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## TRENDS IN AVIATION DEVELOPMENT\*

J. MONROE JOHNSON†

A year ago, when I had just come to Washington, I had the pleasure of meeting some of you people. Your new president speaks of his desire for cooperation. I promised it then, and nobody knows better than I that uniformity of legislation is absolutely essential. Last year I knew nothing whatever about the problems of air transportation, and as I have had four other bureaus to learn about, I feel perhaps I haven't gained very much on the industry, but I think I shall be able to catch up on the sick within a short time.

Think of what has happened since I met with you last year! While this was going on at home important developments were taking place beyond the boundaries of continental United States. Airmail service across the Pacific to Hawaii and the Philippine Islands, inaugurated late in 1935, is in operation regularly with a round trip every 10 days. The next step will be passenger service. Bureau of Air Commerce inspectors already have flown over the route, inspected the equipment and checked operations methods and the Department has issued a letter of authority for the air line to operate this service.

Trans-atlantic scheduled service is soon to become a reality. This involves diplomatic negotiations between the nations on both sides of the ocean, and the conversations toward this end are proceeding satisfactorily. There will be two routes, a northern route via Newfoundland, and a southern one by way of the Azores and Bermuda, and services will be operated by both American and European air lines.

The Hindenburg will soon complete twelve trips. Those things have happened since I met with you last. Fortunately for me, I have led the negotiations with Great Britain. I want to assure you that the share of the United States will be safeguarded. The United States produces 80% of the traffic, so why, in this trans-atlantic flying, should we let someone else have 80% of the business?

A conjecture on my part, confirmed in my mind now, is that

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while we take great pride in the development of aviation, it is still in its absolute infancy. Things we have pride in today are in a few days obsolete. I am informed by your airline companies they have no reserves at all for physical depreciation, but their reserve is for obsolescence. You are in an industry competing with other forms of transportation, and you have the world in front of you. Those other forms of transportation have no more business, no more revenue, until people produce more business, while you have just the slightest part of 1% of your potential business. The Douglas Aircraft Company took pride last year in their new ship, but now that has been superseded by a bigger Douglas. The Boeing Company is also bringing something out. Things looked at in wonder today are quickly superseded tomorrow.

You of course are aware of the encouraging trends apparent in all phases of aeronautics. There is a new interest in flying, a larger volume of air traffic, rapid strides are being made in design of flying equipment, production is increasing, scheduled air service is being expanded to embrace transoceanic routes; in fact, you will find evidence of optimism and concrete progress wherever you turn in aeronautics.

I believe we are at the beginning of another phase of development which will equal or exceed the one which began in 1926, with the important difference that we now have much more upon which to build than we had in 1926.

In the operation of scheduled air lines, the new advance is well under way. During the calendar year 1935 the scheduled lines of this country carried 860,000 passengers, which was better than a 50 per cent increase over the preceding year and the first important gain in four years. This year it appears that passenger volume will pass the million mark.

Air mail jumped from 7,800,000 pounds in 1934 to nearly 14,000,000 in 1935, and there is every likelihood that there will be another substantial increase in 1936. Air express is growing at an amazing rate. There has been a gain in every successive year since 1926. Poundage continued to mount right through the depression years, and in 1935 the air lines carried 5,500,000 pounds of air express.

In miscellaneous operations branches of the industry—charter flying, aerial photography, crop dusting, student instruction, private flying and the like—there has been a steady increase in the number of miles flown annually since 1933. The number of licensed air-

planes and pilots likewise has increased. There now are more than 15,000 licensed pilots, more than 7,000 licensed airplanes.

The Bureau of Air Commerce report on aircraft production for the first six months of 1936 discloses that American manufacturers built 1,363 aircraft during the first half of the year. This was a notable gain over the corresponding period of the previous year, and the total for the 6-month period exceeded the total for the entire year 1933.

Everything is growing. You are fortunate to be state aviation officials at a time like the present when your efforts at promotion and regulation of aeronautics in your states are bound to have deep significance and to bring about gratifying results.

The work of the Department of Commerce reflects the increasing importance of aeronautics in everyday business and social life of the nation, and at the same time contributes to this development.

For example, air traffic along the established air routes has become so much heavier in the past few years, and so much of it takes place under the difficult conditions presented by unfavorable weather, that the Bureau of Air Commerce has found it necessary to institute a system of airway traffic control.

Airway traffic control stations are in operation at Newark, Chicago and Cleveland. Others are being established at Pittsburgh, Detroit, Washington, Los Angeles and San Francisco. These control stations coordinate the movements of all airplanes flying along the airways converging at their airports, carrying out this function every day, in good weather or bad, but bearing the heaviest responsibility in poor weather, when aircraft are flying in or above the clouds, and it is especially necessary to see that they are at safe distances from each other.

The airway traffic control station is, in effect, a super dispatching agency, coordinating the work of the various air line dispatching departments and following the operations of any other craft on the airways, including miscellaneous commercial operators, private flyers, and pilots of the Army, Navy, Marine Corps and Coast Guard. It receives reports on the flight plans of all the air lines and all other planes, gets radio reports from the air lines and Bureau of Air Commerce stations as to progress of airplanes in the air. Through these same radio stations it issues instructions which put the various airplanes at different altitudes, or in some cases reduce speed or alter courses so that there will be sufficient separation.

A number of airports have airport traffic control towers for supervising actual takeoffs and landings. Airway traffic control stations necessarily work in close harmony with the towers—bringing the airplanes to the vicinity of airports in orderly sequence and turning them over to the towers for the landing operation.

To make the system effective for all aircraft, the Bureau obtained the cooperation of the Army, Navy, Marine Corps and Coast Guard, and promulgated new regulations governing the flight operations of non-air line craft engaging in intentional instrument flight along the airways through or over clouds. These new regulations provide for ratings on instrument flying for non-air line pilots, require these pilots to furnish advance information when they propose to proceed through or over clouds along an airway, and require them to report on their progress by radio en route.

The fact that a traffic control system and regulations governing intentional instrument flying along airways were necessary is definitely an indication of progress. They were needed only because the aeronautics industry has advanced to the point where it can keep operating in weather which formerly would have been prohibitive, with more regularity of service and fewer cancellations.

You know, in speaking of traffic control, every movement of every animal on the surface of the earth has always been in a path. The buffalos of the plains and the birds of the air have their paths. We came along, and we had the bridle paths, wagon roads, then the highways and railways. From the time of Solomon, human beings have sought to fly. We began to fly, and now it has become matter of fact. Our airways are 50 miles wide compared with the width of the railway of  $4.8\frac{1}{2}$  feet and highway width of 20 feet. We have airways 50 miles in width, but these have depth as well. All the other paths for traffic have length, but almost no breadth and no thickness. We have unlimited breadth, unlimited length, and unlimited depth, and yet already we have the problem of traffic control in a limitless atmosphere. Finally, we are beginning to think in terms of traffic control at different altitudes. We can't stop airplanes with red and green lights, but something has to be done about them, and with time and thought spent on it we ought to have no trouble at all.

I come from South Carolina. I believe in states' rights. We started this railway business about 1830, and as soon as we got it started we had our Railway Commissions, and for years went along all right and the trains were run successfully, but it was thirty or forty years before the railway was recognized as a means of suc-

cessful transportation. As soon as a little speed was developed and the trains got to traveling greater distances, they found the state boundaries were too close even for trains. The Interstate Commerce Commission was formed in 1887. Each state could not have separate regulations for the railways, so the Interstate Commerce Commission took on this duty and, from day to day, year to year, the state railway commissions have even changed their names and devote their entire attention to something else. Now to come to this air business, you can see at a glance that to be cognizant of new regulations and to fly with peace of mind and certainty, you have to have uniform regulation, and the only way to have it is to have the various states pass almost identical regulations. There will be individual ideas and desires that might not and should not interfere at all with persons not crossing the state boundary, but you cannot get into an airplane in any state and go very far without going out of the state. Most nations are much smaller than ours, and an airplane cannot go very far without crossing a national boundary.

When savages lived far apart, each man's right was his own law, but he found out that to combine families and have a chief brought more power, and this went on and on until we had states and nations, and we had to surrender some of our individual rights, but we still have every right that doesn't interfere with some other individual. It is proper that the individual, the county, the state, and presently the nation should surrender those rights that interfere unnecessarily with some other individual, state or nation. I have no regrets when South Carolina surrenders any right which interferes with North Carolina or Connecticut, nor am I jealous when the United States surrenders any right which interferes unnecessarily with Canada or Mexico, and you people can bring that lesson home to the world. Wars are caused by nations not caring and refusing to surrender national rights likely to interfere with another country. We have laws to settle our disputes in civil life in accordance with the readiness which we take to comply with the decrees of the court. That is a measure of civilization, and there is no reason in the world why aviation cannot bring that lesson to humanity when flying to all parts of the world. When we are so closely together, there is no possibility of maintaining civilization unless nations, like individuals, and states, surrender their rights whenever they interfere with the rights of others.

Now then, when you have your uniform regulation, there is a peculiarity of the American not to be compared with any other

man on earth which has to be taken into consideration. We have very heated campaigns, but when we vote, we don't think we have to fight. We count the ballots and go home. That is another great mark of the measure of civilization. We consider that the majority vote represents the will of the people, and will consider the result right until we have a chance to vote again. We don't like governmental regulation, especially federal governmental regulation. In general people do not like to be interfered with by the federal government. We, in Washington, are open-hearted and anxious to serve. It would be fatal if any state thought the Bureau of Air Commerce was urging any piece of legislation on it. We will help you to form suggestions, but they must be proclaimed as such, but while we may say we think it is fine, and tell you we know it would be fine to have uniform regulation, if you want South Carolina, my state, to pass it, don't announce it as a federal regulation. I think every state in the Union more or less feels the same way. If we can help you, nothing will give us greater pleasure. We know that without uniform legislation in aeronautics, chaos is the result.

Turning back now to developments within the United States I want to mention a project of the Bureau of Air Commerce which concerns not only scheduled air transportation, but also all other phases of aircraft operation, namely, the airport development program. As state aviation officials each of you knows what has been accomplished in your own state toward the establishment of new airports and improvement of old ones by means of Works Progress Administration projects, with the Bureau of Air Commerce participating as adviser and consultant on technical aeronautical phases. Nationally, the last report of W. P. A. shows that 506 projects have been released for operation at 438 locations. Total funds released for these projects amounted to \$40,690,290. These figures cover the present W. P. A. program only, and are in addition to what was accomplished previously under the Civil Works Administration and the Federal Emergency Relief Administration. The present program is by far the best of the three from the airman's point of view, because it includes such substantial improvements as hard surface runways, hangars, aeronautical lighting and radio equipment.

In the Bureau of Air Commerce airplane development program, aiming at improvement of private owner types with reference to simplicity of operation and reduction of costs, five of the six new type airplanes for which the Bureau contracted have been de-

livered, and other work on engines, propellers and accessories has been completed or is under way.

One of the planes is the Hammond, a craft which is outstanding for the ease with which any pilot, even a novice, can take off and land. A second is the Waterman tailless airplane, in which the tail has been eliminated entirely, and control surfaces are at the trailing edges and ends of the wings. A third is the Weick, an experimental venture with which various new principles in control are being tested. The Curtiss-Wright Coupe embodies in a small airplane the all-metal type of construction which has been utilized so successfully for large transport craft. Latest to be delivered to the Bureau is the Arrow, which in most respects is conventional, but which is powered with a Ford V-8 automobile engine. The sixth aircraft is an autogiro of advanced design, an outstanding feature of which is ability to operate on the highway between the owner's home and the field at which he is to take off.

In activities such as I have been discussing it is necessary for the Federal government to take the initiative. In many others the responsibility falls to state officials. In everything close cooperation between the states and the Federal government is essential, and in some cases it is a prerequisite to success. In the airport program, for example, the states in which local officials have participated actively in setting up programs and seeing them carried through are the ones which have seen real improvements effected in their airport systems.

It is the view of the Department of Commerce that aeronautics in the United States can best be expanded and safeguarded if, in addition to the activities of the Bureau of Air Commerce, the states within their own spheres undertake to encourage aeronautics upon the basis of integrated programs and to regulate flying under rules and practices which are uniform.

I am sure that the states in general concur with this view. The efficient manner in which they have cooperated in the nation-wide airport programs is one indication that they do. The spirit of cooperation that is invariably present in general conferences between the Bureau and State officials, and in individual contacts, is further evidence. The present status of licensing requirements—most of the states now simply require pilots and aircraft owners to hold Federal licenses, thus achieving uniformity in the simplest possible way—testifies to the concern of the states for uniformity in aeronautic regulation.

This happy situation is a direct result of the National Associa-



tion of State Aviation Officials program. It is through your organization that so much progress has been made toward unity of purpose and uniformity of regulation, and it will be through you that further gains will be made.

The Department of Commerce has information respecting draft state aeronautical regulatory acts and a draft airport act which will be furnished to any states requesting it. Any assistance that we can give is freely available to the states in framing further legislative programs. But we want at all times to be sure that we are simply giving information and assistance, and bear in mind that the state itself finally must decide what legislation and regulations it requires to meet its own local problems.

Conversely, we are relying upon the state officials individually and through their associations for advice and counsel on proposed new Federal regulations as the necessity for revision or amplification of these Federal regulations arises from time to time.

During the past ten years, since the enactment of the Air Commerce Act in 1926, the number of aviation activities to be brought under Federal supervision has increased very rapidly and changes in operating methods and techniques have required corresponding alterations and amendments in the regulations issued by the Secretary of Commerce. For some time it has been obvious that while the regulatory program was quite well adapted to conditions as they have been and now are, it is not sufficient to afford that full measure of flexibility of treatment which will be required for the next ten years.

Accordingly, an effort was made to take a careful inventory of the situation and, within the legal framework of the Air Commerce Act, to plan a regulatory program sufficiently comprehensive to permit the expansion necessary for the next decade. The assistance of two outside legal counsel was arranged and we are now proceeding to revise the whole set of Department rules and regulations.

The fundamental change which will be first noted is one of form rather than substance. While somewhat different from the bulletins which have been previously issued, the new Regulations Manual will be found, upon inspection, to be in better order and casier to read. We hope, also, that it will be even clearer in its meaning. Naturally it is expected that it will take considerable time to complete this job.

The present plan provides for a series of drafts to be examined and tentatively approved by the Department technical and legal personnel.

We then intend to circulate the most important of these new regulations for the inspection and comment of a select group of persons interested—including representatives of the National Association of State Aviation Officials.

We shall be pleased to have your full and frank expressions thereon, but we shall of course have to reserve to the discretion of the Secretary of Commerce the final decision prior to issuance. When the tentative drafts have been reworked in the light of the best thought and advice thereon, they will be formally issued to take the place of the regulations now in force.

Realizing the far reaching effect of any scheme of such magnitude, we shall be quite as anxious as those subject to the control of the regulations to see that they are not premature nor unsuited to the general objective of all sound control—*the full promotion and development of aviation in all of its phases.*

If you live five years from now, you will find that you have not the least conception of what aviation will be in five years, or what regulations will be necessary. I don't know how close kin you are to Jules Verne, but nobody, not Solomon himself, could prophesy where aviation will go, so when making these regulations, you had better use a loose-leaf book, and from time to time put in new leaves. It will be necessary to change some of these regulations overnight until they become crystallized. Some years hence, instead of 8000 airplanes in the United States there will be 100,000, and you can go and come as you please and there will be no prejudice against flying. It is a business now, and those of you who have exhibited executive ability or financial ability, can grow into this as a business. You will notice that most of the flying men are young, so as time goes on, there will be some older men on the ground who are more stable and conservative. But we have to have pioneers.

These regulations are going to be flexible just as much as possible. We must stop right where there might be a chance for partisanship. For each infringement of a regulation, the required penalty ought to be paid.

As you read the papers of the United States you would think that American aviation was an opportunity to risk your life. I am sorry that Governor Cross spoke about the bathtub. He said the dangers of it were on a par with air traffic in the United States. Our civil aviation in its airways, in the excellence of its equipment, and in safety, is far ahead of the rest of the world. If I recollect, correctly, we are six times as safe as Great Britain, and twelve or thirteen times as safe as the rest of Europe. They have no radio

beacons, and do very little flying at night. There is nobody that even approaches us. The United States airlines flew like this—one 20½ million passenger miles, two flew 70 million, and one 90 million without a single passenger fatality. Don't let anybody fool you that anybody else approaches us in excellence. I think the Federal Aviation Commission was right in saying, in no uncertain terms, that our air lines are superior. We haven't much military and naval equipment, but the quality of our military equipment is superior to that of foreign countries. If we had as many airplanes as Italy has, we would not have enough pilots to fly them.

We, as you know, cannot get along without cooperation. We are perfectly helpless in the Bureau of Air Commerce without cooperation of this body and all the other agencies of the aviation business in the United States. There are any number of bodies that shape the opinions of the aviation activities of America. If there is resistance to any new thought that we suggest, any such body as the Manufacturers' Association, the editors of an aeronautical periodical, and others which desire uniformity, and who desire advancement of civil aviation in the United States, can influence opinion. Through such cooperation the best results can be brought about. We can't do without you and your thinking.

In 1932 there was a certain appropriation advanced for air commerce, and there was a certain volume of aviation activity. In 1935 the moneys allotted were 62% of the 1932 appropriation, and the activities had increased 300%. Now when you say that such and such should be lighted, and this and that done that we don't do, just imagine having 62% of the amount of money that we had in 1932 with 300% more to be done, and then you will find out we have done a pretty good job. Air commerce is six times as safe now as in 1935 with 62% of the money and 300% more load. We aren't discouraged. We are going to continue to give you that much of service with the aid of your cooperation and more uniformity of legislation.

The cordial relationship between the state aviation officials and the Department of Commerce represents a priceless asset to aeronautics. It enables us to work together towards the ends that all of us desire, and to discover the workable course promptly if there is a difference of opinion about details.

Continuance of this good will and cooperation is vitally important, and I am confident it will be continued. For the Department, I can say that we respect and admire your organization and its work. It is my pleasure to congratulate you upon past accomplishments, and to extend my best wishes for the future.