AERONAUTICS

VHF for Safe Landings

Instruments make it possible for planes to land through overcast skies at three-minute intervals. Use very high frequency radio.

➤ SAFE AIRCRAFT instrument landings at overcast airports at three-minute intervals are now possible by a new technique and very high frequency radio apparatus developed by the U. S. Civil Aeronautics Administration at its experimental station in Indianapolis at the municipal airport. By this method approximately 20 planes can be brought safely in on a single runway in an hour, while under the usual method the number is only four or five. It doubles the number of instrument landings an hour over that obtained in a method demonstrated only two months ago at the Washington, D. C., airport by the same organization.

The new method assists greatly in solving one of the most serious problems facing commercial and private flying with the greatly increased use of airways now expected. With high visibility and good flying and landing conditions, planes can safely land at a rate approximately 60 an hour on a single runway. When visibility is such that landings must be by instrument, approaching planes, under radio orders from the control tower at the port, must be "stacked up," circling at levels 1,000 feet above each other at some distance from the field, waiting often an hour or more before they can be permitted to land.

Very high frequency radio, called VHF for short, is the key to the new technique. Its great advantage is that the VHF channel is basically static-free. With the present lower frequency radio static causes much difficulty, and it is worse in bad weather when clear reception is most needed. Approach guidance is by means of a localizer element, also operated on VHF.

The new technique does not employ radar, but later, when certain developments now under way are more nearly perfected, a combination of the VHF control and radar will probably be used. This will help the tower control man "see" approaching and stacked planes, and, perhaps, result in instrument landings at the rate good weather landings are now made.

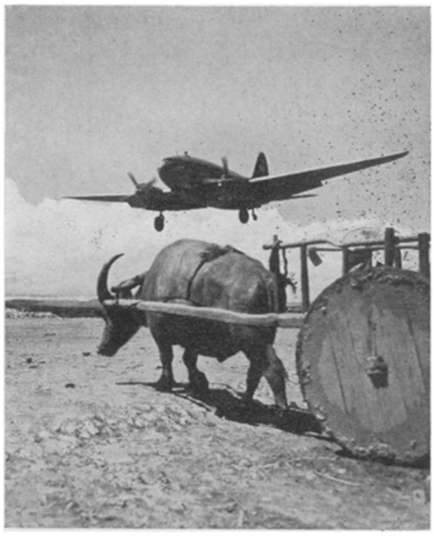
The technique of stacking and communication with the stacked planes is important in the new method. Planes are held behind a radio vertical "fan marker" 10 miles from the tower on the approach airlane. With the VHF radio equipment all pilots in the stack can hear the instructions to any individual plane, and therefore be ready for immediate action when their specific instructions come. This is a time-saver. When they hear the lowest plane in the stack ordered in, they know that each of them in turn will be lowered a thousand feet, and the pilot of the new low plane adjusts himself to be at the marker at the exact time designated by the tower man.

In a recent demonstration made for visiting scientists and aviation experts, five CAA planes participated in instrument landings under the new technique. The visitors, by means of loud speakers attached for the occasion, could hear the instructions to the pilots and their acknowledgments. The five planes made landings at intervals varying only a few seconds over or under the three-minute intervals.

When the first plane had covered about half the distance from the 10-mile fan marker to the airstrip it had glided down to perhaps a thousand feet of the earth, and the second plane was in place at the marker at a 2,500-foot level and immediately, when ordered, followed the first one in.

The government aeronautics experiment station in Indianapolis is maintained by the Civil Aeronautics Administration to develop aids to flying. It is not an institution for research and invention. Its job is to bring to practical application inventions originating in the aviation industry or in some other government agency. Much of its work, during the six years it has been in operation, has been in the development of radio aids to flying.

Its work, however, has not been confined to radio alone, but has included many other projects such as flutter recorder, fabric tester, transmissometer, approach lighting, impact-resistant windshield, stall warning device, and others. Among the radio aids developed are the instrument landing equipment and technique, the omni-directional radio range, and the aural-visual radio range.



OLD AND NEW—The water buffalo assigned to the task of building a runway in China is unperturbed as one of our Fourteenth Air Force planes roars above him. The water buffalo is the principal beast of burden in most of China. Army Signal Corps photograph.

The transmissometer makes a continuous record of the resistance of the atmosphere to the transmission or penetration of light. In other words, it makes a visibility record. A narrow beam of light, carefully calibrated, is directed at a distant photoelectric cell. The response of the cell varies with the amount of light coming through.

The station is working on an experimental high intensity beacon, consisting of a series of evacuated glass coils, through which a bank of condensers discharges several thousand amperes at about 3,000 volts. The resulting flashes are of about 50,000,000 candlepower, visible to approaching planes in daylight but too bright to be used in darkness.

The station, also, has on the landing field an installation of two-color boundary lights. They show red from the airport side, and green from the outside. It has a glide path indicator that shows a flashing light to an incoming pilot. If he is on the correct gliding path for a landing, the light appears white. If he is above the correct path, the light appears green, and if below the light appears red.

All CAA traffic control towers are already equipped with the VHF system to assist instrument landing. Before the system can be put into full use commercial