

AERONAUTICS-PHOTOGRAPHY

Camera Aids Air Safety

Provides a scientific method of determining the required runway lengths by recording and analyzing take-off and landing characteristics of planes.

► A NEW camera system that provides a scientific method of determining the required runway lengths for the safety of air travelers by recording and analyzing take-off and landing characteristics of airplanes has recently been revealed by the Civil Aeronautics Administration.

The system was developed by a number of companies under the direction of the Technical Development Division of the CAA. The equipment includes two cameras, two wind indicator units, two control units and an analyzing projector. In operation, it measures accurately the distances traveled by an airplane along the flight path during a take-off or landing, and the plane's corresponding height, at exactly uniform time intervals.

Where the path of flight follows the center line of the runway, only one camera is required. It is located 1,500 feet to the side of the runway, and opposite the point where the airplane leaves or touches the ground. As the camera follows the movement of the plane, an electrically-controlled shutter snaps the pictures.

Two cameras are used when conditions prevent a precise location of the camera with respect to the path of flight, as in the case of seaplanes or flying boats. The cameras are located up to 2,000 feet apart, and are controlled electrically, so that pictures are taken by both cameras simultaneously. A special type of drafting device is required to project the line of sight from each camera through the imaginary flight paths to a point of intersection.

Each time the shutter clicks, recording the picture of the airplane, a second lens system makes a picture of a small panel which includes instruments for indicating wind velocity and direction, a stop watch, a device for counting the number of frames exposed, and a card on which special information may be written. The direction of the camera at each interval is recorded by photographing an arc marked off in degrees. Both the airplane and the instrument panel appear in the same picture.

An analyzing projector is used to study the pictures. This projector is equipped with a graduated screen which

shows the distance traveled by the airplane, and its height above ground when the picture of the airplane is projected on its screen.

The camera was developed by the Bell & Howell Company; the analyzing projector by the W. and L. E. Gurley Company; and the wind indicating unit by the Electrical Speed Indicator Company.

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AERONAUTICS

B-29s Are Put Together Like Jigsaw Puzzle

► WATCHING final assembly of America's air challenge to the Japanese prong of the Axis, the B-29 Superfortress, is a lot like looking over the shoulders of a number of jigsaw puzzle specialists and watching them put together 40,450 pieces to form a giant airplane. It is an achieve-

ment of American engineering and mass production. Only a few completed sections, such as the outboard wing panels, stabilizers, and rudders, come to the Boeing plant in Wichita, Kans., completed from sub-contractors. Sixty-two per cent of every B-29 is fabricated on the spot, on big stationary jigs.

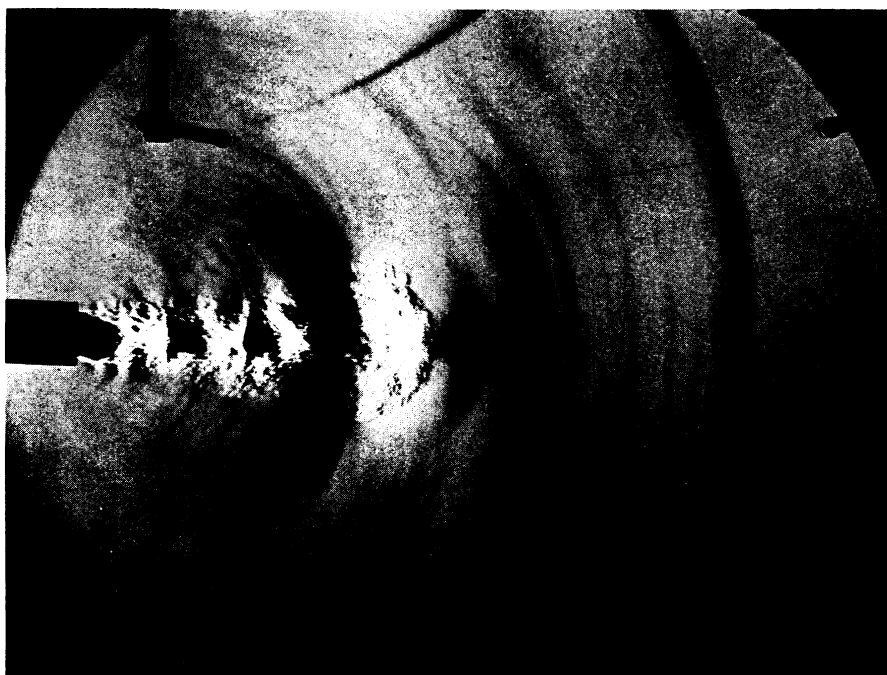
Raw materials flow in a ceaseless stream into the fabrication shops at one end of the big airplane plant. Here parts are stamped out, and moved rapidly on to waiting crews of workers who begin the job of assembling the main sections, the inboard wings, nose, bomb bay, and tail sections. Many of these sections are built standing on end, since it was found that this procedure simplifies the fabrication job. First the framework of ribs is constructed and joined to the bulkheads, and finally the skin is added.

Before the body sections, mounted on wheeled dollies, are moved in on long rows of completed units that lead to the final assembly line, other special equipment is added. This includes instruments, 149 electric motors that control almost every operation performed on the ship, more than ten miles of electric wiring, and a mile and a half of tubing.

When the wings, attached to the bomb bay, known as the inboard wing section, reach the (Turn to page 327)



ASSEMBLY OF THE B-29—This "exploded" view of the B-29 Superfortress shows graphically the system of production in which major units of the giant airplane are brought together in the final assembly stages. This makes final assemblage a matter of joining and connecting. Visible in the fuselage section at center of main wings is part of the tunnel used by crew members in passing over bomb bays between fore and aft pressurized cabins of the airplane.



BLAST—This is what happens to the air surrounding the muzzle of a gun when it is fired. Coming from the muzzle, shown at left center, are gases that are expelled. Long, dark, curved line shown at the right is the high pressure, or sound, wave. This is produced when the compressed gas in the barrel first begins to expand from the muzzle. The short, black, curved line at the top of the picture is a reflection of the sound wave from a metal plate. This picture was taken in only four-millionths of a second, by the Schlieren process.

PSYCHOLOGY

Morale Builders

► SOLDIER morale depends on two things: faith in his leaders and faith that the folks back home are backing him up, not only by buying war bonds but in their attitude and daily behavior, Dr. Edward A. Strecker of Philadelphia, consultant in psychiatry to the surgeons general of both Army and Navy, declared at the meeting of the Chicago Institute of Medicine.

"An army may march to its objective on its belly," he said, "but it takes its objective by its morale."

His contact with soldiers in and from various combat areas leads him to believe that almost irrespective of educational and cultural levels and before giving consideration to questions such as why we are fighting this war, we must satisfy the soldier's urgent need for faith in his leaders and in support from the home front.

"The morale barometer of troops in the field," he said on this last point, "dropped appreciably at the news of the coal and other strikes."

A skeleton neuropsychiatric organization capable of expansion in case of need should be kept in the Army after the war, no matter how small the peacetime Army may be, he said.

The surgeon general should be a member of the General Staff, he urged.

"It is incomprehensible," he declared, "that the surgeon general, who presides over the medical health and care of more than 8,000,000 men, should be under the line, which, if it chooses, may override his judgment in medical matters."

Turning to the future, he declared that the neuropsychiatric experience of this war teaches that we "must learn at once a sounder evaluation of democratic civilization and put it into practice before it is too late."

Although the considerable segment of young men discharged from the Army after a short trial of service and the larger segment rejected at induction are best described as temperamentally unsuited for military life, the records show, Dr. Strecker stated, that the majority had

not adjusted satisfactorily in civilian life.

"One makes no progress at all," he said, "by precipitating arguments as to whether these men are really sick. Of course they are sick, even if there should happen to be a considerable element of malingering in the situation.

"Much more important is it to know what the sickness expresses, its significance for democracy and, if possible, its origin."

Most of these men, he said, are not only unable but unwilling to serve. They show "a profound disturbance of the 'I and You' relationship."

Explaining, he pictured each individual as the center of a series of concentric circles representing his inalienable rights, which eventually expand to a point where they begin to impinge on the circles surrounding other individuals.

"The intermediate mutually held territory between I and You should be and in fact must be a land of fair give and take, of reasonable concession and of decent tolerance. While this area must necessarily have shifting boundaries, yet it is so significant that I do not think it is too much to say that the survival or the death of democracy will depend on a clearer understanding and a more accurate delineation of the I and You relationships enclosed in the area."

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final assembly line, they already carry gas tanks, two-and-a-half-ton main landing gear, and four giant nacelles.

Four assembly lines that move regularly send completed planes out the front door to be tested and flown. On each of these assembly lines a pair of ten-ton overhead cranes carries the 17-ton in-board wing section, all in one piece, and lowers it into place in a slot between the double bomb bay and nose section, with only quarter-inch tolerance. Finally the tail assembly is fitted on and pushed by the same workers who complete the final assembly. The completed B-29, weighing 120,000 pounds, is rolled out through the giant doors of the plant toward its first take-off on the road to Tokio.

There are more women than men employees at the Boeing-Wichita plant where the bulk of the B-29s are being fabricated. Most of the more than a million rivets that go into each plane are driven by women. Many were nurses, schoolteachers, students or housewives.

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