison*  
WAR ALBUM





ALLISON DIVISION  
GENERAL MOTORS CORPORATION  
INDIANAPOLIS

OFFICE OF  
GENERAL MANAGER

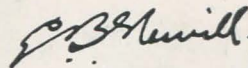
Fellow Employees:

This book tells the story of your splendid work in producing the Allison engine -- the engine which powers the majority of our Army's fighter aircraft.

It is your right to feel gratification and pride that you have participated in Allison's rapid growth from a small experimental enterprise to the great organization which has now produced more than 50,000 aircraft engines of highest quality. This accomplishment is a tribute to the soundness of Allison's engineering, the experienced men and vast resources made available by General Motors Corporation and the patriotic effort of each of you. Today our armed services are making great strides on various fronts all over the world. The European invasion has begun with stirring initial successes.

However, it is a sobering thought that victory is not yet ours -- more engines are needed than ever before and they must be more powerful engines, demanding still more exacting quality. The unfilled pages at the back of this book are provided for your history of the next few years. Let us make it a glorious record!

Sincerely,



E. B. Newill,  
General Manager

EBN:HDW

*Into these our efforts went...*

# ETROITTIM

Mich.

Tuesday, Dec. 29, 1942

## On the Business Front

By WARD SCHULTZ

Financial Editor

A good friend of mine, now attached to the United States Army Air Corps, dropped in to see me on his very brief Christmas leave. He's been flying everything the army has in the way of pursuit planes and has either been pilot or co-pilot on every type of bomber we build.

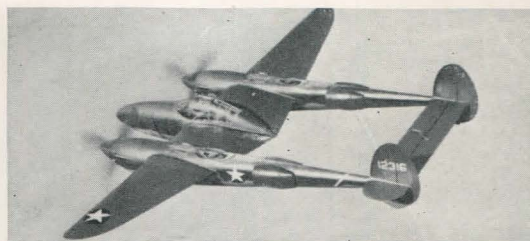
In short, he's sat behind, or over, or in front of every type of motor Uncle Sam uses in his fighting craft—and he had this to say:

"There's been a lot of talk about the Allison engine. Will you tell all the armchair kibitzers for me—and for the boys in the air force—that there never was a sweeter power plant built.

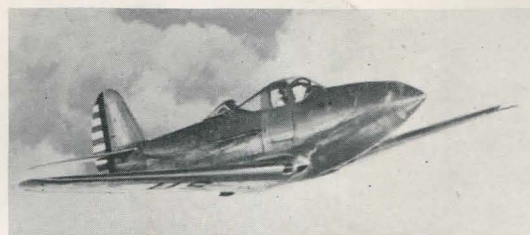
"I'm making no exceptions, either. Brother, that IS a motor. It just seems to sing our kind of music. And it's a mechanic's motor, too. It's not a three-day job to repair a minor electrical breakdown—it's a matter of a few hours with that baby."

And although my friend has been gone for months—and although he keeps sending his wife little gadgets which were certainly not made in these parts—that's all he would talk about during our several hours together—the fine qualities of the Allison.

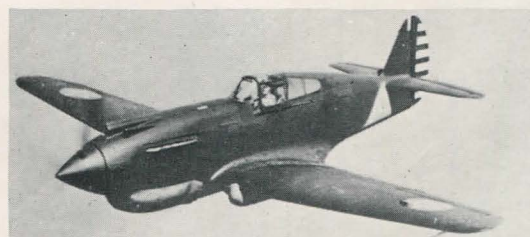
*Lightning*



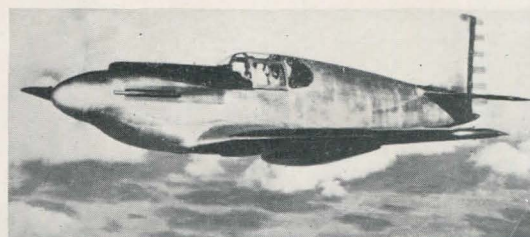
*Airacobra*



*Warhawk*



*Mustang*



**ALLISON AT WAR** At the time of the most disastrous Sunday in American history, the Allison Division of General Motors Corporation, at Indianapolis, had reached a high output in the production of America's only natively-designed, liquid-cooled aircraft engine—an objective set by the U. S. Army Air Forces. The schedule was increased time after time as the conflict spread across the Pacific, through the Philippines, through Burma and overran the Libyan desert. And just as often as the goal was increased, it

was as consistently met at Allison. Organization and an ability to deliver were the reasons behind this success. Allison was the principal powerplant for fighter planes of the U. S. Army Air Forces and was widely used by other United Nations. It was in the P-38 Lightnings, the P-39 Airacobra, the P-51a Mustang and in the P-40 Tomahawks, Kittyhawks and Warhawks. War-wise fliers praised it. New development at Allison kept pace with ever more powerful engines being designed behind the curtain of secrecy.

# ALLISON PLANT 3 TO BE EXPANDED

## Further Growth Necessary as Army Orders Are Filled.

Further expansion of the Allison Engineering Company plant, where War Department orders for army plane motors are being filled,

## That Allison Engine Experience in the Air and at the Front Demonstrates The Value of the Liquid-Cooled Aircraft Motor

(Special to NATIONAL AERONAUTICS)

In attempting to evaluate the performance record of American military aircraft in World War II while it is still being made, it would seem to be within the realm of reason to give at least as much credence to the word of the men who must fly them as to the theorists.

The faith, which was from those who believed in the liquid cooling of aircraft engines when all others felt that it was enough that America establish herself as the producer of the working finest air-cooled power-plants, is proving itself out around the world today. The spectacular war records being set by the Lightnings, the War Hawks, the Mustangs and the Airacobras is the proof of all this. On the wings of these rides the American liquid-cooled aircraft engine program.

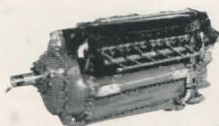
It has ever been a sound theory in determining performance in the air to ask the man who flies one. While some skeptics might wish to deride or belittle, for their audiences to talk the men of Chennault out of their P-40s; the Russians out of their P-39s; the English out of their P-51s; nor the Americans in Tunisia, New Guinea, in the Aleutians, in China, in Sicily out of their P-38s.

Colonel Robert L. Scott, who is credited with thirteen Japanese planes and six others probable, as commander of the 23d U. S. Fighter Group in China, speaks thus:

"The P-40 is the strongest ship in the world. It will outlive anything the enemy possesses. It has superior fire power and no engine is more dependable than the Allison. No man who ever flew one criticized it. The Japanese Zero can outclimb and out-maneuver the P-40, but no pilot of the 23d Squadron would take the Zero in preference."

Major Vasily Kolibelnikov, commander of Stalin's Falcons, crack Russian fighter squadron, says:

"Since June, 1942, when this aircraft group was equipped with Airacobras and up to March 27, 1943, this unit has shot down 142 enemy planes in air battles. Of these there were twenty-nine Junkers 88s; two Heinkels 111; one Dornier 217; eight Focke-Wulf 109s; one Messerschmitt 210; seventy-two Messerschmitt 109Fs; four Macchi 200s; four Heinkel 126s. Besides this, nineteen more enemy planes were hit. The group's losses were twenty Airacobras."



Both Colonel Scott's and Major Kolibelnikov's statements are high tributes to the Army's liquid-cooled aircraft engine program, which in the form in which it is known today began in 1933 when the U. S. Army Air Corps became interested in the Allison liquid-cooled development.

The earliest stages of this development, undertaken in a small engine machine shop on the outskirts of Indianapolis, were concerned solely with laboratory research. The General Motors Research Laboratories in Detroit, headed by C. F. Kettering, lent valuable assistance no less important than the GM underwriting of the project.

The coolant to be used was one of the first engineering considerations. Glycol ethylene—base chemical of Prestone, with its boiling point of 357 degrees, proved to be the best. The answer to permit running an engine at 250 degrees to give higher power output than a 160-degree water-cooled engine. An unsuccessful effort was made to substitute glycol for water, but the engine failed.

The Allison V-1710 was delivered to the Army Air Corps at the end of 1933. It was a 350 horsepower engine.

The Air Corps ordered a redesign, seeking higher horsepower, and this resulted in the model known as the V-1710-C. A satisfactory 50-hour development test was completed at a rating of 800 horsepower at 2400 revolutions per minute. In 1935, an improved model, on a second development test, was rated at 1,000 horsepower at 2650 r.p.m.

In this and subsequent development stages the usual griefs, heartaches and disappointments, common to all pioneering engine ventures, were encountered. Some of these have become strangely distorted in fancy and fable and are believed by a few of the uninitiated as being constant and continuing visitations at Allison, rather than historical milestones now all in the past.

In preparation for the first 150-hour type test necessary for final Army acceptance, the Allison V-1710-C was run at increasingly higher horsepower outputs. Suddenly things went "haywire." Vibrations twisted off the crankshaft, bearings cracked, valves burned out, bearings failed. A major redesign of the engine was decided upon. In exactly three months and three days, every part of the engine, except the connecting rod, was redesigned under the direction of Chief Engineer Ronald K. Hazen. The new model was assembled and delivered to the Army, June 13, 1936. Shortly afterward the grueling 150-hour test began at Wright Field, Dayton, O. For 140½ hours the engine ran sweet and true. Then a disqualifying crack developed in the head of one bank of cylinders. With a new block of the same cylinders, the engine operated on the penalty run for 245 hours when the cylinder head in the other bank failed in similar fashion.

This was proof only of what was particular. The design of the whole was pronounced fundamental. The Air Corps, engineers, cheered up the heartbroken unit for experimental airplane installation. This was an important step forward.

Allison engineers, studying the causes of the cylinder-head failure, found that it had cracked solely for want of several ounces of aluminum at one particular spot—the head between No. 3 and No. 4 cylinders. This strengthening through redesign was a comparatively simple matter and on March 22, 1937 the Allison V-1710-C-8 passed the Army 150-hour type approval test with flying colors.

The Allison, by virtue of Army acceptance, was the first aviation engine to establish itself at a normal rating of 1,000 horsepower on a military test. Step by step in subsequent models the normal step in horsepower was taken.

NATIONAL AERONAUTICS—SEPTEMBER, 1943

America's motor factories, hitting full stride in plane-engine production, are leaving the Axis flat-footed in the race for the air power that will decide the war.

THERE was a very great deal not so long ago. It has grounded him the only true virtuoso of the airplane. He was not just a pilot who has seemed able to extend his own heart, arteries and muscles into the relative components of any plane. Moreover, he could receive encyclopedic aviation problems into one amiable phrase: "Give me enough horsepower and I'll fly it." This man, at the center of the engine's importance in aviation has more than technical interest. It is for your heart as much as for your mind today. For if you personally haven't a relative or friend or former schoolmate who knows someone who has, fully a third of our great final Army will be Air Corps.

But not only armaments—that is, pilots, bombardiers, gunners, navigators, radio-aiders, and hard-laboring Army units. It is the men who are the backbone of our command to distant shores, by the long command to actual fighting lines. It is the men who are the backbone of our command to actual fighting lines. It is the men who are the backbone of our command to actual fighting lines.

It Will Win the War

Engine quality holds in for countries that stand with them, particularly in long-weathered or war-torn lands. It is the men who are the backbone of our command to actual fighting lines. It is the men who are the backbone of our command to actual fighting lines.

new single aircraft-engine factories in the United States today are larger, and produce more engines, than the entire aircraft-engine industry here before the war. The exact number of engines built daily in December figures, however, the last military planes had been produced in that month—yet it was admitted that more engines than planes had come off the factory lines.

Naturally, flight designers sound upon the first mechanical power available—before the revolution in the 1840's. Henry Ford was able to build for his ready-made power 100 horsepower for each horse. Henry Ford was able to build for his ready-made power 100 horsepower for each horse.

concerns resembling a Gibson girl had several inches off the ground. Springfield and Langley both flew steam-driven plane models. The idea of steam-powered planes was laid down in California. Wright's of the great concern in stationary power plant, even non-automobile engines. But about one third of the average airplane's speed not only for themselves, but for the aircraft-engine designer.

Weight, that is the special concern of the aircraft-engine designer. Weight, that is the special concern of the aircraft-engine designer. Weight, that is the special concern of the aircraft-engine designer.

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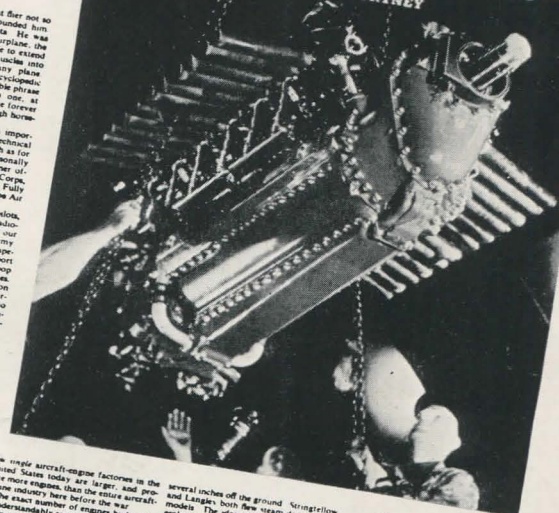
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## HERE'S YOUR HORSEPOWER

BY W. B. COURTNEY



Above is the Allison American designed and built liquid-cooled aviation engine that carries more than 1,000 horsepower and is the backbone of our command to distant shores, by the long command to actual fighting lines. It is the men who are the backbone of our command to actual fighting lines.

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## NEW CONTRACT

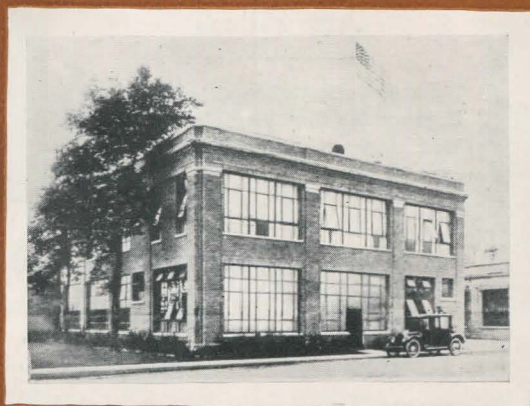
A \$124,459,170 contract with the Allison Division, General Motors Corporation, for airplane engines was announced by the War Department in Washington last Thursday.

As the War developed, greater grew the demands upon the Home Front. Events at Allison were typical of what happened all over America. People became busy planning in the offices; equally busy "out in the shop." The results of their activities were closely followed by the nation. They were not found wanting. In the third year of America's participation in the war, the aviation editor of COLLIER's, after traveling to the major battlefronts, accorded Allison the highest praise in a salute: "Here's Your Horsepower." NATIONAL

AERONAUTICS, official organ of the National Aeronautic Association, stated, "It has ever been a sound theory in determining performance in the air to ask the man who flies one. While some skeptics might wish to deride or belittle, for their audiences it would not be wise for them to attempt to talk the men of Chennault out of their P-40's; the Russians out of their P-39's; the English out of their P-51's, nor the Americans . . . out of their P-38's." In all of these the Allison engine served. The secret is found in Allison's early history.



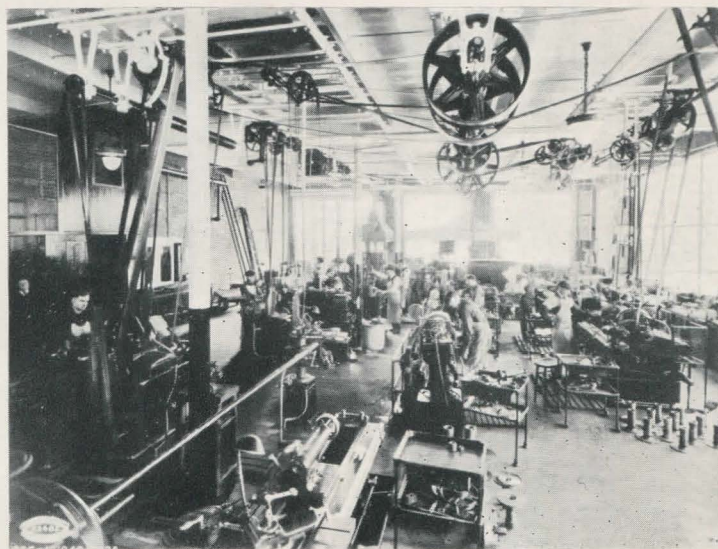
*Plant No. 1  
as it originally was*



*When we were very young*



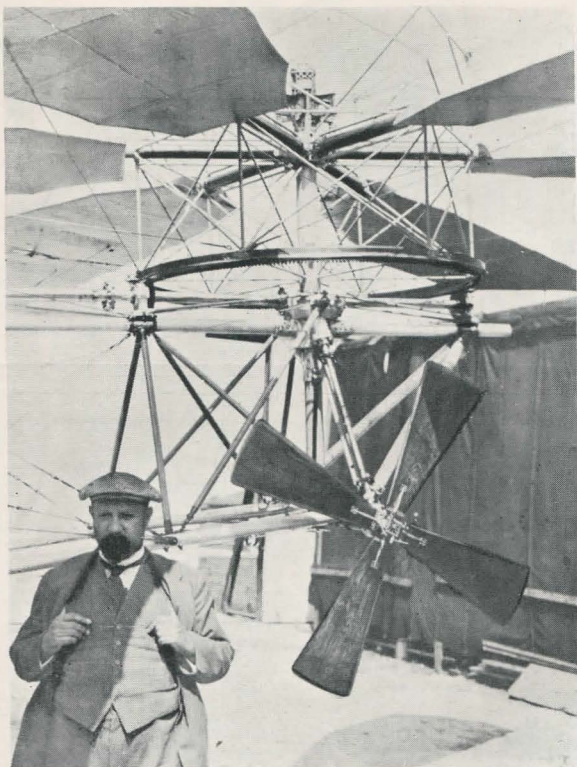
*Early Force  
1943 we are more than 20,000 strong*



*The shop as the oldsters remember it*

**EARLY HISTORY** ▲ The little machine shop has been called the keystone of America's mechanical might. Among the finest machine shop traditions is that touched by the early development of the automobile. Beginning as the headquarters of a famed auto racing organization, The Speedway Team Co., Allison was totally in this tradition. ▲ Then across this typical beginning of a machine shop set down in the cornfields of Indiana fell the shadow of World War I. Automobile racing stopped. A name changed. The Speedway Team

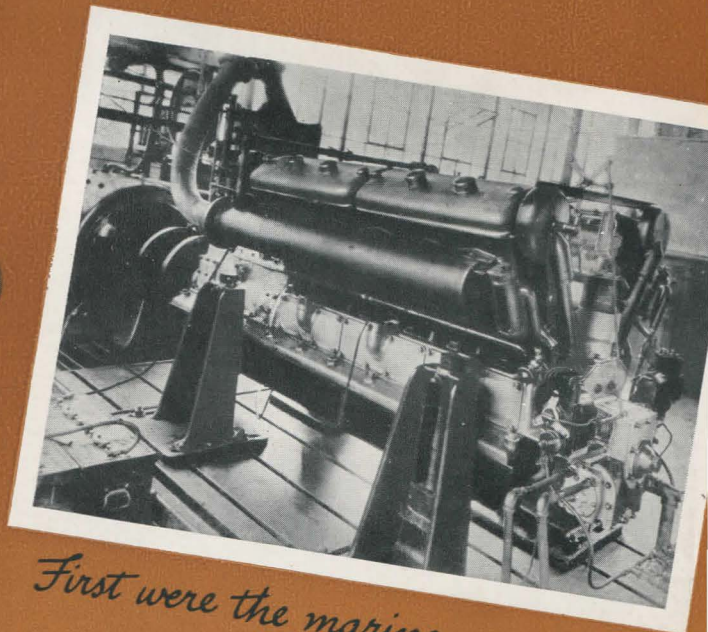
Co., became the Allison Experimental Co. One of the first orders of the newly named company was to build tools, jigs, and gauges for Hall-Scott and Liberty aircraft engines. It also produced the original models of superchargers, trucks, whippet tanks, and high-speed tractors. ▲ Nov. 11, 1918, and the war was over. The shop at Speedway returned briefly to auto racing, building the winning car in the 500-mile International Sweepstakes of 1919. Then in 1920 it was decided to give up auto-racing work for good. The name became



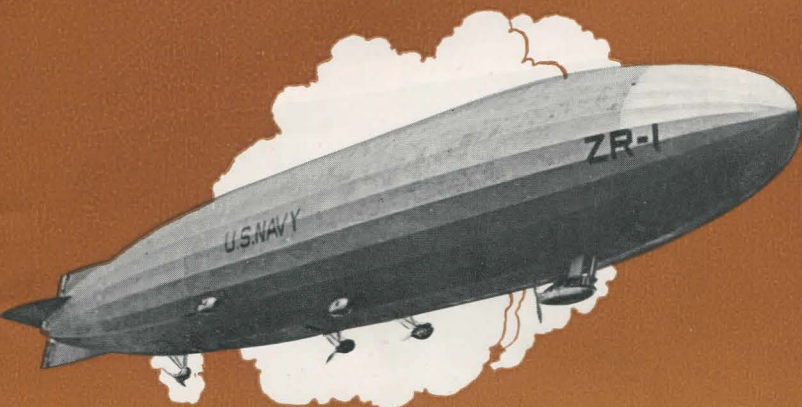
*Army's first helicopter-It flew*



*Mass converting Liberties*



*First were the marine engines*



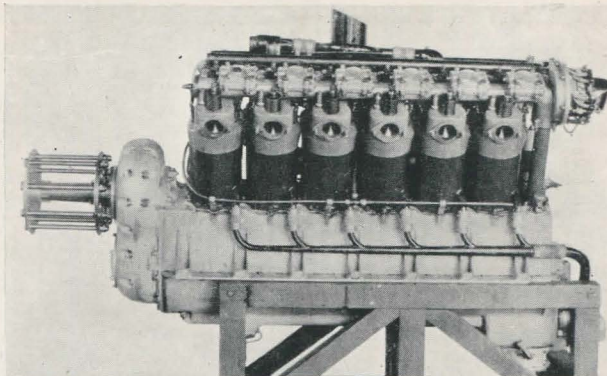
*U.S.S. Shenandoah-Airship power, too*

the Allison Engineering Co. One of the earlier activities of the new engineering company was the production of the famed Miami marine engine. Well remembered by both the Army and the Navy was the fine precision machine work done by the original organization in World War I. In building up their post-war air equipment the Army and Navy turned frequently to Allison, which manufactured both high-speed reduction gears and superchargers. These went into Army planes, into Navy airships, such as the *Shenandoah* and even into

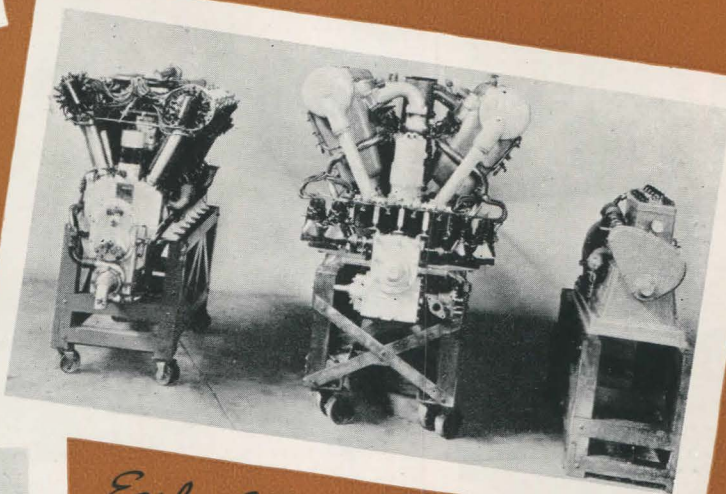
the Army's first helicopter. ⚡ The transition in engineering thinking from the problems of the automotive field to those of aviation was gradual but early. But once established it was never changed, giving to Allison one of the longest continuous American records of effort and activity in this most modern, highly specialized endeavor. Rebuilding Liberty engines for the Army was one of the most important early aviation assignments undertaken by Allison. From this came a vision of a new type liquid-cooled aircraft engine.



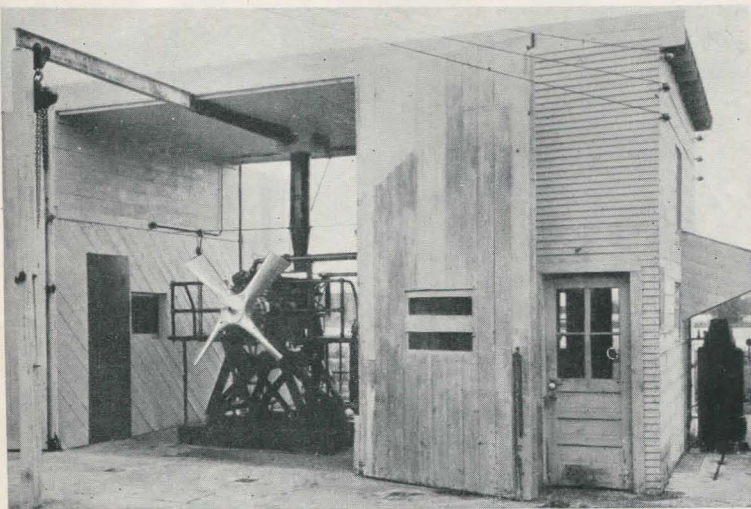
*Early Drafting Room-1921*



*Famed Liberty Reconverted*



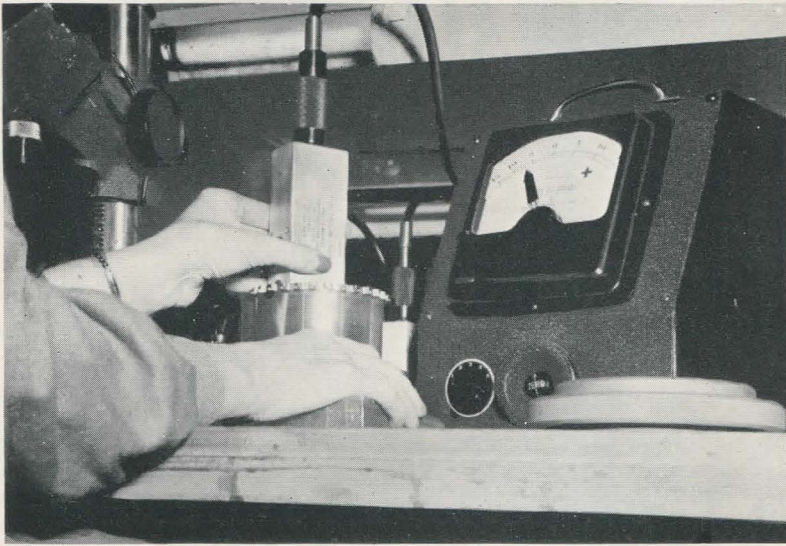
*Early Allison Power Plants*



*One of the first  
test stands*

**ENGINEERING DEVELOPMENT** ▲ By the time Allison was called upon to perform a major task in producing for Victory in World War II, it had already made an enviable record in engineering development work. There is no substitute for engineering experience. That possessed by Allison was gained in the performance of the great variety of tasks which it was called upon to perform in its early days. ▲ While a valuable backlog of manufacturing experience was being built up in the production of marine engines and

stationary powerplants, from the drafting rooms and the test stands at Allison came many a correct answer to a myriad of puzzling mechanical problems. One such typical problem presented itself in connection with rebuilding Liberties for the U. S. Army. A Liberty engine equipped with an experimental cooling system broke down after a 31-hour test stand run because of connecting rod bearing failure. The cause was discovered and a cure worked out in the form of a steel-backed bronze bearing. The excellence of the Allison



## Bearing Inspection Process

Charge to the account of

| CLASS OF SERVICE DESIRED | CLASS OF SERVICE DESIRED |
|--------------------------|--------------------------|
| TELEGRAM                 | URGENT                   |
| DAY LETTER               | DEFERRED                 |
| SERIAL                   | DEFERRED                 |
| OVERNIGHT DELIVERY       | DEFERRED                 |
| DELIVERY                 | DEFERRED                 |

# WESTERN UNION

A. N. WILLIAMS  
PRESIDENT

NEWCOMB CARLTON  
CHAIRMAN OF THE BOARD

J. C. WILLEVER  
FIRST VICE PRESIDENT

1211

CHECK

ACCOUNTING INFORMATION

TIME FILED

Send the following telegram, subject to the terms on back hereof, which are hereby agreed to

WU AC97 DL DAYTON O NOV 13

F C KROEGER  
ALLISON DIV.  
INDIANAPOLIS

CONGRATULATIONS ON BEARING INSPECTION PROCESS IMPORTANCE OF WHICH CANNOT BE MEASURED IN MERE WORDS. YOUR COOPERATION IN IMMEDIATELY MAKING DISCOVERY AVAILABLE TO OTHER MANUFACTURERS UNDER OUR REGULATIONS IS FINE EXAMPLE OF TEAM WORK NATION SO SORELY NEEDS IN THIS EMERGENCY.

BRIG GEN GEORGE C KENNY MATERIEL DIV. WRIGHT FIELD

WANT A REPLY?

"Answer by WESTERN UNION" or similar phrases may be included without charge.

## A word of Congratulations

## Extension Shafting—a unique achievement

bearing resulted in its wide use in such engines as those of Pratt & Whitney, Wright and the Rolls-Royce, and Allison became one of the leaders of the world in bearing manufacture. This interest has been a continuous one at Allison. One by-product of this manufacturing activity resulted later in the development of a method of ultra-violet detection of defective bearing material, which won a special commendation from the U. S. Army. But bearing manufacture and numerous other engine development activities did not deter the men

of Allison from their larger dream of producing a high-powered, liquid-cooled aircraft powerplant. This dream was advanced a long way when in 1929 Allison became a part of the General Motors organization. With its vast engineering skill and wide resources, General Motors offered the original company the opportunity it had long sought to fulfill its principal engineering dream. The now world-famed Allison V-1710 engine was begun in 1931 as a 750-horsepower unit. In June, 1933, this engine successfully

## ALLISON BUILDS IMPROVED MOTOR

Model Will Be Better Than Machine Now In Production.

The Allison Engineering Division of the General Motors Corporation is completing a new model engine which is better than the engine now in production.

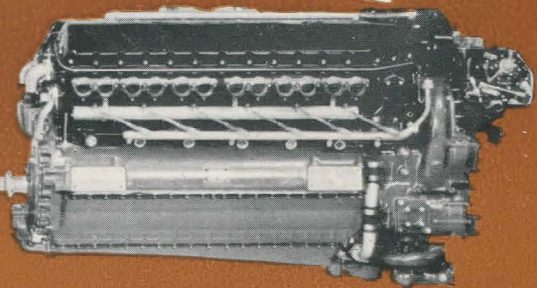
This was revealed yesterday after Fred C. Kroeger assumed managership of the plant, succeeding Otto T. Kreusser, who became head of the division's engineering work and program for inauguration of schools for training mechanics at the plant and at government armories throughout the country.

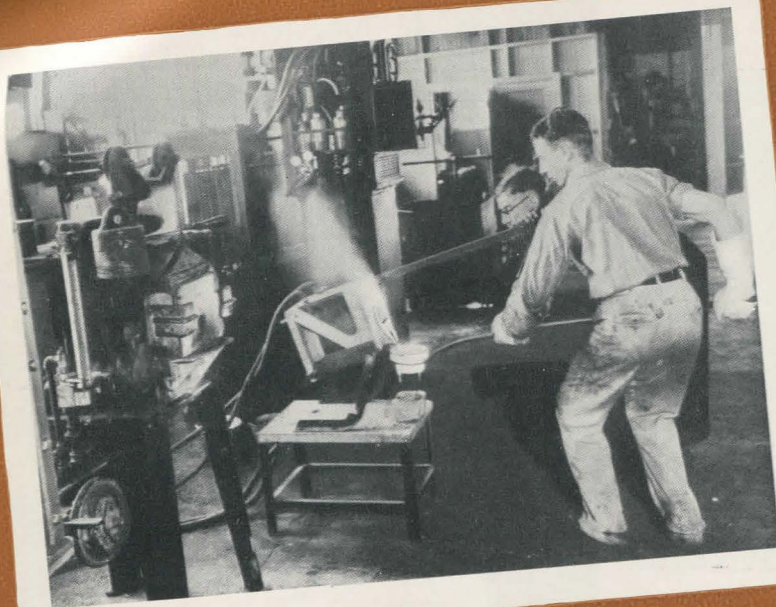
Mr. Kreusser said that the new model, which will be ready for production in 1941, is different in performance from the present motor, having greater horsepower and different installation.

### Same Appearance.

In appearance both the present and 1941 models are the same, being 12-cylinder "V" type liquid-cooled engines.

Meanwhile, the production schedule at the Allison plant was ordered doubled so that manufacture of the Allison engine can keep pace with production in plane factories.





*Early bearing Manufacture*

# ALLISON TO ADD 12 ENGINE TEST UNITS

Expansion Prompted by Increased Production of Motors for Britain and U. S.; Extra Land Obtained for Water Needs.

By SAM TYNDALL

Immediate expansion of the engine test building at the southwest corner of the main Allison production plant (No. 3) was announced today.

Plans call for the construction of 12 additional two-story brick, concrete and steel, sound-proof test sheds which will bring to 48 the total number of sheds available for testing the liquid-cooled warplane motors.

Expansion was necessitated by the steadily increased daily production of motors—now being delivered to the British and U. S. Governments at a combined total of more than 400 per month. Exact production figures is restricted information.

Although officials did not disclose the amount to be spent on the latest expansion, it is believed the new sheds with necessary equipment installed will cost at least \$60,000.

At the same time it was announced that the local General Motors engine division has purchased a 17-acre tract containing a gravel pit located west of Plant No. 3.

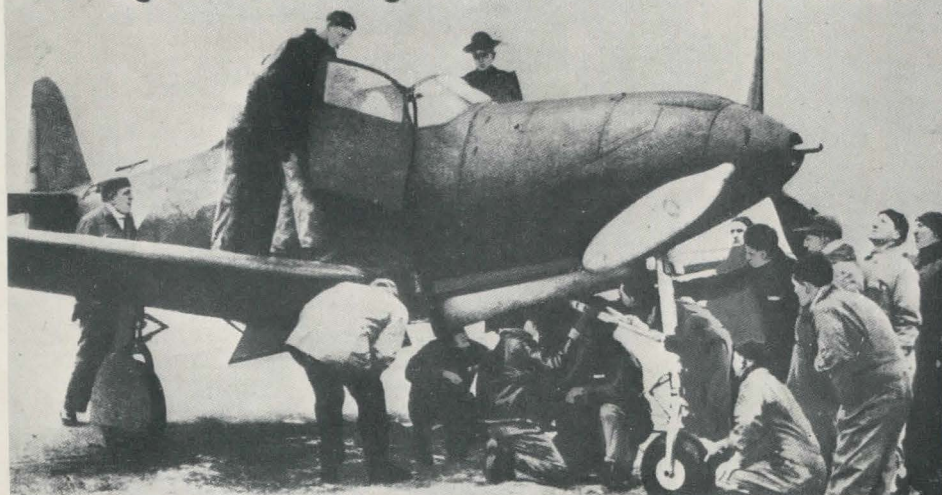
## Gravel Pit Acquired

The gravel pit is to be used as a dumping "depot" for waste water used to cool the engines run on the test blocks. It is necessary to return the water used for cooling to the ground near its source in order to maintain a water table level adequate to serve the many wells at the Allison plant site.

The new test sheds will be duplicates of the present ones, which are two stories in depth, one story underground. Each has a stack at each end for use in drawing air by the propeller and in turn exhausting it from the shed.

Each test room is equipped with a separate control and observation room. The basement and that part of the shed adjoining the observa-

## Selfridge Field Getting Its First Look at an Airacobra



passed Wright Field tests. Next the goal became higher horsepower. In time this goal too was achieved. Allison became the first aircraft engine in the world by standards of military test to achieve a normal rating of 1000 horsepower. In 1939 the Allison-powered Curtiss XP-40 airplane won the Army Pursuit Competition, a contest conducted by the Air Corps to determine the relative superiority of various types of planes for military purposes. Another model of this same engine, equipped with a pusher-type drive and propeller, made

possible the novel Bell Airacobra, forerunner of Bell's Airacobra, which the Russians declared to be one of the finest aerial fighters in World War II. Many are the engineering "firsts" officially credited to Allison. It produced the first engine to be model tested at a power weight ratio of under one pound per horsepower. It was the first American manufacturer to establish War Emergency Ratings for its engines and first to provide automatic engine controls. Until the development by Allison of the hydraulic dampener for an



*Building Plant No. 5  
Land as it was*

*Digging foundations  
July 15, 1942*



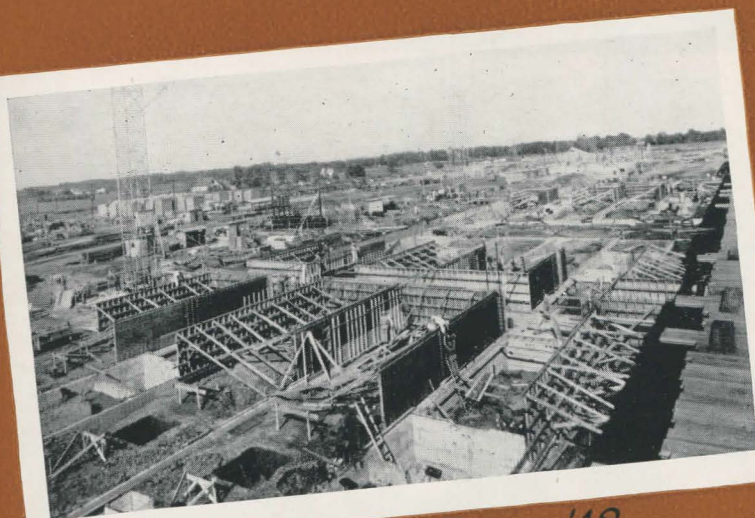
*20 days later*



*40 days later -  
famed thunderbirds are up*

**BUILDING THE BUILDINGS** ▲ The perfect precision machine shop is one in which neither the light of day, the darkness of night, nor changes of temperature can affect to the tiniest degree the accuracy of the machines. This means a windowless plant, artificially lighted and air-conditioned throughout. Such a plant was the type in full operation producing the Allison engine when the declaration of War Dec. 8, 1941 created a need for record quantities of liquid-cooled aircraft engines. As the scope of war increased,

more and more such manufacturing space was needed. ▲ Erecting these buildings forms a stirring chapter in the story of Allison at war. The construction in record time of new manufacturing space, until that under six roofs in the Indianapolis area equaled 88 acres, remains an almost unbelievable accomplishment to those who remember the original engineering machine shop. ▲ First there were the numerous additions made to Plant No. 3 which was the principal manufacturing unit at Allison prior to Pearl Harbor. First addition



*Same building - Sept. '42*



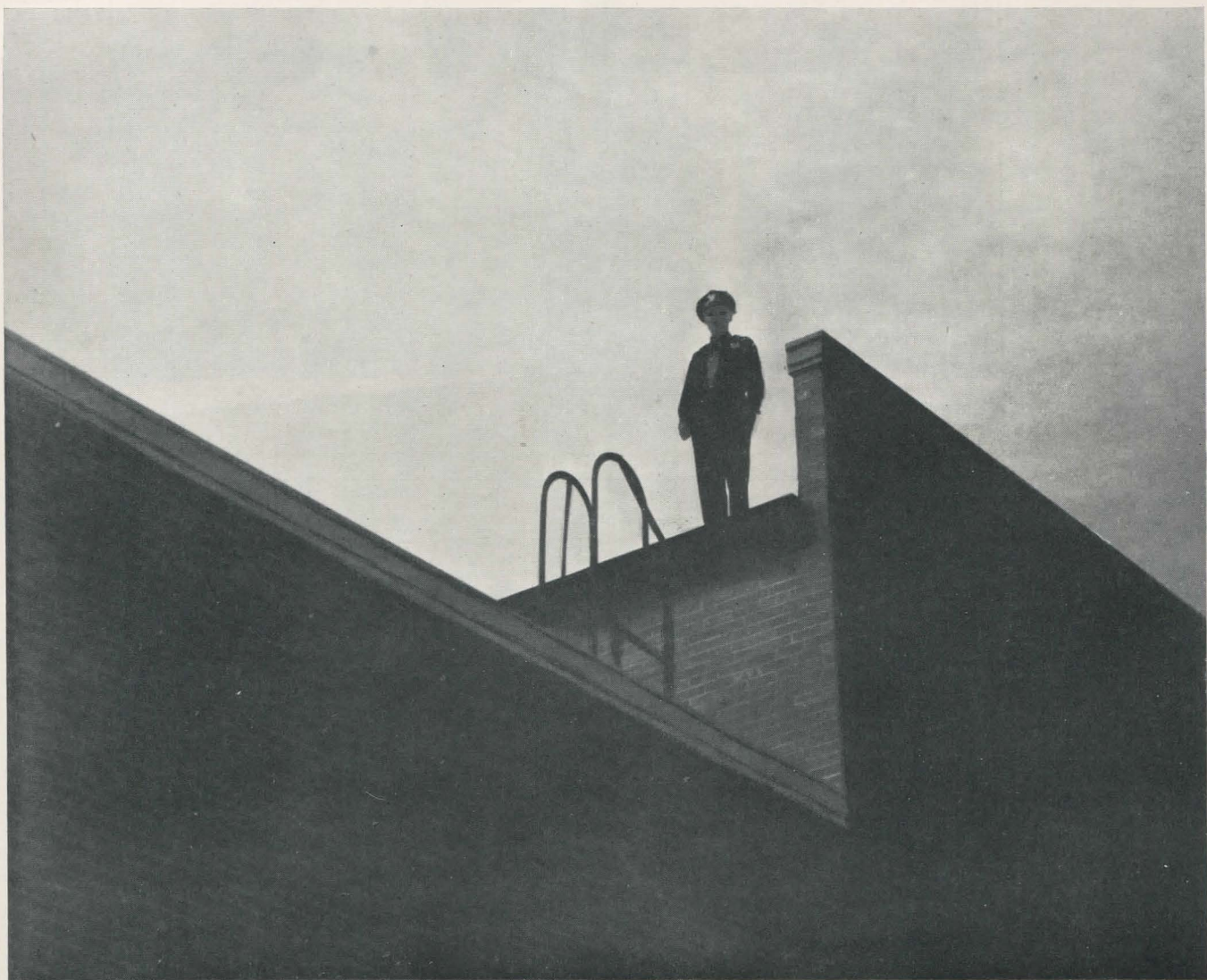
*Nearing completion - Oct. '42*



*Plant No. 5 Completed  
Nov. 11, 1942*

added some 200,000 square feet. Then another 150,000 square feet; and finally a whole new wing of 300,000 square feet was constructed. The ever-mounting production of aircraft engines was reflected in building in the construction of test stand houses which were put up by the score. ▲ Most striking building feat was the construction of the new manufacturing edifice known as Allison Plant No. 5. Because of the critical steel shortage, many ingenious building devices, such as gigantic wooden pillars known as "thunderbirds," were

employed in its construction. Open land was cleared, excavations made, and concrete poured with unbelievable speed. From the laying of foundations to occupancy required but three months and twenty-seven days. In this time a factory was built covering an area equal to that of 20 city blocks, a record in building which fosters a favorite Allison legend that the new factory was in use before the architect's drawings were completed. Equipped with plant facilities in record time, Allison was early prepared to meet every call made on it.

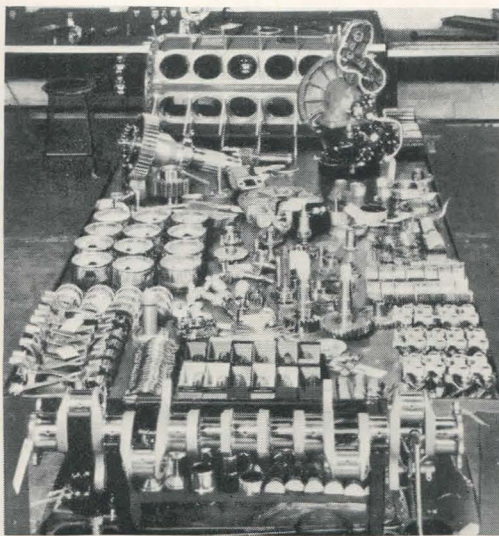


## *On Guard*

**PLANT PROTECTION** ▲ In time of war there is need for vigilance everywhere against the enemy within our gates. Doubly true is this of a nation's war plants. Even as the new buildings at Allison were being constructed there was being created a system of plant protection which has been called outstanding throughout the country. In numerical strength the uniformed patrol service, guarding the plant properties of Allison and protecting its workers alike from innocent and malicious interference, was greater than that of the police

force of many a medium-sized American community.

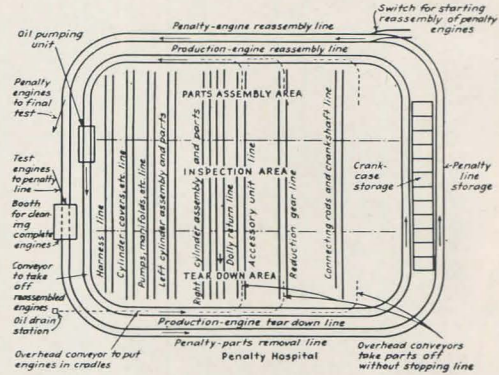
▲ Numerous were the duties performed by Plant Protection. Among these were control of employee identification, supervision of passes, fire fighting, fire prevention, and investigation work. As women workers came in ever-increasing numbers to help in the war work of Allison, the Plant Protection Auxiliary, a uniformed women's patrol organization, was organized and trained to assist the large uniformed male force in providing Allison with a model in plant protection.



## Conveyor Teardown and Reassembly Technique Speeds Power-plant Production

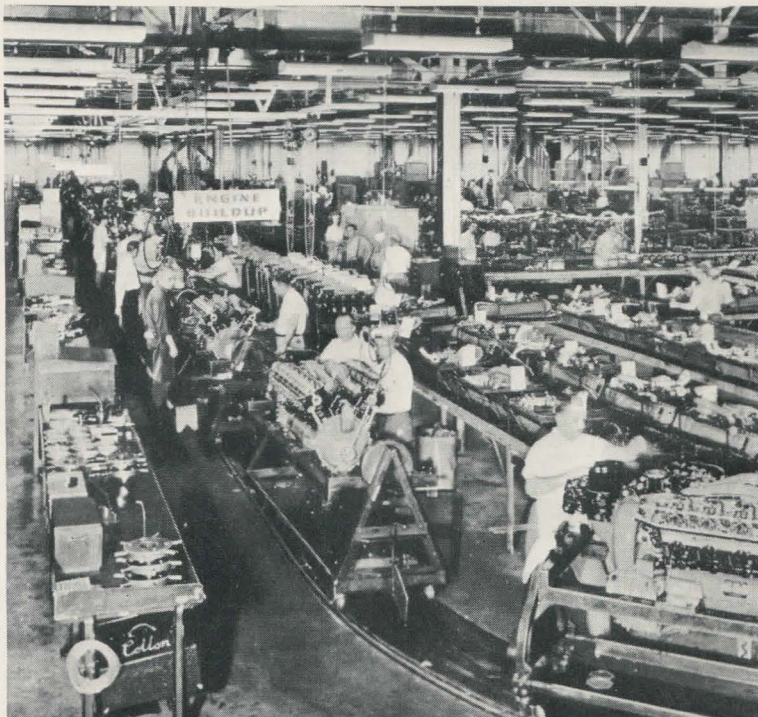
Allison progressive system reduces plant space required as well as man-hours per unit, improves workmanship in reassembly, simplifies inspection procedure, and accelerates shipment of finished engines.

From an interview with:  
**W. G. GUTHRIE**  
Works Manager, Allison Division,  
General Motors Corp.



Principle of arrangement of the continuous conveyor system of teardown and reassembly, with inspection by Army and Allison inspectors.

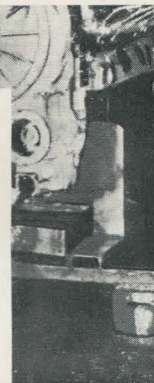
*All of the parts are here*



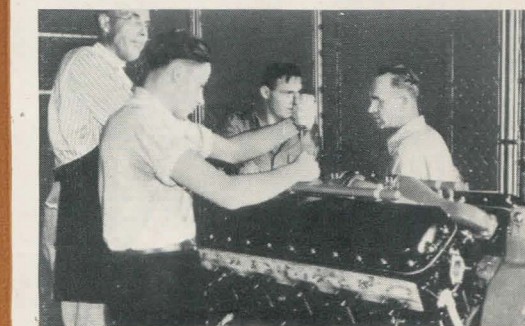
*Assembly line for war*

**REFASHIONING FOR WAR** Long before the entrance of the U. S. into World War II the need in the military air establishment of America for powerful liquid-cooled airplane engines was a known and proven fact. The chief demand of war upon Allison was for faster production in greater and greater quantities. To meet this call meant streamlining many a proven method of manufacture. For example, one serious bottleneck between production and shipping created in an aircraft engine factory by the dictates of

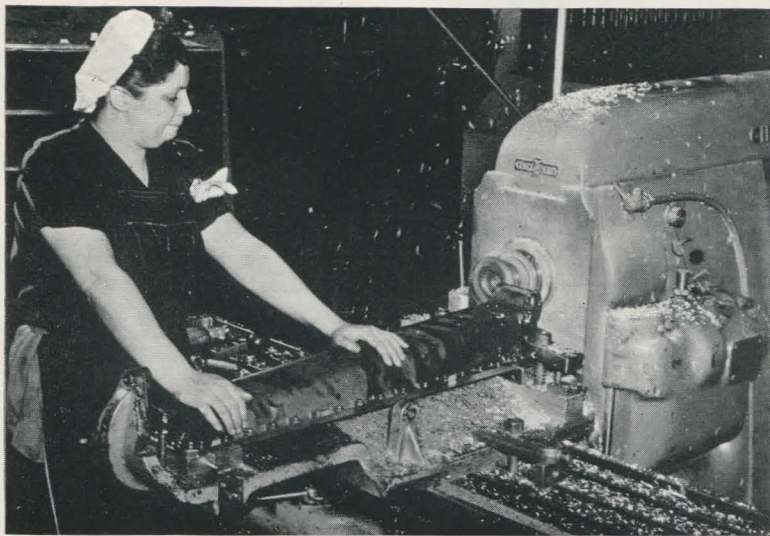
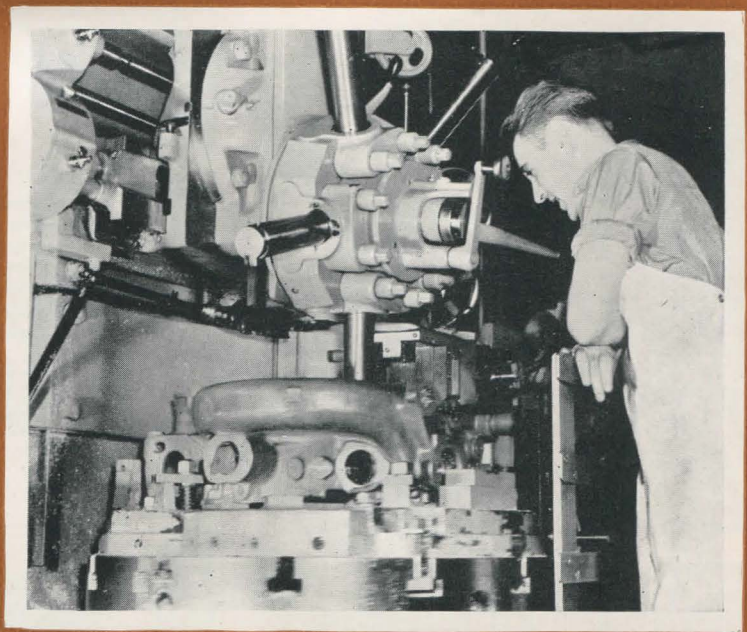
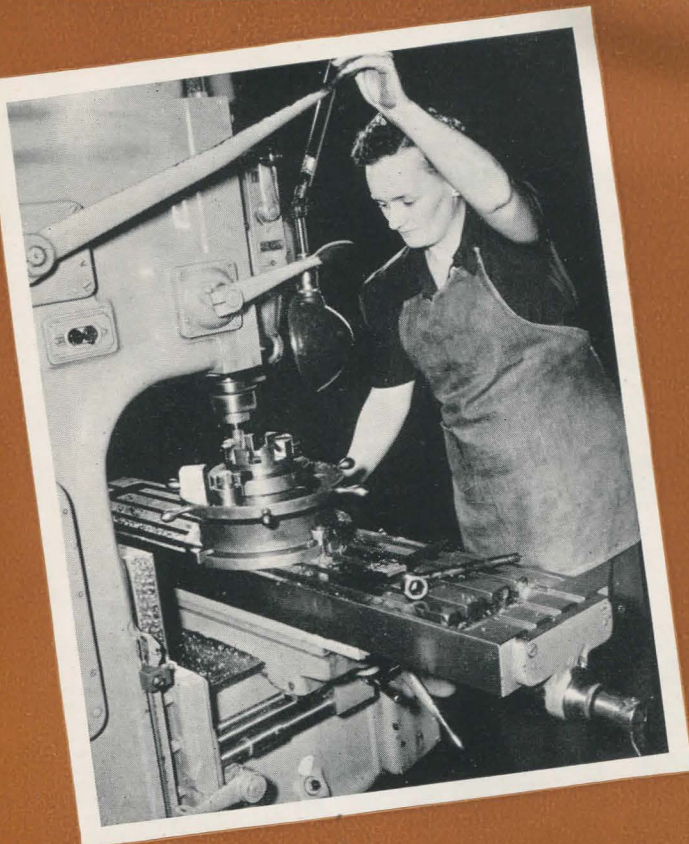
safety is the established practice of complete teardown and inspection of each engine after the initial test run. Before the advent of war each engine at Allison was brought from its initial test and locked in a cage along with a crew of mechanics and inspectors. The whole engine was torn down, inspected and carefully reassembled. Without jeopardizing safety, this tedious process was replaced with a unique conveyor loop system. This was typical of many short-cut procedures worked out at Allison to meet the war's demands.



vn test run on special tow-hoist conveyor line, they are drained into be end of a pipe section swiveled to catch the drain plug or any such basin. A 15-ton hoist with 4 drops it on the next empty a carries the crankcase around.



To prevent this, we have developed an entirely new conveyor (Text continued on page 613)



*Dec. '41 found everything  
going full blast*

**PRODUCING FOR WAR** ▲ The dream long held by the Allison organization to create a dependable, high-powered, liquid-cooled aircraft engine was made possible when that organization became a divisional unit of General Motors Corporation. To meet the war's demands for quantity production of Allison's unique product, it had available the technical and manufacturing experience and resources of General Motors. With such to draw upon, no insurmountable obstacles were encountered in the forced-draft period of war

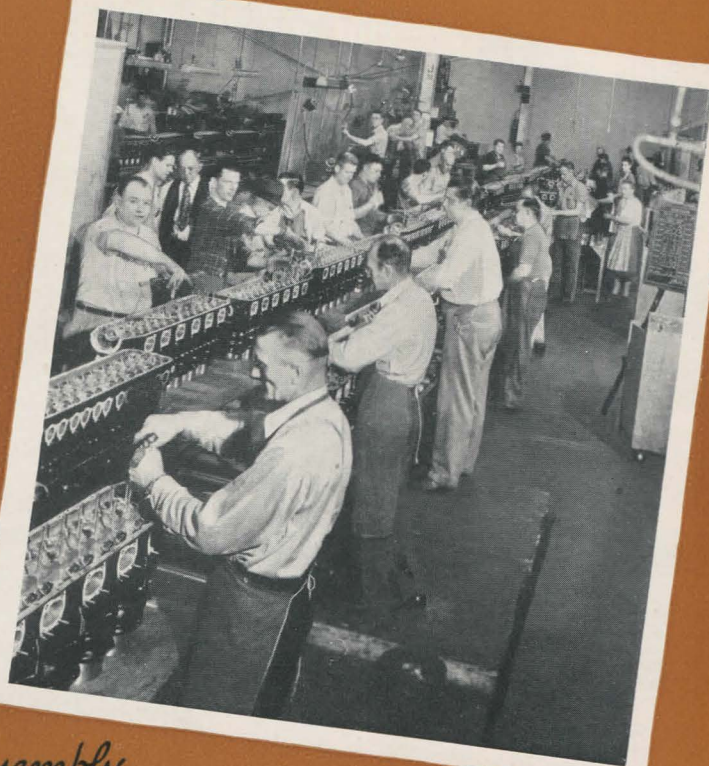
expansion and in the refinement for mass manufacture. As often as the schedules for more and more engines were increased by the Army they were as consistently met by Allison. ▲ The error of Hitlerian thinking to the effect that as great as was the productive power of America it could never produce in time for successful war on two fronts and two oceans was early proven. ▲ Changes in scene, always imposed by war, came early to Allison. Women replaced men in various manufacturing tasks, reaching 32% of the total productive

ALLISON DIVISION  
GENERAL MOTORS CORPORATION  
INDIANAPOLIS, INDIANA

December 23, 1941

*To Each Employee:  
Best wishes for a Merry  
Christmas and a New Year  
of continued achievement.*

*H. C. Kroeger.*



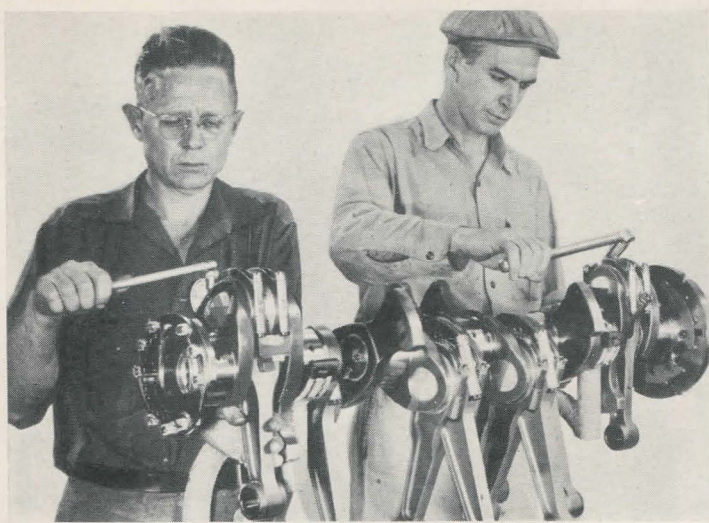
*Sub-assembly*



*Everything moves in lines*

employees in 1944. ♣ With surprising ease, developed of long manufacturing experience, production lines were lengthened and began putting forth, at a previously undreamed-of rate, perfectly functioning engines for the leading aerial fighters of the world. Volume production was of supreme importance, yet at no stage in manufacturing, either in finishing, in sub-assembly or in final assembly, was anything permitted to encroach upon the high standards of precision. Here women workers, called upon to perform vital tasks of produc-

tion, proved themselves to be as equally capable as their fellow men workers. ♣ The skill of these workers combined with the soundness of the manufacturing practices employed enabled Allison to meet the demands for its product which poured into Indianapolis even before Pearl Harbor. These came from the air services of all of the United Nations then engaged in stemming the initial air thrusts of the Luftwaffe both in Europe and Africa. From the head of the British Aircraft Ministry on Aug. 13, 1941, came the following:



*Working on a Crankshaft*

**ALLISON DIVISION**  
GENERAL MOTORS CORPORATION  
INDIANAPOLIS, INDIANA

December 14, 1943

CABLE ADDRESS  
ALLISON DIVISION

SUBJECT: Oil Reclaiming

General Manager

BC #3

TO: Mr. E. S. Hewill

It may be of interest to you to know that about a year ago we made an investment of \$66,786.88 for oil reclaiming equipment to salvage the following oils:--

1. Kendall #70 Oil for Engine Test
2. Cutting Oil (Light)
3. Cutting Oil (Sulphurized)
4. ES-6 Mineral Spirits

This equipment has been in operation now for one (1) year, up to and including October 31, 1943, and the following savings in gallons and dollars have been accomplished:--

| KIND OF OIL               | GALLONS RECLAIMED | SAVINGS      | MONTHS IN OPERATION |
|---------------------------|-------------------|--------------|---------------------|
| Kendall #70 Oil           | 486,440           | \$106,777.33 | 14                  |
| Cutting Oil (Light)       | 166,673           | 8,754.71     | 14                  |
| Cutting Oil (Sulphurized) | 36,530            | 13,411.42    | 8                   |
| ES-6 Mineral Spirits      | 316,533           | 20,620.77    | 4                   |
| GRAND TOTALS              | 976,176           | \$149,564.15 | --                  |

*W. G. Guthrie*  
W. G. GUTHRIE  
WORKS MANAGER

WOG:gh

*Oil salvage was important*

OFFICE OF  
THE DIRECTOR GENERAL

**BRITISH AIR COMMISSION**

1785 MASSACHUSETTS AVENUE  
WASHINGTON, D. C.

August 13, 1941.

Dear Mr. Wilson,

You will, I am sure, be most interested to read the following telegram which has been sent to Curtiss-Wright by Colonel Moore-Brabazon, the British Minister of Aircraft Production. I thought you would wish to have a copy because so much of the success of the Tomahawk is due to the admirable skill and excellent workmanship of all those connected with the production of the Allison engine which power them.

"Air Marshal Tedder has told me of the brilliant performance American aircraft are giving in the Middle East. He asked me to send the following message to you:

"As Air Officer commanding Middle East, as experience of that your Tomahawk fighters can do, I send you the thanks of our fighter pilots for the machines. My pilots tell me again and again how they relish the performance, the manoeuvrability, and the range of the Tomahawk and their successes against enemy fighters and bombers supply the proof. We can use all you send us."

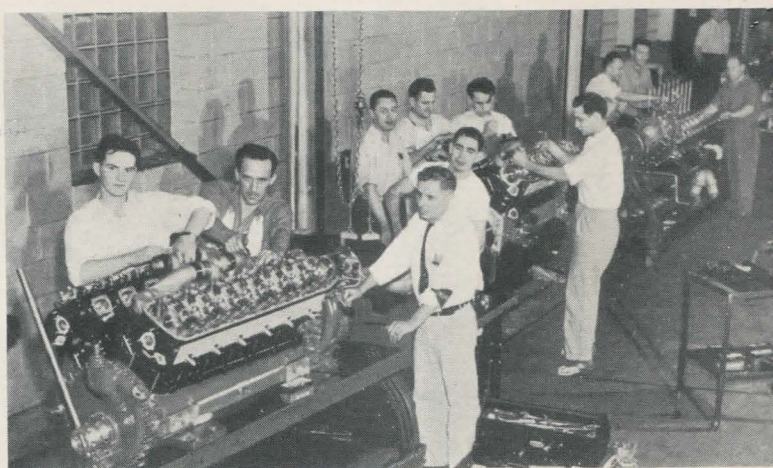
With every good wish,

Very sincerely yours,

C. E. Wilson, Esq., President,  
General Motors Corporation,  
Detroit, Mich

*C. E. Wilson*

*"Air Marshal Tedder told me..."*



*Down the Assembly Line*

"Air Marshal Tedder has told me of the brilliant performance American aircraft are giving in the Middle East. My pilots tell me again and again how they relish the performance of the Tomahawk, and their successes against enemy fighters and bombers supply the proof. We can use all you send us." Such calls did not go unheeded at Allison. That they could be promptly and fully met was in no small part a result of the high efficiency standards maintained. A by-word at Allison, efficiency was achieved in many ways despite the sever-

est of war-time shortages. In production, scrap was reduced 65%. In Dec., 1941, 61 machine tools were required to produce crankcases for all the Allison engines then being turned out. In 1944, however, to produce five times as many of these same vital engine parts only 66 tool machines were needed. In this same time of record development the man-hours required to produce a single crankcase were reduced 80%. In the first full year after Pearl Harbor, tool salvage efforts represented nearly a half million dollar saving, while

# Plane Engines That Fly World Swarm Into Air

Indianapolis, April 16.—To visit the Allison aircraft engine plant practically requires an act of congress, but once inside you see in the making the motive power for almost all American pursuit planes in service at the front.

Here in Indianapolis a laboratory and a cornfield have been converted, in just a shade less than three years, into one of the nation's great blackout engine factories with thousands of workers.

It has been operated on a three-shift, 24-hour basis since April, 1940.

## ROAR OVER WORLD

Allison engines, developed by a subsidiary of the General Motors Corporation, are roaring in India, Burma, Russia, England, China, Hawaii, Alaska and at scores of army air force tactical fields in continental United States.

Lieut. Gen. Henry H. Arnold, deputy chief of staff and chief of the army air forces, has said that Allison-powered planes are "chalking up brilliant records" in the Orient and North Africa.

**In one instance 18 Curtiss-Allison pursuits shot down 20 out of a squadron of 30 enemy planes in five minutes.**

Unlike the history of American aviation as a whole, the story of Allison is a very recent story, based on the need for powerful, highly-streamlined airplane engines in large quantities.

Until the Allison was put into quantity production, this country was without liquid-cooled engines like those in wide use in Europe.



*Final testing*



*Shipping*



*Allisons at the Curtiss factory*

through oil reclaiming efforts in one year nearly 1,000,000 gallons were saved. ▲ By the end of 1943, there was a 12 to 1 increase in the number of employees at Allison over that of 1940, and the daily output in terms of horsepower in an entire month of 1940 was equalled by that of a single day's output in 1943. Between 1940 and 1944, the productive man-hour effort increased ten times, with one eight-hour shift in the former year of 12,000 productive man-hours while in 1943 there were three shifts daily with a total of

122,750 productive man-hours. ▲ And so more and more Allison engines were produced to aid in the cause of the United Nation's war effort, moving down assembly lines to preliminary testing, through tear-down and inspection, back for final testing and thence to careful packaging and boxing to be shipped in quantities undreamed of a few years before to the factories of the principal builders of America's most famous aerial fighters, which in every day of the war were proving themselves both reliable and unbeatable.



WAR DEPARTMENT  
OFFICE OF THE UNDER SECRETARY  
WASHINGTON, D. C.

October 10, 1942

To the Men and Women  
of the Allison Division  
General Motors Corporation  
Indianapolis, Indiana

This is to inform you that the Army and Navy  
are conferring upon you the Army-Navy Production Award  
for your fine record in the production of war equipment.

The award consists of a flag to be flown above  
your plant, and a lapel pin which every man and woman in  
your plant may wear as a symbol of high contribution to  
American freedom.

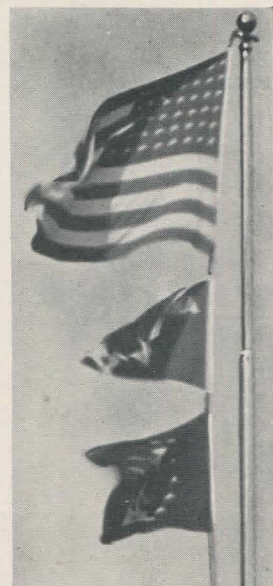
This award is your nation's tribute to your  
patriotism and to your great work in backing up our soldiers  
on the fighting fronts. I have full confidence that your  
present high achievement is indicative of what you will do  
in the future.

Sincerely yours,

*Robert P. Patterson*  
Robert P. Patterson  
Under Secretary of War

**ARMY-NAVY "E"** In full proof that all of the people of Allison—management and employees alike—had met their responsibility to their country to wage efficiently and effectively on the Home Front the War of Vital Machines, the highest joint recognition of the military services for such performance, the Army and Navy "E," was awarded to the Allison Division of General Motors Corporation. Less than a year after Pearl Harbor, Under Secretary of War Robert Patterson, writing to "the men and women of Allison," stated,

"This award is your nation's tribute to your patriotism and to your great work in backing up our soldiers on the fighting fronts." In ceremonies befitting the occasion the Army and Navy production award was formally presented to Allison on Nov. 15, 1942. Ranking Army and Navy officers and prominent city and state officials attended to witness this signal tribute to the Allison workers. High was the praise of the speakers of the occasion. Equally high was that uttered for the Allison achievement by the press. In its editorial com-



*We get our  
"E"*



*Oldest employee gets first pin*

### ALLISON AWARD

The community takes a special pride in the award of the army-navy "E" to the Allison division of the General Motors Corporation. The Allison division grew from a small experimental shop in which James A. Allison and other pioneers in the development of the internal combustion engine worked out their ideas about racing motors. That was just before this country entered the first world war. The shop became in time a world motor experimental center.

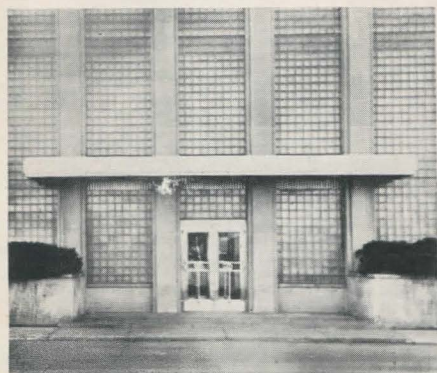
General Motors carried on in the spirit of the pioneers, made the most of the pool of Indianapolis experts who applied their genius and skill to the problem, and added the best of its own men and experience as the demand for lighter and more powerful airplane motors grew. In particular, the experimental zeal of the entire organization is encouraged. It is always working on a better motor.

The organization has met the strain of wartime production with remarkable success. Good management and the sound co-operation of the employees' bargaining group, the United Aircraft Engine Workers, Inc., account for much of this success. Production experts generally rate the Allison operation as a model of excellence in all respects. Certainly the community feels that way about it, and is glad to see it receive the merit citation of the army and navy.

ment upon the award, the INDIANAPOLIS STAR said, "The community takes a special pride in the award to the Allison Division of the General Motors Corporation. The experimental zeal of the entire organization is encouraged. It is always looking for a better motor. The organization has met the strain of wartime production with remarkable success. Good management and the sound cooperation of the employees' bargaining group, the United Aircraft Engine Workers, Inc., account for much of this success. Production experts generally

rate the Allison operation as a model of excellence in all respects. Certainly the community feels that way about it and is glad to see it receive the merit citation of the Army and Navy." By the people at Allison the awarding of the Army and Navy "E" was taken as much as a challenge to future effort as a recognition for past performance. As proof that it was so regarded, the output of Allison engines increased steadily month after month as the war progressed, and in Feb., 1944, a star for continued excellence was added to the Allison flag

Messages  
Delivered through  
these doors



Plant No. 3

Address reply to: Commanding General  
AAF Materiel Center.  
Ref: GEP'amp-70-3  
Wright Field, Dayton, Ohio  
November 30, 1942

Subject: P-38 Airplanes.

To: Allison Division  
General Motors Corporation  
Indianapolis, Indiana

1. The following communication has been received from an Air Force Headquarters concerning the performance of P-38's under combat conditions. The text of the message has been revised and censored for security reasons. It is desired to stress, however, that the message is one hundred per cent favorable to the airplane-engine combination and there was nothing unfavorable to be deleted:

"... HQ AIR FORCE The P-38 is the best and most versatile airplane in use in this theatre of operations. It is very fast at all altitudes and performs excellently in aerial combats to the maximum altitudes used in this theatre. It operates successfully from small rough fields. It is an excellent ground strafing plane and due to its speed and fire power it is very effective against enemy ships. The P-38 is long range bomber escort. When one engine is shot up, the P-38 returns easily on the other engine. In summation, the P-38 has been of extreme value in our operations and we cannot praise its work too highly."

2. It is suggested that the foregoing message be placed on employees' bulletin boards although it obviously is not to be used in commercial advertising.

3. May I add my congratulations and express our belief that next year's P-38's and Allison engines will be even more outstanding.

Copy to:  
Central District Supervisor

*A. W. Vanaman*  
A. W. VANAMAN  
Brig. General, U.S.A.  
Commanding General  
A.A.P. Materiel Center

RECEIVED BY PRIVATE  
WIRE FROM  
POSTAL TELEGRAPH  
STANDARD TIME INDICATED  
IN THIS MESSAGE

Postal Telegraph



THIS IS A FULL RATE TELEGRAM, CABLE-GRAM OR RADIOGRAM UNLESS OTHERWISE INDICATED BY SYMBOL IN THE PREAMBLE OR IN THE ADDRESS OF THE MESSAGE. SYMBOLS DESIGNATING SERVICE SELECTED ARE OUTLINED IN THE COMPANY'S TARIFFS OR HAND AT EACH OFFICE AND ON FILE WITH REGULATORY AUTHORITIES.

ND6 TWS GOVT PD 3 MINS-PH FTHARRISON IND 11 1016A

ALLISON ENGINEERING DIVN GMC PPC

121. CURTISS WRIGHT PLANES ARE RUNNING UP HIGH SCORES AGAINST THE AXIS PERIOD SPECIAL DISPATCHES FROM BRITISH AND AUSTRALIAN AIR FORCES IN THE NEAR EAST REVEAL THAT FORTY FIVE ENEMY PLANES WERE DESTROYED BY CURTISS P FORTY APOSTROPHE S WITH A LOSS OF ONLY FOUR UNITED NATIONS PLANES PERIOD QUOTE WE JUST CAN'T OUT-FIGHT THOSE SHIPS COMMA UNQUOTE A CAPTURED GERMAN PILOT OFFICER SAID PERIOD QUOTE WE MAKE A PASS AT IT AND DIVE THROUGH PERIOD IF WE APOSTROPHE RE LUCKY WE MAKE A HIT PERIOD IF WE MISS WE APOSTROPHE RE THRU COMMA BECAUSE THE P FORTY CAN OUT-MANEUVER US EVERY TIME PERIOD UNQUOTE THAT APOSTROPHE S THE SORT OF PLANE YOU BUILD PERIOD KEEP APOSTROPHE EM COMING END SPILL

ARNOLD AIR FORCES COMMANDING. WASHINGTON DC.

1044A

"Hap" Arnold  
wired

RECEIVED BY PRIVATE  
WIRE FROM  
POSTAL TELEGRAPH  
STANDARD TIME INDICATED  
IN THIS MESSAGE

Postal

ND6 (TWO) GOVT PD 3 MINS-0 WASHINGTON  
TO THE MEN AND WOMEN OF GENERAL  
ALLISON DIV

ON THIS SACRED DAY OF OUR LORD WE TIE  
YOU SOLDIERS ON THE PRODUCTION LINE  
POSSIBLE. WE ARE DEDICATING THIS CHRIST  
YES THIS CHRISTMAS DAY THE DAY AFTER  
PEACE ON EARTH AND GOOD WILL TO MEN

**WORDS OF COMMENDATION** ▲ As the supply lines from the Home Front lengthened to reach theatres of war all over the world, back over those same lines there was passed many a word of praise from hard-pressed aerial fighters of the United Nations for the products of the labor of the people busily engaged in Indianapolis in producing the Allison engine. ▲ From Air Forces headquarters in the Near East, in the Middle East, in China to the nerve center of America's military effort in Washington came the highest commendation

of the handiwork of those employed in producing the powerplant of Lightnings, Warhawks, Airacobras and Mustangs. ▲ Relayed from Washington to Allison, those words offered ample proof that the creators of America's only natively-designed, liquid-cooled aircraft engine were manufacturing a powerplant capable of performing in every clime of the globe. Particularly pleased were the men of the Army Air Forces who had insisted long before upon and encouraged the development in America of a reliable liquid-cooled engine. In

# The Indianapolis Times

WEDNESDAY, JANUARY 27, 1943

## ZERO NEMESIS PRAISES P-40'S

Allison - Powered Planes  
Strongest in World,  
Col. Scott Says.

WASHINGTON, Jan. 27 (U. P.).—Col. Robert L. Scott, 34, who shot down 13 Japanese planes for certain and probably six others as commander of the 23d U. S. fighter group in China, today praised Allison-powered P-40 fighter planes. He has had 7000 hours of flying time and wears the distinguished flying cross with two oak leaf clusters, the silver star with oak leaf cluster and the air medal with oak leaf cluster. He will go on leave at his home in Macon, Ga., where he will await reassignment.

### Engine Is Dependable

"The P-40 is the strongest ship in the world," Scott declared. "It will outlive anything the enemy possesses. It has superior fire power and no engine is more dependable than the Allison."

"We have never had better planes. Naturally we want the best we can get in China. The P-40 is all we have flown out there and we know how good it is. No man who ever flew one criticized it. The Japanese zero can outclimb and outmaneuver the P-40, but no pilot of the 23d squadron would take the zero in preference."

"It's peculiar when an enemy ship burns," he said. "You slip in and let him have it. For a moment nothing happens. Then you see flames appearing over the wings. Then she blows up and you fly through the pieces."

### Jap Column 'Disappears'

Scott told of shooting up Japanese columns on the road to Myitkyina, Burma.

"I never realized what the six .50's could do before. I flew over one column at almost head height. The guns, pouring out 1800 rounds in 50 seconds, appeared to dissolve the column."

"We have sunk steel gunboats on the Yangtze, put anti-aircraft guns out of action and destroyed hundreds of tanks on the Burma road."

"The guns will disable a Japanese medium tank and set it afire. A truck simply splits open, one part falling to one side, the other to the other. The windshield shatters and the truck usually runs off the road."

*A word  
from China*

*From  
Mac Arthur*

**Postal Telegraph**

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THIS P DEC 21 1942

MOTORS CORP

OFF-

DIERS ON THE FIRING LINE GIVE THANKS TO

THE SIRENS OF WAR THAT MAKE VICTORY

AS DAY TO THE DEFEAT OF OUR ENEMIES--

EVERY DAY THEREAFTER UNTIL WE ESTABLISH

THE

IA

**Postal Telegraph**

RECEIVED BY PRIVATE WIRE FROM POSTAL TELEGRAPH STANDARD TIME INDICATED IN THIS MESSAGE

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NDS GOVT TWS PD 3 MINS-PDI WASHINGTON DC 642P MAR 20 1942

ALLISON ENGINE DIVN GENERAL MOTORS CORP PPC

AMERICAN FLYING TIGER VOLUNTEERS IN THE FAR EAST AND BRITISH FLIERS IN NORTH AFRICA ARE CHALKING UP BRILLIANT RECORDS WITH CURTISS TOMAHAWKS AND KITTYHAWKS PERIOD IN A RECENT ACTION THE AMERICANS KNOCKED DOWN TWENTY TWO JAPANESE PLANES WITHOUT A LOSS PERIOD BRITISH PILOTS AT THE CONTROLS OF NINE KITTYHAWKS IN LIBYA DROVE OFF SIXTEEN HEAVY NAZI BOMBERS COMA DESTROYED FOUR AND WINGED THREE ITALIAN ESCORT SHIPS PERIOD AN AUSTRALIAN PILOT REMARKED AFTER THE LYBIAN ENGAGEMENT YOU QUOTE THE P DASH FORTY APOSTROPHE S WENT IN LIKE EAGLES PERIOD COMING HOME YOU COULD FEEL THE HOT WIND THROUGH A HUNDRED BULLET HOLES PERIOD BUT THE YANKEE PLANES ARE HARD TO KNOCK DOWN PERIOD WE CAN USE ALL WE CAN GET PERIOD UNQUOTE END SPFL

ARNOLD ARMY AIR FORCES COMMANDIN . 747A

*Arnold again*

Charge to the account of

| TYPE OF SERVICE DESIRED |                   |
|-------------------------|-------------------|
| TELEGRAM                | CABLE             |
| DAY LETTER              | NIGHT LETTER      |
| SEMI-DAY LETTER         | SEMI-NIGHT LETTER |
| SPECIAL DELIVERY        | POSTAL TELEGRAPH  |

Send the following telegram, subject to the terms on back hereof, which are hereby agreed to

**WESTERN UNION**

A. N. WILLIAMS  
PRESIDENT

NEWCOMB CARLTON  
CHAIRMAN OF THE BOARD

J. C. WILLEVER  
FIRST VICE-PRESIDENT

LONG WU BA87 73 NT-WASHINGTON DC JAN 1

F C KROEGER

ALLISON DIV

THE ARMY AIRFORCES WANT YOU AND YOUR ORGANIZATION TO KNOW HOW MUCH WE VALUE THE HELP AND UNDERSTANDING YOU HAVE GIVEN US THIS PAST YEAR WE HAVE ALWAYS REGARDED THE MEN IN THE INDUSTRY AS OUR COMRADES IN THE DEFENSE OF OUR COUNTRY AND WE LOOK INTO THE FUTURE WITH CONFIDENCE KNOWING THAT WE HAVE THEIR LOYALTY AND SUPPORT WE WISH ALL OF YOU GOOD LUCK AND GOOD HEALTH IN THE NEW YEAR

ROBERT A LOVETT ASSISTANT SECRETARY OF WAR POP AIR

923A

WANT A REPLY? Answer by WESTERN UNION or similar phrases may be included without charge.

one of his messages relaying an actual combat report, General H. H. Arnold, Commanding General, United States Army Air Forces, wired, "In a recent action the Americans knocked down twenty-two Japanese planes without a loss. British pilots at the controls of nine Kittyhawks in Libya drove off sixteen heavy Nazi bombers, destroyed four and winged three Italian escort ships." ✈ Fliers returning from time to time from the war fronts were equally enthusiastic regarding the performances of Allison-powered planes. One of

these, Col. Robert L. Scott, who commanded the 23d U. S. Fighter Group in China, interviewed by the United Press, said, "We have sunk steel gun boats on the Yangtze, put anti-aircraft guns out of action and destroyed hundreds of tanks on the Burma Road. The Japanese Zero can outclimb and out-maneuver the P-40 but no pilot of the 23d Squadron would take the Zero in preference. It has superior firepower and no engine is more dependable than the Allison . . . We have never had better . . . No man who ever flew one criticized it."