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## AIRWAY TRAFFIC CONTROL\*

R. S. ROOSE†

AIRWAY TRAFFIC CONTROL, a branch of The Bureau of Air Commerce, has been established for the purpose of providing adequate separation between aircraft when weather conditions are such as to make contact flights impossible or inadvisable and thus eliminate all danger of collision. This new branch of the Bureau is in no sense a police organization, but endeavors at all times to aid and cooperate with all pilots in flight.

Standard equipment at the stations now in operation consists of a large blackboard on which all inbound trips are posted, their time over each designated radio fix estimated, and actual times of reporting over each fix recorded. A large map is used in conjunction with the blackboard, the scale of which is eight miles to the inch. On this map all airways are plainly marked and small representative ship markers, one for each aeroplane in flight in the control area, are placed in positions to correspond with the actual radio checks received from the pilots of the aircraft represented. These markers, which are moved to corrected positions every fifteen minutes, give a very clear, concise picture of what will probably take place as the control problem under consideration progresses. Actual control information is taken from the very accurate checks and estimates on the blackboard, but the map and markers are an invaluable reference.

Two separate teletype lines are provided. One constantly receives weather reports and forecasts from all parts of the country and the other, more recently installed, is for the purpose of contacting any Airway Traffic Control Station or Department of Commerce Airway Radio Station. All movements of private, Army and Navy aircraft are reported and controlled over this system, and, in case of heavy static or radio skip, it is possible to contact regular scheduled transport aircraft.

An interphone system links the local offices of all airlines, Army, National Guard, and the local airport tower with one another. This interphone system makes all operating units on the field instantly available to Airway Traffic Control. Scheduled air-

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craft are contacted by means of their own company radio and information exchanged between the operating companies and control personnel.

In conjunction with the interphone system a standard recording device has been installed. Every word spoken by or to control personnel is recorded on this device and the cylinders filed for future reference in case of any controversy. Every report received and every instruction given is timed—the time being spoken into a microphone and recorded immediately after that particular phase of operation.

Two monitor radio receivers are supplied. One is constantly tuned to the local airport tower frequency in order that accurate check may be had on all instructions issued to aircraft operating in the immediate vicinity of the field. The other may be tuned to any desired airline frequency. Close cooperation between Airway Traffic Control and the local tower is essential for safety and efficiency in operation.

Personnel have been picked for their efficiency and experience. The various companies and services in aviation are well represented by Airways employees. During peak periods of the day an Airways station is manned by three men. "A" who is the key man to whom the others are responsible, issues the necessary controlling instructions. "B" corrects the position of the representative ship markers on the map every fifteen minutes; keeps a close check on and posts the weather and advises "A" of any change in weather; he also checks every word spoken by "A" for any possible error and offers corrections or suggestions whenever necessary. Both "A" and "B" are connected on the same line of the interphone and can talk at will. Possibility of error when issuing instruction is in this way practically eliminated. "C" is responsible solely for estimating inbound trips at the various radio fixes over which all aircraft report and for the correction of any estimate found to be in error. Correct estimates are obtained by checking elapsed time against known mileage between fixes. "C" is supplied with a circular slide rule to aid him in his calculations and to eliminate delay with the possibility of some discrepancy if ordinary mathematics were employed.

Passive control is exercised over aircraft in the control area during periods of good weather. This means that no effort is made to establish separation while aircraft are in the clear with good visibility but they are advised of any other aircraft which may be within fifteen minutes or less of their line of flight and also of the estimated time and altitude over the point at which they will pass.

Active control is taken over under conditions of instrument flight. Under these conditions separation is accomplished by two methods. The first and most commonly used by the assignment of altitudes; the second by holding over designated radio fixes at assigned altitudes. The last method is resorted to only when traffic congestion makes it inadvisable for aircraft to proceed to the next fix until traffic ahead has cleared to some extent. When flying on instruments all aircraft within fifteen minutes of one another on the airway and flying in the same direction are assigned definite altitudes with a minimum separation of two thousand feet. All westbound traffic flies at even altitudes such as; two, four, six, and eight thousand, and all eastbound traffic flies at odd altitudes as; three, five, seven, and nine thousand, thus avoiding any conflict between east and westbound traffic (SEE NEW REGULATIONS EFFECTIVE Nov. 1ST). As an inbound pilot passes over each radio fix, he reports his time of passing to his company and in turn the company flight dispatcher relays this information to Airway Traffic Control over the interphone. Not more than ten minutes or less than five minutes before reporting over a radio fix, Airway Traffic Control has relayed to the pilot through his company radio instructions, advice of all traffic of interest to him, and a clearance to the next radio fix. The picture constantly changes and in this way his advice is kept up to date. Considerable good judgment is required in the manipulation of altitudes in order that all trips may proceed and hold over their point of destination in sequence. Each time that an altitude change is requested either by the pilot or Airway Traffic Control every other unit of the problem in question must be considered carefully before the change is made. The change in altitude of one ship usually necessitates the change of two or three others.

As traffic approaches the point of destination, the aircraft estimated over the Department of Commerce Radio Range Station first is assigned the lowest attitude and cleared in to land. The next ship in line is instructed to proceed and hold over the range station at three thousand feet until advised, the next at four thousand feet, and the next at five thousand feet, etc. Immediately after the aircraft cleared in to land is on the ground, the ship holding at three thousand feet is cleared in for a landing and instructed to report when at two thousand feet and not to fly above two thousand after reporting. As soon as the ship descending from three thousand to two thousand reports that he has reached two thousand feet, the aircraft at four thousand feet is instructed to

descend to three thousand feet and report when at three thousand. Upon receipt of the three thousand foot report, the ship at five thousand feet is told to descend to four thousand and report. In this manner ships holding over the range station are cleared down in successive steps of one thousand feet until instructed to land.

This information has necessarily been given in condensed form and is therefore incomplete and in many ways confusing. A cordial invitation is extended to anyone interested in Airway Traffic Control to visit any one of the stations at any time and questions will be gladly answered by one of the staff.