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16. Abstract On November 13, 1980, the availability of two studies was announced to the public in the Federal Register. These two studies are the "Microwave Landing System Transition Plan - Draft" dated October 20, 1980 and "An Analysis of the Requirements For and the Benefits and Costs of the National Microwave Landing System" dated June 1980. These two studies were the basis of four public hearings: Los Angeles, January 5, 1981; Denver, January 7, 1981; Chicago, January 9, 1981; and Washington, D. C., January 13, 1981. In addition to the public hearings, the public was invited to submit written comments by February 10, 1981. Approximately 150 people participated in the four public hearings and 39 letters were submitted.					
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SUMMARY

Microwave Landing System Public Hearings and Written Comments

Public Coordination

The Federal Aviation Administration (FAA) has analyzed the benefits and costs on the FAA and the aviation users (air carriers, commuters and general aviation) of continuing with the existing instrument landing system (ILS) or replacing ILS with the proposed microwave landing system (MLS). The FAA has also proposed ten MLS implementation strategies which contains an analysis of the economic impact on the aviation users of each of these strategies.

However, public coordination of these two analyses was considered essential to obtain user input as a guide for future FAA actions. The two analyses were published as two separate studies so they could be made available to the public for review and serve as a basis for input. The studies are the "Microwave Landing System Transition Plan-Draft" dated October 20, 1980 and "An Analysis of the Requirements For and the Benefits and Costs of the National Microwave Landing System" dated June 1980.

A. Public Hearings

Using the two studies as references for public comment, their availability was announced in the Federal Register on November 13, 1980, along with the schedule for four public hearings. These public hearings were held in: Los Angeles, California, January 5, 1981; Denver Colorado, January 7, 1981; Chicago, Illinois, January 9, 1981; and Washington, D. C., January 13, 1981. The public hearings were attended by representatives of a wide range of aviation user groups, including airport owners, state and local government aviation organizations, (e.g., Airline Pilots Association and the Commuter Airline Association of America), airlines and environmental interest groups. A verbatim transcript of the four public hearings is available in Appendix I of this document. A total of approximately 150 people participated in the four public hearings.

B. Public Written Comments

When the availability of the two studies was announced on November 13, 1980, the public was also invited to submit written comments regarding their views on MLS implementation. Comments were requested by February 10, 1981, for consideration in the development of a final implementation strategy. As a result of the request for written input, 39 letters were received from representatives of various segments of aviation, (e.g., individuals, aviation organizations and the Department of Defense). State aviation

organizations comprise the largest group of those responding. With the exception of one individual, all comments received support MLS implementation. Copies of the letters received are enclosed in Appendix II of this document.

C. Summary of Public Comments

The statements presented at the public hearings support implementation of MLS. However, comments varied regarding which airports should receive initial systems and the rate at which implementation should take place. For example, representatives from commuter airlines suggested that initial MLS implementation should occur at the smaller community airports that feed the major city airports; on the other hand representatives of the Airline Pilots Association recommended that implementation begin at major city airports on runways that do not currently have an ILS.

The written comments supporting MLS implementation were generally very similar to those received during the public hearings. The primary recommendation was to install MLS ground equipment in networks that connect to major city airports. The network installations would encourage the pilots or airline companies that frequently fly into these network airports to equip aircraft with MLS avionics. However, comments were expressed, primarily by the Air Transport Association of America that MLS implementation should begin on a relatively small scale and the benefits of MLS be more fully demonstrated prior to widespread implementation.

The preferred strategy expressed at the hearings and in written comments would be to install MLS in networks that connect to major city airports. In this strategy, priority would be given to initial installations at small community airports where the use of an ILS is not presently possible due to siting, terrain and/or frequency problems or at other small community airports that have commercial service but do not have an ILS. It should be noted that many of the verbal and written comments supporting rapid MLS implementation were based on the belief that curved/segmented approaches which support noise abatement procedures are a benefit that is immediately available. These types of approaches will probably not be fully approved until after the first MLS facilities have been in operation for several years.

APPENDIX I

TRANSCRIPTS OF FOUR PUBLIC HEARINGS

Los Angeles, California - January 5, 1981
Denver, Colorado - January 7, 1981
Chicago, Illinois - January 9, 1981
Washington, D. C. - January 13, 1981

PUBLIC HEARING

"Microwave Landing System"

Monday, January 5, 1981
2:00 p.m.

Hacienda Hotel
Crystal Ballroom
525 North Sepulveda Boulevard
El Segundo, California

INTRODUCTION

Mac McClure
Deputy Director, Western Region
Federal Aviation Administration

Good afternoon ladies and gentlemen. I'm Mac McClure, the Deputy Director of the FAA Western Region, and I want to take this opportunity to welcome all of you to this first in a series of four public hearings on the microwave landing system.

It's a privilege for the Western Region to host this very first hearing. I'm sure that from the subject matter of this hearing you're well aware of the fact that the gestation period for the MLS program is almost over. The FAA recognizes that a decision on the implementation of MLS is tied to the question of how we can transition from the ILS to the MLS as easily as possible.

We are fortunate to have with us today several of the people from the FAA who are seeking your involvement in this decisionmaking process. I want to assure you that the representatives of the FAA who are here are more than willing to listen, as well as to attempt to answer any questions that you may have regarding MLS. Coordinating this effort and chairing the public hearings for the FAA is our Associate Administrator for Policy and International Aviation, Dr. Bill Wilkins. At this time I would like to turn the hearing over to Dr. Wilkins.

Dr. Bill Wilkins
Associate Administrator for Policy and International Aviation
Federal Aviation Administration

On behalf of the FAA and Administrator Bond, let me welcome you to this meeting today. I want to take just a minute to first describe what we will be doing for the next few minutes and then to introduce to you the FAA people who are here by reason of their involvement and duties in the MLS transition process.

First, we expect it will take us almost exactly an hour to make a set of presentations to you, the first of which will describe briefly the characteristics of MLS and will include a film. Then I will talk for a few minutes about the transition process itself, and then at the end of that time, which will be as I said about an hour from now, we will invite the people who have signed up to make formal presentations to make their presentations. And we will then go to any other comments, questions, and answers which might be forthcoming.

The FAA'ers who are here -- let me introduce them to you. You've met Mac McClure. Going down the table, Sieg Poritzky. Sieg is the Director of the Office of Systems Engineering Management and will be speaking in a few minutes. Ed Kennedy, some of you may recognize. He is the Deputy Director, Airway Facilities Service, representing the Associate Administrator for Air Traffic and Airway Facilities. We also have Jack Edwards who is Chief, Navigation and Landing Division, Research and Development Service. We also have Mr. John Kern, Chief, Aircraft Programs Division, Office of Flight Operations.

Again, I would urge any of you present who wish to make statements to do so after the formal presentations. We'll begin our formal presentations now with Sieg Poritzky.

Siegbert Poritzky
Director, Office of Systems Engineering Management
Federal Aviation Administration

"The Introduction of the Microwave Landing System -
A Call for User Involvement"

The microwave landing system, a system generally superior to the venerable instrument landing system, has been developed, is proven to be technically successful, meets a series of rigid operational requirements which were imposed on it by the aviation community itself, and is nearing the end of the international standardization cycle. What remains is choosing the method of introducing the MLS into operational service and establishing a sensible eventual transition time from ILS to MLS -- transition time and method.

The views of the aviation community are crucially important because the transition to MLS will be difficult. It may be tempting, or in the near term convenient, to simply forget about it and press for the installation of more ILS. But we believe that the studies we've made, the clearly evident benefits, and the previously expressed views of the community are such that the transition should proceed.

The aviation community has been instrumental in microwave landing system development from the beginning. Back in 1967, with the FAA's blessing, the Radio Technical Commission for Aeronautics (RTCA) formed Special Committee 117 for the purpose of making recommendations on a new precision approach and landing guidance system. The RTCA agreed from the beginning that the search for a new approach and landing system would try to draw on the expertise of all countries in the world with instrument landing system knowledge. The response of the world's best experts and companies with diverse interests is remarkable. Literally hundreds of people, organizations and countries participated.

The first task was to write a set of operational requirements documenting the needs of all users, from general aviation aircraft interested in landing on grass strips to short takeoff and landing aircraft and helicopters, to large airline jets, to military aircraft with their diverse missions.

Operational requirements were agreed on, later endorsed by FAA, and later substantially adopted by the International Civil Aviation Organization (ICAO), the standard-making body of world aviation. The cooperation was remarkable also during nearly all the development of the microwave landing system which was undertaken in this country in a joint program by NASA, the Department of Defense and the FAA.

At the end of the development period, an international group of experts was again assembled to help the U.S. reach the system decision. And another group, the ICAO All Weather Operations Panel prepared the way for the international decision. The cooperation was superb almost to the very end when a nagging international controversy developed over one part of the signal format. But this problem too was overcome and in April 1978, the International Civil Aviation Organization selected the broadly supported U.S./Australian Time Reference Scanning Beam System for the new microwave landing system.

Much has happened since. The ICAO technical standards are now very near formal adoption with a worldwide meeting to agree on them scheduled for April 1981. We have every reason to believe that ICAO will finally ratify the new system.

Before continuing to talk about the benefits and the capabilities of the system, we'd like to show a brief film describing the microwave landing system and what it can do. (Film presented)

As you heard, we expect worldwide standardization to take place in early 1981, and as that is happening, FAA has undertaken a series of activities, some of which were mentioned in the film. We're moving along on the service test and evaluation program -- the STEP program -- which is really a further demonstration of MLS capabilities in operational terms, following up on the extensive international demonstrations which you saw in the movie.

You heard about the first three installations and the one at Clarksburg, West Virginia, yet to come. And we will have two additional facilities to be installed in mid-1982. Sites for these systems will be determined shortly. As also was touched on in the film, we're procuring 30 airborne MLS receivers to become available this spring to permit FAA and selected operators to participate in MLS operational evaluations.

We have awarded a contract for the development of a computer chip which we expect will lower the cost of airborne MLS equipment for the future. Utilizing these chips, we hope to procure 20 receivers in the high end of the general aviation category starting in mid-1982. The development of airborne receivers by the industry is essential.

MLS implementation, as all implementations of this kind, is a "chicken and egg" proposition. Ground implementation is not likely to occur very extensively until receivers exist and vice versa, and so it goes.

We have completed a Notice of Proposed Rulemaking which would amend the Federal Air Regulation Part 171 to permit the use of non-Federally funded MLS's for publicly authorized approaches. This action, on which the comment period ended on November 7, 1980, is intended to permit those of you in the aviation community who wish to proceed now to achieve the benefits of MLS to move forward. FAA will cooperate fully with users and providers who wish to proceed with MLS implementation with other than Federal facilities and equipment funds.

In late 1982 we hope to procure and commission for operational use approximately ten pilot production MLS ground stations. These systems will not only provide early operational benefits to users but will permit final development of commissioning and flight inspection standards.

Now, the film you saw demonstrated very briefly a number of MLS capabilities. How do we know these capabilities exist? We've proven them. The MLS development program has taught us more about the capabilities of MLS than we've ever known about any system in aviation prior to implementation. We've successfully demonstrated the capabilities of the system at 12 of the toughest sites around the world in complex procedures. But what will it do for you?

Let me turn quickly to the benefit-cost study and tell you briefly what we've found in what we believe is a realistic and objective assessment of MLS. It's difficult to translate the demonstrated superiority in operational performance into dollars and cents. Some of the most obvious technical capabilities are not amenable to ready calculation of dollar benefits. Yet they may in the end be the most important. Let me start with those.

Let me have the first slide please. The superior quality of signal will provide for more reliable coupling to the autopilot, making it easier to achieve consistent and routine auto-land capability. The ability to standardize operations so that all approaches can be made in the same way in all weather conditions will yield considerable economic benefits when procedures are devised to make these operations routine. It will also please the National Transportation Safety Board since the use of auto-land capability in a routine manner is their recommended procedure for the future.

I must note that the method we used for calculating benefits, and I'll come back to that, assumed MLS service to the Category I level of service only. This means that at runways where an MLS might provide better than CAT I or even better than CAT II signals, but where an ILS can only provide service to less than Category I, the dollars credited to MLS include the benefits to CAT I only. In cases where unrestricted CAT I service is available with ILS, the MLS accrues no dollar benefits, even

though it's capable of providing a much better signal than Category I. The additional safety benefits due to the system's ability to routinely provide better signals and better service than ILS are, therefore, seriously understated in the calculations that we made.

Next, the use of variable glide slope angles with MLS provides the ability to restructure approach paths, as you saw in the film, to permit segregated approaches to be made to short runways by general aviation, commuter and perhaps helicopter operators. Thus, there is the capability of providing several glide paths for a variety of aircraft which will enable small aircraft to follow heavies at higher glide angles as a means to ensure protection from wake turbulence, although this is still controversial.

The capability of using flexible approach paths, however, both in azimuth and in elevation, as well as the availability of precision departure or missed paths, should make it possible to segregate traffic according to aircraft flight characteristics. This operational flexibility provides the potential for significant dollar benefits.

The work of our FAA/Industry Major Airport Task Forces, of which one I believe is still at work in Los Angeles, has pointed to other potentially valuable applications of MLS at major airports. We foresee innovative applications, particularly in providing precision missed approach capability for either independent or dependent IFR approaches to triple parallels. Other applications include independent approaches to separate short runways for general aviation and commuters. MLS may also provide the possibility for independent operations to parallel runways more closely spaced than today's standards allow.

The potential benefit has been identified by using MLS on converging runways. Converging approaches are used extensively under visual conditions. They are not used when the weather goes below 800 feet and two miles because the aircraft may not see each other in the event of a simultaneous missed approach. MLS guidance could allow high capacity configurations to be used in this kind of operation, IFR, by providing the ability to provide precision navigation for missed approaches. In the case of O'Hare, this represents the difference of perhaps 170 operations in certain weather conditions, and 135.

The flexible approach capability of MLS will allow some airports to take advantage of surrounding industrial areas or waterways to offload noise or other environmental problems, again touched on in the film. This is an important benefit to MLS. One can readily imagine departure and arrival flight profiles to take advantage of this capability. Yet, since there is no agreement on how one should assign dollar values to the highly desirable attribute of being a good neighbor, this benefit category was not quantified in the study.

It must also be said that the flexible or curved approach capability will require more than just the MLS ground station and a simple MLS receiver. It will require a flight control system and an RNAV computation capability to take full advantage of it in the aircraft.

Finally, there is the significant benefit category of nonproliferation, but I'm not going to touch on that now. I'll come back to it in a moment.

As you can see, major categories of benefits are not included in the benefit-cost study. They are not on the books yet. To put them there requires redefinitions of terminal area procedures which must be defined and evaluated by our Flight Operations and Operating Services. They are benefits which you as well as we must press for and exploit if they are to result in a realistic improvement in precision guidance service. The FAA is committed to respond constructively to proposals to exploit MLS advantages. After all, we taxpayers have every right to exploit a more than \$100 million investment.

Let's go to the next slide please. The benefit-cost study did attempt to make a realistic and objective assessment of MLS capability of providing operational advantages in several significant benefit categories -- the ones shown on the slide.

First, the superior quality of signal will enable precision guidance service where none, or at most, severely restricted service would be available from ILS. As I've said, dollar benefits for improved safety were estimated only if ILS equipment was restricted to less than Category I service and could be corrected to at least this level with MLS. In addition, since all dollar calculations were based on the existing criteria for installing ILS, the safety benefits were estimated for IFR weather conditions only. For many owners of general aviation aircraft, the benefits in increased safety resulting from receiving precision guidance service at locations not able to receive full unrestricted ILS service, but available from MLS, will become newly available.

The majority of precision guidance installations currently planned which will increase the number of ground ILS systems or precision approach and landing guidance systems from the present level of about 620 to the 1,250 level forecast for the year 2000 will be made at small community airports serving the general aviation and commuter communities. These places are not equipped presently to provide precision approach service. Almost all the alternative strategies proposed for implementing MLS in the books that you've seen or received, as described in the transition plan, are for the earliest installations to be made at such airports.

Second, the inherent reliability and superior quality of the MLS signal will continue to provide precision guidance service when weather is poor and restricted service only is available from ILS. Thus, delays due to flight diversions or cancellations may be averted during periods of reduced visibility with MLS in place of ILS at selected airports.

Third, the technical capabilities of MLS will enable properly equipped aircraft to make curved or segmented approaches or departures or missed approaches. These capabilities will provide for more efficient use of airspace. Airway routings -- again, you saw an example in the film -- which are presently found to conflict at major airports can be eliminated. For example, the case study that was touched on of the common airspace surrounding New York City's airports reveals that significant increases in capacity could be achieved by the elimination of intersecting approach patterns with the segmented or curved approach paths available with MLS.

The use of MLS may reduce taxiway restrictions and their resulting delays at selected airport locations such as runways 4 left and right at Kennedy. Obstructions at JFK make it necessary to locate the ILS glide slope antenna on the taxiway side of the runway where an adequate smooth ground plane exists. The MLS requires a much smaller protected area. Delays due to signal restrictions at this runway can be eliminated.

Fourth, a considerable advantage of MLS is the potential for expansion of the national network for all elements of aviation users from grass fields to major jet ports to military uses. A shortage of assignable ILS frequencies exists now in certain major hub areas. ILS, as you know, currently has 20 channels available with a possibility of expansion to 40 by channel splitting and by the rather costly conversion of existing airborne equipment. It's been estimated by FAA that even with the splitting of available channels, the national network will be limited to about 1,400 ILS ground installations. An expansion beyond this level would result in severe limitations in service at congested hub areas.

Our current forecast requirement is for 1,250 by the year 2000. But forecasting is treacherous business, and even small changes can lead to significant underestimates. The problem associated with such conservative forecasts can be avoided by providing now for a system with adequate potential for growth -- MLS with 200 channels.

Fifth, the MLS requires no horizontal plane for generating its signal in space and is thus less vulnerable to the effects of snow, rain, tides or other deviations in terrain smoothness. In addition, the unique design of MLS makes it easier to diagnose the causes of system outages and make repairs. The result should be less downtime with MLS equipment and fewer aircraft delays. The dollar benefits claimed in this category in the benefit-cost study were based on a three-month study of the ILS system outage record at O'Hare and the pattern of air traffic delays which resulted from those outages.

Sixth, as you saw in the film, the use of the smaller MLS antennas and the ability to avoid extensive site preparation, as you saw in the film, provides a benefit which does not accrue directly to the aviation user but is available to the FAA as the manager of the national network in the form of reduced investment needed.

Seventh, for fuel savings, there is a measure of double counting in our study, since in our tally of dollar benefits due to the MLS ability to reduce delays we estimated delays by the amount of savings in aircraft operating costs. Fuel is already included as a component of these operating costs. However, with the current fuel problem, it is important to keep a separate subtotal tally of the potential for savings of our nation's fuel resources. Based on estimates made at selected case study locations, our MLS benefit study identified a significant potential for saving fuel.

Now, based on the factors we could quantify, the net benefits -- benefits less cost -- accruing to the community of aviation users were estimated to be substantial. Some \$500 million was estimated as the twenty-year total net return to the aviation users, measured in 1976 dollars and discounted at an annual rate of ten percent. And, if any of you have any questions about that, there is Dr. Wilkins, because I don't understand all that stuff.

The operators of commercial airlines were estimated to have a significant economic advantage reflected in a benefit-to-cost ratio of 8.5 to 1, benefit versus cost. Now, even if the dollar estimates for savings in passenger travel delay times were excluded from this ratio, although there is little justification for doing this since it's the saving in travel time that brings the passengers to aviation in the first place, there is still an estimated \$300 million in benefits for the commercial airlines.

This benefit total still compares favorably to the additional cost of \$69 million for MLS avionics in place of ILS, a favorable ratio of 4.3 to 1. Similar estimates were compiled for the commuters and indicate that benefits of \$22 million could be obtained on the same basis that I've touched on, with an additional cost investment of \$9 million -- a favorable ratio for commuters of 2.4 to 1, conservatively.

Now, not all aviation groups were estimated to benefit equally from the implementation of MLS in the quantifiable areas. A small economic disbenefit, costs exceed benefits, was estimated for the average general aviation user. The size of the dollar disbenefit to the general aviation owners of single and multi-engine prop aircraft is quite small, a 20-year total of \$4 million calculated on the same basis as before. This amount represents about a three percent increase in the total bill, which is about \$145 million that would be spent by general aviation users for precision approach capability.

The economic disbenefit arises from the study's conservative method of evaluating the benefits of reduced delays resulting from this user group's use of precision guidance services. The benefits were based on the national income figures estimated for the average citizen, however, not the average general aviation owner. Since it's likely that the typical general aviation owner earns more than the average annual income of \$25,000, or he probably couldn't afford his airplane, it's equally likely that the dollar benefits attributed to this owner's use of MLS are undervalued in our study.

Large segments of the user community already, of course, receive substantial benefits in excess of costs from precision guidance services. For many general aviation users, the possibility of increased safety of operations resulting from precision guidance service at locations not now able to receive unrestricted service and correctable to full service with MLS, will become newly available. We are optimistic that many more general aviation users will be able to benefit from MLS than now use ILS.

Now, the benefit-cost ratios which I've just cited, which support the conclusion that the microwave landing system is the superior long-run economic alternative to ILS, were based only on the factors that could be quantified, not the categories that I mentioned first. But, there is another factor which has to be mentioned -- the economic advantage to the aviation community that results from the use of a single internationally accepted standard of precision guidance equipment.

The proliferation of nonstandard systems can be halted by the introduction of the single internationally standardized MLS. Make no mistake about it, people who need microwave landing systems will buy them. And there is no shortage of equipment manufacturers willing to offer nonstandard systems. Prior to the time the MLS development began, the United States alone had spent money on the development of no less than 40 different precision landing guidance systems.

There is a need for a single standard that is able to meet our military requirements as well as those of the international aviation community. We all benefit by a single standard, and the sooner we decide to move and implement, the sooner the proliferation of nonstandard systems will stop.

Let me say one more thing in closing. The exploitation of MLS rests in your hands as much as it does in FAA's. We want and need to know how important it is to the aviation community. We believe we've amply demonstrated the capability of the system, and the FAA Flight Operations organization is currently and actively involved in exploring the MLS capability and operational uses in the development of procedures. But exploiting the system and wringing optimum benefits from it depends very much on you.

Traditionally, users have come forward to innovate with new systems, and FAA helps and approves safe and efficient procedures -- not the other way around. You should not wait for the government to hand you the minimums on a platter. You have to exploit the system yourself and establish the benefits for yourself. You have to come to FAA with proposed procedures which will benefit you. FAA will help and approve those procedures when they are demonstrated to be safe. This involves you heavily.

It might be nicer if the government could simply hand it all to you, but the history of the development of procedures -- not for MLS, for every other aid that is in use in aviation -- shows that the best use of

new systems is made when users and FAA work together on procedures to gain benefit. Thus, your stake in a sound MLS transition is clear. We seek your thoughtful advice. But making most of the MLS capability in your operation requires your labors more than ours. Thank you.

Dr. Bill Wilkins
Associate Administrator for Policy and International Aviation
Federal Aviation Administration

"The MLS Transition"

At this point, I want to briefly cover why we have developed the MLS draft transition plan, and to make a few remarks about the proposed implementation strategies. After I've finished these remarks, I will open the meeting for your inputs.

Several years ago, the Federal Aviation Administration established an improved acquisition management process which introduced the concept of a formal transition plan for selected major new systems. As the name implies, the transition plan is designed to facilitate the transition from an existing system to a new system. In this case, from ILS to MLS.

We are at a point in the decisionmaking process where virtually all of our development of the MLS capability has been completed. The International Civil Aviation Organization (ICAO) selected the joint U.S./Australian approach for the new MLS international technical standard. It is anticipated that this international technical standard will be formally adopted at ICAO's worldwide meeting scheduled for April 1981.

As Sieg pointed out, FAA has embarked upon an in-service evaluation project to demonstrate more extensively the MLS technology under rigorous demands of field operating conditions. Now it must be decided how and at what pace to bring this MLS technology into the national aviation system. That is the major purpose today, to receive your comments on alternative implementation strategies before proceeding with the decision process.

One point must be emphasized at the outset. The final transition plan, once it has evolved, will not be an implementation plan. A more detailed implementation plan is being developed. In its final form, it will incorporate the implementation strategy approved in the final transition plan. That implementation plan will contain such information as the specific locations, including runways, and detailed installation schedules.

The transition plan that we're to talk about today is something quite different. It is one of several tools designed to support the decision-making process -- in this case, the choice of how MLS can be implemented to best solve and serve the needs of the future. When finally adopted, the transition plan will provide in a single integrated package such

information as the current validated requirements for MLS, the results of the development phase of the program, the analysis of alternative strategies which could be employed to implement MLS, and ultimately, after we have received and evaluated your comments, the recommended strategy for introducing MLS.

Thus, the transition plan and the benefit-cost study together will form a complete justification package to support the implementation decision for subsequent Executive Branch and Congressional reviews. These two documents -- the transition plan and the benefit-cost analysis -- cover the broader questions of what, when and why, leading up to implementation. Then the implementation plan provides the individual specifics of who, where, when and how which are needed to carry out the program.

At this point in our decisionmaking process, the draft transition plan contains the analysis of ten alternative strategies for full-scale implementation of MLS. This is the draft microwave landing system transition plan -- the orange document.

The analysts who authored this draft transition plan started with 22 alternative implementation strategies. As a result of the analyses, the choices were narrowed to nine. The tenth strategy contained in the plan is an aviation user strategy proposed by the Radio Technical Commission for Aeronautics -- RTCA. This strategy was developed by RTCA Special Committee 125 which consists of a wide spectrum of prospective manufacturers and users of MLS equipment, as well as various government representatives. I want to take this opportunity to thank RTCA Special Committee 125 for their continuing interest in the planning for MLS and their thoughtful proposal of the alternative strategy number ten in the draft transition plan.

All of you should have available a booklet entitled "Guide To Microwave Landing System Implementation Strategies." That's the red booklet, this one. This is a short, 16-page booklet. On page ten of that booklet there is a summary of the seven installation options which form the heart of the implementation strategies described in the transition plan or in the draft transition plan. Each of these potential implementation strategies has been constructed using combinations of the installation options in different orders of priority.

I will not now belabor the details of these strategies which we hope you've had an opportunity to review and evaluate. Instead, I would like to highlight several of the key factors and policy questions associated with the transition. Our hope is that these will be addressed in either our public hearings, like this one, or in written comments that we will be accepting until February 10th, or in both.

The draft transition plan contains an economic analysis of ten alternatives -- that's the orange one again -- ten alternative implementation strategies. The calculation of benefits and costs presented in the plan is for the purpose of evaluating the relative

economic merits of the alternative transition strategies. All of the comparisons, it's important to note, are MLS to MLS, not of MLS to any other precision approach guidance system.

The separate benefit-cost study accompanying the draft transition plan documents the analyses of MLS versus the ILS alternatives. And this, the benefit-cost study that Sieg was talking about (the brown document), comes in three parts -- the study itself (in two parts) and an executive summary.

Let me comment about the availability of the draft. We have with us enough copies of this one for everyone. We have a limited number of copies of the draft transition and the benefit-cost study. If we run out of these, please leave your name and address and we will see that you get a copy if you want one, of all of these documents. Marv, would you hold up your hand? He'd be the ideal man to give your card to with a note that you want any or some of these documents. And also, in case anybody should want them, Sieg's remarks and my remarks will also be available at the table after the meeting closes.

To say the same thing as I've been saying in another way, the draft transition plan compares various possible ways of moving to MLS while the benefit-cost study compares in economic terms MLS to ILS. There is another point about the economic analysis contained in the draft transition plan. The plan contains earlier estimates based upon 1976 values that differ from our current dollar estimates of costs and benefits. Thus, while the data contained in the draft transition plan are still valid for comparison of the alternative strategies, they cannot be used outside of that context.

The results of the analysis presented in the draft transition plan show no statistically significant economic difference among the ten alternative strategies. The total range of net benefits, that is benefits minus costs, is only about ten percent. That ten percent is less than the possible range of estimating errors. Thus, the analysis provides no overwhelming economic basis for selection of any one of the strategies over the others.

This indicates to us that the choice of the strategy -- the final strategy -- may be based almost entirely upon operational factors. Concerning those operational factors, one of the primary considerations will be the views of the users of the system and of the public as expressed to us during the comment period, this comment period, for the transition plan.

We welcome and we will most assuredly use, to the extent possible, your evaluations regarding the appropriate implementation strategy for MLS. Your insights and expertise will be significant factors in determining a future course of action to make the best utilization of the capacities and capabilities of MLS.

Each of the ten alternative implementation strategies presented in the draft transition plan would, if adopted, have an impact -- to a greater or lesser degree -- upon several key considerations. For

example, some strategies, namely numbers 1, 2, 6, 8 and 9 (if you have the little red booklet) will tend to encourage faster general aviation MLS avionic equipage while others, numbers 3, 5 and 7 would encourage air carrier equipage first. In at least one case -- strategy number 4 -- the incentives would be rather equally balanced between general aviation and the air carriers.

The strategy proposed by RTCA -- strategy number 10 -- which in its early stage focuses upon clustering MLS installations around selected major hubs, would be likely to have a somewhat different impact. It would probably tend to encourage early equipage by geographic networks.

Each of the strategies will also have varying impacts upon the rate at which ILS installations are decommissioned. This in turn will affect the rate of savings for the taxpayers, particularly at problem sites currently equipped with tube-type equipment.

Two of the strategies -- numbers 5 and 6 -- offer accelerated installation rates for MLS. These two strategies would speed up the pacing of the transition but would require Executive Branch and Congressional support for the expanded capital investment budgets needed in the earlier years to carry out the speeded up program.

Finally, one of the strategies -- number 8 -- would place greater emphasis on MLS installations at noise sensitive locations. This approach would utilize one of the strong points of MLS -- the ability to solve site-specific problems and help make our airports better neighbors for the surrounding communities.

All in all then each of the alternative strategies offers choices. What we need is your advice and counsel on what you believe to be, from your perspective, the best choice and why you believe it to be the best.

We want to hear from you now, and we would welcome any follow-up comments that you would care to submit in writing. If you decide after our meeting today that you would like to submit written comments, please send them by February 10, 1981, to the FAA at the address listed on page two of the red booklet.

One other item before closing. Since we closed the comment period a couple of months ago, some of you may be wondering when we will be publishing a final FAR Part 171 standard for the microwave landing system. FAR Part 171, remember, is the portion of the Federal Aviation Regulations which sets forth the minimum requirements for approval and operation of nonfederal air navigation facilities. Our current best estimate is that the final FAR Part 171 standard for MLS will be published by the late spring of 1981.

We continue to rely on the expertise and judgment of the aviation community and the public to guide us in our decisions. We are now asking for that input regarding the MLS draft transition plan. For the balance of this meeting, the panel and other FAA'ers here will primarily listen to your comments and seek to understand your thinking.

We will, of course, answer to the best of our ability any questions of general interest which you have related to the transition plan or the supporting documents. Our objective today is to listen to what you have to say to us and establish a public record upon which the Administrator can make a better informed decision.

It is now my pleasure to open the meeting to receive the first of the statements of those persons who have signed up to speak. After we have gone through our list, any additional comments from anyone here will be heard.

We have had four people who have indicated their interest in making presentations. What I propose to do is to start that process and see how long it goes. If it goes quickly, perhaps we can get directly into the question period. If it doesn't go all that quickly, we'll take a break so that people can get up and move around a little before proceeding.

Let me now ask Mr. Russell Widmar to come to one of the microphones. Mr. Widmar is Manager of the Burbank-Glendale-Pasadena Airport Authority. Welcome sir.

Prepared Statement

By

Russell Widmar

Manager - Airport Services

Burbank-Glendale-Pasadena Airport Authority

Thank you. Good afternoon ladies and gentlemen. My name is Russ Widmar. I am pleased to appear here today representing the Burbank-Glendale-Pasadena Airport where my title is Manager, Airport Services.

I have thoroughly reviewed the microwave landing system transition plan and the benefit-cost study which were forwarded to us. We are strongly in favor of moving forward rapidly with the application of this new technology.

The Burbank-Glendale-Pasadena Airport recognizes that the MLS will offer many operational advantages and the chief among these will be the noise abatement potentials which are extremely important at our facility. In brief, our recommendations are: One, that the microwave landing system technology be introduced as rapidly as possible using the shorter transition period rather than the longer one; and two, that the Burbank Airport be chosen as a field evaluation site for Phase 2 of the service test and evaluation program -- also known as STEP.

These recommendations are made with the recognition that the transition plan is not an implementation program and with the full understanding that the choice of transition strategies is operationally and not economically predicated.

As I elaborate, you will find that the Burbank Airport represents the potential for optimizing the achievement of STEP program goals and objectives. Perhaps a few words about our airport are in order. The Burbank Airport is one of five air carrier facilities which serve the 4,000 square mile metropolitan Los Angeles area. The airport is situated in the eastern portion of the San Fernando Valley, approximately 12 miles northwest of central downtown.

The airport is recognized by the California Department of Transportation and the Southern California Regional Systems Plan as a major airport within the region, integral to providing short-haul and medium-haul air carrier service to an air trade area population of nearly 2.5 million people.

The airport is served by the scheduled flights of PSA, Continental, Republic, Aspen, Sun Aire and Inland Empire Airlines with a total volume of passengers in calendar year 1980 of approximately 2.3 million. Burbank is ranked nationally as the 53rd busiest air carrier airport and has a complete mix of commercial, military, general and corporate aviation users. It ranks seventh in the state in air carrier enplanements. About one-fifth of the six million air passengers traveling annually between the greater Los Angeles and San Francisco Bay areas use our airport.

The airport is an IFR facility providing two crossing, asphalt-surfaced, grooved runways: 7-25 and 15-33. The north-south runway is the longer of the two at 6,902 feet. But surrounding terrain makes only runway seven suitable to be equipped with an instrument landing system. And as I shall explain, there are certain limitations to this arrangement.

The transition options. We have thoroughly reviewed the 22 transition options and the ten transition strategies. It is our opinion that the earliest implementation of MLS should be targeted at existing locations which yield the greatest and most immediate noise abatement benefits and solve the restricted locations problem currently affecting 162 of 621 full ILS installations in the United States. Each of these is discussed specifically below.

Noise abatement. The value of precision, curved approaches and departures for noise abatement is especially important to the Burbank Airport where environmental restrictions are particularly significant. The Burbank Airport has been identified as having a noise problem, and applying technological advances to the solution of environmentally based problems is especially desirable here. For example, the airlines have used an unpublished noise abatement VFR approach to our runway 15 for

years with good success. However, MLS may support more noise-effective IFR and VFR approaches to this runway because the VFR approaches are generally restricted to using the visual landmarks, and thus may be constrained to noisier, lower altitude profiles that would not be required with MLS.

Also, we feel that the day is not far off when the flexibility of our air traffic control system will be additionally restricted by the removal of all discretionary language in the standard instrument departure procedures due to noise abatement. On the surface, this may appear as a loss in flexibility of the system. This does not necessarily have to be the case as curved MLS departure profiles from noise sensitive runways may yield overwhelming noise abatement benefits to areas surrounding airports. Flown with the most advanced technology aircraft, these profiles may be the key to keeping airports in noise-sensitive areas open and prosperous over the long term.

Lastly, the Executive Summary indicated that MLS has a direct application in this regard on runway 28L at San Francisco International Airport. The Burbank Airport can offer you the same application on our runway 25 with the added incentive of more effectively and efficiently using airspace over residential land rather than water.

Because MLS is capable of providing departure as well as approach guidance, the noise abatement program at our airport would be greatly enhanced. We have recently completed the installation of an approved, permanent noise monitoring system which can provide added data and information about the positive noise abatement results accrued from MLS, and we will make this system available if chosen as a Phase 2 site.

Restricted locations. Restricted locations are defined as locations currently equipped with ILS, but having operating restrictions greater than 200' decision height and one-half mile visibility minimums. The Burbank Airport has one of 47 medium-grade restricted instrument landing systems in the United States with a 250' decision height and one-mile visibility requirement. Considering the fact that during much of the year visibility in the Los Angeles basin is limited to one mile or less simply because of smog, an approach to this airport is essentially special VFR.

The immediate benefits to the air carriers of having full, unrestricted Category I minimums will be fewer missed approaches, less disruption of flight schedules, and improved safety for the traveling public.

Additionally, the Burbank Airport is unique in the nation in that the localizer is placed on the approach end rather than the far end of the instrument runway. The offset localizer capability of MLS has an immediate application here.

Recognizing that the transition from an ILS to an MLS environment would be both difficult and costly, the national plan for development of MLS has specifically provided for an operational evaluation as a prelude to full-scale implementation. The concept of field evaluation is supported by this airport, and we wish to volunteer this facility as a suitable site for Phase 2 evaluation. The Burbank-Glendale-Pasadena Airport will contribute meaningfully to the goals and objectives of the STEP program for several reasons.

Maximum user participation. Installation of an MLS with a curved approach to runway 15 will yield a high volume of operations and a wide variety of users. The airport is served by the airlines, military, air taxis, business and general aviation, ranking seventh in the FAA Western Region operationally.

Maximum benefits. While user benefits are readily apparent, the noise abatement benefits would also be significant to the surrounding community. As you may be aware, California leads the nation in environmental concerns, and Burbank Airport often finds itself at the forefront of noise abatement issues. We would be pleased to play a leadership role in the transition to MLS as well.

Challenging sites. Burbank Airport offers a restricted physical plan with frequent poor visibility conditions, mountainous terrain on two sides, and a crossing approach with the instrument landing system at the Van Nuys Airport. MLS at Burbank would integrate solutions to operational, technical and environmental problems in one complete package.

Maximum exposure. Four of the nation's ten busiest airports are located in the Los Angeles basin. Accessibility and visibility for the Phase 2 MLS installation are unduplicated anywhere in the country.

To summarize, we favor moving forward rapidly with the MLS program on the shorter transition schedule. We also feel that the solving of existing problems at existing airports, particularly with respect to noise abatement and restrictions to minimums, should be paramount in the test and implementation programs.

Lastly, we wish to volunteer our airport as a field evaluation site during Phase 2 of the service test and evaluation program.

This concludes my prepared remarks which I have provided in written form to the committee. I would be pleased to respond to any questions which you might have.

Thank you very much for your interest and cooperation.

Dr. Wilkins

Thank you Mr. Widmar. We will now take a short recess before continuing with our registered speakers.

BRIEF RECESS

Dr. Wilkins

Ladies and gentlemen, we're now ready to get back to our agenda. There will be an opportunity to ask questions for the record, if you like, and additionally the FAA experts will be available at the close of the meeting. Finally, we're prepared to stay here a long time, if necessary, to answer your questions.

Thank you for your patience. The next person who has signed up to speak is Mr. Dennis Crabtree. Mr. Crabtree is Senior Vice President of Operations - Golden West Airlines. Mr. Crabtree.

Prepared Statement

By

Dennis Crabtree
Senior Vice President of Operations
Golden West Airlines

Thank you Dr. Wilkins. I'm here today representing not only the views of Golden West Airlines but those of the Commuter Airline Association of America. I have been authorized to speak on their behalf. Our message is going to be and is the message of the CAAA.

As for my company, Golden West, we operate 11 DeHavilland Twin Otters, four Shorts SD-330's, and we'll soon have five of the 50-passenger Quiet STOL DeHavilland-7 aircraft into service. We're one of the largest commuter air carriers in the country. In 1980, this past year, we carried 675,000 passengers and provided over 69,000 scheduled operations into nine Southern California airports.

From 1973 to 1975 we conducted safe and reliable scheduled IFR operations at Fullerton, California, aided by an early model MLS system. We have a first-hand appreciation of the public benefits and operational advantages to be gained through the use of an MLS system.

During the past eight years, we have frequently expressed our support for MLS and the need to move ahead with its implementation. We're pleased to have this opportunity to present our thoughts and comments on the subject of the FAA's MLS transition and implementation strategies.

First, we would like to point out and emphasize that within the continental United States, scheduled airline service is provided at approximately 225 airports, without a single precision instrument

approach facility. Only 19 of these airports are presently scheduled for a precision approach within the next few years. This will leave 206 scheduled service airports without a single precision approach. Add Alaska and Hawaii and the number is obviously even greater.

Within the same relative short period, the number of precision approach systems at the 123 hub airports served by major air carriers will reach 349. That's an average of 2.84 per airport. This inequity exists despite a clear mandate from Congress that the FAA provide an equivalent level of safety in air carrier operations under the provision of the Airline Deregulation Act.

Our message is clear and to the point. First, without precision approach, commuter airlines cannot provide the dependability of service which is absolutely essential to our economic survival and continuation and growth of our nation's air service to small communities.

Secondly, we do not believe that ILS can or will satisfy the needs of a great majority of these airports for various reasons cited here earlier, including the siting frequency allocation, multi-path, high-angle approach requirements and other problems.

Third, we do believe that MLS will satisfy all the needs of these small community airports and the carriers that serve them.

We have examined the ten implementation strategies outlined in the Federal Register. We basically agree with the strategies that place first priority on new qualifier airports. However, our specific preference is as follows. One -- urgent implementation of MLS starting in 1982 for all or at least a majority of the non-ILS-equipped airports which have scheduled air service. The program should be ambitious. Eighty percent of the sites to have MLS should be so equipped by 1986. And the \$20 million or \$50 million arbitrary numbers should be replaced with a funding level that would meet that objective. It's our observation that with \$3.55 billion in the aviation trust fund, there should be no reason that such a funding level couldn't be made available.

Two -- urgent implementation of MLS, also starting in 1982, at major airports for separate access by commuter airlines, business operators and other small aircraft. We are convinced that this will alleviate a great majority of the congestion and delays which are costly to all operators and wasteful of precious fuel.

Third and finally -- a successful implementation strategy has to include a method of prioritizing selection of sites avoiding random installations. The initial selections must take into consideration networks of airports as appropriate to commuter airlines' service between smaller airlines and major hub terminals.

In addition, we're seriously concerned about the eligibility criteria established for these airports, for the new qualifier airports, as established currently by the FAA. We also recognize that FAA is faced

with budget constraints during the coming decade, and that they do not expect to receive adequate funding for the RNAVs, computer replacement, flight service station modernization, radar replacement, and other important F&E projects, plus MLS.

We, therefore, implore the Congress and the Department of Transportation to give special funding consideration to the implementation of MLS for the urgent needs expressed above.

In closing, we'd like to state for the record that during 1972 and 1977 -- and I'll have Dr. Wilkins determine what the dollars are -- we, the users and operators in the U.S. aviation system invested \$120 million in the MLS development. What's that worth today? Figure it out.

We believe this is a good investment. We would like to receive the payback and the benefits of our investment. Folks, let's get on with it now. Golden West Airlines, by the way, is getting on with it. We're putting our money where our mouth is. We have placed an order for a private use MLS system to support our operation at Lake Tahoe, and we expect to be fully operational in 1982. Incidentally, the system we've ordered will meet the requirements -- the ICAO requirements for MLS.

I thank you for your attention.

Dr. Wilkins

Thank you Mr. Crabtree. Our next speaker is Mr. Jeff Bayer. Mr. Bayer is Chairman of the Foster City Noise Abatement Committee.

Prepared Statement

By

Jeff Bayer

Chairman, Foster City Noise Abatement Committee

Thank you. First, I'd like to ask a question. Are there any other people out there that are specifically interested, on behalf of their communities, other than airport people? Interesting. Fantastic. Put us down first then.

I have come to Los Angeles today from Foster City located 5.6 nautical miles from runways 28 left and 28 right, San Francisco International Airport. I've served as Chairman of the Foster City Noise Abatement Committee for about the last 15 months. My primary involvement, although it's called the Noise Abatement Committee, is my concern for safety over Foster City.

There have been too many weird things that have happened in the last ten years in aviation, last 20 years in the history of aviation. I look out my door on a daily basis and I see the final approach to San Francisco Airport. And as the gentleman from Burbank Airport stated, his airport was the seventh busiest in the State of California. I believe San Francisco Airport is the seventh busiest in the world.

We see airplanes coming in on direct approaches day after day, night after night. And I have calls at home from neighbors and whatnot, but I enjoy that because that means they really are concerned. But again, the problem I see is safety. Quite often they're running parallel approaches to San Francisco Airport. And when they do run parallel approaches, quite often, the pilot on the left runway might try and move over a little bit more to help his guy out on the right side. It's just a bad safety factor.

The microwave landing system came to our attention through one of our monthly meetings about a year ago. Obviously everyone in this room has much more knowledge of the system and much more knowledge of aviation than I do. But I'm here because, as the gentleman down here said, I want to exploit the system. Very simple.

The FAA has said to the citizens of this country, "give us input -- tell us why you should have it rather than someone else." Why should we have it? Why should San Francisco Airport get it rather than Burbank when they have to come in through mountains? All San Francisco Airport has to be concerned about is a little piece of property out into the bay that was filled about 15 years ago and it's about six miles from the airport. The planes are about 2,000 feet overhead, and from every aviation man I've ever talked to, it's safe. There will never be an accident. I can't totally believe that. I just have some feelings that some day there will be a very bad accident because, also, at the other end of Foster City is San Carlos Airport, the second busiest general aviation airport in the country.

I don't intend to take up a lot of your time today and I don't know that what I have to say will go very far. But what I do want to say is that, on behalf of the community I live in, I represent them today and I represent them requesting consideration for a microwave landing system for San Francisco International Airport. We will provide further written comments and we will be in contact with the FAA at a later time.

Thank you.

Dr. Wilkins

Thank you Mr. Bayer. And thank you for making the journey down here. Our next and final speaker who has signed up ahead of time to speak is Mr. H. Ray Lahr. Mr. Lahr represents the Air Line Pilots Association (ALPA).

May 12, 1982

CLARENCE:

Get this in th collection somewhere will you please.

It has a number APO-81-2. Needs a cover to protect it.

Thanks,

HARRY

Prepared Statement
By

H. Ray Lahr
Air Line Pilots Association

Thank you Dr. Wilkins. My remarks will be brief. I was invited to participate today by Joseph Schwinn, Deputy Manager of our Engineering Department for the Air Line Pilots Association. I asked Mr. Schwinn to also provide me with ALPA's Washington-developed position.

As mentioned on the telephone, our priorities for MLS are: number one, primary carrier runways where no ILS exists. Our number two priority would be where an ILS exists, the lower landing minimums could be achieved with an ILS. The third priority would be secondary runways that are without an ILS.

Within the above confines, the implementation should take place regionally and/or in consideration of a particular airline's primary route structure. This would encourage an airline to equip their fleet with the necessary systems because of the higher return on investment as opposed to a random plan that would not benefit any one airline sufficiently to justify the expense involved.

Thank you for your interest. My personal thoughts, in addition to that would be that possibly, one possibility for a scenario that would incorporate our priorities would be to pick a region where we have bad weather, say the New England area. Implement the microwave landing systems in that area so as to benefit the particular carriers there. They would all have the equipment aboard. That would also encompass some of the major airports like Boston and Hartford so that you would get a running comparison then between the ILS systems presently in use and the microwave landing system. Then as this developed, at some future date, why we'd be able to make a true evaluation and see how effective it is. If it's as good as the proponents say and as many of us think it could be, I think we'd see the whole aviation community jumping in line to broaden the concept nationwide.

There is a reticence on the part of the manufacturers, ATA in particular, to equip the aircraft with the necessary equipment, and so that until they get in line, I don't think that we can move too far forward. If the experience didn't turn out as well as we anticipate in New England, then I foresee that we would probably build upon our present VOR ILS system until some future date when maybe a spin-off from our NAVSTAR program would give us a quantum jump, where we would have a piece of equipment that would be flexible and give us worldwide capabilities and still give us the accuracies that we're achieving with ILS and the microwave landing system.

One thing I would caution though is that some of the people that see some of the benefits for this microwave landing system are jumping hard on the curved approaches and the dippy-doodle approaches. Early on in

the jet age, we learned the hard way that the only really safe approach is the straight-in, fully stabilized approach. To depart from that concept would be very, very difficult, very dangerous, in my opinion, to do it under instrument conditions, because the valuations that we've had with some of these types of equipment thus far have not justified taking that quantum step.

So if you're basing your projections for the microwave landing system on the capabilities for noise abatement, let me caution that it would be a very slow and delicate step-by-step procedure to move in that direction and maybe we would find that we really couldn't move too far in that direction. Thank you.

Dr. Wilkins

Thank you Mr. Lahr. Let me say for all the FAA'ers here that you can be sure that safety will be the primary consideration from the point of view of the agency.

That exhausts the list of people who signed up ahead of time to speak. Is there anyone else who would like to make a prepared statement at this juncture? I'd be pleased to recognize you. (No response) All right, may I then ask for questions. Are there questions or comments? Yes sir. Would you identify yourself, and because of the microphone problems, I will probably repeat the question.

QUESTIONS AND ANSWERS

Howie Keefe - (President, Air Chart Company) - Our primary function is to service the general aviation pilot with instrument approach charts. That's basically what we do. My questions are, I'm not quite clear on the system, and if I understand it correctly, the system is one in which it's kind of an add-on system. In other words, it's like having a localizer and then you might have glide slope capability. Is that what we're hearing -- that the airborne equipment is an add-on system, that the basic system is the tube system of the ILS, and then if you want the parabolic capabilities?

Dr. Wilkins - The question basically is, is the system an add-on system to the ILS or is it something quite different? Let me ask Sieg if he'd like to respond to that, or Jack or both.

Sieg Poritzky - Let me say very quickly, the MLS is not an add-on. It's a different system operating at a different frequency band.

Howie Keefe - I didn't mean that. I mean in and of itself like the localizer -- someone could have a localizer.

Sieg Poritzky - Yes.

Howie Keefe - In the aircraft, he can add on a glide slope?

Sieg Poritzky - Yes, he can indeed.

Howie Keefe - And this system can also have that progression?

Sieg Poritzky - Yes, it could easily. We don't imagine that there will be too many installations that will be localizer only or glide slope only.

Howie Keefe - I mean airports.

Sieg Poritzky - In the aircraft, the single receiver will decode both the vertical and the lateral information, and initially, for the simplest installations, the pilot will simply use the instrumentation he has. If he then wants to use offsets, curved approaches, segmented approaches or whatever, that then requires additional capability in the aircraft, possibly in the flight control system.

Dr. Wilkins - Let me try to just elaborate on that. An aircraft that is presently equipped with the localizer only and does not have the display for the glide slope could utilize the system in the absence of the glide slope?

Sieg Poritzky - Oh, indeed, yes it could.

Dr. Wilkins - And then it could be added later.

Howie Keefe - What would you suggest is the level of sophistication to go from the tube-type use of the MLS to the ILS, to the parabolic, to the curved? What would be the increment of increase in the airborne equipment?

Dr. Wilkins - Jack Edwards or John Kern or one of the others, do you want to try to respond to that?

Jack Edwards - Well, I think we had talked a little earlier or Sieg had mentioned that in order to go from the, let me call it the simple MLS approach procedures meaning you're flying angle guidance with ranging information and using that, and for more sophisticated flight profiles in the coverage volume of the system, it will in fact require on-board computational capability. So if your aircraft is equipped with the MLS receiver-processor for the more simple functions or flight profiles, then you would need to add, if you don't already have an RNAV computer on board, say some computational capability in order to do the computations for the sophisticated flight profiles.

I don't know for certain, but a general purpose computer today for that type of operation I would judge would cost somewhere probably around \$6,000 or \$8,000.

Howie Keefe - Versus the basic installations cost for just the simple tube type?

Dr. Wilkins - What would the basic instrument itself cost to be able to fly it straight in?

Jack Edwards - Are you talking about the airborne equipment costs?

Howie Keefe - Airborne.

Jack Edwards - Okay, there's a range of airborne equipment costs available to the user, and he will be able to decide on the investment that he wants to make based upon the performance capabilities that he desires. Now, I'll give you the range of costs as we see them today. For the very simple, low-cost general aviation type user, we're talking about a receiver-processor that will cost in the order of \$1,400 plus installation. So you would have it installed in your aircraft for less than \$2,000.

That receiver-processor will provide you ILS type operational capability in terms of a single approach path, as far as azimuth is concerned. The receivers that we have today in that category in the test program do, in fact, have selectable elevation capability. That may or may not, in the final analysis, be in the final receivers and it won't be because it's a high-cost item. It'll be at the desires of the users and the response that we get from having the selectable path capability and elevation for the low-cost receiver-processors.

Going beyond that then to what I will call the executive level or corporate aircraft equipage requirements, we're looking at receiver-processor costs on the order of \$5,000 to \$6,000 in production quantities. As an indicator of that, we have, as Sieg has mentioned, a contract today for development of a productionized receiver-processor, if you will, for availability in mid-1982. That receiver-processor, in low quantities, will be available for \$8,000. So we expect that when you go to production quantities that price will come down to in the order of \$5,000 to \$6,000.

Howie Keefe - And that would give you the full parabolics?

Jack Edwards - No, that gives you the angle guidance capability. You would still need the additional computer capability in order to fly more sophisticated flight profiles. That will give you the selectable path capability in azimuth and elevation. And you need that then, coupled with ranging information or DME and a computer, in order to calculate more sophisticated flight profiles. Going on from that then in terms of air transport category aircraft and receiver-processors for air transport aircraft, we're looking at costs in the order of \$7,000 in production quantities.

Howie Keefe - That's in addition to the \$1,400 and the \$5,000 and the \$7,000?

Jack Edwards - I'm giving you a range of prices for different levels of capability, different quality airborne receivers.

Dr. Wilkins - From the least sophisticated, in a sense, to the most sophisticated will range from \$1,400 to \$7,000 in production quantities. In addition, if you wish to obtain the capacity to fly the curved approaches and others, you'd need a computer system which he estimates at \$5,000 to \$7,000. Is that what you said, Jack?

Jack Edwards - The general purpose computer somewhere in the order of \$6,000 or \$8,000, I think, would be available today.

Howie Keefe - And have you given any thought to the pilot training requirements to use this material? Is it thought that the general aviation pilot can just go out and install it and use it? Or do you have a certain amount of hourly training, and if so, what do you suggest that might require?

Jack Edwards - Let me offer an initial reaction to that and then John Kern can probably give you a more detailed reaction. For the general aviation user and the minimum level receiver-processor, we're talking about ILS-like procedures. So the training, the education necessary for the general aviation pilot would not be much different than what we do today for ILS, with the possible exception of that selectable elevation path capability. John?

Dr. Wilkins - Let me mention, you've been listening to Jack Edwards who is Chief of the Navigation and Landing Division and the man who is about to talk is John Kern, Chief of the Aircraft Programs Division, Office of Flight Operations.

Before you start, one more point. We've got some pilots here who have flown the MLS, in case you'd like to talk to them after we're through. They actually have some experience with it. Would the FAA'ers who have some experience flying the MLS please -- we have at least one pilot here who's flown the MLS. Don, please stand up or hold up your hand so people can see you. That's Don Elam. Then you can talk to a pilot who has really flown it. Okay, John, I'm sorry.

John Kern - Yes. One of the things that I was asked about a little earlier was the development of our terminal instrument criteria for those microwave approaches. This is something that we're working on right now. For those of you who are familiar with it, it's called our TERPS Handbook, and if you're in the instrument approach chart business, you're probably very familiar with that. Any criteria that goes into the TERPS Handbook of course is developed jointly by FAA, ALPA and all the other interest groups in the country.

Before we get into the charting and actual operation of any TERPS criteria, we have a thorough check-out process. A lot of this work has already been done by the FAA in the research and development program. We

expect over the next year or so -- two years -- to develop the criteria necessary for curved approach and others, and I can assure you that it will be thoroughly tested from the general aviation to the airline transport type usage.

Howie Keefe - But you don't have any thoughts about how long it would take a pilot, the average pilot, to transition to the full use of the full equipment?

John Kern - I wouldn't think it would be much different than a transition to some of the RNAV type equipment we have today. The display in the cockpit is another thing that will, of course, be a major factor in that. No, I don't really anticipate any big problems with it.

Howie Keefe - Would you say five, ten hours?

John Kern - We have another department within the Office of Flight Operations, of course, which determines what a pilot needs to do in order to get his various licenses. Maybe this will be part of the testing procedure for a private pilot and commercial, etc. I'm sure the airlines, if we get that far, will establish their own training programs to make sure their pilots can handle that.

Howie Keefe - I'm sorry to occupy all your time. I just needed to ask these questions before I could ask an intelligent one. Now, getting the charts, in the cartographic phase of this, do you see these things, do you see more or less revisions than you would see to an ILS because of the facts of -- I mean, we're seeing a tremendous amount of corrections of one degree, causing a new amendment. And it's just a tremendous work load, particularly for the private who --.

Dr. Wilkins - All right. The question is, do you see more or fewer revisions?

John Kern - It's interesting you ask about that because Dr. Wilkins and I were talking about this just yesterday. We both have the problem with keeping up with those changes, and I hope we can do a lot of other things to reduce that -- I hope MLS is one thing that will. I don't know of any specific reasons why it will, but there are a lot of reasons why we make revisions to charts. We change a frequency in the New York area, as an example, and we have to print up 80,000 pieces of paper. It's probably the same in San Francisco and the Los Angeles areas too.

Howie Keefe - Do you see the plate itself being more or less complicated than the ILS plate -- to read?

John Kern - I don't think we have any -- I don't know of any. If you're talking about the curved approach, I would say it's probably going to be a little more complicated. The straight-in approach should be very similar to what we now know as an ILS approach.

Dr. Wilkins - Let me ask Sieg to respond to that, too. He's been wanting to comment.

Sieg Poritzky - I guess I want to make two comments. There are a whole variety of reasons, as you know better than I, why charts get changes. And some of the reasons will be -- there will be fewer changes, I think, which result from, one degree or half a degree recognition of an error in a chart, or new information about where a radial is or a beam is. You can almost surely count that as the system gets implemented, there will be new procedures. As I was trying to say when I was speaking, I anticipate that there will be a great many demands for new procedures. They aren't going to make the charting problem any simpler. Probably they'll make it more complicated. As John said, a segmented approach or a complex approach is going to be a more difficult chart, in all probability, unless you can figure out some sexy way to make it simpler than we have them today.

But let me just change subjects, for one moment, to the dippy-doodle approach because I think that's a very important point. I was involved in the development of CAT II and CAT III, and I'm damned well aware of the importance of the stabilized approach segment for operations. But that's as much due to the kind of instrumentation that's in the airplanes and the kind of flight control systems that are in the airplanes as it is to anything else.

One of the things in the movie I think showed a NASA 737 making short finals with one mile, one-and-a-half mile stabilized finals. The system that was in the airplane to do that was significantly different from the system that you'd have in the airplanes that you fly. There's been a fair amount of work done, is being done, to look at how one presents MLS information so that all the gauges and gadgets are not jiggling around when you're making the final approach, when you want to be sure that everything is stable.

I think we will see a fair amount of development as time goes on, and it will be a very slow process to go from the long stabilized final to something less -- easier in a Dash-7 certainly and in a little airplane than in a 747. But I think the flight control systems will change to the point where you will be comfortable in making a complex approach. I suspect it will not be exactly the same instrumentation you have now.

The point of MLS is to be sure that we provide a system of guidance that lets the aircraft user do what he wants to do to get optimum operation out of his airplane and the airport. It shouldn't be the landing guidance system that says "No, damn it, you're only going to go straight in." If that's a decision that's made, that ought to be made on different grounds and shouldn't be limited by the specific capabilities of the precision landing system.

Howie Keefe - He's basically answered that. Would you suggest that these curved approaches would be pretty much like a DMER type of a revision? We heavily depend, and so does the NOTAM System, as a matter of fact the FBIC's, on being able to communicate verbally changes in an approach procedure. I know the military system, with their advanced

system, relies heavily on that as well. Will that verbal accommodate a graphic change in this system as easily as it does now? For example, if a DMER is a one-dimensional procedure change -- this is a two-dimensional procedure change on your parabolic approach coming down -- will that accommodate it as well -- the verbalization of that change?

Sieg Poritzky - I doubt it.

Howie Keefe - In other words, you'd have to have a graphic, pictorial presentation to make the change?

Sieg Poritzky - I would suspect so. I don't know. John, what do you think?

John Kern - I think we could probably go either way. But a lot of these issues, as you know, haven't been decided. I was going to suggest that since you're obviously thinking way ahead of most of the community in this area, we solve these problems in the cartographic committee back in FAA -- that's headed in FAA. If you do have some specific ideas in that area, we'd certainly like to know what they are.

Some of the things that we're trying to do in the curved arena right now, as an example, anybody who's ever flown into the Washington area is very familiar with National Airport. We saw a picture of it earlier. We've been flying the river approach from the north into National Airport for many, many years, and it's a very short turn to final. Of course, it's under visual conditions right now. The approach will take you down to about 1,100 feet in three miles right now. From there on it's a visual down the river.

An MLS following the river might allow you to go down a little bit lower. We have some experimental charts we've made. They're like an unlimited way point RNAV chart. How they'll be programmed into the computer in the airplane, we really don't know yet. And how it's going to be best depicted to a pilot, we really don't know yet.

Howie Keefe - If there's time, I'd like to hear from the gentleman who has flown the approaches.

Dr. Wilkins - Why don't we let you get with him after the questions?

Howie Keefe - I mean, if there's anybody else who'd like to hear him and chat about it, so he doesn't have to repeat it.

Dr. Wilkins - All right. Yes sir.

Jeff Bayer (Chairman, Foster City Noise Abatement Committee) - These are more mechanical questions. Will the right and left runways both have the MLS system put in like the ones, for instance, at Kennedy Airport and Philadelphia? Do those airports have one microwave coming in or do they occupy both runways? I assume most major airports have two runways coming in.

Dr. Wilkins - Let me take a try at that. What we're trying to address now is how to implement the full system. The questions being asked which we're trying to address are: How do we get to some 20 years or sometime in the future having the entire system be an MLS system? So I presume the answer to your question is that eventually all runways that have precision approaches would be MLS approaches.

Jeff Bayer - Okay. I understand what you're saying, but my question has more background than that. What I'm trying to find out in my mind is whether, if a certain community is granted an MLS, will it be granted one system, and is it one system per runway -- or would it be two systems, meaning both runways? It has a very major effect on where my whole thinking is coming from.

Dr. Wilkins - Yes sir. Well, let me try again. In an airport which justifies two or three or more precision approaches, eventually all of those approaches would be MLS.

Jeff Bayer - Okay. Let me go back just a little bit here. In the case of San Francisco International Airport -- in the event that the right runway, for instance, could be implemented with the microwave system now (meaning 1982), would it then be reasonable to assume that the left runway would be installed at the same time? Or would you come back at a later date and do that?

Dr. Wilkins - Those are the kinds of questions that we're struggling to get input on now so that the Administrator can make those kinds of decisions. Those decisions simply have not been made.

Sieg Poritzky - Just a comment that I think might help you a little. I think several of us who were speaking -- Bill did, I did -- said that what we are looking for are those strategies, transition implementation, which will yield the greatest benefit for the largest number of people.

Now, let's take an example. Suppose at Airport XYZ you want to have parallel operations, independent parallel operations. Today independent parallel operations require spacing of 4,300 feet and a whole bunch of other requirements. Suppose that airport has independent parallel runways 3,500 feet apart. I personally believe that with MLS on both of those runways, one could use 3,500 feet parallel spacing for independent parallels. That's a decision yet to be made, but technically there's not a problem in the world to do that.

Now if there are three airports, for example, where you could show capacity goes up, safety goes up, whatever, a benefit accrues, then that becomes an input into the decision of where you put them. But one of the things that we want to hear, as Bill was saying, is somebody to say, "Well, my goodness, at Airport XYZ you can gain a genuine card-carrying benefit by achieving the 3,500 feet." If it takes two MLS's to do that, that's what you ought to do and you ought to beat on the government to do it.

Let's take another case -- Denver -- for example, where there's consideration of a short runway for commuters, for general aviation particularly. There you may find that you gain a major benefit from MLS on that short runway because you will be able to get a particular benefit by off loading the commuters and that sort of airplane onto the short runway, leaving the long runways (or runway) for the heavies.

You get a benefit in the wake vortex area. You get a benefit in simply off loading the long runway of airplanes that don't need the long runways. So I would expect that at Denver, the community would come in or the local carriers or the commuters would come in and pound the table and say, "Well, damn it, at Denver I want the MLS on the short runway because I can demonstrate a benefit." I think there you have to look at the individual case, but those all put together then say, "Here is a transition strategy which helps the largest number of people the fastest way."

Jeff Bayer - So you're asking for that input now?

Sieg Poritzky - Sure.

Jeff Bayer - Okay. Well, would I be out of order to go into that just very briefly?

Dr. Wilkins - No sir, go right ahead.

Jeff Bayer - Okay. The strategy of using the right runway for early installation of an MLS system at San Francisco International Airport would probably be the most intelligent way to approach it simply because of the spacing problem I was speaking about earlier -- you have a pilot that is on the left approach on runway 28 left coming in for a landing and there is a parallel on the right. Many times there is a farther overflight into the city.

Now, if you lined the pilot -- let's take a 727 aircraft that can have a steeper glide slope approach into San Francisco -- put him on the left runway, use the right runway for the MLS, swing him out a little bit (at least to what they call the quiet bridge approach) and then hook him into San Francisco International Airport, you have benefited many people and you've eliminated part of your problem. You've solved one of your problems of noise abatement and what will be happening in the next few years in terms of the noise contours in respective communities and whatnot, a direct benefit of an MLS system. Not only that but, with the opportunity of saving possibly -- that's why I was asking about putting two systems in -- what I'm saying at this point might be if we can get one MLS on the right runway and come back at a later point and do the other one.

Dr. Wilkins - Thank you. Are there other questions or comments? Yes.

Lisa Murphy (Aviation Planner - Southern California Association of Governments) - I'm an Aviation Planner with the Southern California Association of Governments, and we've been looking at the MLS as a means

to relieve noise and congestion problems in the Los Angeles area in our aviation studies. One of the questions I have refers to something that was said in the film about a 1.1 nautical mile final approach segment being the shortest allowed. Is that an equipment limitation or a TERPS limitation?

Dr. Wilkins - I'll ask John to speak to that.

John Kern - If memory serves me correctly, the sound track in that portion of the film was talking to the approaches that were being made at Buenos Aires in Argentina, and the curved approaches that were made there were made with steep angle intercepts, you know -- 90, 60 degrees and so forth, intercepts, totally coupled on the centerline. The closest intercept at that time was 1.1 miles. I don't think it said that that was a limitation. That was the intercept that was flown at that time for demonstration purposes.

I might add that the intercept at JFK on 13L during the demonstrations in New York were made with a flat, large-radius, very slow turn onto 13L. The intercept there, when the aircraft rolled out wings level, was at a half a mile. Now, we're not saying that these are going to be acceptable in the final analysis -- I think as we've alluded to earlier, in terms of the need yet to develop acceptable procedures for implementation.

During the development program, of course, we're looking at the capabilities of the system. The procedures to implement in the real world in different airport environments are still to be developed.

Lisa Murphy - That would be a function of the TERPS development?

John Kern - Of course, yes.

Lisa Murphy - Okay. The other question I have -- forgive me, I haven't read anything except to glance through the summary. The installation of MLS, especially at general aviation airports, would that be an eligible item under the aviation development program if we ever get any more money?

Dr. Wilkins - Paul Galis, come to the microphone, would you?

Paul Galis - Well, certainly at this point it's a little difficult to estimate or to state with any certainty as to what the eligibility of this kind of equipment would be under an ADAP type program. As you know, I'm sure, we don't have any statutory authority for the program right now. Rather than estimate as to when we will have a new statutory authority, I think I'd rather opt for an estimate as to if and when we'll discover life on Mars.

At any rate, assuming we do have a program sometime next summer -- a program similar to the present ADAP type program -- I think I see our role in providing financial assistance under a grant program similar to what it's been all along.

There has been a great deal of cross-pollination, I guess if you will, using ADAP grant monies to support the precision instrument approach systems installed primarily under the F&E program in the past -- as far as the purchase and installation, that's primarily an F&E type funding situation.

We have used ADAP monies to upgrade runways, to get the minimums we need for the instrument approach systems, obstruction removal, site prep and so forth. In the area of site prep, for example, there will be very little site preparation, as I understand it, with the MLS as compared to the ILS system. But at any rate, we would continue to play kind of a support role in the use of grant monies to facilitate the purchase and installation of MLS systems.

Our present policy is to provide funds for the purchase of ILS equipment, for example, only where entitlement monies are available -- an air carrier airport sponsor that has entitlement moneys could use those monies for that kind of purchase. We have not been providing any discretionary monies to actually purchase this kind of equipment.

So what I guess I'm getting down to basically is that this would be primarily an F&E program, and Ed Kennedy could speak to that in a little more detail.

Dr. Wilkins - Also, remember that he's predicating everything on the proposition that the next Act is something like the one that just expired on September 30, 1980.

Lisa Murphy - I think we all are predicating our life on that in a lot of cases. Like I said, I haven't read the analysis and so I presume that you're saying that all the MLS strategies deal with F&E budgeting as a regular part of the FAA budget.

Paul Galis - Yes, with respect to the purchase and installation.

Lisa Murphy - Of the equipment?

Paul Galis - I can see grant monies, if we do have a program, being used to provide support type development. The eligibility not only would depend upon the enactment of new legislation authority, but certainly the implementation strategy and implementation plans that are ultimately adopted would have some bearing, you know, whether air carrier airports are emphasized first as opposed to general aviation and noise-sensitive runways and that sort of thing.

Lisa Murphy - Well, it seems to me from just kind of a first blush that any implementation that emphasized the lower cost and the lower complex alternative or installations at commuter airports and things like that would be accelerated by the ability to have the MLS equipment and installation as an eligible grant item. I wondered if that had been considered and if not, I'd like a response to that. That's all.

Dr. Wilkins - Do you want to try to respond?

Paul Galis - We certainly have considered and will continue to consider the eligibility, if that's what you're talking about, these facilities have under a grant type program -- if I understand your question correctly.

Lisa Murphy - That's a strong alternative means to promoting new replacement programs, you know.

Paul Galis - Correct. Now, to the extent that the FAR Part 171 criteria would apply, you know, we're talking about criteria then for a non-Federally funded facility and so forth. To the extent that we would continue to reply on the, for example, the Airway Planning Standard No. 1 criteria that we currently apply to determine eligibility under ADAP, you know, those kinds of things have to be considered in the future as well. Certainly its eligibility under this kind of program is something that will be considered very carefully.

Dr. Wilkins - Yes sir?

Don Downie (Regional Representative for the Aircraft Owners and Pilots Association) - Our Washington staff will be with your people when you meet back there. I had one question for Mr. Edwards when he was talking about the cost of the general aviation installation at, ball park, \$2,000. What basically do you get and how firm on it? What kind of size, weight, installation problems? How much panel space does it take? Does that include the indicator dials? Is it a whole package? Is it something that we can live with or is it going to escalate any higher than the economy at the present time?

Jack Edwards - Well, I think it will escalate with the economy and you're probably a better predictor of that than we would be. As far as the size of the unit that we're talking about, American Electronics Laboratories and NARCO were funded jointly by FAA and NASA-Ames for a technology development program directed at a low-cost general aviation receiver. So the numbers and the statistics on this receiver are coming from that contract.

The target price, as I indicated earlier, for that contract, in production quantities, was at the sell line - \$1,350. I mentioned \$1,400 a little bit earlier in answer to the earlier question. The installation would include an antenna which is roughly \$100 to \$150, and then simply installation costs. We're talking about a panel-mounted box that's about the size, I think, of -- let me give you the dimensions. It's about 6.5 by 2 by 10 and weighs six pounds. It would be panel-mounted, and on the box itself is the control for tuning and the selectable elevation capability. It would interface directly with onboard instruments. So you wouldn't need to add another instrument if you have the cross-pointer on the aircraft already.

Don Downie - Thank you very much.

Dr. Wilkins - Yes sir?

Howie Keefe - I would like to ask, and this has to do with how you phase this in. Right now the general aviation pilot who conceivably goes to every airport in the United States, unlike the air carrier and the military, has to carry around 5,000 approaches. That's 5,000 pieces of paper. He not only has to carry it around, he has to pay for it -- he has to update it. While some have secretaries and wives, most of them find this chore themselves. The question I would have is this -- how long, if you implement an ILS system you're going to put in let's say \$1,250 an MLS, how long would the ILS plate and the localizer plate and the localizer back course plate and those things stay in while the two were in existence? Would the eventual MLS eliminate, say, the back course and any other approaches?

Dr. Wilkins - I'll ask Ed Kennedy to speak to that. I would like to point out that some pilots have husbands that do those corrections for them.

Don Downie - I'm a chauvinist. I'm too old for that.

Ed Kennedy - Let me answer the last part of the question first -- the back courses. If we were, of course, to install an MLS on the opposite end of a runway from an existing ILS that provided both a front and a back course, the MLS installation would obviously replace the back course ILS approach to that particular runway. It would be a change basically of one plate for one plate.

On the question of the coincident installations of ILS and MLS on the same approach, our plans are at this time not to take out or decommission any ILS's that are presently commissioned in a system through the completion of the ICAO standard, which today is 1995. So the answer to the first part of your question is that there would be a requirement, a possible requirement -- let me take that back -- there would be a definite requirement for two approach plates.

Howie Keefe - On that basis and with your ten options then, which option would require the pilot to carry more plates the longer time? Has that been considered?

Ed Kennedy - Any option that involves the coincident installation of MLS and ILS on the same approach -- that runs across several of the options.

Howie Keefe - Let's take Option #4. On Option #4, the pilot would be carrying two sets of plates. I believe that the Option #4 was indicated as the most across-the-board option.

Dr. Wilkins - That's true.

Howie Keefe - On that option, would a pilot -- you're eventually going to put in, let's say 1,250 of these by 1995 in the United States.

Ed Kennedy - Yes, but the installation of MLSs by 1995 would not all be on runways that are already instrumented with ILS. Only a portion of them under Option #4 would be colocated with an ILS.

Howie Keefe - I understand. Let's say a fourth of them were. Then the pilot would be carrying say 500 additional pieces, or ten percent, roughly more, would you suggest?

Ed Kennedy - In the unlikely event that he required approach plates for every runway in the United States that was instrumented dually with ILS and MLS - yes.

Howie Keefe - That's my question.

Dr. Wilkins - The basic answer, of course sir, is that two of the options are envisioned quicker and more costly in terms of immediate funding -- so two of those options do have quicker transition periods than the others. In that case, you would have a somewhat shorter period.

Are there any other questions?

Wallace Robbins (National Business Aircraft Association) - I've been asked by the Board of the National Business Aircraft Association to represent them at this meeting and express the opinion that they are 100 percent for the MLS -- the further development and implementation of it.

My question is simply -- what is the range in altitude at this stage of the MLS?

Dr. Wilkins - Jack?

Jack Edwards - The specifications that were put down in the statement of operational requirements way back in the late 1960's that formed the basis for the development program -- and they have been met, by the way, as far as the standards and recommended practice that will be developed by ICAO -- the minimum range requirement is 20 nautical miles. The elevation or altitude was 20,000 feet at 20 miles. From the elevation facility -- I'm searching my memory on this one -- we're looking at, I think, a 30-degree elevation angle to 20,000 feet and then out to 20,000 feet at 20 miles. That was the minimum requirement.

Wallace Robbins - Fine, thank you.

Dr. Wilkins - Are there any other questions or comments?

Let me invite the FAA'ers to ask questions of you while we've got you. Are there some people on the panel or the others who would like to ask questions of the folks because of the discussion?

You've been very patient. We are grateful for you to have come and to have taken part in this meeting. There will be one in Denver the day after tomorrow, another one in Chicago on Friday, and then next Tuesday we'll be in Washington, D. C., for the last of the four meetings. Thank you again.

Howie Keefe - Would it be possible to just informally have the gentleman who has flown to go to some spot so we can all ask him questions?

Dr. Wilkins - Sure. Don, if you're willing to do that, just stand up right there and folks can ask you questions.

Don Elam - I think the question probably is - how difficult is the MLS to fly? The airplane that I've flown with the MLS is the King Air 200. As you all probably know, the control responses and all are probably typical of an aircraft of this size and weight.

There are certain things that you have to do, that you have to do with any system, such as ILS. You have to select the proper frequency and you have to select whatever the course -- the inbound precision approach is. In the case of ILS, you have to select the inbound course or the back course, however the case might be. This you have to do also in the case of the MLS. However, there is one other thing that an MLS will do.

Let's say you're making an approach to runway 18. You would select zero degree azimuth -- that's literally saying "I want a centerline approach." It is possible now, with an MLS, to select something different than that, say 20 degrees right of course, 40 degrees right of course, what you want to do.

There is one other thing that you have to do. It's also selecting the glide slope angle, if you will. I would envision that all the approach charts will tell you what angle that's to be selected. If you select three degrees, fine. You can select four degrees, six degrees, twenty degrees -- whatever is in the capability of the set.

So basically we're coming down to -- you have to do three things. You have to select the frequency, you have to select the azimuth course, and you have to select the elevation angle. This is only in the particular set that we have installed in this airplane. Different manufacturers would probably elect to do it somewhat differently.

In our case, we are coupled to a flight director system which is also possible to couple to an autopilot. Once you've done the three things that I mentioned before, as far as the pilot is concerned, it just looks like you're flying an ILS. You have a cross-pointer indication that looks just like an ILS.

The pilot inputs -- same as an ILS. It's no more complicated, no more difficult, nor is it any simpler. It requires the same pilot responses, same responses in the case of the aircraft.

The capabilities of the system are obviously a little bit better. The MLS is less disturbed by aircraft passing over the antenna sites than say an ILS is. It also seems to be a straighter course. By that I mean that some of our ILS's have some anomalies that you've all seen -- slight course deviations from an absolute straight line, centerline.

In my experience with the MLS so far to date, the final course approaches are absolutely straight. That's really about all I can tell you. It flies just like an ILS. It's no more difficult, no more simple. Any questions specifically?

VOICE - Have you flown the curved approaches?

Don Elam - No sir. I have not flown the curved approaches. We're not presently equipped in the King Air to fly the curved approach.

VOICE - What about the missed approach? How does it deal with a missed approach?

Don Elam - Well, a missed approach in the particular installations we have at Washington and Philadelphia and some test sites -- there's no course information on the back side. This could be installed at a later date if you so desire. In the case of a missed approach, you would go to some other type of navigation. Either that or it would be a return back into the coverage pattern of the MLS. I'm really not prepared to speak about what can be done and what cannot be done. Right now all these sites are experimental -- they're prototype units.

VOICE - Am I correct in understanding you to say you've flown the curved approach?

Don Elam - No sir. The curved approach has been flown many times, but I have not flown it.

Jack Edwards - Let me add a little bit to that. You might be interested in the range of aircraft and the types of procedures that have, in fact, been flown so far in the program. Again, I'll search my memory here -- I'm not sure I'll catch them all. The receiver-processors that we have -- and there are right now something like 20 in our inventory -- have been installed in a wide range of aircraft, all the way from a twin piston Aerocommander and a light twin down in Buenos Aires (a flight inspection aircraft of the Argentine Government -- we installed it down there for the demonstration program) to the King Air that Don is talking about here to a twin Otter DHC-6.

We've flown coupled, curved, automatic landings in a Convair 880. We've flown coupled, curves, and automatic landings in a Boeing 737. We've flown automatic coupled approaches in 727s. We've flown manual operations in helicopters, Convair 580. Let me think. The T-39.

Dr. Wilkins - Let me break in. I'd like to call the meeting to a close, and if there are more specific questions, the FAA'ers will be here to try to answer them.

Thank you very much.

PUBLIC HEARING

"Microwave Landing System"

Wednesday, January 7, 1981
2:00 p.m.

Centennial Square Room
Stouffers Denver Inn
3203 Quebec Street
Denver, Colorado

INTRODUCTION

Arthur Varnado
Director, Rocky Mountain Region
Federal Aviation Administration

Good afternoon, my name is Arthur Varnado. I'm the Regional Director for the Rocky Mountain Region, Federal Aviation Administration. I'd like to welcome each and everyone of you to Denver and say to those of you who are from out of town, that we're particularly pleased to be able to share this delightful weather with you.

This will be my first winter in the Denver area, and I am told that the weather that we're experiencing now is atypical, that Denver winters are generally unlike what we're experiencing now. Having grown up in Buffalo, New York, of course, I don't feel any loss for any snow activity although many people, I'm told, are tearing their hair out about now because of the lack of snow. As physical evidence would show you, I'm not or can't be accused of that; but I do plan to spend some time, I suppose, on the ski slopes if the weather changes.

This meeting is an exceptionally important one in that it is just one integral step in moving us to another dramatic aviation threshold. I can assure you that the FAA's excitement about the prospects of MLS, and that is not to say that ILS has not served us faithfully -- the inherent limitations of ILS continue to surface -- is enthusiastic. The FAA Rocky Mountain Region is particularly enthused because of the unique application we can expect -- such things as less frequency band congestion, reduction in terrain interference effects, susceptibility to siting and adverse weather, and overall operational flexibility. We are especially hopeful that we can enjoy a reduction in flight delays along with increased airport capacity. Hopefully, we will be able to support shorter runways in the system, reduce weather diversions and combat inherent noise problems. We in the Denver area, as well as other urban areas, are suffering. These are but a few of the benefits that I feel we may very well derive from MLS.

So as not to steal any of the importance of this meeting, let me set about the job that I have been asked to do and that is to introduce to you a very good friend of mine, the FAA Associate Administrator for Policy and International Aviation -- Dr. Bill Wilkins. Dr. Wilkins directs the FAA Offices of Aviation Policy and Plans, Environment and Energy, International Aviation, and our FAA European Offices. His duties include work on national as well as international aviation policy, goals and priorities including the identification of areas that need improved aviation service.

Let me just spend a moment and share with you his background. Before joining the FAA in September of 1979, Bill was a Professor of Economics and President of the Faculty Center at Oregon State University. He is a specialist in international economics and economic policymaking, with emphasis on aviation transportation and resource problems.

Bill is an active general aviation pilot holding a commercial license with an instrument rating. He is also a Colonel in the Air Force Reserve, having logged over 3,000 hours in military flying time, including a combat tour in Korea.

Bill received his doctorate in economics from the University of Texas and has been on the faculty of Oregon State University since 1961. In the 1975-1976 time frame, Bill served as a staff economist of the Committee of Ways and Means of the U.S. House of Representatives. He was the first professionally trained economist on the staff of this legislative committee which has jurisdiction over taxes and international trade matters.

Bill is from Corvallis, Oregon, where he served on an airport master planning committee, the Board of Directors of the Chamber of Commerce, and has chaired its airport committee. He also served on the Board of Directors of the Western Economic Association and as a member of several other professional and learned societies. It gives me a great deal of pleasure to present to you, Dr. Bill Wilkins.

Dr. Bill Wilkins
Associate Administrator for Policy and International Aviation
Federal Aviation Administration

Thank you, Art. It's a pleasure to be with you and to be in Denver. I understand the dual concerns about snow for skiing and as you learn when you have lived in the west for a while, snow for water for next summer is extremely important. I wish you a snowy winter.

It is a pleasure for us to be here on behalf of the FAA and Administrator Langhorne Bond, and we welcome you to this meeting. What I'd like to do first is to introduce to you the group of FAA people who are with me who are prepared to try to answer any questions which might come up. Then, we will go into the presentations before actually turning the meeting over to the major part which we hope will be your statements and your reactions, and questions to which we might respond.

The team to which I would like to introduce you -- going past Art (whom you've already met), Sieg Poritzky -- Sieg is the Director, Office of Systems Engineering Management. You will hear from Sieg in just a moment. Next to Sieg is Ed Kennedy. Ed is Deputy Director, Airway Facilities Service. Ed represents the Associate Administrator for Air Traffic and Airway Facilities. Next to him is Paul Galis, Acting Director of the Office of Airport Planning and Programming. Going to the next table is Jack Edwards. Jack is Chief of the Navigation and Landing Division, Systems Research and Development Service. Over in the corner is John Kern, Chief, Aircraft Programs Division, Office of Flight Operations. Also with us are people who have been and are currently engaged in the MLS program in other capacities: Joyce Gillen, MLS

Program Office, Systems Research and Development Service; Seymour Horowitz, Economist, Office of Systems Engineering Management; and Marv Olson who is the Chairman of the MLS Transition Plan Development Group.

What we expect to do is, I will call on Sieg in a moment. Sieg has a few remarks, then there will be a film about the MLS, then he will conclude with some more remarks. I then will want to talk for a few minutes about the transition process itself and then we will go to the one person who has signed up to speak. Following that, I will invite others to make statements or ask questions.

All together, our presentation from right now until we come to the first speaker from the audience group will be just about an hour. So if you check on us, I think an hour from now, we will come to the first non-FAA speaker. At this juncture, let me invite Sieg Poritzky to start our presentation.

Siegbert Poritzky
Director, Office of Systems Engineering Management
Federal Aviation Administration

"The Introduction of the Microwave Landing System -
A Call for User Involvement"

Good afternoon. The microwave landing system, which is a system greatly superior to the venerable instrument landing system that Art was talking about a moment ago, has been developed, is proven to be technically successful, meets a series of rigid operational requirements which were imposed on it by the aviation community itself, and is nearing the end of the international standardization cycle. What remains is choosing the best method for introducing the MLS into operational service and establishing a sensible eventual transition from ILS to MLS.

The views of the community are crucially important. The transition to MLS will be difficult. It may be tempting, even convenient, in the near term, to simply forget about it and press for the installation of more ILSs, but we believe the clearly evident benefits and the previously expressed views of the community are such that implementation should proceed.

The aviation community has been instrumental in the microwave landing system development from the beginning. Way back in 1967, an industry government body -- the Radio Technical Commission for Aeronautics -- formed Special Committee 117 for the purpose of making recommendations on a new precision approach and landing guidance system. The RTCA agreed from the beginning that the search for a new approach and landing system would try to draw on the expertise of all countries with instrument landing system knowledge.

The response of the world's best experts and companies with diverse interests was remarkable. Literally hundreds of people, organizations and many countries participated. Their first task was to write a set of operation requirements documenting the needs of all users from general aviation users interested in landing on grass strips, to short takeoff and landing aircraft and helicopters, to large airline jets to military aircraft with their diverse missions. Operational requirements were agreed on, later endorsed by FAA and still later substantially adopted by the International Civil Aviation Organization, ICAO, the standard-making body of the world's aviation.

The cooperation was remarkable also during nearly all of the development of the microwave landing system which was undertaken in the United States in a joint program by NASA, the Department of Defense and FAA. At the end of the development period, an international group of experts was again assembled to help the U.S. reach the system decision. Another group, the ICAO All Weather Operations Panel, prepared the way for the international decision. The cooperation was superb almost to the very end when a nagging international controversy developed over one part of the technical signal format of MLS. This problem, too, was overcome and in April 1978 the International Civil Aviation Organization selected the broadly supported U.S./Australian Time Reference Scanning Beam MLS as the approach to be taken by the world for the new microwave landing system.

Much has happened since. The ICAO Technical Standards are now very near formal adoption. Bill will say a little bit more later about the schedule. Before continuing now, we'd like to show a brief film which describes the microwave landing system and what it can do. (Film presented)

Pending the worldwide standardization meeting that's been touched on in the film, FAA has undertaken a series of activities. We are moving forward, as you heard in the film, on the Service Test and Evaluation Program which, because we like acronyms, is called STEP, is only another demonstration of capabilities in operational terms.

We have studied the procurement of two additional ground systems to be installed in mid-1982 in addition to the four that were mentioned in the film. Sites for these systems will be determined shortly. We have procured, or are procuring, thirty airborne MLS receivers to become available in the spring of 1981 to permit the FAA and selected operators to participate in MLS operation evaluations.

We have awarded a contract for the development of a computer chip which will lower the cost of airborne MLS equipment for the future. Utilizing these chips, we will buy twenty production-quality receivers for the high end of the general aviation category, starting in mid-1982. The development by industry of airborne receivers is essential -- MLS implementation is a chicken-and-egg proposition. The receivers will come when there is a substantial ground implementation. Ground implementation is not likely until receivers exist, and so it goes.

We've completed a Notice of Proposed Rulemaking which would amend the Federal Aviation Regulations Part 171 to permit the use of nonfederally funded MLS's for publicly authorized approaches. This action is intended to permit those of the aviation community who wish to proceed now to receive the benefits of MLS to move forward. FAA will cooperate fully with users and providers who wish to proceed with implementation with other than Federal facilities funds.

In late 1982 we hope to procure and commission for operational use approximately ten pilot production MLS ground stations. These systems will not only provide early benefits to users, but will permit final development of commissioning and flight inspection standards for FAA.

The film you saw described a number of MLS capabilities. How do we know these capabilities exist? We've proven them. The MLS development program has taught us more about the capabilities of MLS than we've ever known about any new system prior to large scale implementation. We've successfully demonstrated the capabilities in complex procedures at twelve of the toughest sites around the world and you saw some of them fleetingly in the film. But, what will it do for you?

Let me turn to the Benefit-Cost Study, the fat books that most of you have received, and tell you briefly what we found in what we believe is a realistic and objective assessment of MLS.

It's difficult to translate a demonstrated superiority in operational performance into dollars and cents. Some of the most obvious technical capabilities are not amenable to ready calculation of dollar benefits, yet they may in the end be the most important. Let me start with those.

If you'd turn on the first viewgraph please. The superior quality of signal will provide for more reliable coupling to the autopilot, making it easier to achieve consistent and routine auto-land capability. The ability to standardize operations so that all approaches can be made in the same way in all weather conditions will yield considerable economic benefits when procedures are devised to make these operations routine. It will also please the National Transportation Safety Board since the use of auto-land capability in a routine manner is their recommended procedure for the future.

I must note that the method we used for calculating benefits assumed MLS service to the Category I level of service only. This means that at runways where an MLS might provide better than CAT II signals, but where an ILS can only provide less than Category I, the dollars credited to MLS include the benefits to Category I service only. In cases where unrestricted Category I service is available with ILS, the MLS accrues no benefits in our calculations, even though it's capable of providing a much better signal than Category I. The additional safety benefits due to MLS's ability to routinely provide better signal and better service than ILS are, therefore, seriously understated in our calculations.

As you saw in the film also, the use of variable glide slope angles with MLS provides the ability to restructure approach paths at certain airports to permit segregated approaches to be made to short runways by general aviation, commuter and perhaps helicopter operators. Thus, there is a capability of providing several glide paths for aircraft to enable small aircraft to follow "heavies" at a higher glide angle as a means to ensure protection from wake turbulence, although this is still a controversial application.

The capability of using flexible approach paths, however, both in azimuth and elevation as well as the availability of precision departure or missed approach paths, should make it possible to segregate traffic according to aircraft flight characteristics. This operational flexibility provides the potential for significant dollar benefits.

The work of our FAA/Industry Major Airport Task Forces has pointed to other potentially valuable applications of MLS at major airports. We foresee innovative MLS applications, particularly in providing precision missed approach capability for either independent or dependent IFR approaches to triple parallels. Other applications include independent approaches to separate short runways, primarily for general aviation and commuters. MLS may also provide the possibility for independent operations to parallels more closely spaced than today's standards allow.

The potential benefit has been identified by using MLS on converging runways. Converging approaches are used extensively under visual approach conditions but are not used when the weather goes below 800 feet and 2 miles because the aircraft may not see each other in the event of simultaneous missed approaches.

MLS guidance could allow high capacity configurations to be used in IFR operations by providing the ability to give precise navigation for missed approaches. In the case of O'Hare, this represents the difference between perhaps 170 operations per hour and 135.

The flexible approach capability will allow some airports to take advantage of surrounding industrial areas, again as you saw in the film, to offload noise or other environmental problems. This is an important benefit of MLS.

One can readily imagine departure and arrival flight profiles to take advantage of this capability. Yet, since there is no agreement on how one should assign dollar values to the highly desirable attribute of being a "good neighbor", this benefit category was not quantified in the Cost/Benefit Study. Finally, there is the significant benefit category on nonproliferation, and I'll come back to that in a moment.

As you can see, there are major categories of benefits which are not included in the benefit-cost study -- they are not on the books yet. To put them there requires redefinitions of terminal area procedures which must be defined and evaluated by our Operating and Flight Operations Services. They are benefits which you as well as we must press for and

exploit if they are to result in realistic improvement in precision guidance service. The FAA is committed to responding constructively to proposals to exploit MLS. After all, as taxpayers, we have every right to exploit our \$100 million investment.

May I have the next slide please. Let me now talk about benefits we did attempt to quantify. We tried to make a realistic and objective assessment of MLS capability of providing operation advantages in several significant benefit categories. First, the superior quality of signal will enable precision guidance service where none, or at most a severely restricted service, would be available with ILS. As I've said, dollar benefits for improved safety with MLS were estimated only if ILS equipment was restricted to less than CAT I service, and could be corrected to at least this level with MLS. In addition, since all dollar calculations were based on the existing criteria for installing ILS, the safety benefits were estimated in IFR weather conditions only.

Secondly, the inherent reliability and superior signal quality of MLS will continue to provide precision guidance service when weather is poor and restricted service only is available with ILS, thus delays due to flight cancellations and diversions may be averted during periods of reduced visibility with MLS in place of ILS at a number of airport locations.

Third, the technical capabilities of MLS will enable properly equipped aircraft to make curved or segmented approaches or departures, or missed approaches. These capabilities will of course, again as you saw in the film, make for more efficient use of airspace. Airway routings which are presently found to conflict at major hub intersections can be eliminated. For example, the case study of the common airspace surrounding New York, as you saw in the film, reveals that significant increases in capacity could be achieved by elimination of the intersecting approach patterns.

The use of MLS may reduce taxiway restrictions and their resulting delays at some airport locations such as runways 4L and 4R at JFK in New York. Obstructions there make it necessary to locate the ILS glide slope antenna on the taxiway side of the runway where an adequately smooth and adequately sized ground plane exists. The MLS requires a much smaller protected area; delays due to signal restrictions at this runway can be eliminated.

Fourth, a considerable advantage of MLS is the potential for expansion of the national network for all classes of aviation users from grass fields to major jet ports to military uses. A shortage of assignable ILS frequencies exists now in major hub areas. ILS currently has 20 channels available with a possibility of expansion to 40 by channel splitting and by the rather costly conversion of existing airborne equipment. It's been estimated by FAA that even with the splitting of available channels, the national network would be limited to about 1,400 ILS ground installations. An expansion of the network beyond this level would result in severe limitations in service at congested hub areas.

Our current forecast requirement is for 1,250 ground stations by the year 2000 for Federal application. But forecasting is treacherous business, and even small changes can lead to significant underestimates. The problems associated with such conservative forecasts can be avoided, however, by providing now for a system with adequate potential for channels, i.e., MLS.

Fifth, the MLS requires no horizontal plane for generating its signal and is thus less vulnerable to the effects of snow, rain, tides or other deviations in terrain smoothness, as you saw in the film. In addition, the unique design of MLS makes it easier to diagnose the causes of system outages and make repairs. The result should be less downtime with MLS equipment and thus, fewer aircraft delays. The dollar benefits claimed in this category of the benefit-cost study were based on a three-month study of the ILS system outage records at O'Hare and the pattern of air traffic delays resulting from those outages.

Sixth, as you saw in the film, the use of smaller MLS antennas and the ability to avoid extensive site preparation provides a benefit which does not accrue directly to the aviation user but is available to the FAA as the manager of the national network and thus, indirectly to U.S. taxpayers. It provides for a reduced investment for the installation or the facility.

Seventh, for fuel savings in the benefit-cost study there is a measure of "double counting" since in our tally of dollar benefits, due to the MLS ability to reduce delays, we estimated delays by the amount of savings in aircraft operating costs. Fuel is already included as a component in these operating costs. However, with the current fuel problem, it's important to keep a separate subtotal tally of the potential for savings of our nation's fuel resources. Based on estimates made at selected case study locations, the study of benefits for MLS identified a significant potential for saving fuel.

Now, based on the factors that we could quantify, the net benefits (benefits less cost) accruing to the community of aviation users were estimated to be substantial. Some \$500 million was estimated as the twenty-year total net return to the aviation users, measured in 1976 dollars and discounted at an annual rate of ten percent. If anybody has questions about the mechanics of that, there are, happily, economists here.

The operators of commercial airlines were estimated to have a significant economic advantage reflected in a benefit cost ratio of 8.5 to 1. Even if dollar estimates for savings in passenger travel delay times were excluded from this ratio, although there's little justification for doing it since it's the savings in travel that brings the passengers to the airlines in the first place, there is still an estimated \$300 million in benefits residual for the commercial carriers.

This benefit total still compares favorably to the additional costs of \$69 million for MLS avionics in place of ILS, a favorable ratio for the airlines of 4.3 to 1 by that method of calculation. Similar

estimates were compiled for the commuter airlines. They indicate that benefits of \$22 million could be obtained with an additional cost investment in avionics equipment of \$9 million, a favorable ratio to the commuters of 2.4 to 1.

Now, not all aviation groups were estimated to benefit equally from the implementation of MLS. The small economic disbenefit, costs exceed benefits, was estimated for the average general aviation user -- whoever that may be. The size of the dollar disbenefit to the general aviation owners of single and multi-engine prop aircraft is quite small -- a twenty year total of about \$4 million -- which represents about a three percent increase in the total bill of \$145 million that would be spent by the general aviation users for precision approach capability in an ILS world.

The economic disbenefit arises from the study's conservation method of evaluating the benefits of reduced delays resulting from this user group's use of precision guidance service. The benefits were based on the national income figures estimated for the average citizen, not the average general aviation owner. Since it's likely that the typical general aviation owner earns more than the average annual income of \$25,000 a year, it's equally likely that the dollar benefits attributed to this owner's use of MLS are undervalued in the study.

Large segments of the user community already receive substantial benefits in excess of costs from precision guidance service. For many owners of general aviation aircraft, the benefits in increased safety resulting from receiving precision guidance service at locations not able to receive full unrestricted ILS service, but available from MLS, will become available. The majority of the precision guidance installations currently planned which will increase the number of ground systems from the present level of around 620 to the 1,250 level forecast for the year 2000, which I mentioned earlier, will be made at small community airports serving the general aviation and commuter communities. These places are not equipped presently to provide precision guidance service.

Almost all of the alternative strategies that you've seen and that Dr. Wilkins will be talking about, which are proposed for implementing MLS in the transition document, are for the earliest installations to be made at such small airports. We are, therefore, optimistic that many more general aviation users will be able to benefit from MLS than now benefit from ILS.

The benefit/cost ratios, of which I've talked about which support the conclusion that the MLS is the superior long-run economic alternative to ILS, were based only on those factors that could be quantified -- that is the second group of users, not the categories I mentioned first. But, there is another factor which should be mentioned -- the economic advantage that results from the use of a single internationally accepted standard of precision guidance equipment.

The proliferation of nonstandard precision guidance equipment can be halted by the introduction of the single internationally standardized microwave landing system. Make no mistake about it, people who need microwave systems will buy them and there is no shortage of equipment manufacturers willing to offer nonstandard systems.

To make that point, prior to the time that the MLS development got started, the United States alone had spent large amounts of money on the development of no less than 40 different microwave landing and precision approach and landing guidance systems. There is clearly a need seen, now for a number of years, for a single standard for a precision guidance service which will be able to meet our military requirements as well as those of the international aviation community and the domestic community. We all benefit by agreeing on a single standard. The sooner we decide to move and implement, the sooner the proliferation of nonstandard systems will stop.

Where do we go from here? Let me just say one thing more in closing before Bill talks about the transition process. The exploitation of MLS rests in your hands at least as much as it does in FAA's. We need to know how important it is to you. We believe we've amply demonstrated the capability of the system, and the FAA Flight Operations organization is currently and actively involved in exploring MLS capabilities and operational uses in the development of procedures. But exploiting the system and wringing optimum benefits from it depends very much on you.

Traditionally, the users have come forward to innovate with new systems. FAA helps and approves safe and efficient procedures -- not the other way around. You should not wait for the government to hand you the minimums on a platter. You have to exploit the system yourself, in your own interest, for your own benefit. You need to come to FAA with proposed procedures which will benefit you. FAA will help and approve those procedures when they are demonstrated to be safe. This involves you heavily.

It might be nicer if the government could simply hand it all to you on a platter, but the history of the development of procedures for essentially all systems is such that the best of new systems is made and the best exploitation is achieved when users and FAA work together to gain the benefits. Your stake in a sound MLS transition is clear. We seek your thoughtful advice. Making the most of the MLS in your operation requires your labors as well as ours. Thank you very much.

Dr. Bill Wilkins
Associate Administrator for Policy and International Aviation
Federal Aviation Administration

"The MLS Transition"

At this point I want to briefly cover why we have developed the MLS draft transition plan and make a few remarks about the proposed implementation strategies. I will then open the meeting for your inputs.

Several years ago, the Federal Aviation Administration established an improved acquisition management process which introduced the concept of a formal transition plan for selected major new systems. As its name implies, a transition plan is designed to facilitate the transition from an existing system to a new system -- in this case from ILS to MLS.

We are at the point in the decisionmaking process where virtually all of our development of the MLS capability has been completed. The International Civil Aviation Organization (ICAO) selected the joint U.S./ Australian approach for the new MLS international technical standard. It is anticipated that this international technical standard will be formally adopted at ICAO's worldwide meeting scheduled for April 1981.

As Mr. Poritzky pointed out, FAA has embarked upon an in-service evaluation project to demonstrate more extensively the MLS technology under the rigorous demands of field operating conditions. It must be decided now and at what pace to bring this MLS technology into the National Aviation System. This is the major purpose today -- to receive your comments on alternative implementation strategies before proceeding in the decisionmaking process.

One point must be emphasized at the outset. The final transition plan, once it has evolved, will not be an implementation plan. A more detailed implementation plan is being developed. In its final form, it will incorporate the implementation strategy approved in the final transition plan. That implementation plan will contain such information as specific locations including runways and detailed installation schedules.

The transition plan is something quite different. It is one of several tools designed to support the decisionmaking process -- in this case supporting the choice of how MLS can be implemented to best serve the needs of the future. When finally adopted, the transition plan will provide in a single integrated package such information as the current validated requirements for MLS; the result of the development phase of the program; the analysis of alternative strategies which could be employed to implement MLS; and ultimately, after we have received and evaluated your comments, the recommended strategy for introducing MLS. Thus, the transition plan and benefit-cost study together will form a complete justification package to support the implementation decision for subsequent Executive Branch and Congressional reviews.

These two documents -- the transition plan and the benefit-cost analysis -- cover the broader questions of what, when and why, leading up to implementation. Then the implementation plan provides the individual specifics of who, where, when and how which are needed to carry out the program.

At this point in the decisionmaking process, the draft transition plan (that's this document, the orange one) contains an analysis of ten alternative strategies for full scale implementation of MLS. The

analysts who authored this draft transition plan started out with twenty-two alternative implementation strategies. As a result of their work and analyses, the choices were narrowed to nine.

The tenth strategy contained in the plan is an aviation user strategy proposed by the Radio Technical Commission for Aeronautics - RTCA. This strategy was developed by RTCA Special Committee 125 which consists of a wide spectrum of prospective manufacturers and users of MLS equipment as well as various government representatives.

All of you should have available a booklet entitled: "Guide To Microwave Landing System Implementation Strategies." This is the red book. This is the short, 16 page booklet. On page ten of that booklet, there is a summary of the seven installation options which form the heart of the nine implementation strategies described in the draft transition plan. Each of these potential implementation strategies has been constructed using combinations of the installation options in different orders of priority.

I will not belabor here the details of these strategies which I hope you have had an opportunity to review and evaluate. Instead, I would like to highlight several of the key factors and policy questions associated with transition. Our hope is that these will be addressed in either our public hearings today or the written comments which we will be accepting until February 10th -- or even better, in both.

The draft transition plan, that's the orange booklet, contains an economic analysis of the ten alternative implementation strategies. The calculation of benefits and costs presented in the plan is for the purpose of evaluating the relative economic merits of the alternative transition strategies. All of those comparisons are for MLS to MLS -- not of MLS to any other precision approach guidance system.

The separate benefit-cost study which accompanies the draft transition plan documents the analysis of the MLS versus ILS. That's the brown set that is available. This, the benefit cost study itself comes in two volumes. The third one is an executive summary of these two. We have copies, sufficient copies, of the red book with us. I don't know whether we have sufficient copies of the brown and the orange books for everyone here to have one. If we do not, please make sure that we have your card or your name and address and we will see that you get copies of them. For whatever it's worth, copies of Sieg's remarks and my remarks are also available if you would like them.

To say the same thing that I've been saying in another way, the draft transition plan compares the various possible ways of moving to MLS while the benefit-cost study shows how MLS compares, in economic terms, to ILS. There is another point about the economic analysis in the draft transition plan. The plan contains earlier estimates, based upon 1976 values, that differ from our current dollar estimates of benefits and costs. Thus, while the data contained in the draft transition plan are still valid for comparisons of the alternatives, of the alternative strategies run together, they cannot be used outside of that context.

The results of the analysis presented in the draft transition plan show no "statistically significant" economic difference among the ten alternative strategies. The total range of net benefits -- that is benefits less costs -- is only about ten percent. This ten percent is less than the possible range of estimating errors. Thus, the analysis provides no overwhelming economic basis for the selection of any one strategy over another.

This indicates to us that the choice of a strategy may be based almost entirely upon operational factors. Concerning those operational factors, one of the primary considerations will be the views of the users of the system and the public as expressed to us during the comment period for the transition plan. We welcome, and will most assuredly use to the extent possible, your evaluations regarding the appropriate implementation strategy for MLS. Your insights and expertise will be significant factors in determining a future course of action to make the best utilization of the capabilities of MLS.

Each of the ten alternative implementation strategies presented in the draft transition plan would, if approved or if adopted, have an impact to a greater or lesser degree upon several key considerations. For example, some of the strategies (listed in the red book) -- numbers 1, 2, 6, 8 and 9 -- would tend to encourage faster general aviation MLS avionics equipage while others -- numbers 3, 5 and 7 -- would encourage air carrier equipage first. In at least one case -- strategy number 4 -- the incentives would be rather equally balanced between general aviation and air carriers.

The strategy proposed by RTCA -- strategy number 10 -- which in the early stage focuses upon clustering MLS installations around selected major hubs, would be likely to have a somewhat different impact. It would probably tend to encourage early equipage by geographic networks. Each of the strategies will also have varying impacts upon the rate at which ILS installations are decommissioned. This in turn will effect the rate of cost savings for the taxpayers, particularly at problem sites currently equipped with tube-type ILS equipment.

Two of the strategies -- strategy number 5 and strategy number 6 -- offer accelerated installation rates for MLS. These two strategies would speed up the pacing of the transition, but would also require Executive Branch and Congressional support for the expanded capital investment budgets needed in the early years to carry out the program.

Finally, one of the strategies -- number 8 -- would place greater emphasis on MLS installations at noise sensitive locations. This approach would utilize one of the strong points of the MLS -- the ability to solve site specific problems and help make our airports better neighbors for the surrounding communities.

All in all, each of the alternative strategies offers choices. What we need is your advice and counsel on what you believe to be, from your perspective, the best choice and why. We want to hear from you now and

we would welcome any follow up comments that you would care to submit in writing. If you decide after our meeting today that you would like to submit written comments, please send them by February 10, 1981, to the FAA at the address listed on page two of the red booklet on implementation strategies.

One other item before closing. Since we closed the comment period a couple of months ago, some of you may be wondering when we will be publishing a final FAR Part 171 standard for the microwave landing system. FAR Part 171 is the portion of the Federal Aviation Regulations which sets forth the minimum requirements for approval and operation of non-Federal air navigation facilities. Our current best estimate is that the final FAR Part 171 standard for MLS will be published by the late spring of 1981.

We continue to rely upon the expertise and judgment of the aviation community and the public to guide us in our decisions. We are now asking for that input regarding the MLS draft transition plan.

For the balance of this meeting, the panel will primarily listen to your comments and seek to understand your thinking. We will, of course, answer to the best of our ability any questions of general interest that you have related to the transition plan or the supporting documents. Our objective today is to listen to what you have to say to us and establish a public record upon which the Administrator can make a better informed decision.

It is now my pleasure to open the meeting to receive first the statements of those persons that have signed up to speak, and then any additional comments from the audience. The person who has signed up to speak is Mr. Gordon Autry.

Prepared Statement

By

Bruce Gunberg
Vice President of Flight Operations
Rocky Mountain Airways

I am Bruce Gunberg, Vice President of Flight Operations for Rocky Mountain Airways, representing Gordon Autry today, the President of our company, who could not be present this afternoon. I'm basically here today to put on record a statement in support of the MLS transition plan.

Rocky Mountain Airways has been in the business of MLS approaches for a number of years, having our first approach -- MLS approach -- into Aspen, Colorado, early in the decade (back in late 1972). A couple of years after that we added an MLS approach in Steamboat Springs, Colorado, and just a little over a year and a half ago, put an eight degree MLS

approach into Avon Stolport which is right near Vail, Colorado. So I guess it's needless to say that we fully support MLS and what it can do for us, not only the commuters, but the industry as a whole.

In your public hearings in Los Angeles a few days ago, Mr. Crabtree of Golden West Airlines -- representing Golden West Airlines and also the Commuter Airline Association of America -- gave his statement and the statement of the CAAA in their feelings and support in the MLS transition. Basically, Rocky Mountain Airways fully agrees and supports the statement that was previously presented by Mr. Crabtree.

In his reported statement I think he stressed the two main points of the smaller communities throughout the country -- over two hundred of them -- that have scheduled air service but do not have adequate precision approach facilities. Whereas most of these are commuter airline served communities -- and many of the commuters get a little touchy as far as getting jabbed as far as reliability -- when you look at the ILS facilities and other facilities they have to deal with, I think there's some understanding of that. Mr. Crabtree's statement also stressed the importance of what is going on back at Washington National as far as the major congested hub airports and where the MLS approach concept can help us there.

Rocky Mountain Airways also supports these comments very much in view of our operations daily into Denver Stapleton. I'm not going to dwell on the report of what Mr. Crabtree said. Again, it represents, I think, CAAA's feeling on this subject. I think it definitely represents the commuter industry, but I think Rocky Mountain Airways feels even more that what we experience and what we feel should represent the total industry.

Over the last eight or nine years, we've accomplished quite a bit as a private company -- first installing nondirectional radio beacons in the mountains which we still have employed (a total of six of them at this time) and recognizing early on that it was going to take a higher level of technology to provide a reliable air service to the mountain communities in Colorado. Of course, we also realized to be a successful company we were going to have to do that, so we looked towards the higher level of technology, and as technology goes, we all know that it progresses very rapidly but when conditions dictate, it takes giant leaps forward, such as the ones you know. Space industry and stuff like that, and also now with the cost of fuel, the oil situation, all of a sudden technology seems to be going full speed ahead.

I think conditions are such right now in the industry that a higher level of technology is needed throughout the industry and we feel that MLS is the answer. We have seen this in the communities that we serve, not that we're a special airline or we're very special, it's just that I think we've been faced with some of the things that other airlines are being faced with now -- those being congested airports, service, new service in smaller communities, smaller communities that have very

environmentally sensitive areas, pollution, noise, etc. Of course, now with the fuel costs, these are the conditions that I think are spawning need for new technology.

I'd like to give an example. In Steamboat Springs, Colorado, we do have like I mentioned, an MLS approach. It's been there for about six years. We also have a nondirectional beacon, NDB approach into the airport. The time difference between the two approaches in real conditions, considering wind and so forth, is 12 minutes. Right now today we operate five flights daily into Steamboat Springs. If you had to do the MLS approach every time, reference the NDB approach every time, reference the MLS approach, we'd be wasting one hour a day of aircraft time and aircraft fuel.

I think you can see the importance of the approach facility as far as our operation is concerned. Almost all the airports we served in the mountainous areas are environmentally sensitive, and we have made use of the MLS approach facilities to help us there as far as high angle approaches. Like I said, into Vail, our Avon Stolport, we have an eight degree approach.

We are looking for, in the future, some relief in the Denver area also as far as the congestion, delays and so forth -- very similar to what Ransome is doing at Washington National.

Basically, I think that is my statement and the statement of our company in our support of MLS -- a little bit of an outcry to try to get the program going and basically off dead center. If you have any questions of me or anything like that, I'd be happy to consider them.

Jack Hart (Loma, Colorado) - As a private company you took on an MLS system or a couple of MLS systems. I'm curious as to how you funded those and what the approximate current dollar costs would be for on-ground and on-board avionics?

Bruce Gunberg - Very good question. We funded them solely through the internal earnings of the company, purely Rocky Mountain Airways owned and installed. We were fortunate to get the equipment produced by Singer Corporation -- Talar equipment. It is not the up-to-date scanning beam-type of MLS transmitter. However, it was worked out very well for us. Like I said, we purchased all the equipment -- both the transmitters and receivers -- ourselves. We ended up purchasing all the equipment, even the manufacturing rights at that time. In today's dollars, I couldn't answer your question as far as what they cost.

Dr. Wilkins - Let me get Jack Edwards over here to take a stab at that. Jack, as I will remind you, is Chief of the Navigation and Landing Division.

Jack Edwards - I guess there was some question as to whether you were directing your inquiry to current costs of the Rocky Mountain Airways equipment or to the MLS that's now coming?

Jack Hart - I was curious as to what it would cost a private company, as to what it's going to cost the taxpayer?

Jack Edwards - The MLS -- I'll give you some numbers and work from there. The private purchase and ownership will generally be made, you know, on a very small quantity basis so you're going to be paying penalties for small quantity purchasing versus the production quantity gain, if you will, that would be enjoyed by the government when we go to implementation. I will give you the numbers that we have in looking forward in our internal planning within the FAA as far as purchasing systems in large quantities.

The small community system, as we have come to call it and referenced in the film, in production quantities hardware alone would be available for \$200,000. Higher order systems in terms of greater performance levels would, of course, cost most at the price or sell line. The basic system which we would call it, which would be applicable in terms of current language for both Category I and Category II performance levels, would be available for about \$350,000. That's single equipment. If we went dual for Category II operations, that number would go up to about \$500,000.

The largest, most sophisticated version of the ground equipment would be available at the price or sell line at about \$950,000. Again, I emphasize that these numbers come from production quantities; and if you're looking for a price for small quantities, we would have to back off from those numbers. In our estimating we use 92 percent, and just to give you an indication of the kind of differences that would come from application of that curve, a small community system in production quantities would be about \$200,000. If you back that off to, say, quantities of less than five down to a one or two order; the number that we're talking about of course, goes up considerably and I would expect that number to be up in the order of \$275,000.

Jack Hart - How about airborne?

Jack Edwards - Airborne equipment -- there is again a range of capabilities which would be available to the user. What that really means is then that the user will have decisions of his own to make in terms of the investment versus the capabilities that he wants to enjoy in terms of benefits of the system. The small community, general aviation flyer, airborne equipage on his aircraft in terms of an airborne receiver processor, he would have azimuth and elevation capability in his airborne receiver, selectable elevation capability would come with it, installed in his aircraft for less than \$2,000. Hardware cost wise -- about \$1,400.

The corporate or executive level airborne equipment in production quantities, we're looking at a price in the order of about \$6,000. That's based upon extrapolations of the current technology development activity that we have in the general aviation receiver processors.

For the air transport category user and again the most sophisticated version of the airborne equipment, we're looking at a price of about \$8,000.

Dr. Wilkins - Are there any other questions for Rocky Mountain Airways before I let him return to his seat? (No response)

Are there other statements or questions?

Tom Lindeman (Area Coordinator - Airline Pilots Association) - I'm the area coordinator for the Airline Pilots Association here in Denver, and we'd like to say that not only U.S. ALPA but the International Federation of Airline Pilots has long endorsed the MLS concept. Now, when we discuss implementation, we have some reservations because I've been on this job for some ten-twelve years, and one of the schemes that I have found that has been almost consistent within the agents, is that you have to have X number of operations before you can get this nondirectional beacon, or X-plus to get a VOR and ILS. ALPA would like to suggest that our priorities for an implementation plan for MLS are primary air carrier runways where no ILS exists. Where an ILS exists, but lower landing limits could be achieved, would be our second emphasis and secondary runways that are without an ILS.

I feel that perhaps more than almost any other region in the United States, the Rocky Mountain Region is perhaps more suitable to the MLS system because of the siting problems and the problems that we encountered in trying to develop procedures. Well, Butte, as an example. So within the above confines of the implementation, we feel that perhaps it should take place regionally and with particular concern to the given route structures.

When we really got into the ILS system, it was a kind of a beginning thing and the larger airports were the ones that were getting them and we really needed the vertical guidance associated with approach procedures. We hope that the MLS system would be applied in a shorter period of time and where there are no ILS's at the present time to try to integrate in that form. I thank you for your attention. If there are any questions, I will try and answer them.

Dr. Wilkins - Are there others who would like to make a statement or ask a question?

Jack Daniels (Member, Aeronautics Commission of North Dakota) - I'm a fixed base operator, operating a fleet of about 12 airplanes, employing about 15 people and doing a lot of 135 work. I'm also the Airport Manager for the City of Williston. From that basic background, I guess one of the things that I would like to see you people consider in your deliberations is the harangue that the industry went through when it went from the four course range to the very minimum of VOR presentations in the cockpit, and it's impact on the general aviation community.

The time, as I recall, that it took to get that presentation accepted in the general aviation community was horrendous. I being one of those that told you to go to hell, but I nevertheless, eventually got around to flying the VOR and did indeed, will learn how to fly the MLS. I'll punch a bunch of buttons and don't have to do much of anything but pull the throttle back. You forced me to become an astute aviator.

But at any rate, that -- the transition then -- I guess, one of things that we need to consider is the transition from the ILS as the industry knows it today, from the general aviation point of view, to an MLS program, has got to be implemented in a manner that will expedite the acceptance of the MLS by the general aviation community.

I think one of the things that you need to consider in that acceptance or presentation is the situation that Rocky Mountain Airways has developed and that that other private user has developed. You're going to proliferate the system with nonstandard installations around the country which is going to cause some problems, if you don't get it put together in a manner that you can get a base line developed for getting all this study standardized, getting the airborne equipment standardized, getting it in the airplane and getting it in the system, and that in itself, if you can accomplish that, with the independence that exists in the general aviation community you will have earned your wages.

I want to stick my neck out to the extent that the ALPA boy did and set some priorities as I view them on what should be done and I'll go to page ten in the red book and pick Plan B or Selection B as the most important. That needs to be done first, C second, F third, G fourth, A fifth, E sixth and D seventh. While there might be some merit to reducing a segment of the aviation world in the form of network or airway installations of the MLSs, that would do more, in my opinion, to preclude rapid transition of the MLS system into the network.

If the guys in the "Golden Triangle" are the only ones that have MLSs, the airplanes in the "Golden Triangle" are going to be the only ones that have got them on board -- the airborne equipment. To whatever extent is possible, scatter it around the country as much as possible, then make it possible for the aviation world, the general aviation world in particular, to do that. I think that air carriers themselves, the commuter industry, as witnessed by Golden West in his remarks and by Rocky Mountain Airways in theirs, anything that you could do to enhance the completion reliability -- and I speak from experience there and at Williston was served by a Twin Otter for ten years with 601 minimums from a VOR approach, and that airplane was bought as an instrument airplane, provides to the pilot with VFR guidance, almost a walk-beside-me concept, and the inability of that airplane to complete all 601 approaches cost the air carrier a hell of a lot of more money than any airborne gear that he could put in it.

So from that point of view, the air carrier industry is going to do their thing anyway. So the people that you really need to enhance are going to be the general aviation community. The guy who is flying a two

or three or four million dollar executive-type airplane into any airport in the country where he may have people that he needs to go, don't need to be confused about an eight thousand dollar on-board piece of gear, because he's got a guy sitting in the back end that's getting eight thousand dollars an hour, and if he don't get where he wants to go without a bunch of missed connections, or Plan B, go when I want to go, he'll get the stuff and put it on board the airplane. Thank you.

Dr. Wilkins - Thank you for a very thoughtful statement too. Are there others who would like to speak or ask questions? I'm going to put John Kern on the microphone for a minute and ask him to talk about, just for a moment about the flyability, the question about how much difference the pilot will see. John, would you do that, please?

John Kern - I think maybe rather than myself, maybe one of our active pilots who is involved in the program on a daily basis could answer your question. Just briefly I should say that the displays that we have, if you're concerned about the displays that a pilot sees and I think that's one of the things that you're concerned about, are identical to what you see today. Perhaps we ought to let Don Elam say a few words. One of our test aircraft and one you did see in the movie was the King Air 200, and this aircraft is equipped with the microwave landing system. It's the display, actually two displays (one is the original crosspoint) that we're all fairly familiar with, and the other is a little more sophisticated and it's the Collins FD 109 flight director which gives you displays identical to what any of us are accustomed to flying right now. Perhaps Don could talk about his experiences with the system basically at Washington National. Don, would you like to?

Dr. Wilkins - Don, take a couple of minutes and describe it, would you?

Don Elam - I have had occasion to fly the FAA King Air and the Beech 200. We installed a microwave system in it approximately a year ago. We also installed a tangent piece of gear -- a flight inspection panel -- so that we could measure the accuracy and flyability and so forth of the equipment.

As John mentioned, this King Air has a Collins FD 109 flight director. We can also fly it with purely the raw data. I'm sure you are familiar with the handling characteristics in all of the turbo-prop airplanes like the King Air. This particular installation -- the microwave system -- is installed so that the pilot might either fly the straight ILS or he can fly it with microwave. A simple toggle switch switches him out of the ILS mode and displays an MLS. The flight director computers or the autopilot will look at the MLS -- they know no difference than from what is normally presented to them by an ILS.

We installed that out of Oklahoma City and we had no facility to fly it against so we brought it back to Washington. The very first approaches they flew fine. We didn't have to tweak the system or something. I guess what I'm really trying to say is, from a pilot's point of view, the pilot doesn't know that he isn't flying an ILS. It's no more complicated, no more simple than an ILS approach.

We made maybe a hundred or so approaches at Washington National, Philadelphia, the test facilities at Atlantic City and the NASA test facility down at Lobbs Island. In all of these approaches we have experienced no difficulty. Well, no difficulty -- I guess there's always a difficulty when an airplane taxis in front of the facility and you have to break off the approach, but the flyability is excellent.

We haven't had any unusual problems with the ground equipment. The only failure I think we've had in the airplane was one time we had a switching relay (a pretty common small item) fail (an item that's been around for twenty years or so) and the other time there was a broken wire.

The equipment that we have in the airplane is test, prototype stuff, but from a flyability standpoint, we've had no problems. Are there any questions that I can answer? Thank you.

Tom Miller (Johns-Manville Corporation, Denver) - In other words, the state of the art is such that the transition would be, with reporting of Mr. Edwards, relatively inexpensive to put a converter in each of the aircraft. Would it be compatible with the present systems?

Jack Edwards - The airborne receiver processor for the MLS is a new unit. It's not, if I read you correctly you're referring to a frequency converter for down converting and using some already existing equipment on board the aircraft -- is that what you meant?

Tom Miller - Yes.

Jack Edwards - No. That's not possible with the MLS. It operates on an entirely separate frequency and it requires a whole new receiver processor on board the airplane. In addition, the output of the receiver processor interfaces with all the existing on board aircraft instrumentation as well as flight control systems.

Tom Miller - One other thing -- as a representative of the National Business Aircraft Association, I'd like to go on record for the Denver region stating that we concur with the analysis development or the tenth strategy. We feel that this strategy was developed by a user group, but appears to provide the best possibility of achieving maximum penetration of all elements of the aviation business community. That's all I have.

Dr. Wilkins - Thank you sir. Are there others who would like to speak or ask questions? (No response)

Yesterday or day before yesterday in Los Angeles I asked the FAA's if they wanted to take the opportunity to ask questions of you. Now that we have this group of interested people here, I'm going to do the same thing again. Are there questions that any of you would like answered?

John Kern - I have one question for the ALPA area representative. You made a recommendation that perhaps MLS could be implemented on a regional basis. Are you talking about an FAA region or just a region of the country? Like the southeast or southwest or rocky mountain area?

Tom Lindeman - Well, in fact, the regional offices are regional in nature, aren't they?

John Kern - Okay, so you're referring to a specific geographical area, perhaps the Rocky Mountain Region?

Tom Lindeman - Well, the rationale behind that was in a regional concept, it could be consistent with a line operation of several air carriers, rather than one in Kansas City and another one in Seattle, then a third one in San Diego -- whether there would be a little more continuity to the system.

John Kern - So a regional area would be something maybe let's start with Rocky Mountain Airways as an example -- their particular area would qualify as what you would call a regional concept?

Tom Lindeman - Yes sir.

John Kern - Thank you very much.

Dr. Wilkins - Anyone else?

Jack Daniels - Everywhere I see the combination of characters that says 2000, which I assume to mean by the year 2000, I'd like to have that backed off to 1990 and put yourself in that bracket and maybe by 2000 the job will be done.

Dr. Wilkins - Thank you for that.

Once again, on behalf of the Federal Aviation Administration, thank you for coming and we are grateful for your attention to our presentations and for your participation here today.

PUBLIC HEARING

"Microwave Landing System"

Friday, January 9, 1981
2:00 p.m.

Sheraton-O'Hare Hotel
Hearing Room
6810 North Manheim Road
Rosemont, Illinois

INTRODUCTION

Wayne Barlow
Director, Great Lakes Region
Federal Aviation Administration

I am very happy to welcome you today to the Microwave Landing System Transition Public Hearing. I am very gratified that so many of you would take the time to come out and talk with us about the various kinds of work in the FAA's scheme of doing business.

It is my pleasure today to introduce to you Dr. Bill Wilkins who is the FAA's Associate Administrator for Policy and International Aviation who will be the moderator for this activity and introduce the other FAA participants.

Dr. Bill Wilkins
Associate Administrator for Policy and International Aviation
Federal Aviation Administration

It is my pleasure to welcome you on behalf of the FAA to this public discussion of the microwave landing system transition process. Let me start by saying that our presentation -- the FAA's presentation -- will take almost exactly an hour. Then at the end of that time, we will go to the people who have signed up to make public statements. There are about four, I believe, who have thus far registered to speak. If anyone wishes to make a public statement, please contact the people at the desk and we will be pleased to put you on the list. Then we will proceed with questions and discussion within the entire group. Before we do that, let me make a short statement about the process this afternoon.

Let me introduce to you the FAA people who are here and are available for responses to your questions. First you will hear from Siegbert Poritzky, the Director of the Office of Systems Engineering Management. Ed Kennedy is next to Sieg. Ed is the Deputy Director of the Airway Facilities Service. He is here representing the Associate Administrator for Air Traffic and Airway Facilities. Paul Galis is the Acting Director, Office of Airport Planning and Programming; Jack Edwards, Chief, Navigation and Landing Division, Systems Research and Development Service; and John Kern, Chief of the Aircraft Programs Division, Office of Flight Operations.

We also have some other folks with us here who have had and continue to have important roles in the MLS process. Let me introduce them too, briefly. There is Joyce Gillen. Joyce is from the MLS Program Office, Systems Research and Development Service; Seymour Horowitz who is an economist with the Office of Systems Engineering Management; and Marvin Olson who is Chairman of the MLS Transition Plan Development Group.

It is my pleasure at this time to start our part of the program by asking Sieg Poritzky to come to the microphone for his presentation.

Siegbert Poritzky
Director, Office of Systems Engineering Management
Federal Aviation Administration

"The Introduction of the Microwave Landing System -
A Call For User Involvement"

Good afternoon. The microwave landing system, which is a system that is greatly superior to the venerable instrument landing system, has been developed. It has been proven to be technically successful. It meets a series of operational requirements being imposed on it by the aviation community itself.

What remains is chiefly the best method of introducing the MLS into operational service and establishing a sensible eventual transition from ILS to MLS. The views of the community in this process are crucially important. The transition to MLS will be difficult. It may be tempting, even convenient, to simply forget about it and press for the installation of more ILS, but we believe the benefits and the previously expressed views of the community itself are such that implementation should proceed.

The aviation community has been instrumental in microwave landing system development from the beginning. Back in 1967, the Radio Technical Commission for Aeronautics formed Special Committee 117 for the purpose of making recommendations on a new precision approach and landing guidance system. The RTCA agreed from the beginning that the search for a new landing system should involve not only participants from the U.S. but would attempt to draw on all countries of the world with instrument landing system knowledge.

The response of the world's best experts in companies with diverse interests was remarkable. Literally hundreds of people, organizations and many countries participated.

The first task was to write a statement of operational requirements documenting the needs of all users from general aviation interests that land on grass strips or short take-off and landing aircraft and helicopters to large airline jets and to military aircraft with their diverse missions.

Operational requirements were then agreed on and later endorsed by the FAA. Later than that, they were substantially endorsed by the International Civil Aviation Organization. ICAO, which you will be hearing more about, is the standard body of aviation. The cooperation among all of these parties was remarkable during nearly all of the microwave landing system development program, which was undertaken in the U.S. jointly by the FAA, the Department of Defense and NASA.

At the end of the development period, a group of experts was again assembled to reach the system's decision. And another group, the ICAO All Weather Operations Panel, prepared the way for the international decision. The cooperation was superb almost to the very end when a nagging international controversy developed over one part of the signal format. But this problem too was overcome and in April 1978, ICAO -- International Civil Aviation Organization -- selected the broadly supported U.S.-Australian time referenced scanning beam microwave landing system as the approach to be taken for international standardization. Much has happened since.

Before continuing to talk about the benefits and possibilities for MLS, we would like to show you a brief film describing the microwave landing system. (Film presented)

FAA has taken a series of steps which are really indications of further operational standards. We have already started installation of the two additional ground systems to be installed in May 1982. The location of those systems will be determined shortly.

We have also awarded a contract for the development of a computer chip which will lower the airborne cost in the future. The development by industry of airborne receivers is essential. Plans for further ground implementation are not likely until the receivers exist. FAA will cooperate fully with users who wish to proceed with MLS implementation with other than the Federal facilities and equipment funds.

In late 1982, we hope to procure and commission for operational use approximately ten MLS ground facilities. These systems will not only provide benefits to users, but will permit the final development of operational standards.

The film that you all saw demonstrated a number of MLS capabilities. How do we know the capabilities exist? We have proven them. The MLS program has taught us more about the capabilities of this system than we have ever known about any system prior to implementation and probably a lot more. We have successfully demonstrated this in complicated procedures at 12 of the toughest sites around the world.

Let me turn to the benefit process and tell you briefly about the objective assessment of MLS. It is very difficult to translate or demonstrate superiority of operational performance. Let me start with some of the benefits. The superior quality will provide more reliability making it easier to achieve that capability. We have gone to standardized operations so that all approaches can be made in the same way. Procedures are devised to make these operations routine. This will also please the National Transportation Safety Board. The use of this in a routine manner is their recommended procedure for the future.

I must note before going on that the method used for calculating benefits assumed that it only had MLS service to the Category I level of service only. This means that at runways where an MLS might provide better than Category I signals to beyond, an ILS can only provide Category I. The dollars credited to MLS include only the benefits to Category I. In cases where there are unrestricted CAT I services available with ILS, the MLS approves no dollar benefits in our study even though it is capable of providing much better signals than Category I. The additional safety benefits due to MLS's ability to routinely provide better signals and better service than ILS are, therefore, seriously understated in the calculations that I will talk about.

As you saw in the film, the use of various or variable glide scope angles with MLS provides the ability to restructure approach paths at certain airports to permit segregating approaches to be made to short runways by general aviation, commuter or helicopter operations. Thus, there is the capability of providing several glide paths for aircraft which will enable small aircraft to follow heavies at a higher glide angle as a means to ensure protection from the turbulence although this is a controversial use for MLS.

The capability of using flexible approach paths, however, both in azimuth and elevation as well as the availability of precision departure or missed approach paths, should make it possible to segregate traffic according to aircraft flight characteristics. This operational flexibility provides the potential for significant dollar benefits.

The work of our FAA/industry task force has pointed to other potentially valuable applications of MLS at major airports. We foresee innovative applications, particularly in providing precision missed approach capability for either independent or dependent IFR approaches to triple parallels. Other applications include independent approaches to separate short runways for general aviation and commuters.

MLS may also provide the possibility for independent operations that parallel runways more closely spaced than today's standards allow. The potential benefit has been identified by using MLS on converging runways. Often, they are not used when the weather goes below 800 feet in two miles because the aircraft may not see each other in the event that there was a simultaneous misapproach.

MLS guidance could allow high capacity configurations to be used by providing the ability to give precise missed approach navigation. In the case of O'Hare, this could represent the difference between 170 operations per hour and 135 under certain conditions.

The flexible approach capability of MLS will allow some airports to take advantage of surrounding industrial areas or whatever. It is an important benefit. One can readily imagine departure and arrival profiles to take advantage of this capability. Since there is no agreement yet on how one should assign one to the highly desirable attribute of being a better neighbor, this benefit category is not

quantified in our study. Finally, and I will come back to this in a moment, is the significant benefit category of standardization of all instrument landing systems across the country and across the world.

As you can see, major benefits or categories are not included in the benefit process. They are not on the books yet. To put them there requires redefinitions of terminal area procedures that must be defined and evaluated by our Flight Operations and Operating Services. They are benefits that we must press for and exploit if they are to result in realistic improvement in precision guidance service. The FAA is committed to respond constructively to proposals to exploit these advantages. After all, as taxpayers, we have every right to exploit the more than \$100 million development investment.

We talked about benefits that we did attempt to quantify. We tried to make a realistic and objective assessment of MLS capability of providing operation advantages in several significant benefit categories. First, the superior quality of signal will enable precision guidance service where none or at most a severely restricted service would be available with ILS. As I said, the benefits were estimated only if ILS was restricted to less than Category I service and could be corrected to at least a Category I service with MLS. In addition all dollar calculations were based on the existing criteria for installing ILS.

Secondly, the inherent reliability and superior quality of the MLS signal will continue to provide precision guidance service when weather is poor and restricted service is only available from ILS.

Third, the technical characteristics of MLS will enable properly equipped aircraft to make curved or segmented approaches or departures or missed approaches. These capabilities will provide for more efficient use of airspace. Airway routings which are presently found to conflict at major hub intersections can be eliminated. You could use that at certain airports.

Fourth, there is the potential for expansion of a national MLS network for all occasions. A shortage of ILS frequencies now exists, which has 20 channels with a possibility of extending to 40 by channel splitting. It has been estimated by FAA that even with splitting of available channels the national network will be limited to about 1,400 ground installations. An expansion of the network is then a problem. An expansion of the network beyond this level will result in severe limitations as to the service to congested areas.

Our forecast requirement is for 1,250 going in, ground installations, for the Federal system. But forecasting is treacherous business and even small changes can lead to problems with such a conservative forecast, but they can be remedied now by adding the system with an adequate potential for channels.

Fifth, the MLS requires no horizontal plan for generating a signal in space and it is thus less vulnerable to the effects of snow, rain and other deviations. In addition, the unique design of MLS makes it easier to diagnose the causes of system outages and make repairs. The result should be less down time with MLS and fewer aircraft delays. The dollar benefits in this category were based on a three-month study of the ILS system outage record at O'Hare.

Sixth, as you saw in the film, the use of smaller MLS antennas provides a benefit which does not go directly to the aircraft but is available to the FAA as manager of national networks.

Seventh, there is a measure of double counting in the benefit study for fuel savings. There are dollar benefits due to MLS delays. We estimate there is a saving, and fuel cost is included already as a component of those costs. However, with the current fuel problem, it is important, we think, to keep a separate subtotal tally of the potential savings for resources. Based on estimates at selected case study locations, the study of MLS benefits are identified at significant levels of fuel savings.

Let me talk to the benefit-cost study results. Based on the factors that we could quantify, the net benefits, benefits less cost, accruing to a community of aviation users were estimated to be substantial. Some \$500 million was estimated as a 20-year total net return to the aviation users measured in 1976 dollars and discounted at an annual rate of ten percent. It does mean that by almost any measure, when you look at things relatively, commercial airlines were estimated to have a significant economic advantage reflected in the benefit to cost ratio of eight and a half to one.

Even if dollar savings were excluded from the ratio, there remains an estimated \$300 million in benefits for the commercial airlines. This benefit total still compares favorably to the additional costs of \$69 million for MLS avionics in place of ILS, a favorable ratio of 4.3 to 1. It was indicated that benefits of \$22 million could be obtained with additional cost investments of maybe nine million and a ratio on commuter airlines of 2.4 to 1.

Not all aviation groups were estimated to benefit equally from the implementation of MLS in the quantifiable areas in our study. The size of the dollar disbenefit represents about a three percent increase in the total of \$145 million that would be spent by general aviation users for precision approach capability.

The economic disbenefit arises from the study evaluating the benefits resulting from this user group's use of precision guidance service. The benefits were based on national income figures estimated for the average citizen, not the average general aviation user. It is likely that the typical general aviation user earns more than the average annual income of \$25,000 or else he probably could not afford his airplane.

It is equally likely that the dollar benefits attributed to the use of MLS are undervalued in the study. Large segments of the user community already receive substantial benefits in excess of cost from precision guidance service. The majority of guidance installations currently planned would increase the number of guidance systems from the present level of around 620 to the 1,250 level forecast for the year 2000. These places are not equipped presently to provide the guidance.

Almost all of the alternative suggestions are for the earliest installation to be made. It is, therefore, optimistic that many more general aviation users would yield a benefit from MLS than now benefit from ILS. The benefit-cost ratios supporting this were based only on those factors that could be quantified.

There is another factor which should be mentioned -- the economic advantage from the results of a single internationally accepted standard procedure. I enter this discussion with some care, because there were others who also believe the need to proceed with the implementation of forms of microwave landing systems. Unfortunately, systems were used which were not and are not likely to receive the kind of international acceptance which is probably a nationwide growth towards that system.

People who need microwave systems must buy them. There is no shortage of equipment manufacturers and systems to provide such systems. Prior to the time MLS was developed and started, the United States alone had spent large amounts of money on the development of no less than 40 different approach and landing guidance systems.

There is a need for a single standard to meet our military requirements as well as those of the international and domestic aviation community. We will all benefit by agreeing on that single standard. The sooner we start to implement, the sooner the proliferation of nonstandard systems will start.

Where do we go from here? Let me say one word in closing. The exploitation of MLS rests in your hands at least as much as it does in FAA's. We need to know how important it is to you. We believe that we have amply demonstrated the capability of the system and the FAA is currently and actively involved in exploring its capabilities in development of procedures.

Exploiting MLS and getting benefits from the system depends very much on you. Traditionally, users have come forward with new systems with the FAA helping and building safe and innovative procedures -- not the other way around. You should not wait for the government to bring you the system on a platter. You have to exploit the system yourself. You have to come to FAA with proposed procedures which will benefit you.

It might be nicer if the government could hand this to you on a platter, but history does not show that. It shows that the best use of new systems is made when users and the FAA work together to obtain benefits. We seek your thoughtful advice. But making the most of the MLS capability in your operations requires your labors more than ours. Thank you.

Dr. Bill Wilkins
Associate Administrator for Policy and International Aviation
Federal Aviation Administration

"The MLS Transition"

Several years ago the Federal Aviation Administration established an approved acquisition management process which introduced the concept of a formal transition. As its name applies, the transition plan is designed to facilitate the transition from the existing system to a new system. In this case, it is from ILS to MLS. We are at a point in the decisionmaking process where virtually all of the MLS capability has been complete.

The International Civil Aviation Organization selected that which appeared appropriate for standards. FAA has embarked upon a project to demonstrate even more extensively the MLS. It is important to receive your alternatives before entering into the decisionmaking process. The final transition will not be an implementation plan. The transition plan is quite different. The transition plan and the cost-benefit study together will form a complete justification package to support the implementation decision for Congressional review.

The broader questions of what, when and why leading up to implementation are covered. Our present question is when do we get started or with what strategy. At this point there is the draft transition plan. It contains an analysis of ten proposed alternatives. The tenth strategy is an aviation user strategy proposed by the Radio Technical Commission for Aeronautics - RTCA.

All of you should have available the booklet (the red one) entitled "Guide To Microwave Landing System Implementation Strategies." On page ten of that, there is a summary which forms the heart of the implementation strategies described in the draft transition plan. I will not now belabor the details of the strategy, but instead would like to highlight key qualities or factors and policy questions associated with the transition. Our hope is that we will receive input in written comments that we will be receiving until February 10, 1981.

The calculation presented is for the purpose of the alternative transition strategies. All of the comparisons are for MLS to MLS, not from MLS to any other precision approach system.

All of these documents are available here, at least the red one is. If we don't have enough copies here today, please give your name and address to one of our people and we will see that you get copies.

To repeat then -- the major points -- the benefit cost study shows economic analysis. The data contained in the draft transition plan is valid for comparison usage but cannot be used outside of that context. The results show that statistically the total range of net benefits is only about ten percent. The ten percent is less than the possible range

of estimating errors, plus the analysis provides no overwhelming economic basis for the selection of any one strategy over any other. This indicates to us that the choice of the strategy to be used may be based almost entirely upon operational factors. Concerning these operational factors, one of the primary considerations will be the input from users of the system as expressed to us during the comment period of the transition plan.

We welcome and will surely use to the extent possible your evaluations regarding the appropriate implementation status for MLS. Your insights and your expertise will be significant factors in determining the future course of action to make the best utilization of the capabilities of MLS.

Each of the ten alternatives presented in the draft transition plan would, if adopted, have impact to a greater or lesser degree upon several key considerations. For example numbers 1, 2, 6, 8 and 9 would tend to encourage faster general aviation avionics equipage, while others -- numbers 3, 5 and 7 would encourage faster air carrier avionics equipage. In at least one case -- number 4 -- the incentives would be rather equally balanced between general aviation and air carriers.

The strategy proposed by RTCA -- strategy number 10 -- which in the early stage focuses upon clustering MLS installations around selected major areas, will more likely have somewhat of a different impact. It would probably tend to encourage early equipage by geographic networks.

Two of the strategies -- numbers 5 and 6 -- are accelerated. These two strategies would speed up the pacing of transition but would require Congressional support in the early years to carry out the program.

Finally, one of the strategies -- number 8 -- would place greater emphasis on MLS installations at noise sensitive locations. This approach would be one of the strong points of MLS -- the ability of solving these problems .

All in all, each of the alternative strategies offers a choice. What we need is your advice and counsel on what you believe to be from your perspective the best choice and why it is the best choice. We want to hear from you today. We would also welcome any follow-up comments that you would care to submit in writing. If you decide after this meeting that you would like to submit written comments, please send them by February 10, 1981, to the FAA at the address listed on page 2 of the red booklet.

I have one other item before I close. Since the agency closed the comment period a couple of months ago, some of you may be wondering when we will be finishing or publishing a final standard -- FAR Part 171 -- which sets forth the minimum requirements for approval and operation of non-Federal air navigation facilities. Our current best estimate is that the final FAR Part 171 standard for MLS will be published by late spring of 1981.

For the balance of this meeting, the panel will primarily listen to your comments and seek to understand your thinking. We will, of course, answer to the best of our ability any questions of general interest that you have relating to the transition plan or the supporting documents. Our objective today is to then listen to what you have to say and to establish a public record on which the Administrator can make a better informed decision.

It is now my pleasure to open the meeting to receive first the statements of those persons who have signed up and then any additional comments. Because we are making a public record and recording this and also because there are media representatives here, I would ask that those who wish to make formal statements come to this podium and use this microphone.

Prepared Statement

By

Martin Schultz
Administrator, Safety and Services Division
Michigan Aeronautics Commission

I am not used to making formal prepared presentations. I am more an ad lib type of speaker, but because of this written testimony being submitted, I will stick pretty much verbatim to our written report with just a few ad libs.

Before agreement can be reached on a transition implementation strategy, agreement must be reached first on the major roles, objectives and requirements for the system. The major roles, objectives and many of the requirements have been defined in the "Guide To Microwave Landing System Implementation Strategy, November 1980."

To summarize those, the Commission believes that the goal is to achieve an orderly transition to an internationally accepted microwave landing system to provide a common civil and military precision approach into the year 2000 and beyond that will, one, be free of frequency congestion problems; two, provide a high power signal that is relatively free from local structural effects; three, provide an approach path for various types of aircraft; and four, be such that cost, weight and size will permit reasonable access to all areas of the air transportation system. Number four is crucial to the success of any national implementation plan. There are many factors that will even legally affect the implementation that so should be addressed before a specific strategy is recommended.

To achieve a smooth transition, the support of the entire industry is important. To start with, the aviation industry has been fragmented in its approach to its needs. It is essential that the implementation plan

selected meet the needs of all users so that total support is possible. There will be more sophisticated systems and so on which have the potential to increase capacity and provide more accurate, stable and reliable position service.

The analysis of the needs of the military would come under important requirements. Military impact, the volume of equipment, can have a significant impact on per unit civil cost and vice versa. The acquisition time is concurrent. Coordination of these procurements should be monitored.

The transition period, once we go into transition, should occur as rapidly as possible to minimize the time that systems must be carried in aircraft and in many cases they operate on the same runway and/or airport.

In the transition plan documents, the initial plan was to implement 1,250 locations with MLS, but the Federal budget system has budgeted for three to five hundred additional ILSs. We recognize that to change all of these systems to MLS would in many cases result in a disservice to some segments of the industry because of the time and instrumentation constraint. However, each program system would or should be analyzed closely to determine when or how many of these systems can be switched. This could impact considerably on the time needed as well as the budget position. In addition, plans were announced recently to start implementing this.

I guess I have a problem with the fact that we are talking about 1,250 remedies between now and the year 2000.

Michigan has developed a precision instrument master plan which has a program of MLS for every airport, and they will schedule implementation as soon as possible. This plan will have nearly 100 percent commuter air carrier accessibility for carrier, business and private aircraft. Other states are planning similar or modified implementation plans. The individual state plans need to be incorporated into the national system.

Operational expense will become a significant factor when implementation of the comprehensive precision programs outlined above become a reality. The operational expense will probably determine the number of systems. Those requirements or systems would require maintenance weekly or twice weekly depending upon the make and model of the equipment maintained.

There could be problems caused by changing reflective surface conditions, frequency interference, and so on. Those compound the operational expense problems by their existence. The ability of microwave technology, digital technology and remote maintenance capability to resolve all of these problems will permit more comprehensive implementation.

As an example, in Michigan that has already been implemented and requiring maintenance by a technician only once every three months. The end factor of maintenance expense is obvious. The system should permit expansion without increasing maintenance.

Installation costs will pose special problems. Most small airports were built with 500-foot rather than 700-foot lines. Therefore, small buildings should be relocated to comply with current standards. This cost has been substantial and can become prohibitive at the low density airports. Fortunately, the buildings are usually clustered near the center of the runway or at least one end of it.

The problem is the inability to meet all lateral criteria. Category I and primary surface requirements need to be modified to identify a specific electronic and safety requirement. We recommend a surface which the Commission believes will not compromise safety but will permit full implementation of the precision program.

If the facilities and equipment program does not meet funding needs, we will not be able to meet everything needed in an acceptable time frame; therefore, other means of supplementing implementation must be established. With maintenance capability, it will be easier for states and so on to buy or obtain contracts or provide their own maintenance. However, financing the original installation is the main problem. There are communities in Michigan attempting to attract such.

The Air Force has not been able to obtain funding. It has not been able to secure funding for runways, taxiways and so on, but the things airlines are demanding first are things like precision instrumentation. This is not done for low density communities.

Eligibility criteria in legislation must be changed to permit installation systems on a reasonable priority or criteria basis. All of the operational expense, life cycle cost, and aid should be considerably less so that eligibility criteria should be considerably less also. In this manner, state, community, precision programs can be promoted nationwide and conversion expedited.

In order to justify ground system implementation, there must be users. There cannot be users without FAA approved manufactured equipment. There will not be a large enough market to provide marketing incentives unless there is a large user demand. Large user demand will not occur until there are enough ground systems in the region or area to justify airborne instrumentation. Also, until airborne instrumentation is available, or until airborne equipment is available in all price ranges -- including the low cost of around \$2,000 -- without the low price, total implementation will never be possible and total industry support will never materialize. Therefore, implementation can occur both practically on a regional basis with concentration for the scheduled users and general implementation by all users occurring where there are enough systems in an area to supply adequate individual justification.

In Michigan, our Commission believes the ability to acquire only one type of precision system will not occur for some time even if the complete route is equipped.

In order to have a flight plan, all airports have certain requirements. Based on these many factors providing the transition plan and consulting factors outlined above, the Aeronautics Commission does not totally agree with any of the transition strategies. Therefore, we would like to present the transition strategy which we perceive to be appropriate and try and relate that to the proposals.

One, we believe we should begin implementation at qualified airports to the extent possible on a network basis and by region or area with priority assigned to the snow and/or mountainous area where airlines are least capable of providing satisfactory service.

Concerning or concurrent with the above, we would implement MLS at the network sub-airports when capacity can be increased, sensitive areas or problems reduced and instrumentation employed. We would divert as much of the funds allocated for systems as possible to MLS implementation to expedite MLS transition, minimize the time that both types of systems would be required in the aircraft and to minimize the number of systems which would have to be used twice for the same thing.

We would allocate \$50 million per year for MLS implementation for the same reasons just mentioned. The \$50 million we agreed also with that figure because it seemed to recognize the need for implementation. Whether \$50 million is the magic number or not, I don't know. We use that figure to be consistent with the plans.

We would modify criteria so that all airports with scheduled air service and serving at least 2,500 passengers a year or with 400 actual approaches per year would be eligible. We would like to see all airports with scheduled commuter air service and 200 actual approaches per year qualify for funding assistance in implementation.

We would develop primary and other requirements to recognize a greater stability of accuracy and capability of MLS. We would incorporate state and Federal funds for greater coordination between programs as possible to achieve maximum implementation. That completes what we see as the need in Phase I.

There are similarities between this recommended plan and several plans, particularly eight and nine, although the closest option is six, because it recognizes the need to implement the program over a short time period.

To conclude this testimony, the Commission would like to compliment the FAA for the recent publication of the proposed FAR Part 171 and so on. This has provided the community with a long needed demonstration of commitment by the FAA to proceed with this implementation.

We have some concern over the result of the questionnaires that have been circulated. This lack of knowledge could result in some unintentional, undesirable conclusions.

There is pressure on the FAA for many new important programs. We urge the FAA to give special attention to the immediate MLS implementation with the funds available and to provide the regulatory changes to be sure that there is a smooth transition period. We cannot emphasize enough of the need of this implementation.

To demonstrate this urgency and the State of Michigan's commitment to this program, the Michigan Commission will issue an offer this month for a small community installation at a commuter airport. In addition, there are at least two MLS systems in the 1981 budget, which we expect to have under contract before the first unit is delivered. It is our intent to install at least two and up to five systems per year until our master program is complete.

We need to have the FAA ready to come into those facilities when they are installed and install additional systems for the state to encourage widespread airborne implementation. Also, we think that the commuters are not going to be successful without this program. There is no practical surface transportation by road or rail. We need a transportation system which would simply help because we need a viable air transportation system which simply won't occur without MLS.

The small community program -- we have some concern over there. That will not occur before late 1984 at the earliest. There will be many systems installed before that time. We will be getting a test of the implementation two or three years after the implementation has begun. It does not seem to be too consistent.

Thank you for the opportunity to provide this testimony.

Dr. Wilkins

There are some things that the FAA wants to respond to, but we will hold that off until we have heard from others because of the time limitations.

Prepared Statement

By

Larry McCabe
Assistant Commissioner, Division of Aeronautics
Department of Transportation
State of Minnesota

I have some thoughts. We have a paper that we will submit to you the first week in February.

I would like to touch on a few items. Then I will be available for a few questions that anyone would like to ask of me.

My name is Larry McCabe and I am the Assistant Commissioner of the Department of Transportation, Aeronautics Division, representing the State of Minnesota. Minnesota has been active in aviation programs for some 35 years. Since 1954, we have installed twenty-four VOR stations, three nondirectional beacons and so on. We have a deep commitment to the airport system. Our philosophy is that you must provide the basic system for the users such as the basic airport, the necessary lighting aids and the navigational aids. That is why we felt so strongly about supplementing the FAA system.

I would like to compliment Sieg on his comments and the movie and the slides. He did a nice job. I think that what we have heard and seen here today has got to get out to the man in the street. Maybe we can sell the aviation industry, but I think it is going to be a big job to sell the community.

We have installed six of these -- ILS microwave systems. The system that we installed was the first standard system. It is an international system. All of our systems are getting used every day.

There is some confusion about what this whole thing was about. Some years ago, we all decided microwave was the way to go. We did not talk to the people in the streets then. Now they do not understand what the problems are and what some of the associated costs are. I think we have some educating to do. Maybe collectively we can develop now an action as to why we should be implementing this and doing it faster than it is being done.

If you believe in a program, I think you have to fight for it. I must say over the years, spending all of that money, we will still support this. After the fight took place the program did seem to settle down and die. I know there is more confidential stuff. I guess we have to work together on this thing now. We talk about safety. I think the time is right. Collectively, I think we have to go to the new Secretary of Transportation because the time is right when the money certainly is available in the trust fund. We should bring this program to the Congress, the people in the street.

This subject was brought up before nine organizations here twice. Once, it was by a man urging everyone to take part in this. It will be the first time in this country now that all of these aviation groups will be going together collectively supporting this position. It will be the first time in the aviation of this country. That is one of our problems in this country in aviation.

We should have sufficient monies or funds maybe earmarked for MLS. Somebody suggested just today that it may be both ways. We have to go to the Secretary. We have to convince DOT and the Administration that this is a good program. We are asking for a pittance, a small amount of money. We have to convince them of the importance of this. I think the time is right, particularly since they don't have to raise any taxes for it. I think the FAA should stop buying ILSs and that money could be converted or diverted to this program. There has been talk about \$50 million. I just think there should be sufficient motive to move the program.

Talking about the various kinds of airports -- I think the large airports are where we have problems. I think we have problems with that. In the large airports, some of the short runways, some of these things I think could be used, but I do not think the large air carriers are ready to get into this program yet. For them to get into this particular program at this time may not be timely. I am not saying they cannot, but I think we can move the program along faster and better without them, the large airports, at this time.

I think the smaller airports are important and are very much a part of relieving congestion at the larger airports. Congestion can be the kind that you normally have, and the other kind is when you only have one particular approach, and we know what happens when this takes place.

In the Twin Cities now we have two reliever airports and they are truly reliever airports in that we have microwave systems at both. We have over 1,500 airplanes. Our systems relieve the larger airports. We did this in cooperation with our metropolitan airport commission with which we worked very closely on all of these things. We have excellent cooperation.

Talking about the other airports -- In our state we consider precision approaches for runways over 5,000 feet in length. If you have enough land to build a runway and light it and so on, then you certainly, I think, have justification to consider it for a precision instrument approach. I think you should look at the total usage of the approaches, not necessarily just the instrument approaches. Instrument approaches are not always measured accurately. People cancel them and they are not counted. Total operations then might be a better measure there.

Schedules -- Look at pilots' schedules. It is important to have a precision approach, perhaps to keep a schedule. Mail coming and going -- they need precision approaches to maintain their schedules. An airport that has scheduled approaches on it -- a precision approach is important to them.

A small plane operator -- If we are going to try to satisfy him, I think we are going to be a long, long time then. He thinks we are going to take this VOR approach off. He feels he is gaining something when it is explained that he will have both. Really when you look at this whole thing, precision approaches are really a small part of this for the total number of people.

We spend a lot of money and we will continue to spend a lot of money on the approach lighting systems and the precision approach systems. They are used by a small number of people, group of people, operators.

There are nine locations that we would consider priority locations for predetermined or precision locations. We got the lights and so on. We have six others. We have a total of 18 locations in Minnesota that we would consider right for precision approaches. When some people look at the numbers, they say you are spending an awful lot of money for a few people.

I think one thing else that we have been doing, our airports are seriously now in need of a precision approach but we don't have the equipment available. We have the beacons and lights so let's put those in, the markers. Let's put those in ahead of time. That is one way of expediting the program.

I have touched on quite a few subjects. Right now we have nine locations that we have selected the zoning, that we have the lights, and so on. We have three low priority and six interim systems, as time goes on, for replacement. As I said, there are 18 locations that we are considering strongly.

That pretty well touches on the things I would consider important. I would urge the FAA to get out there and we will work with them. All of the organizations I have anything to do with will work with you.

Dr. Wilkins

Our third speaker is Claude Schmidt, Director of Operations and Environmental Affairs, Metropolitan Airports Commission, Minneapolis, Minnesota.

Prepared Statement

By

Claude Schmidt
Director, Operations and Environmental Affairs
Metropolitan Airports Commission
Minneapolis, Minnesota

Ladies and gentlemen, the Metropolitan Airports Commission wishes to thank you for letting us come and express our views.

I would like to state our position on the implementation strategy. I will not dwell too much on the reasons why. We are an operator of the Hub Airport. We are struggling to keep that airport operating. With all of the environmental considerations, we have a selfish interest in it. We at the Commission have been preaching the gospel about this. We have been telling our people that the salvation is coming, that it will be here in 1982 with the microwave landing system.

I think it is only fair to say that I intend to retire in December of 1981.

We believe that anything does or that anything not including installation at the Hub Airport would be a mistake. The Hub Airport, the commuter, for whatever the reasons, ultimately they want to operate at the Hub Airport. Our recommendation would be a modification of the ten strategies.

Incidentally, I struggled through all of these books. I also tried to understand the cost analysis. I thought maybe I was not smart enough to understand the details. Don't ask me any questions.

I do believe that there should be a combined strategy. I believe with the state officials that we should proceed with the microwave landing system. We have been looking for it and watching for it. We were pleased that you were persuasive in getting it established. I know there was no problem doing this with Congress, but we have been watching this. We are eager. We want it in Minneapolis.

We think that we have a runway that would fit the criteria. We have siting problems. It would make better utilization of airspace. It would save tremendous amounts of fuel. It would help us in our lawsuits also. I think one of the equations in your analysis could have included the lawsuits that are issues today. I do think that we have enough lawsuits potentially pending that could pay for your program. I say that it is time that we do it.

We suggest that you make a cut-off date for the instrument landing systems and that the FAA, through the regional offices, work on this with aviation organizations. We will make a formal position by them, maybe with some rationale.

Dr. Wilkins

Our final speaker is Mr. Raymond Hill, Waxford County Airport, Cadillac, Michigan.

Prepared Statement
By

Raymond Hill
Waxford County Airport
Cadillac, Michigan

My comments are going to be very short. I wasn't sure I was going to be here today. I have had a round with the flu. I am not sure my voice is going to carry through.

We at Cadillac, Michigan, Waxford County Airport, are stuck out at or in the sticks, so to speak. I have been working to implement a microwave landing system at Cadillac. We have been working on this program for two years. Sometimes it feels like we are getting some place; sometimes it does not, but the main thing that the microwave landing system can do for Cadillac, I cannot believe can be overstated.

We go anywhere from big snow in the winter time to dry sand in the summer time. We lost a commuter airline because we could not provide the ground service. We have been working for the last year trying to get a new commuter airline in service.

We feel that this program, particularly the STEP 2 Program, has been delayed unnecessarily. We feel that the small community needs the program now for the commuter service so it can free the larger airports. We feel there is going to be a problem without the commuter planes. We feel the program could benefit us.

With that, I am just going to close real quickly and say let's get on with it.

Dr. Wilkins

Thank you for your statement. I would like to very quickly recognize one of my colleagues for a clarifying statement. Ed Kennedy.

Ed Kennedy - Yes. I believe the impression was left that we had funds early in the program. That is not so. We had issued a news item that potentially over the next several years we would spend over \$500 million. The purpose of that announcement is we will have to spend funds to buy ILS equipment and complete the satellite airport and other programs. That was the purpose of that announcement -- to generate interest, to make people aware of our plans over the next five years. It might not be that amount. It is probably going to be much lower than that.

Dr. Wilkins - Are there questions or comments from anyone else?

Jack Edwards - I detected what I think was a misconception. People referred to the STEP 2 Program in relation to the microwave landing system. I think the STEP 2 Program was confused with our plan of production. Our STEP 2 Plan is going to initiate a contract mid-year, this year, for installation next year with two locations yet to be selected.

Dr. Wilkins - Are there questions or comments?

Martin Schultz - I don't think we are confused on that. We are aware of the two system purchases.

Dr. Wilkins - Are there other questions or comments? Are there questions about or from the FAA?

Sieg Poritzky - I have a question. I find myself confused between the steps. They all sound terribly bureaucratic. I think you were making the point we want to make to move forward. The question really is -- when do we start? We don't care what it is called, but the question is really when do you begin and on what basis? That is what this is all about. Is there something that we can do to make this whole mish mash of Phase I, Step 2, that whole business clearer?

Martin Schultz - We are confused too. You are confused. We have been working on it day-by-day or daily. Whenever we are speaking around the state, we try to clear up the confusion. There is all kinds of confusion so I really don't know what the answer is as far as a nationwide solution to the problem.

Dr. Wilkins - Are there any other questions or comments?

Larry McCabe - Yes. If I want to buy a piece of ground equipment a year from now, can I as a private individual?

Dr. Wilkins - Yes.

Ed Kennedy - We will be using the test evaluation.

Dr. Wilkins - Let me point out that the purpose of these hearings is to establish a record for the Administrator to make a decision on how to make the transition. That decision has to be made by the Administrator.

Lee Nobel - When can we expect this? How many will there be? When is this going to be opened up? I might as well ask another question too -- part of a two-part question. In many cases, there are not facilities on the ground. How does this criteria get reconciled?

Dr. Wilkins - The first part of the question -- the answer is that we would encourage you to make a strong representation as to how you would like to see this implemented. I would urge you to make a statement, as you have done today, saying that you favor a transition strategy. Emphasize that.

The second part of your question would be directed at the established criteria for the facilities. Some changes have been made. We anticipate perhaps early next week that the Administrator will announce yet another change this week. We have a commuter conference going on in Washington this week. The purpose of the criteria is very straightforward. There are limited amounts of money. The criteria sorts things out.

Nobel Lee - Maybe we should put a concentrated effort on the new Congress.

Dr. Wilkins - It is important, but the agency can only spend those monies appropriated to it. Congress must appropriate the money for the agency to spend it. Are there other questions or comments?

Jack Edwards - The only other point that might be made is that it has taken a long time for these processes. We don't expect any significant changes now.

Dr. Wilkins - If there are no questions or comments, there will be one more meeting which will be in Washington, D. C. This hearing is now closed.

PUBLIC HEARING

"Microwave Landing System"

Tuesday, January 13, 1981
2:00 p.m.

Department of Transportation
400 Seventh Street, S.W.
Washington, D. C.

INTRODUCTION

Dr. Bill Wilkins
Associate Administrator for Policy and International Aviation
Federal Aviation Administration

On behalf of the Federal Aviation Administration and Administrator Langhorne Bond, let me welcome you to the session this afternoon on the microwave landing system transition process.

The FAA'ers here have a presentation, or a set of presentations, which will take almost exactly one hour, so we ask you to bear with us while we do that. Then we will open the program for your input and I will call on the people who have signed up to make formal statements. If you have not signed up, you can, of course, make a statement without signing up; but it is convenient for us if you would let us know ahead of time. Marv Olson, over here, will take your name if you would like to make statements. After the prepared statements are finished, assuming that the jackhammer in the background lets us do it, we will open the meeting for discussion, questions, answers, what have you.

Before I start the program in a formal sense, let me introduce to you the other FAA people who are here and who will be either taking part or answering questions. Sieg Poritzky will be making a statement. Sieg is the Director of the Office of Systems Engineering Management. Ed Kennedy, Deputy Director, Airway Facilities Service, is representing the Associate Administrator for Air Traffic and Airway Facilities here today; John Kern -- Chief, Aircraft Programs Division, Office of Flight Operations; Jack Edwards -- Chief, Navigation and Landing Division, Systems Research and Development Service; and Paul Galis -- Acting Director, Office of Airport Planning and Programming.

We have some other people. You have met Marv Olson who is Chairman of the MLS Transition Plan Group; Joyce Gillen -- MLS Program, Office of Systems Research and Development Service; and Seymour Horowitz -- Economist, Office of Systems Engineering Management.

I want to introduce Sieg Poritzky for a statement about MLS and Sieg will be interspersing in his talk with a film.

Siegbert Poritzky
Director, Office of Systems Engineering Management
Federal Aviation Administration

"The Introduction of the Microwave Landing System -
A Call for User Involvement"

Thank you Bill, and good afternoon ladies and gentlemen, old friends.

As I look across the people who are out there, many of you know much more about this subject than I do and I want to restrain you. You are perfectly welcome to provide verbal abuse, but not allowed to throw anything.

The microwave landing system, a system greatly superior to the venerable instrument landing system, has been developed, has proven to be technically successful, meets a series of rigid operational requirements imposed on it by the community itself, and is nearing the end of the international standardization cycle. What remains is choosing the best method of introducing MLS into operational service and establishing a sensible eventual transition from ILS to MLS.

The views of the community are crucially important. The transition to MLS will be difficult. It may be tempting, even convenient, to simply forget about it and press for the installation of more ILS, but we believe the clearly evident benefits and the previously expressed views of the community are such that implementation should proceed.

The aviation community has been instrumental in microwave system landing development since the beginning. Back in 1967, an industry/government body -- the Radio Technical Commission for Aeronautics -- formed Special Committee 117 for the purpose of making recommendations on a new precision approach and landing guidance system. RTCA agreed from the beginning that the search for a new system should try to draw on the expertise of all countries with instrument landing system knowledge.

The response of the world's best experts and companies with diverse interests was remarkable. Literally hundreds of organizations, people and many countries participated. The Committee was truly an international exercise with strong expert participation from a number of countries, including Australia, Canada, France, the United Kingdom among others.

The first task was to write a set of operational requirements, documenting the needs of all users, from general aviation aircraft interested in landing on grass strips to short takeoff and landing aircraft and helicopters, to large airline jets, to military aircraft with their diverse missions.

Operational requirements were agreed on, later endorsed by FAA and later substantially adopted by the International Civil Aviation Organization (ICAO) -- the standard-making body of the world's aviation.

The cooperation was also remarkable during nearly all of the development of the microwave landing system which was undertaken in the United States in a joint program by NASA, the Department of Defense and the FAA.

At the end of the development period, an international group of experts was again assembled to help the U.S. reach the system decision. Some of the people involved in that are in this room. Another group -- the ICAO All Weather Operations Panel -- prepared the way for the international decision with a truly monumental effort. The cooperation was superb almost to the very end when a nagging international controversy developed over one part of the signal format. But this problem, too, was overcome, and in April of 1978, ICAO selected the broadly supported U.S./Australian time reference scanning beam system for the new microwave landing system approach.

Much has happened since. The ICAO technical standards are now very near formal adoption, and Bill Wilkins will have some more to say about that.

Before continuing now, we would like to show a brief film describing the microwave landing system and what it can do. (Film presented)

Pending the worldwide standardization meeting, FAA has undertaken a series of activities, some of which were discussed in the film. We are moving forward on the Service Test and Evaluation Program. As the film indicated, we have already started the procurement of two additional ground systems beyond the four initial STEP facilities to be installed in mid-1982, and sites for these facilities will be determined shortly.

We are procuring 30 airborne MLS receivers to become available in the spring of 1981 to permit FAA and selected operators to participate in operational evaluations. We have awarded a contract for the development of a computer chip which will lower the cost of airborne MLS equipment for the future. Utilizing these chips, we will buy 20 production quality MLS receivers for the high end of the general aviation category, starting in mid-1982.

The development by industry of airborne receivers is essential. MLS, like all systems, is of course, a chicken-and-egg proposition -- the receivers will come when there is a substantial ground implementation, and ground implementation is not likely until receivers exist.

We have completed a Notice of Proposed Rulemaking which would amend the Federal Air Regulations Part 171 to permit the use of non-Federally funded MLSS from publicly authorized approaches. This action is intended to permit those in the aviation community who wish to proceed now to achieve the benefits of MLS to move forward.

FAA will cooperate fully with users and providers who wish to proceed with MLS implementation with other than Federal facilities funds. In late 1982, we hope to procure and commission for operational use

approximately ten pilot production MLS ground systems. These systems will not only provide early benefits to users, but will permit final development of commissioning and flight inspection standards.

The film you saw described a number of MLS capabilities. How do we know these capabilities exist? We have proven them. The MLS development program has taught us far more about the capabilities of MLS than we have ever known about any other system prior to implementation. We have successfully demonstrated the capabilities of the system in complex procedures at twelve of the toughest sites around the world, but what will it do for you?

Let me turn to the benefit/cost study and tell you briefly what we found in what we believe is a realistic and objective assessment of MLS. All of you know that it is difficult to translate demonstrated superiority and operational performance into dollars and cents, and some of the most obvious technical capabilities are not amenable to ready calculation of dollar benefits. Yet, they may in the end be the most important. Let me start with those.

The superior quality of the MLS signal will provide for more reliable coupling to the autopilot, making it easier to achieve consistent and routine auto-land capability. The ability to standardize operations so that all approaches can be made in the same way in all weather conditions will yield considerable economic benefits when procedures are devised to make these operations routine. It will also please the National Transportation Safety Board since the use of auto-land capability in a routine manner is their recommended procedure for the future.

I must note here that the method we used in the quantified portion of this for calculating benefits assumed MLS service to the Category I level of service only. This means that at runways when an MLS might provide good signals to very near threshold, but where an ILS can only provide less than Category I, the dollars credited to MLS include the benefits to CAT I service only. In cases where unrestricted CAT I service is available with ILS, the MLS accrues no dollar benefits, even though it is capable of providing a much better signal than CAT I. The additional safety benefits due to MLS's ability to routinely provide better signal and better service than ILS are, therefore, seriously understated in the calculations.

As you saw in the film, the use of variable glide slope angles with MLS provides the ability to restructure approach paths at certain airports to permit segregated approaches to be made to short runways by general aviation, commuter and perhaps helicopter operators. Thus, there is the capability of providing several glide paths for aircraft to use to enable small aircraft to follow heavies at a higher glide path angle as a means to ensure protection from weight turbulence, although this is still a controversial application.

The capability of using flexible approach paths, however, both in azimuth and elevation, as well as the availability of precision departure or missed approach paths should make it possible to segregate traffic

according to aircraft flight characteristics, and this operational flexibility provides the potential for a significant dollar benefit also not quantified.

The work of our FAA/industry major airport task forces on capacity and delay has pointed to other potentially valuable applications of MLS in major airports. We foresee innovative MLS applications, particularly in providing precision missed approach capability for either independent or dependent IFR approaches or triple parallels. Other applications include independent approaches to separate short runways, as you saw; but MLS may also provide the possibility for independent operations to parallels more closely spaced than today's standards allow.

A potential benefit has been identified by using MLS on converging runways. Converging approaches are often used under visual approach conditions. They are also often not used when the weather goes below 800 feet and two miles because the aircraft may not see each other in the event of a simultaneous missed approach.

MLS guidance could allow high capacity configurations to be used in IFR operations by providing the ability to give precise navigation for missed approaches. In the case of O'Hare, this could represent the difference between perhaps 170 operations per hour and 135 operations per hour under certain conditions.

The flexible approach capability of MLS will allow some airports to take advantage of surrounding industrial areas or waterways to offload noise or other environmental problems. This is an important benefit. One can readily imagine departure and arrival flight profiles to take advantage of this capability. Yet since there is no agreement on how one should assign dollar values to the highly desirable attribute of being a good neighbor, this benefit category was not quantified in the study.

Finally, there is the significant benefit category of nonproliferation, but I will discuss the advantages of that single standard idea in a moment.

As you see, major categories of benefits are not included in the benefit/cost study -- many of them dealing with airport capacity of major airports -- even though we believe that MLS may be one of the few things that can make a significant difference in terms of reducing delays and increasing capacity at major terminals. Most of these benefits are not included because they are not on the books yet. To put them there requires redefinitions of terminal procedures which must be defined and evaluated by our Operations and Flight Standard Services.

There are benefits which you, as well as we, must press for and exploit if they are to result in realistic improvement in precision guidance service, and "exploitation" here means not simply implementation of ground stations or pressing for implementation, but work by all of you to develop the procedures which will then yield the potential benefits.

The FAA is committed to respond constructively to proposals to exploit those MLS advantages. After all, as taxpayers we have every right to exploit a more than \$100 million investment.

Let me turn now to the next slide to quantify benefits. The benefit/cost study did attempt to make a realistic and objective assessment of the MLS capability of providing operational advantages in several significant benefit categories. First, the superior quality of the signal, as I have already touched on, will enable precision guidance service where none or, at most, severely restricted service would be available from ILS. As I have said, the dollar benefits were estimated only if ILS was restricted to less than Category I and could be corrected to at least this level with MLS. In addition, since all dollar calculations were based on the existing criteria for installing ILS -- a rather important point -- the safety benefits were estimated in IFR weather conditions only.

Second, the inherent reliability and superior quality of the signal will continue to provide precision guidance service when the weather is poor and restricted service only is available with ILS. Thus, delays due to flight diversions or cancellations may be averted during periods of reduced visibility with MLS in place of ILS at selected airports.

Third, the technical capabilities of MLS will enable properly equipped aircraft to make curved or segmented approaches or departures or missed approaches. These capabilities will provide for the more efficient use of the airspace.

Airway routings which are presently found to conflict at major airport hub intersections, as you saw in the film, can be eliminated. A case study of the common airspace in New York -- the Kennedy-LaGuardia interference that was shown in the film -- reveals that significant increases in capacity could be achieved by the elimination of the intersecting approach patterns, and that kind of benefit has been quantified.

The use of MLS may also reduce taxiway restrictions and their resulting delays at airport locations, such as runways 4 left and right at JFK. Obstructions at Kennedy, as many of you know, make it necessary to locate the ILS glide slope antenna on the taxiway side of the runway where an adequate smooth ground plane exists. The MLS requires a much smaller protected area, thus delays due to signal restrictions can be eliminated.

Fourth, a considerable advantage of MLS is the potential for expansion of the national network for all classes of aviation users from grass fields to major jet ports to military uses.

A shortage of ILS assignable frequencies exists now in major hub areas. ILS currently has 20 channels available with a possibility of expansion to 40 by channel-splitting, and by the rather costly conversion of existing airborne equipment. It has been estimated by FAA that even

with the splitting of available channels, the national network of systems will be limited to about 1,400 ground installations, and expansion beyond this level would result in severe limitations and service in congested hub areas.

Our current forecast requirement is for 1,250 ground installations by the year 2000, and I am talking here about federally funded installations. But forecasting is treacherous business and even small changes or a larger or a significant nonfederal program could lead to significant underestimates. The problems associated with such a conservative forecast can be avoided by providing now for a system with an adequate potential for growth.

Fifth, the MLS requires no horizontal plane for generating its signal in space, and is thus less vulnerable to the effects of snow, rain, tides or other deviations in terrain smoothness. In addition, the unique design of MLS makes it easier to diagnose the causes of system outages and make repairs. The result should be less down time with MLS equipment and fewer aircraft delays. The dollar benefits claimed in this category were based on a three-month study of the ILS system outage record at O'Hare and the pattern of air traffic delays resulting from these outages.

Sixth, as you saw in the film, the use of smaller antennas and the ability to avoid extensive site preparation costs provide a benefit which does not accrue directly to the aviation user, but is available to the FAA as the manager of the national network, or to the private owner or community which chooses to install it in the form, of course, of reduced investment needed.

Seventh, for fuel savings there is a measure of double counting in our study since in our tally of dollar benefits due to MLS's ability to reduce delays, we estimated delays by the amount of savings and aircraft operating costs. Fuel is already included as a component of these operating costs. However, with the current fuel problem, it is important to keep a separate subtotal tally of the potential for savings of our nation's fuel resources.

Based on estimates made at selected case study locations, the study of MLS benefits identified a significant potential for saving fuel. Based on the factors that we could quantify, the net benefits -- benefits less cost -- accruing to the community of aviation users were estimated to be substantial. Some \$500 million was estimated as the 20-year total net return to the aviation users, measured in 1976 dollars and discounted at an annual rate of ten percent.

The operators of commercial airlines were estimated to have a significant economic advantage reflected in the benefit to cost ratio of eight and a half to one. Even if dollar estimates for savings in passenger travel delay times were excluded from the ratio -- although there is little justification for doing this since it is the savings in travel time that bring the passengers to the airlines in the first place -- there is still an estimated \$300 million in benefits for the commercial carriers.

This benefit total still compares favorably to the additional cost of \$69 million estimated for MLS avionics in place of ILS -- a favorable ratio of 4.3 to 1. Similar estimates were compiled for the commuter airlines and indicate that benefits of \$22 million could be obtained with an additional cost investment in avionics equipment of \$9 million -- a favorable ratio of 2.4 to 1.

Not all aviation groups were estimated to benefit equally from the implementation of MLS. A small economic disbenefit -- cost exceeds benefits -- was estimated for the average general aviation user.

The size of the dollar disbenefit to the general aviation owners of single and multi-engine propeller aircraft is quite small at a 20-year total of \$4 million. This amount represents about a three percent increase in the total bill of about \$145 million that would be spent by the general aviation users for precision approach capability. The economic disbenefit arises from the study's conservative method of evaluating the benefits of reduced delays resulting from this user group's use of precision guidance service.

The benefits were based on the national income figures estimated for the average citizen, not the average general aviation user. Since it is likely that the typical general aviation owner earns more than the average annual income of \$25,000 -- a fairly likely situation if you own an airplane -- it seems likely that the dollar disbenefits attributed to this owner's use of MLS are probably significantly undervalued in the study.

Large segments of the user community already receive substantial benefits in excessive costs from precision guidance service. For many owners of general aviation aircraft, the benefits in increased safety resulting from receiving MLS precision guidance service at locations not able to receive full unrestricted ILS, but available from MLS, will become newly available.

The majority of precision guidance installations currently planned which will increase the number of ground systems from the present level of 620 to the 1,250 level forecast for the year 2000, will be made at small community airports serving general aviation and commuter communities. These places are not equipped presently with precision guidance service.

Almost all of the alternative strategies proposed for implementing MLS described in the transition plan documents that Dr. Wilkins will be talking about are for the earliest installation to be made at such airports. We are optimistic, therefore, that many more general aviation users will be able to benefit from MLS than now use ILS.

Now, the benefit cost ratios which support the conclusion that the MLS is the superior long-run economic alternative to ILS were based only on these factors that could be quantified, not the categories I first mentioned. But there is another factor which needs to be mentioned: the economic advantage that results from the use of a single internationally accepted standard of precision guidance equipment.

The proliferation of nonstandard equipment can be halted by the introduction of the single internationally standard microwave landing system. Make no mistake about it, people who need microwave landing systems will buy them, and there is no shortage of equipment manufacturers willing to offer nonstandard systems.

Prior to the time that the MLS development started, the United States alone had spent large sums of money on the development of no less than 40 different precision approach and landing guidance systems. There is a need for a single standard for a precision guidance service able to meet our military requirements as well as those of the domestic and international aviation community. We all benefit from agreeing on that single universal standard. The sooner we decide to move and implement, the sooner the proliferation of nonstandard systems will stop.

Let me say one more thing in closing. The exploitation of MLS rests in your hands as much or more than it does in FAA's. We want to know how important it is to you. We believe we have amply demonstrated the capability of the system and the FAA Flight Operations Service is currently and actively involved in exploring MLS capabilities and operational uses in the development of procedures, but exploiting MLS and reaping optimum benefits from the system depends very much on you -- the user community.

Traditionally, users come forward and innovate with new systems, and FAA helps and approves safe and efficient procedures -- not the other way around. You should not wait for the government to hand you the minimums on a platter. You have to exploit the system yourself. You have to come to the FAA with proposed procedures that will benefit you. FAA will help and approve these procedures when they are demonstrated to be safe. This involves you heavily.

It might be nicer if the government could simply hand it all to you on a platter, but the history of the development of procedures and new systems shows the best use of such systems is made when users and the FAA work together to gain the benefits.

Your stake in a sound MLS transition is clear. We seek your thoughtful advice. Making the most of the system in your operation requires your labors more than ours. Thank you very much.

Dr. Bill Wilkins
Associate Administrator for Policy and International Aviation
Federal Aviation Administration

"The MLS Transition"

At this point I want to briefly cover why we have developed the MLS draft transition plan and make a few remarks about the proposed implementation strategies. Then I will open the meeting for your input.

Several years ago, the Federal Aviation Administration established an improved acquisition management process which introduced the concept of a formal transition plan for selected major new systems. As the name implies, a transition plan is designed to facilitate the transition from an existing system to a new system -- in this case, from ILS to MLS.

We are at the point in the decisionmaking process where virtually all of the development of the MLS capability has been completed. The International Civil Aviation Organization (ICAO) selected the joint U.S./ Australian approach for the new MLS international technical standard. It is anticipated that the technical standard, the international one, will be formally adopted at ICAO's worldwide meeting scheduled for April 1981 and as Mr. Poritzky pointed out, FAA has embarked upon an in-service evaluation project to demonstrate more extensively the MLS technology under the rigorous demands of field operating conditions.

Now it must be decided how and at what pace to bring this MLS technology into the national aviation system. That is the major purpose today -- to receive your comments on alternative implementation strategies before proceeding in the decisionmaking process.

One point must be emphasized at the outset. The final transition plan, once it is evolved, will not be an implementation plan. A more detailed implementation plan is being developed. In its final form, it will incorporate the implementation strategy approved in the final transition plan. The implementation plan will contain such information as specific locations, including runways, and detailed installation schedules.

The transition plan is something quite different. It is one of several tools designed to support the decisionmaking process -- in this case supporting the choice of how MLS can be implemented to best serve the needs of the future. When finally adopted, the transition plan will provide in a single integrated package such information as the current validated requirement for MLS, the results of the development phase of the program, the analysis of alternative strategies which could be employed to implement MLS and ultimately after we have received and evaluated your comments, the recommended strategy for introducing MLS.

Thus, the transition plan and the benefit/cost study together will form a complete justification package to support the implementation decision for subsequent Executive Branch and Congressional review.

These two documents -- the transition plan and the benefit/cost analysis -- cover the broader questions of what, when and why leading up to the implementation, then the implementation plan provides the individual specifics of who, where, when and how which are needed to carry out the program. In other words, the present questions are about how to transition into MLS rather than whether an MLS ought to go on runway 17 at XYZ airport.

At this point in the decisionmaking process, the draft transition plan contains an analysis of ten alternative strategies for full-scale implementation of MLS. The orange document that is in your packages is the draft transition plan. The analysts who authored this draft transition plan started with 22 alternative implementation strategies. As a result of their work, the choices were narrowed to nine. The tenth strategy contained in the plan is an aviation user strategy proposed by the Radio Technical Commission for Aeronautics -- RTCA. This strategy was developed by RTCA Special Committee 125 which consists of a wide spectrum of prospective manufacturers and users of MLS equipment, as well as various government representatives.

All of you should have available with you a book entitled "Guide To Microwave Landing System Implementation Strategy" -- the red booklet. On page ten of that booklet, there is a summary of the seven installation options which form the heart of the implementation strategies described in the draft transition plan. Each of these potential implementation strategies has been constructed using combinations of those options in different orders of priorities.

I will not belabor the details of the strategies at this time, which we hope you have had or will have the opportunity to review and evaluate. Instead, I would like to highlight several of the key factors and policy questions associated with the transition. Our hope is that these will be addressed in either our public hearings like the one today or the written comments which we will be accepting until February 10 or, better yet, in both.

The draft transition plan contains -- that's the orange one -- an economic analysis of ten alternative implementation strategies. The calculations of benefits and costs presented in this plan are for the purpose of evaluating the relative economic merits of the alternative transition strategies. All of the comparisons are for MLS to MLS, not of MLS to any other precision approach guidance system.

The separate cost/benefit study -- the one which Sieg described and which accompanies the draft transition plan -- documents the analysis of MLS versus the ILS alternatives. These are the cost/benefit studies, the brown volumes. All of these documents are either available here today or, if we should run out, by request through Marv Olson or any of the FAA'ers. Just leave your card and/or your address and we will be sure that you get one.

To repeat, the draft transition plan compares various possible ways of moving to MLS, while the benefit/cost study shows how MLS compares in economic terms to ILS.

There is another point about the economic analysis in the draft transition plan. The plan contains earlier estimates based on 1976 values that differ from our current dollar estimates of costs and benefits. Thus, while the data contained in the draft transition plan are valid for comparison of the alternative strategies, they cannot be used outside that context.

The results of the analysis present in the draft transition plan show no statistically significant economic difference among the ten alternative strategies. The total range of net benefits -- that is benefits less costs -- is only about ten percent and ten percent is within the possible range of estimating error. Thus, the analysis provides no overwhelming economic basis for the selection of one strategy over the others. This indicates to us that the choice of a strategy may be based almost entirely on operational factors.

Concerning those operational factors, one of the primary considerations will be the views of the users of the system and the public as expressed to us during this comment period for the transition plan. We welcome and will most assuredly use to the extent possible your evaluations regarding an appropriate implementation strategy for MLS.

Each of the ten alternative implementation strategies presented in the draft transition plan would, if adopted, have an impact to a greater or lesser degree upon several key considerations. For example, some of the strategies -- numbers 1, 2, 6, 8 and 9 -- would tend to encourage faster general aviation MLS avionics equipage, while others -- 3, 5 and 7 -- would encourage air carrier equipage first. In at least one case -- strategy number 4 -- the incentives would be rather equally balanced between general aviation and air carriers.

The strategy proposed by RTCA -- strategy number 10 -- which in the early stages focused upon clustering MLS installations around selected major hubs, would likely have a somewhat different impact. It would probably tend to encourage early avionics equipage by geographic networks.

Each of the strategies would also have varying impacts upon the rate at which ILS installations are decommissioned. This, in turn, will affect the rate of cost savings for the taxpayers.

Two of the strategies -- numbers 5 and 6 -- offer accelerated installation rates for MLS. These two strategies would speed up the pacing of the transition, but would require Executive Branch and Congressional support for the expanded capital budgets needed in the early years to carry out the program.

Finally, one of the strategies -- number 8 -- would place greater emphasis on MLS installations at noise sensitive locations. This approach would utilize one of the strong points of MLS -- the ability to solve site-specific problems and help make our airports better neighbors for their surrounding communities.

All in all, each of the alternative strategies offers choices. What we need and seek is your advice and counsel on what you believe to be, from your perspective, the best choice. We want to hear from you today, and we would welcome any followup comments that you would care to submit in writing.

If you decide after this meeting that you would like to submit written comments, please send them by February 10, 1981, to the FAA at the address given on page two of the red booklet.

One other item before I close. Since we closed the comment period a couple of months ago, some of you may be wondering when we will be publishing a final Part 171 standard for the MLS. Part 171 is that portion of the Federal Aviation Regulations which sets forth the minimum requirements for approval and operation of non-Federal air navigation facilities. Our current best estimate is that the final Part 171 standard for MLS will be published by late spring of 1981.

We continue to rely upon the expertise and judgment of the aviation community and the public to guide us in our decisions. We are now asking for that input regarding the MLS draft transition plan.

For the balance of this meeting the FAA'ers here will be primarily listening to your comments and seeking to understand your thinking. We will, of course, answer to the best of our ability any questions of general interest you have related to the transition plan or to the supporting documents.

Our objective today is to listen to what you have to say to us and to establish a record upon which the Administrator can make a better informed decision.

It is now my pleasure to open the meeting to receive the first of the statements of those persons who have signed up to speak, and then any additional comments from anyone here. Since we are making a record of this meeting, I will invite those people making formal statements to come to this podium to make their statement. In the later discussion if you have questions or wish to make a shorter statement, please utilize the other microphone or come to this one. I would ask you to identify yourselves for the record each time that you ask a question or make a statement.

Our first speaker is Councilman Henry Martinez, City of Newark, New Jersey.

Prepared Statement

By

Councilman Henry Martinez

City of Newark

New Jersey

First, let me thank you for allowing me to appear before you. For the record, ladies and gentlemen, I come before you today on behalf of the people in the East Ward of the City of Newark, New Jersey -- the district that I serve as Councilman.

Having been born and raised in this unique and interesting section of New Jersey's largest city, I have learned to live with many of the disruptions and inconveniences that plague the residences, the businesses and employees daily.

The Ironbound section of Newark is one of the oldest neighborhoods of the city, and has historically become home to a succession of European immigrants, the most recent being persons of Hispanic and Portuguese origin. The latest group has been like a shot of adrenalin to a deteriorating city. These people have taken decayed and substandard property and through sweat, equity and without public funds, transformed a marginal area into a vibrant and clean community of neat, well-kept homes and thriving businesses.

Over 76,000 residents live in an area of twelve square miles in the East Ward. However, over one-half of this area is comprised of the industrial meadowlands and land leased by the New York-New Jersey Port Authority. At one time, jets taking off from Newark Airport used to ascend over the Freeling Hyson Avenue section of this district, much to the consternation of the many senior citizens who live in that area. This problem has since been rectified.

Unfortunately, large planes that land at the airport historically have had their approach route over the Ironbound section of the ward, and the noise of these jets has been a constant source of discomfort, inconvenience and disquietude to the residents of that area.

Currently I am serving as the chairman of the Meadows Approach Evaluation Advisory Group -- an organization formed by the Aviation Development Council of New York -- to study the efficiency of having jets come into Newark Airport via New Jersey's meadowlands.

I would like to read some of the names of this committee for the record: Mr. Frank Leyden, the Director of the Eastern Regional Office of the Air Transport Association of America; Mark Wiesner, the supervisor of the aviation public services of the Port Authority; Tom Carver, the manager of the Airport Service Division of the Port Authority; Lewis Atchitait, the Noise Abatement Officer of the FAA; Jack Shelly, the Director of the Aviation Development Council; Dr. Ralph Capprio, Associate Dean of Rutgers University; Peter Shapiro, County Executive who is represented by Peter Peppitone who is also a pilot; Congressman Peter Rodino who is represented by Charles Scalero; Angelo Fasselli, an Essex County Freeholder; and Arnold Cohen, Terry Tribell and Reverend Father Miller, all community people.

This committee was formed basically because of the problems with Newark Airport and the community. A task force has been initiated by Dr. Ralph Capprio of Rutgers University, who formed a questionnaire for the purpose of evaluating the ILS system which has been in operation since December 25, 1980. However, with the bad weather we have experienced since that date, it has only been in use for two operational

days of the fourteen, giving very little opportunity to evaluate or provide any comfort to area residents. Enclosed is a copy of the questionnaire for yourselves and also the new approach of the ILS system.

The major problem with the meadowlands approach route which is currently being tested at the airport is the fact that if the weather is bad, the visibility over the meadowlands is too poor for the planes to approach the airport from that direction and they must resort to the former route over the heavily populated and commercial Ironbound section of the East Ward.

Newark is one of the few airports in this country that is situated within the boundaries of a major city. Because Newark is so geographically compact -- only 24 square miles as opposed to the huge sprawl of Los Angeles' 464 square miles and Chicago's 223 square miles -- it is next to impossible to bring jets into and out of the airport without causing some disturbance and inconvenience to persons who live in the flight path of landing and departing planes.

Residents of the Ironbound have a tremendous pride and a commitment to their neighborhoods. They have made considerable financial and time investments in rehabilitating their homes, making their businesses viable, upgrading the schools and developing their community. For this, they wind up paying 47 percent of the total City of Newark's tax load and coping with an increasing decline in municipal services; but the East Ward is their home.

They could easily move across the Passaic River into Hudson County where the streets are cleaner, the taxes are lower, the neighborhoods are safer and the educational opportunities are greater; but they have chosen to remain in Newark. Other residents have fled the inner city. The residents of the Ironbound stay. They live in the midst of a highly industrial area and daily must breathe the fumes, bear the noise, and endure the heavy vehicular congestion from the many super highways and factories that surround and are located in the Ironbound.

My appearance before you today is to plead the cause of these people that I represent, to stress to you their commitment and love of the city, determination to stay in Newark when others have left, and to ask you to pursue the development of the microwave landing system so that Newark International Airport planes may be able to be guided into the airport by routes other than the ones currently in effect.

The MLS would not only be an added safety feature for pilots who often encounter poor visibility in landing at Newark Airport, but it would also cut down on much of the noise pollution and the fumes currently being endured by persons living and working in the Ironbound section.

Residents have not been silent in their displeasure with the present approach routes. They have demonstrated in the streets and at the airport and have marked their most recent protest by releasing helium

balloons in the flight path of approaching planes. I do not condone this act, but I merely point out the anger, the fear and frustration felt by the persons who live in the flight paths of these descending planes.

Enclosed are news articles indicating the condemnation -- also New York Times, Newark Star-Ledger. These demonstrations are not recent occurrences in Newark. The Ironbound residents have been protesting since the late 1960s when larger aircraft began landing at Newark Airport.

Even greater than the discomfort from the noise and air pollution is these residents' constant fear that the heavy air traffic over the Ironbound might someday cause a tragic incident to happen. It does not seem fair to me that one area of the city should have to endure so many inconveniences while still paying a major portion of the municipal tax burden. For this reason, we also would favor some type of tax relief for persons who live within a certain distance of a commercial airport.

In addition, Newark has been long on the short end of the stick regarding the profits enjoyed by the growth at Newark International Airport. Let me give you some background on the historical agreement between the City of Newark and the Port authority of New York and New Jersey. In 1927, a fact-finding commission set up by the U.S. Secretary of Commerce Herbert Hoover declared that a marshy 68-acre site at the southern end of New Jersey's largest city would be an ideal location for the metropolitan area's airport. The original Newark Airport was built in nine months for \$1.75 million, and by 1930 it had become the busiest in the world.

In 1945, the City of Newark had invested \$20 million in the airport; but fearing that the taxpayers could not continue to support the rapidly expanding facility, the consultants suggested that the city lease the airport to the Port Authority. On March 22, 1948, the Port Authority took over Newark Airport under a lease agreement with the city that continues today.

Over 50 years later, the airport takes in more than 2,300 acres of land valued in excess of \$300 million and pays the city \$1 million in annual rental fees. If this land were assessed like any other private property within the City of Newark, paying the \$10 tax rate that we are all paying in the City of Newark for \$100 of assessed evaluation, the Port Authority would pay the city \$30 million in annual taxes.

In the meantime, the Port Authority continues to make money from its operations at Newark Airport. Over nine million passengers passed through the facility last year, and the City of Newark did not derive one penny from their presence.

The issue of a head tax has been raised before and is an idea that I still support. By charging passengers who use the airport a fee, the City of Newark could use the head tax monies to reduce property taxes.

As the elected representative of the East Ward, I feel if we have to contend with the noise and air pollution problems because of the situation at Newark Airport, then the residents should be compensated in the form of a tax rebate to the landlord, resulting in a direct passover for the rent decrease.

Newark is a beautiful new airport and is continuing to grow. The airport is larger than LaGuardia and closer to northern New Jersey and the New York metropolitan area than Kennedy -- last year nine million passengers, this year probably a lot more.

My only wish today is that you grant Newark International Airport the privilege of utilizing the microwave landing system as soon as practicable so that the residents in the immediate area can enjoy the pleasure of having the airport in their community as much as air travelers enjoy using the facility.

In conclusion, you probably cannot change attitudes of people towards airplanes, who live in a community near an airport, until we abate or eliminate airplane noise. Thank you.

If I may, I have a statement here from Congressman Rodino which I would like to read into the record and then give you a copy of everything that I have. This is from Congressman Peter W. Rodino to the Department of Transportation, FAA Public Hearing, January 13, 1981:

I would like to take this opportunity to express my views on the seriousness of the noise and air pollution problems that are confronting the families living in the East Ward of the City of Newark.

As the Congressman representing New Jersey's Tenth Congressional District, which includes Newark, I have been familiar with the problem of aircraft flights over Newark's East Ward since the 1960s.

It is unconscionable that the 76,000 residents of the Ironbound section of Newark, one of the oldest urban settlements in the northeast, must continue to endure the discomfort, the annoyance and the fear of low-flying airplanes because the FAA and the New Jersey-New York Port authority have not found a reasonable alternative route.

This past September, I wrote to FAA Administrator Langhorne Bond asking that the FAA find a solution to the problem of aircraft flying directly over the Ironbound section as they approach runway 22L at Newark International Airport. It was clear to me that the FAA's ruling in June which sought to divert planes using runway 22L to a descent path over the Pulaski Skyway was not working.

This proposed remedy relied on visual guidance by the pilots and many times was not followed by the pilots.

The families living in Newark's East Ward remain plagued by airplane noise and pollution. On December 25, the FAA installed an electronic localizer called an instrument landing system. In the Newark Airport that was designed to guide planes over an unpopulated area as they approached runway 22L. Unfortunately, the residents of the Ironbound have not experienced any relief from the airplane noise or pollution levels because the electronic device has not been used in bad weather.

Nonetheless, it is important that the 90-day evaluation period for the localizer be completed so that we can obtain an accurate picture of how effective it can be in diverting aircraft from Newark's East Ward.

At the same time, I want to join Councilman Henry Martinez in strongly urging that the FAA pursue the development of a microwave landing system which could provide a sure method for guiding aircraft into Newark's airport while avoiding the populated areas. The MLS could be the solution to the problem we face in Newark, and the FAA should give serious consideration to implementing it in Newark.

I cannot impress upon you enough the impatience of the residents of Newark's East Ward to find a solution to this problem. They have heard talk of alternative routes and experimental methods for over ten years, and they are angry and frustrated at the noise and air pollution they must continue to endure.

I have lived in Newark my entire life, and I have seen the city change and grow. The Ironbound section now populated by a growing number of Hispanic and Portuguese Americans is one of the oldest and proudest areas of the city. The residents of the Ironbound put a great deal of pride and hard work into their homes and businesses and schools and their neighborhood activities. They are committed to Newark's future, but the problems of airplane noise and pollution remain a constant drain on their efforts to better their community.

I will continue to work with the residents of Newark, the Port Authority of New Jersey and the FAA to reach a fair and effective solution.

Thank you for this opportunity to speak on behalf of the citizens of Newark.

Dr. Wilkins

The second speaker is Mr. Glen Gilbert, Aviation Consultant with Glen A. Gilbert and Associates, Incorporated. Mr. Gilbert, are you here? We'll pass Mr. Gilbert.

The next person who has signed up is Mr. Dave Ferutti who is Senior Vice President of Ransome Airlines.

Prepared Statement

By

Dave Ferutti
Vice President of Operations and Maintenance
Ransome Airlines

Ladies and gentlemen. I am Vice President of Operations and Maintenance of Ransome Airlines. Ransome operates a fleet of twelve 27-passenger Nord turbo-prop aircraft and three 50-passenger DeHavilland Dash-7 STOL aircraft. We presently have on order seven additional Dash-7 aircraft, three of which will be delivered between February and June of this year.

Ransome is the largest commuter airline in the United States, carrying some 805,000 passengers during 1980, and estimating one million passengers for 1981 with over 100,000 scheduled operations. Our route structure extends from Boston to Washington via Providence, Hartford, Kennedy, LaGuardia, Newark and Philadelphia.

We are pleased to have this opportunity to express our support for the MLS program and to give you our ideas concerning MLS transition and implementation.

There are two major areas where MLS will provide major benefits to the public. The first is at non-ILS equipped airports serving small communities of which there are 225 at the present time, and secondly at the major hub airports utilized by the commuter airlines to connect their passengers to the major trunk carriers.

Of the 225 small community airports currently without ILS, only 19 are scheduled to receive precision equipment in the near future. Without some type of precision equipment, the commuter industry cannot provide service to the public at these some 200 airports at the level of safety and dependability mandated by the Congress in the Deregulation Act. Most of these 200 airports will never receive ILS equipment due to terrain problems, frequency congestion or lack of suitable sites at the runway.

MLS, on the other hand, can provide precision approaches to many of these airports. They can do this because of multipath, high-angle approach capabilities, greater frequency allocations and more lenient site requirements.

MLS is far more versatile than ILS and at the same time provides more precision guidance; plus, in the near future, it can provide curved approaches to airports that have major terrain clearance problems.

In the case of the hub airports served by large numbers of commuters, it will provide a means of separate access on a more or less noninterfering basis with the larger traffic.

Ransome Airlines is currently engaged in a program using the latest state-of-the-art RNAV equipment to make coupled three-dimensional approaches to the off duty stub runways at Washington National and Philadelphia. This program shows great promise and is being monitored very closely by the FAA. Our Dash-7 aircraft utilizing these coupled three-dimensional approaches along with their STOL capabilities are for the most part truly noninterfering with the normal heavy IFR traffic at these hub airports. The RNAV, however, has limitations in regard to safe ceiling and visibility minimums and probably will never be authorized for less than 800 feet and one and a half to two miles visibility.

MLS is the natural extension of the RNAV system we are not pioneering. It could provide, along with the RNAV equipment, separate access on a noninterfering basis utilizing discrete routing, curved precision approaches up to seven degrees to the unused stub runways at the major hubs. The use of the MLS on the stub runway at the hub airport is, in our opinion, the only way to achieve greater utilization of the existing airspace and runways while providing the same level of safety and dependability to which we are accustomed.

We recommend that if the program is to be beneficial it must be implemented in some geographic pattern that will allow the commuter carrier that invests in the equipment to obtain maximum utilization, i.e., such a pattern would encompass a major hub and the associated non-ILS equipped airports that normally feed traffic to that hub.

Funding for the program should commence in 1982 and be sufficient to equip the majority of non-ILS airports and their associated hubs by the end of 1986. Thank you.

Dr. Wilkins

The next speaker is Alan Stephen, Vice President of Operations, Commuter Airline Association of America.

Prepared Statement

By

Alan Stephen

Vice President of Operations

Commuter Airline Association of America

CAAA represents the nation's shorthaul passenger cargo air carriers that provide feeder services to link outlying towns and communities with their associated air transportation hubs.

We appreciate this opportunity to provide comment on FAA's implementation strategies for the microwave landing system. The installation of MLS in a timely and intelligent manner will provide important safety and economic benefits to commuter air carriers and their passengers alike.

Commuter airlines are in the business of providing timely, frequent air services to our nation's small communities and isolated areas. By so doing, commuter airlines become an essential element in the maintenance of a continuous and convenient system or network of air transportation. This is a role that was recently affirmed by Congress in its enactment of airline deregulation which contains important provisions to assure the continuation of such airline services.

Today commuter airlines commute to some 600 communities in North America, eight of ten cities that sustain airline service, and at nearly half of these locations commuter airlines provide the only scheduled link to our nation's air transportation system.

The unacceptable fact is that many of these airports continue to lack adequate development, particularly in the installation of precision approach and other navigation aids that are important to reliable air service.

At the other end of the airport spectrum in our nation's congested air carrier hubs, commuter airlines are requiring a growing volume of access, particularly because of the role of commuter airlines under airline deregulation. Very simply put, where a departing certificated jet air carrier might be providing two ill-timed flights per day from a small community to an associated hub, minimum essential air service by commuters is likely to be four or five well-timed flights daily.

Air traffic and runway capacity is, therefore, a real problem that could impede the development of commuter service by creating extraordinary costly and unacceptable levels of safety. I might say that the numbers that appear in the recent report are frightening -- up to \$40 billion a year as an estimate by 1990.

The CAAA views the microwave landing system as a very important solution to these problems. The lower cost, higher level of reliability and, importantly, guideway flexibility of MLS make it financially prudent to equip many small community commercial service airports with MLS that cannot now qualify for precision approach aids under existing FAA cost/benefit ratios.

At the same time, MLS offers attractive, innovative solutions to congestion at major air carrier hub airports because of the opportunities it provides in implementing noninterfering separate access approaches to reliever runways. We just heard, of course, of the premier example of what is being done by Ransome Airlines at Washington National Airport.

The bottom line is this: The commuter airline industry supports without reservation the FAA microwave landing system program. However, we are troubled by the many delays created by our own government and those abroad in coming to an international system. Our MLS program works. The U.S. national aviation system needs the immediate widespread implementation of MLS for safety, for capacity, and for environmental

reasons. If we cannot conclude a mutually acceptable international agreement, then we favor the unilateral deployment of the U.S. MLS program at the many airports in the U.S. where the MLS is needed.

We also understand that some \$20 million in MLS step program funding may be cut from the fiscal year 1982 FAA budget. We urge the Administration to reconsider such a move. It is ill-conceived, and it raises questions, certainly at home and abroad, regarding U.S. commitment to the MLS program.

CAAA intends as necessary to pursue MLS implementation funding through appropriate legislative safeguards in the post-1980 airport/airways legislation now under consideration in Congress.

With regard to the ten implementation strategies proposed by the FAA, the CAAA suggests a slightly different approach than those now under consideration. Up front we must commend FAA for its thorough operational and economical assessment of the possible implementation strategy for the MLS program. Our decision not to recommend any one strategy stems not from disagreement, rather, commuter airlines have slightly different operational requirements for MLS than other segments of air transportation. Specifically, we recommend:

One - MLS in a network pattern keyed to the hub spoke systems commuter airlines operate.

Two - Prioritize implementation at those hub airports where MLS can provide additional access to noninterfering approaches to runways.

Three - Assure all commercial service airports that can accept precision approaches be equipped. While MLS offers tremendous cost-benefit opportunities in upgrading existing precision approaches to Category II and Category III standards, the CAAA believes that safety must be given priority and that all commercial airports have some sort of a precision approach.

Finally - Accelerate MLS implementation. CAAA recommends that 80 percent of all commercial service airports identified as candidate MLS sites to be so equipped by 1990.

The program will not achieve widespread user acceptance unless it demonstrates to all air transportation segments that it has important operational and cost benefit considerations.

While vigorously supporting this MLS program, the CAAA must nonetheless also repeat that we will not accept any decision by FAA to delay the installation of ILS equipment at those sites which meet qualifying criteria during the interim.

The microwave landing system is a program of the future. It offers tremendous cost and operational advantages that will pay dividends in the 1990s. However, with some 200 airports regularly served by commuter airlines today, lacking approach aids, we have an immediate need to upgrade facilities now.

Thank you for the opportunity to participate. I can assure you the CAAA stands ready to support FAA during this endeavor.

Dr. Wilkins

The final person who has signed up to speak is Mr. Ted Judd of the Airline Pilots Association.

Prepared Statement
By

Ted Judd
First Officer - Eastern Airlines
Washington Area Safety Coordinator -
Airline Pilots Association

I appreciate the opportunity to express my association's views in this important matter. The Airline Pilots Association has been an active participant in the evaluation and selection process of a microwave landing system since 1974. We have continuously supported the FAA's MLS program before Congress and within the aviation industry. We are, therefore, pleased that a plan for the implementation of MLS and for the transition from ILS to MLS has been proposed.

ALPA has three priority levels for the implementation of MLS. The first priority is implementation on primary air carrier runways where no ILS exists. A prime concern of ALPA -- we feel that it should be given top priority during implementation of the MLS due to the increased safety factor of a precision approach versus a nonprecision approach.

Second, in order of priority is implementation on primary air carrier runways where an ILS exists but a lower landing minimum could be achieved with MLS. This implementation would increase the utilization of existing runways by lowering the landing minimums from CAT I to CAT II or CAT III. This would also encourage air carriers to equip their aircraft with MLS avionics. ILS decommissioning would be increased as MLS and ILS will be colocated.

ALPA's third priority level in order of implementation would be secondary runways that are without ILS. ALPA also believes that within the confines of the priorities of implementation which I have just stated

should take place regionally and/or in consideration of a particular airline's primary route structure as stated in strategy number four of the proposal. This type of implementation should encourage an airline to equip its fleet with the necessary MLS avionics because of the higher return on investment.

A random plan of implementation would not benefit any one airline sufficiently to justify the expense involved in equipping an entire fleet of airplanes, when it becomes apparent that the MLS equipment will be used only minimally.

The Airline Pilots Association urges that a decision be made to implement the microwave landing system. The additional benefits the MLS provides in improved safety and in operational reliability alone over the present ILS -- as stated on page 15 of the executive summary of the FAA report -- should be enough of an incentive to implement this program as a replacement for the ILS. Thank you.

Dr. Wilkins

It is now our pleasure to entertain other statements or questions or comments. I would ask you to go to the microphone, either this one or the one that is on the floor, to make your statement. Are there questions or comments?

Mike McCarty (Manager of Airport Environmental Services - National Business Aircraft Association) - While we will be providing written comments for the February 10th deadline, I would like to say that for years NBAA has actively participated with the other aviation users in the promotion of MLS, as we see it as a saving factor at those many airports which business operators have an interest in which are perhaps 5,000 airports in addition to the 375 or so served by the air carriers as being the saving grace in terms that the existing precision guidance system is either too expensive for local folks to come up with their share of the money or where the terrain makes it impossible to put in existing systems.

We hope that the FAA will move expeditiously on getting a strong program and certainly make every effort to convince OMB or whoever holds the purse strings that this is a very important project and should not be cut back in any form. I submit for the record a prepared statement.

Dr. Wilkins - Thank you sir. Are there other comments or questions? I have developed a kind of habit -- this has been a nationwide show. This is the fourth of such hearings, having had one in Los Angeles, another one in Denver, another in Chicago and now this one -- of asking the FAA'ers if there is something that they would like to ask of you since you folks have the expertise.

Are there questions that any of you would like to pose to this room full of experts? One more time, questions or comments?

Al Warner - I mostly represent myself in this. The two airports that remain to be considered for evaluation, are they still undecided, has that decision been made final yet?

Dr. Wilkins - Which airports do you mean?

Al Warner - You said there were two airports to be considered for trial installations.

Dr. Wilkins - I think that is the correct number. I'm not sure whether the decision is made on which airports have been selected.

Al Warner - What are the requirements for submitting comments pertaining to these two installations?

Dr. Wilkins - Jack Edwards.

Jack Edwards - The two airports that need to be selected yet are part of the STEP program -- the two airports that we are talking about here are those to be selected for phase two of the STEP program. The STEP program is managed by an internal FAA working group with participants from all facets of the FAA, including the operating services as well as the Systems Research and Development Service. The group has not progressed to the point yet where they have narrowed their selection process to two airports.

Part of the considerations that have gone into it are directed at filling what we believe is a major gap in the program to date in that we have not had an opportunity yet to involve wide-bodied jet aircraft into the program.

We are seeking interest from an air carrier or air carriers where we might choose or select sites along their route structure in order to equip a large wide-bodied jet aircraft to participate in the program.

Al Warner - The next question is what is the current status of the interim microwave standard? Where is it at this point? There are several systems installed. What is going to happen to those people, for example, the St. Paul people which has been very successful for several years.

Dr. Wilkins - Sieg.

Sieg Poritzky - As we indicated in Chicago a few days ago, the people who have pioneered with microwave landing systems, among which are the people in Minnesota and Michigan, are now, as they indicated to us, very strong proponents for MLS and urge the earliest possible implementation.

Legally and in terms of the FAA stance with respect to the interim standard, the ISMLS, the Tull system, we do not propose to change the eligibility of that system in Part 171; and in the notice that people have commented on we would propose to add the specifications for MLS. But we do not propose to do anything to the eligibility for ISMLS.

We do, of course, note in the preamble, I believe it is, of the Part 171 proposed change that the MLS meets or is intended to meet the international standards as we now understand and hope they will be accepted by ICAO.

Dr. Wilkins - Is that responsive to your question?

Al Warner - I think so. One final question -- would the systems that were installed, such as the Tull System at St. Paul -- there was a pretty strong dispute as to how maintenance actions would be handled on these systems because it was a non-Federally installed system.

If the program for the ICAO system for smaller communities continues along this line, where communities put in ICAO qualified systems but install them on a non-Federal basis, are we still going to have a problem with FAA maintenance, or are we going to be doing maintenance on an outside contract basis?

For example, the system at St. Paul, when it went down as I understand, Tull was notified all the way to New York for repair service that had to be made. FAA couldn't or chose not to become involved in that. Are we still going to be looking at this kind of thing in the years to come?

Dr. Wilkins - Ed Kennedy.

Ed Kennedy - Any community that elects to install an MLS system under PART 171 that is not otherwise qualified under the FAA criteria, whatever that may be at the time -- that is a subject that is under review at the moment -- would be responsible for their own maintenance.

We are not allowed to spend Federal tax dollars to provide maintenance for facilities that don't otherwise meet our standards. Eventually, of course, they could. Things could change at an airport and they could, and that would be subject to a change, but right now the procedure would be for the community to provide its own maintenance either by contract or their own personnel or whatever, and that we periodically -- us and the flight operations people -- verify the operation at a facility if it involves a precision approach, which obviously an MLS would.

Sieg Poritzky - Let me add one point to what Ed has said. In the Tull system in Minnesota and one in Michigan, I think it is (one or two) the idea of remote maintenance monitoring with the idea of a telephone remoting of maintenance information was exploited by Tull and it was, I think, a very valuable process. FAA is also very actively engaged in utilizing remote maintenance monitoring because it has a number of advantages.

I think that question needs to be kept separate from the question of who is responsible -- where does the remote maintenance information go? It may, as Ed says, come to and would be likely to come to the manufacturer, to an airport operator, fixed base operator some other

maintenance organization that the community chooses and, as Ed said, if it is a Federal facility or there is Federal involvement, it could go to a Federal location. But I think the idea of remote maintenance monitoring is one that is very rapidly catching on in FAA as an economical way of providing for maintenance and service of ground facilities.

Ed Kennedy - I'll just add, if I may, the facilities that we will buy under the program for MLSs for installation, regardless of category, will all contain provisions for remote maintenance monitoring. The manufacturers will be encouraged to have that parcel as part of the overall package which would also be available, of course, to whomever else chose to buy it.

Dr. Wilkins - Are there other questions or comments?

Jim Muldoon (Port Authority of New York and New Jersey) - We have been long supporters of the MLS system primarily because of our recognition that it holds promise in solving problems of capacity and some of the problems of noise that Congressman Martinez referred to. Our reading of the strategies outlined in your notice indicates to us that strategy 10 suggested by the RTCA would best respond to those concerns.

Dr. Wilkins - Thank you for your comment sir.

Cy Turanto (Canadian Department of Transport) - I'm not sure it's fitting that I talk here. I'm hesitant because our approaches are so different and for good reason, of course. We are one-tenth the size of your country, therefore, the problems are vastly different.

I do see one point, though, where I think there is a comparison to be made. In the approach so far that was taken in transition in Canada, we are paying far more attention, I believe, to user reaction. This means a few things to us. For example, we are anticipating that one of the early problems will be a reluctance on the part of users to equip with the MLS avionics, and for this reason we are favoring very strongly the idea of going for a network and thereby encouraging a cooperative airline (not of major size necessarily) to equip and get the program rolling that way.

The other thing this does that we intend to do is seek authority to completely waive the normal standards on which we justify the installation of precision aids, and that is to give us this flexibility we think we have to have to achieve a network in the beginning of the transition plan.

The third factor that is involved here, we believe, is that this initial reluctance -- I won't say we are certain of this but it looks fairly likely -- will be succeeded by a phase of, we think, enthusiasm so that we see the program starting out slowly and then burgeoning toward the magic date that ICAO has set in 1995.

The other factor that we are sticking to at the moment, of course, is trying to honor -- that's too strong a word -- go along with the ICAO program. For these reasons, I believe we would favor the strategy number 10. We also took part in 125, so I guess that's understandable, but that is closest to the approach that we are taking. We could put this in writing.

Dr. Wilkins - We would be delighted to receive it. Thank you for your participation. Are there other questions or comments? If not, let me once again, on behalf of the FAA, thank you for your participation and being with us today. Do send in your written comments before February 10th, if you would like to be on the record.

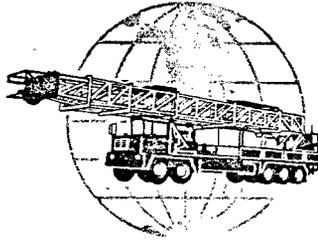
APPENDIX II

PUBLIC WRITTEN COMMENTS

شركة كريستيان انترناشيونال CHRISTIAN INTERNATIONAL, LTD.

Oklahoma City, Okla. 73154 USA
P. O. Box 18918
Ph. AC 405 848-6766
Telex 74-7134

Tripoli, Libya
P. O. Box 8883
Ph. 30800
Cable Chriswell
Trip. Reg. No. 8785



أوكلاهوما سيتي، أوكلاهوما ٧٣١٥٤
ص.ب. ١٨٩١٨
هاتف ٨٤٨-٦٧٦٦ (٥٠٥)
تلكس ٧٤-٧١٣٤
العوليات الترسلا
ص.ب. ٨٨٨٣-طرابلس ليبيا
هاتف ٣٠٨٠٠
برقيا: كريسويل
التسجيل التجاري ٨٧٨٥

December 17, 1980

Federal Aviation Administration
800 Independence Ave, S.W.
Room 939
Washington, DC 20591

Dear Mr. Olson:

In response to the ten proposed strategies for implementing MLS, we believe the tenth strategy proposed by the RTCA will best serve the interests of the aviation industry.

As the analysis for this strategy stated, the installation of MLS at hub airports and airports in the hub areas served by commuter and/or regional air carriers will provide the traveling public with an increased level of safety in the highly accident prone landing phase of flight. In addition, air carrier aircraft can more readily absorb the additional cost of MLS equipment and likewise provide a quicker analysis of the operational benefits of MLS.

Perhaps the only area of difference between RTCA and the FAA, is the annual instrument approach level necessary for qualification in the MLS program. During the short and middle term period, it may be cost beneficial to set the AIA level at 1600. However, an airport which has less than 1600 annual instrument approaches should be considered if the number of instrument approaches has been artificially held to a minimum due to a lack of adequate approach aids.

As an illustration, consider the small town airport which is home base for a number of aircraft belonging to local industries. Due to the higher minimums of NDB and VOR approaches, many flights may be forced to land at the big city airport. Thus the number of approaches for the small airport is held down by the lack of adequate approach aids. Installing MLS at airports with less than the required minimum number of approaches may be the stimulus necessary to increase traffic at these smaller airports.

Whatever strategy is decided upon, the implementation of the program should be given the utmost priority. Any successful program will require close cooperation between the users and the involved government agencies. This will be aided by the designing of a strategy to provide maximum penetration into the aircraft fleets of all the users.

The FAA is to be applauded for its solicitation of user comments on the proposed strategies. Hopefully, the FAA and the users will continue to work together to adopt a strategy which will be of the most benefit to all concerned.

Yours truly,

A handwritten signature in black ink, appearing to read "Michael J. Hynes". The signature is written in a cursive style with a large, sweeping initial "M".

Michael J. Hynes
Chief Pilot

MJH:csh

One World Trade Center
New York, N. Y. 10048
(212) 466-7000
(201) 622-6600

January 6, 1981

Mr. Marvin Olson
APO-320, Chairman
MLS Transition Plan Working Group
Federal Aviation Administration
800 Independence Avenue, S.W., Room 939
Washington, D.C. 20591

Dear Mr. Olson:

The following comments are submitted in response to the "Invitation for Comment Regarding Systemwide Implementation Strategies for Microwave Landing Systems" published in the Federal Register of November 13, 1980.

The Port Authority's long history of support for the Microwave Landing System (MLS) program has been based upon two major attributes of the system, namely, the Air Traffic Control capacity enhancement of MLS and the ability of MLS to support existing and improved noise abatement approach and departure procedures.

The FAA sponsored New York Capacity Task Force identified MLS and other Air Traffic Control enhancements such as "metering and spacing" as the only hope for maintaining a tolerable capacity/delay relationship at Kennedy and LaGuardia Airports in the face of the increases in aircraft separations, which represent the current unsatisfactory "solution" to the problem of wake vortex. This problem will clearly worsen in the next few years with the further introduction of wide-bodied, "heavy" aircraft.

The ability to fly curved or angled approach and departure paths with precision offers the hope of instrumenting many of the visual noise abatement procedures which presently provide a modicum of relief to noise impacted communities adjacent to our airports. This capability would also permit the establishment of new procedures to further improve noise abatement without an accompanying operational penalty.

The agreement with the International Civil Aviation Organization requiring that no conventional ILS at a designated international air carrier airport be decommissioned prior to 1995 has obviously contributed to the development of transition strategies that favor the installation of MLS system at low activity and general aviation airports. To that extent, the strategies do not satisfy the capacity and noise abatement objectives which led the Port Authority to strongly support the MLS program. The strategy offered by the Radio Technical

Mr. Marvin Olson

- 2 -

January 6, 1981

Commission for Aeronautics (RTCA) does, however, offer some likelihood of satisfying those objectives in that it would provide for the installation of MLS at the busiest hubs and the smaller airports within 500 miles which feed each of these hubs.

In addition to supporting the RTCA strategy, we also recommend the inclusion of an additional requirement that noise abatement installations receive a higher priority. Since many of the potential noise abatement installations are not now ILS equipped or are under utilized because of noise problems, the use of annual instrument operations as a ranking criteria is not appropriate. We would recommend a case-by-case approach where noise abatement benefits in terms of population exposure serve as a programming criteria.

Sincerely,



C. B. Pattarini
Director of Aviation

SIDNEY-RICHLAND AIRPORT
P. O. Box 332
Sidney, MT 59270

January 14, 1981

Federal Aviation Administration
APO - 320
U.S. Department of Transportation
800 Independence Ave. SW
Washington, D.C. 20591

Re: MLS Implementation

Gentlemen:

After having attended your excellent briefing on the MLS program at Denver and subsequently reporting back to my Commission and local pilots, I feel that our comments and feelings should be put on record.

In order for you to better understand our position, some facts about Sidney are necessary. We are currently served by a commuter airline, Big Sky Airlines, and the base for approximately 70 private aircraft. We are situated at the hub of the Mon-Dak oil field and, consequently, are being used by numerous corporate turbo and jet aircraft. We have a non-directional beacon on the field as our only navigation aid. Our nearest VOR is 37 miles north. To the south and east the nearest is 130 miles and to the west it is 300 miles.

With the exception of the hub and sub-hub cities of Billings, Great Falls and Helena all other Montana cities served by Big Sky Airlines have no instrument landing systems.

For these reasons, we feel that your first priority for the installation of MLS should be to air carrier airports that presently have no instrument landing systems whatsoever.

Sincerely yours,

SIDNEY-RICHLAND AIRPORT AUTHORITY


Donald M. Rees
Secretary-Manager

DMR/rr



OFFICE MEMORANDUM

APP-1/300 MW
320

AERONAUTICS COMMISSION

DATE: January 15, 1981

TO: Aviation Organizations

FROM: Robert J. Thomas, Director
Michigan Aeronautics Commission

SUBJECT: FAA Invitation for Comment Regarding Systemwide
Strategies for Microwave Landing Systems

Federal Register Volume 45, Number 221, Thursday
November 13, 1980.

The FAA is requesting comments for strategies to transition from ILS to a precision Microwave Landing System (MLS) environment by the year 2000. Ten strategies were proposed and the deadline for comment is February 10, 1981. The FAA needs a strong response to demonstrate the need and interest for beginning immediate implementation of MLS.

Attached are the Michigan Aeronautics Commission comments. We do not request you to endorse our position, only that you respond to support immediate implementation of MLS. Feel free to use any or all of Michigan's comments.

Send response to: Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Avenue, S.W.
Washington, D.C. 20591

RECEIVED
JAN 29 4 00 PM '81
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ADMINISTRATOR
FEDERAL AVIATION
ADMINISTRATION

R. J. Thomas
Robert J. Thomas, Director
Michigan Aeronautics Commission

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att.

AOA#:
ACTION INFORMATION:	APD-1
DUE DATE(S):
FOR SIGNATURE OF:
COORDINATION WITH, THRU:
INFORMATION COPY:

TESTIMONY
SYSTEMWIDE IMPLEMENTATION STRATEGIES
FOR
MICROWAVE LANDING SYSTEMS
BY
MARTIN F. SCHULTZ, ADMINISTRATOR
SAFETY AND SERVICES DIVISION
MICHIGAN AERONAUTICS COMMISSION
JANUARY 9, 1981

Before agreement can be reached on a transition implementation plan strategy, agreement must be reached first on the major goals, objectives and requirements for the system. The major goals, objectives and many of the requirements have been defined in the Guide to Microwave Landing System Implementation Strategies, November 1980, and the many companion documents. To summarize, the Michigan Aeronautics Commission (MAC) believes the goal is to achieve an orderly transition to the internationally accepted Microwave Landing System (MLS) to provide a common civil and military precision approach system through the year 2000 and beyond which will: (1) be free of frequency congestion problems; (2) provide a high quality guidance signal that is relatively free from local terrain and structural effects; (3) provide multiple paths for various classes of aircraft; and (4) be such that cost, weight and size will permit reasonable access to all users of the air transportation system. Number four was not clearly identified in the documents but is crucial to the success of any national implementation plan.

There are many factors which will influence effective implementation which should be addressed before a specific strategy is recommended. These influencing factors follow below and are factors generally not included in the Transition Plan documents:

1. INDUSTRY SUPPORT - To achieve a smooth transition to total MLS precision environment, the support of the entire industry is important. Historically, the aviation industry has been fragmented in its approach to needs. It is essential that the implementation plan selected meet the needs of all users so total support is possible. There will be small community systems to provide service for low density locations. There will be more sophisticated systems for the medium and high density locations which have the potential to increase airport capacity, to reduce noise problems by providing alternate courses over less noise sensitive areas, and to provide more accurate, stable and reliable precision service. There will be ground systems to meet the varying needs of the military with common airborne equipment requirements. Therefore, selection of an implementation strategy which meets the need and time constraints of each segment of the industry should result in unified support of the program.
2. MILITARY IMPACT - In addition to the DOD political and program support, the volume of equipment purchased for military needs can have a significant impact on per unit civil costs and vice versa if acquisition timing is concurrent. Coordination of these procurements should be monitored closely.

3. TRANSITION PERIOD - Once begun, the transition to MLS should occur as rapidly as possible to minimize the time both precision systems must be carried in aircraft and in many cases operated on the same runway and/or airport.

In the Transition Plan documents, the initial plan is to instrument 1250 runways with MLS. The Federal Aviation Administration has budgeted for 300 to 500 more Instrument Landing Systems (ILS) to replace tube type equipment and instrument reliever and commuter airports. This represents about one third of the total initial MLS program. We recognize that to change all of these systems to MLS would in many cases result in a disservice to some segments of the aviation industry because of time and instrumentation constraints. However, each programmed system should be analyzed closely to determine how many of these systems can be switched to MLS. This could impact significantly on the time required for total transition as well as the need to budget precision systems twice for the same runway.

In addition, plans were announced recently to begin implementation of ILS systems on 50 kilohertz channels. This should be avoided so many aircraft owners with 20 channel ILS receivers will not have to purchase 40 channel equipment and MLS also.

4. STATE PROGRAMS IMPACT - Many states have navigational aid programs which generally are designed to be supplemental and not competitive with FAA programs so that more comprehensive instrumentation is possible. Michigan has developed a Precision Instrument Master Plan which programs an MLS for every airport with scheduled air service and basically at least one 5000 foot, hard surface, precision instrumented runway in each county. This plan will achieve near 100 percent air transportation accessibility in all areas of the state for air carrier, commuter, business and private aircraft operations. Other states are planning similar or modified precision instrumentation programs. These state programs will impact on implementation strategy by influencing production volume and costs, facility location and priority, avionics equipment development, and time required for transition to MLS. Therefore, the individual state plans need to be incorporated into the national system plan.

5. MAINTENANCE COST - Operational expense will become a significant factor when implementation of the comprehensive precision programs outlined above become a reality. The operational expense will probably determine the number of systems installed. Current ILS systems require weekly or twice weekly maintenance by a certified technician depending upon make and model of equipment maintained. Problems caused by weather effects, changing reflective surface conditions, frequency interference, etc. compounds the operational expense problem of ILS systems. The ability of the microwave technology, digital technology and remote maintenance capability to resolve all these problems will permit more comprehensive implementation at substantially

lower cost. As an example, the Interim Standard Microwave Landing System (ISMLS) at Bellaire, Michigan, which incorporates all of the above capabilities, now requires maintenance by a certified technician only once every three months. The impact on maintenance expense is obvious and the MLS systems will have even greater capability and benefit. The new systems should permit expanded comprehensive implementation without increasing total maintenance dollars.

6. INSTALLATION COST - Implementation of Category I precision landing systems at low density airports will pose a special problem. Most small airports were built with 500 foot rather 750 foot building lines. Therefore, buildings need to be demolished and rebuilt or relocated to comply with the current precision primary surface criteria. This cost is substantial and can become prohibitive at low density airports. Fortunately, the buildings are usually clustered near the center or one end of the primary runway so at least one runway end can meet all precision final approach criteria. The problem is the inability to meet all lateral clearance criteria for the full length of the runway.

MLS can tolerate reflecting surfaces closer to the runway so the Category I precision primary surface requirements need to be modified to identify specific electronic and safety requirements. Attached (Exhibit A) is a recommended precision primary surface which the MAC believes will not compromise safety but will permit full implementation of the precision instrumentation program.

7. FAA FACILITY ELIGIBILITY CRITERIA - FAA Facilities and Equipment (F&E) Funding will not be able to meet all of the civil precision instrumentation needs in an acceptable time frame. Therefore, other means of supplementing F&E precision instrumentation must be established. Use of ADAP funds in the past has been limited due to the same eligibility criteria requirement as the F&E program. With remote maintenance capability it will be easier for states and communities to obtain contract maintenance for precision systems or to provide their own maintenance. However, financing the original installation is the main problem. There are communities in Michigan attempting to attract scheduled air service. The airports have been able to secure ADAP funding for runway, taxiway, terminal building and apron improvements but the item commuter airlines are demanding first is precision instrumentation and this has not been eligible for new and low density communities. Eligibility criteria in the new airport aid legislation must be changed to permit installation of precision systems on a reasonable priority, reduced criteria basis. Where states and/or communities are providing some of the installation funding and all the operational expense, the life cycle cost to the FAA is considerably less so eligibility criteria should be considerably less also. In this manner state and community precision programs can be promoted and total nationwide MLS conversion expedited.

8. AIRBORNE IMPLEMENTATION INCENTIVES - In order to justify ground system implementation, there must be users. There cannot be users without FAA approved manufactured equipment. There will not be a large enough market to provide manufacturing incentives unless there is large user demand. Large user demand will not occur until there are enough ground systems in a region or area to justify airborne instrumentation and until airborne equipment is available at all price ranges including the low cost general aviation receiver at \$2,000 or less. Without this low cost receiver, total implementation will never be possible and total industry support will never materialize.

Therefore, implementation can occur most practically on a regional basis with "spoke and hub" concentration for scheduled users and general implementation by all users occurring when there are enough systems in an area to supply adequate individual justification.

The Michigan Aeronautics Commission believes the ability to require only one type of precision system in an airline aircraft will not occur for some time even if a complete route is MLS equipped. In order to file an IFR flight plan, alternate airports are required with certain guaranteed weather requirements. These airports are varied, often quite distant and appropriate equipment is required in the aircraft to use the alternate airport. Therefore, MLS only aircraft will not be probable until there is widespread MLS implementation.

Based on the many factors provided in the Transition Plan documents and the additional influencing factors outlined above, the MAC does not totally agree with any of the proposed transition plans but there are some similarities. Therefore, we would like to present a transition plan which we perceive to be appropriate and then try to relate that to the Transition Plan proposals.

RECOMMENDED PLAN

The Michigan Aeronautics Commission recommends the following plan for MLS implementation:

Phase I - Begin implementation at new qualifier airports, to the extent possible on a network basis, and by region or area with priority assigned to the snow and/or mountainous areas where ILS is least capable of providing satisfactory performance. Concurrent with above:

- A. Implement MLS at network hub airports when capacity can be increased, noise sensitive area problems reduced, and/or instrument minimums lowered.

- B. Divert as much of the funds allocated for 300 to 500 ILS systems as possible to MLS implementation to expedite MLS transition, minimize the time both types of systems will be required in the aircraft and on the same runways, and to minimize the number of systems which will have to be budgeted twice for the same runway.
- C. Allocate \$50 million per year for MLS implementation for the same reasons as B.
- D. Modify F&E criteria so all airports with scheduled air service serving at least 2500 passengers per year or have 400 actual instrument approaches per year will be eligible for MLS instrumentation.
- E. Revise ADAP criteria so all airports with committed scheduled air service or 200 actual instrument approaches per year can qualify for funding assistance for precision instrumentation.
- F. Develop new MLS primary and final approach surface requirements to recognize the greater stability and accuracy capability of MLS.
- G. Incorporate the state and federal precision master plans in the National Airport System Plan (NASP) so greater coordination between programs is possible to achieve maximum implementation effectiveness.

Phase II - Deploy MLS on new qualifier and noise sensitive runways.

Phase III - Use baseline deployment by AIA count modified somewhat by amortized status of equipment to be replaced or where master planned NASP indicates greatest benefit is possible.

There are similarities between this recommended plan and several of the proposed transition plans particularly strategies 6, 8 and 9. However, the closest option is 6 because it also recognizes the need to implement the program in the shortest possible time period.

To conclude this testimony:

- 1. The MAC would like to compliment the FAA for their recent publication of the proposed FAR Part 171 and now the MLS Transition Plan proposal. This has provided the aviation community with a needed and long awaited demonstrated commitment by the FAA to proceed with MLS implementation.

2. The MAC has some concern over the results of the questionnaires that have been circulated. There is a great deal of confusion in the aviation community between ILS, ISMLS, and MLS. This lack of knowledge could result in some unintentionally undesirable conclusions.
3. There is pressure on the FAA for many new important programs. We urge the FAA to give special attention to the immediate implementation of MLS with the funds available and to provide the regulatory changes required to insure a smooth transition period.
4. We cannot emphasize enough the need for an immediate beginning for implementation of the MLS program. To demonstrate this urgency and the State of Michigan's commitment to the MLS program, the Michigan Aeronautics Commission will issue an offer to quote this month for one Small Community Microwave Landing System for installation at a commuter airline airport in early 1982.

There are currently funds for at least two more MLS systems in the FY 1981-82 budget which we expect to have under contract before the first unit is delivered. It is our intent to install at least two and up to five systems per year until our master planned precision program is complete.

We need to have the FAA ready to commission these facilities when they are installed and install additional systems in the state to encourage widespread airborne installation.

Thank you for the opportunity to provide verbal and written testimony for this very important program.

CATEGORY I MICROWAVE LANDING SYSTEM
FINAL APPROACH, MISSED APPROACH AND PRIMARY SURFACES

Small community airports, almost without exception, have been built with 500 foot building lines because precision instrumentation was not common or planned in their early stage of development. Therefore, almost all buildings and hangers need to be torn down and new buildings constructed to provide precision instrumentation. This is cost prohibitive to most small communities.

In addition, buildings are usually clustered near the center or one end of the airport so at least one runway end can be cleared to comply with precision obstruction control criteria.

Finally, in the past, obstruction criteria was established partly for safety reasons and partly for electronic reasons. Reflective surfaces close to the runway frequently caused electronic reflections which prevented localizer commissioning. This problem does not apply to precision microwave landing systems. So now is the time to identify what obstruction protection is needed for safety and change the criteria so more communities can afford precision instrumentation.

A 500 foot wide primary surface is required and adequate for VFR and non-precision instrumented runways (which are instrument approaches to an acceptable level of VFR flight with a VFR landing) up through the 5000 foot basic transport category runway. In addition, during a Category I instrument approach, the operation from the middle marker to touchdown is VFR. If adequate visual contact is not established at the middle marker, a missed approach is executed. However, just because the operation is VFR from the middle marker, VFR only criteria should not be applied at that point because the aircraft is low to the ground and may not be precisely on the localizer center. The obstruction control criteria, which provided protection to the final approach and missed approach point, should continue to the point where the 500 foot visual primary surface is intersected. This occurs at 667 to 867 feet beyond the touchdown points where visual obstruction control is already established as adequate. With this concept the pilot is provided equivalent protection from the point of localizer capture to beyond runway touchdown.

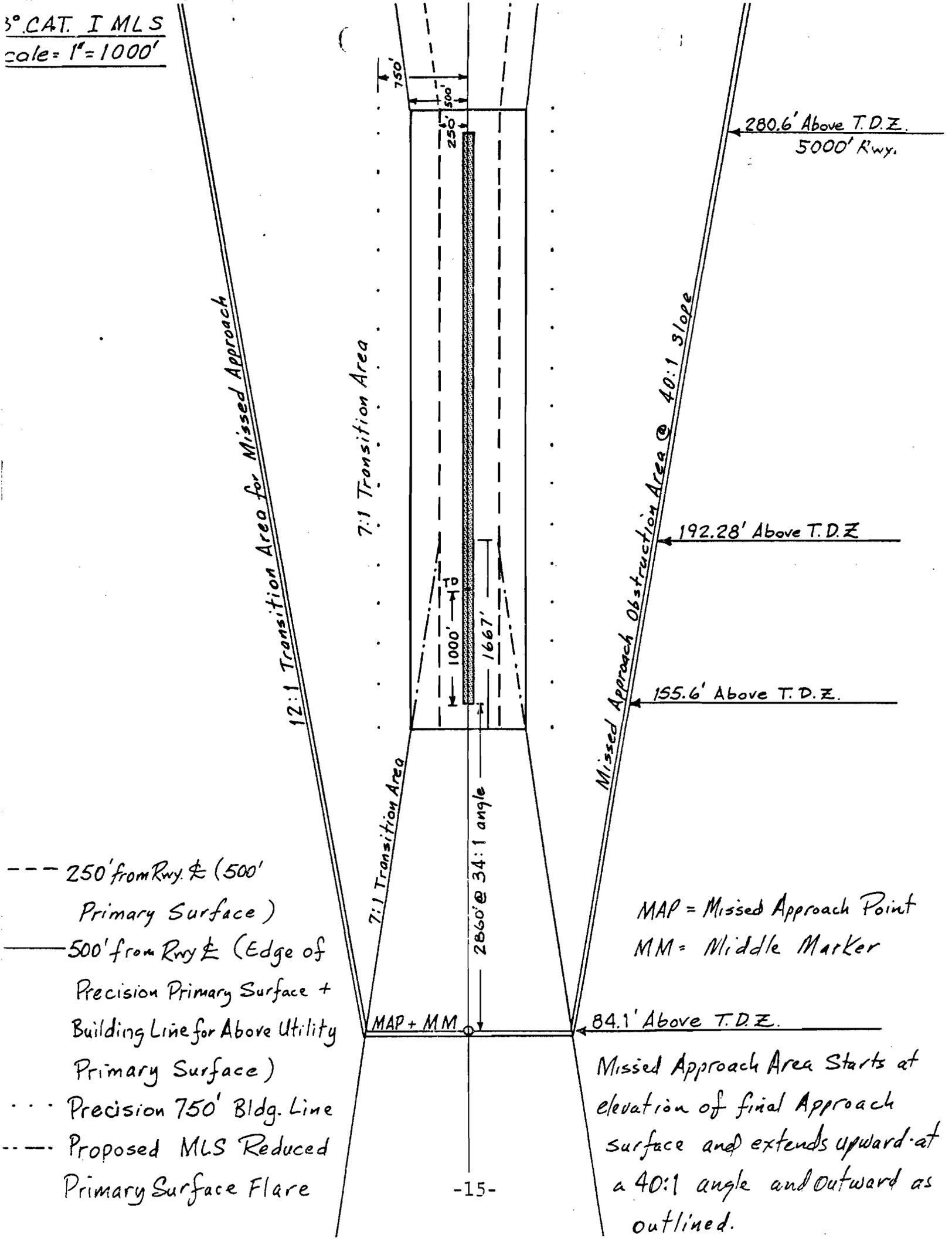
In the attached drawing, the final approach surface to the primary surface is unchanged from current criteria. The "dash-dot-dash" line represents the final approach slope extension to a 500 foot primary surface represented by the dashed lines. This is the criteria used to commission the Antrim County ISMLS at Bellaire, Michigan and works very well.

It is important to note that the final approach and missed approach IFR criteria is absolutely unchanged so there is no compromise to IFR flight. The point where the missed approach floor passes over the narrowed primary surface is 192.28 feet above the touchdown zone so a closer to runway obstruction is no factor.

It is Michigan's intent to install at least three degree glide slope angles. Therefore, it is also our intent to provide 34:1 final approach slope protection on Basic Transport and smaller runways. The cost of property acquisition and easements is significantly less with this method and provides the exact protection as a 50:1 approach slope provides for a 2½ degree glideslope angle. In addition, aircraft are kept higher for noise purposes.

To summarize, this concept is performing satisfactorily at one location in Michigan and should be adopted now for small community precision microwave landing system obstruction control. This will reduce precision instrumentation cost significantly without compromising safety and will permit more small community installations, which are critical to commuter airline safety, dependability and profitability as well as the economy of many areas through the lack of, or loss of, scheduled air service.

3° CAT. I MLS
 scale = 1" = 1000'



12:1 Transition Area for Missed Approach

7:1 Transition Area

7:1 Transition Area

Missed Approach Obstruction Area @ 40:1 slope

280.6' Above T.D.Z.
 5000' Rwy.

192.28' Above T.D.Z.

155.6' Above T.D.Z.

84.1' Above T.D.Z.

- 250' from Rwy. & (500' Primary Surface)
- 500' from Rwy. & (Edge of Precision Primary Surface + Building Line for Above Utility Primary Surface)
- ... Precision 750' Bldg. Line
- - - Proposed MLS Reduced Primary Surface Flare

MAP = Missed Approach Point
 MM = Middle Marker

Missed Approach Area Starts at elevation of final Approach surface and extends upward at a 40:1 angle and outward as outlined.



January 16, 1981

Federal Aviation Administration
APO-320
U.S. Dept. of Transportation
800 Independence Ave. S.W.
Washington, D.C. 20591

Dear Sirs:

I attended the "Microwave Landing System Public Hearing" in Denver, Colorado, on January 7, 1981. After listening to the presentations and subsequent testimony and after reading the handout material, I feel I am in a position to offer comments for your consideration.

T.A.P. Inc. has conducted aviation studies and airport master plans and state system plans in the western States and Alaska over the past sixteen years. We feel our experience in this sparsely populated but vast geographic area is of interest to you in your deliberations regarding placements of MLS.

I have no doubt that as soon as the MSL is provided to the flying public it will catch on even faster than did the transponder. General aviation will buy the airborne equipment once the airport installations are made.

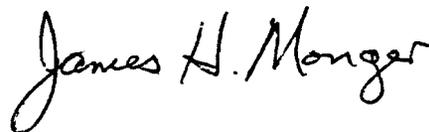
With the concerns of the NTSB, FAA, CAB and the mandates from Congress regarding the improvement in commuter airline safety, I feel the airports served by scheduled airlines should get top priority for the new MLS installations, assuming they don't have the present day ILS. This top priority would naturally include all commuter airports. The fact an airport might have scheduled service is of greater importance than the number of AIA's. The

AIA's can be a determining factor for priorities but only after all airports have electronic landing systems.

Some attempt must also be made to expedite the entire schedule for implementation, even with the full realization the early costs will be far greater.

Sincerely,

T.A.P., Inc.

A handwritten signature in cursive script that reads "James H. Monger".

James H. Monger

Senior Vice President

JHM/srh



State of New Jersey
DEPARTMENT OF TRANSPORTATION

LOUIS J. GAMBACCINI
COMMISSIONER

1035 PARKWAY AVENUE
P.O. BOX 101
TRENTON, NEW JERSEY 08625

January 20, 1981

Mr. Marvin Olson, APO-320
Chairman, MLS Transition
Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Avenue, S.W.
Washington, D. C. 20591

Dear Mr. Olson:

We would like to take the opportunity to provide comment on the National MLS Transition Plan, and make specific recommendations. In general, we recommend that the maximum MLS effort and investment should initially be expended in regions of the country that experience the highest proportion of actual Instrument Meteorological Conditions (IMC), based on national weather records. Instrument operations are, in our view, an insufficient criteria, as many instrument operations occur in Visual Meteorological Conditions (VMC). Furthermore, we also recommend that the Transition Plan should emphasize MLS installation at airports and runways currently unserved by ILS, as opposed to dual MLS/ILS installation.

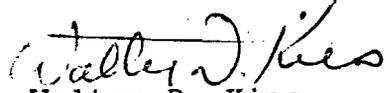
We recommend that the following priorities be adopted by the National MLS Transition Plan:

- (1) Airports served by commuter airline should receive priority consideration for MLS installation. Precision approach capability is a key public safety/reliability consideration. In this category, Privately-Owned Public-Use Airports must have equal eligibility for MLS installation as do Publicly-Owned Airports.
- (2) Reliever/Satellite airports and those facilities serving significant corporate and air taxi operations should be priority MLS locations. Our review indicates a high need for reliable precision approach capability during actual IMC conditions which severely impacts our region of the country. This will also act to relieve the hub airports and thereby provide capacity relief.

- (3) Major airports with noise abatement problems or nearby hazardous terrain should be designated priority MLS facilities. The unique capability of MLS offers significant relief for these important problem areas.

We welcome the opportunity to comment on the National MLS Transition Plan and are prepared to participate in future discussions on the matter.

Sincerely yours,



Walter D. Kies
Director of Aeronautics

WDK:jmk

cc: Joseph Mason, NASAO
Donald Young, Southern Jersey Airways
David Van Dyke, Jr., Princeton Airport
Edward Brown, Monmouth Airport
Jack Elliott, Public Relations Consultant
Irving Tecker, I.J. Tecker Assoc.
All Members of the Aviation Advisory Committee



WEST VIRGINIA AERONAUTICS COMMISSION

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Charleston

January 20, 1981

Mr. Marvin Olson, APO-320
Chairman, MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Avenue, SW
Washington, D.C. 20591

Dear Mr. Olson:

I am aware of the Public Meetings on MLS Transition which FAA held in Los Angeles, Denver and Chicago. I did not attend the meetings, however, I am in favor to support the installation of Microwave Landing System, Nationwide, especially General Aviation Airports.

It is a well-established fact that scheduled air carrier operations benefit greatly through the availability of precision approach capability.

Sincerely,

WILLIAM E. RICHARDS
EXECUTIVE DIRECTOR

WER:mak

AERONAUTICS
COMMISSION
OF
INDIANA

Henry A. Kazimier, dir.

23 January 1981

Mr. Marvin Olson, Chairman
APO-320 MSL Transition Plan Working Group
Federal Aviation Administration, Rm. 939
800 Independence Avenue, S.W.
Washington, D.C. 20591

SUB: MLS Transition Plan

Dear Mr. Olson:

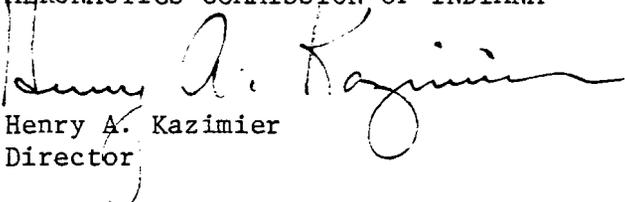
Many thousands of words have been written and spoken on the subject. As representative of the aviation interests in the State of Indiana, I shall attempt to make our position clear with a minimum amount of verbiage.

The subject is complicated because we have two systems that are, in the main, useable; many current and near future installations at airports will be of the old ILS system; most if not all existing ILS systems are acceptable and have many more years of service in them. Therefore, it is our opinion that each state and the representative airports therein should be able to choose when MLS equipment shall be installed into their system. The facets that must be considered for each installation are far too varied to establish a strict pattern. Certain parts of the country need MLS equipment immediately, while others need new or additional equipment but because of circumstances find ILS by far the best cost/benefit answer.

As a result of a thorough evaluation of our constituents' needs, we believe the above to be the more prudent manner with which to accomplish the transition from ILS to MLS. We fully appreciate that this will cause the transition period to possibly extend through several generations, but for an orderly cost effective change to be accomplished we can suggest no other alternative.

Respectfully yours,

AERONAUTICS COMMISSION OF INDIANA


Henry A. Kazimier
Director

co

cc: Mr. John Frick, AAI
Mr. Dan Orcutt, Indianapolis Airport Authority

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF AVIATION
HARRISBURG INTERNATIONAL AIRPORT
45 LUKE DRIVE
MIDDLETOWN, PA 17057
717-783-2282



IN REPLY REFER TO

January 23, 1981

Mr. Marvin Olson, APO-302
Chairman, MLS Transition Plan Working Group
Attention: MLS Transition Plan Comments
Federal Aviation Administration, Room 939
800 Independence Avenue
Washington, D. C. 20591

Dear Mr. Olson:

The Commonwealth of Pennsylvania, both as a manager of five (5) State-owned Airports and as the agency responsible for the promotion and regulation of safe aviation facilities within the Commonwealth, is vitally interested in implementing the Microwave Landing System at airports and heliports within Pennsylvania. The MLS will provide improved safety and efficiency on instrument approaches at lesser cost of installation.

Costs for the airplane owner, airline management and airport owner will be weighed against benefits before aircraft MLS equipment will be purchased and installed. The Aviation segments that should benefit most by this change to a MLS System will be the airlines, major commuters and business fleet. Those operators will weigh added safety and efficiency equally with cost. The small commuter operators probably will not react to MLS airport, installations, immediately because of their normally marginal financial of MLS System coverage for their routes. But the small airports they serve are in dire need of precision equipment, so when the small airports and the hub they connect to are MLS equipped, the small operators will change, the same may be said for General Aviation aircraft.

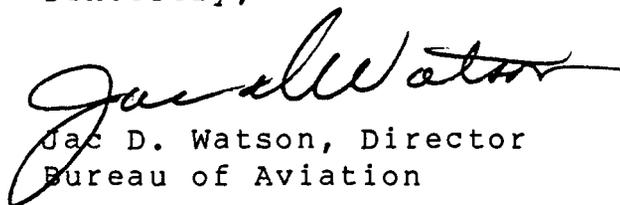
The tenth strategy, proposed by RTCA, should provide a rapid expansion and utilization of the MLS System. It will not provide the incentive to trunk airlines for MLS equipment purchases, however, because only one (1) or possibly a few airports, will have MLS Systems within their routes. When the network system of installation is used and expanded, one or two year programs could provide

simultaneous MLS installations at each major hub airport, while the developing the network system around each hub progresses as the RTCA Study recommends. Included in the Network System Plan must be the installation of MLS's at public heliports with demonstrated need for such instrument landing procedures. The helicopters will operate in the same MLS system environment on their routes.

I propose the Network System of installation be expanded with additional funding for the first year or two at the fifty million dollar level. This could provide simultaneous MLS installations at each major hub airport nationwide, and the Network System around each hub (as the RTCA Study recommends). Please include in the Network System Plan the installation of MLS's at public heliports.

This simultaneous development at major hub airports and by geographic area should emphasize trunk and regional air carrier use, immediately, while encouraging commuter business and general aviation use by geographic area. This type of implementation will convince the aviation user that the FAA is emphasizing MLS installation and should increase their acceptance and use.

Sincerely,



Jac D. Watson, Director
Bureau of Aviation



Minneapolis • Saint Paul

METROPOLITAN AIRPORTS COMMISSION
P. O. BOX 1700 • TWIN CITY AIRPORT • MINNESOTA 55111

OFFICE OF EXECUTIVE DIRECTOR

PHONE (612) 726-5770

January 26, 1981

Federal Aviation Administration
APO 320
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Sir:

The Metropolitan Airports Commission (MAC) has reviewed the Microwave Landing System Transition Plan and associated documents. It is our belief that the MLS concept will provide many benefits and at the same time will alleviate many problems that presently exist with the conventional VHF/UHF Conventional ILS facilities.

MAC owns and operates a system of seven airports, with Minneapolis-Saint Paul International Airport the primary facility and the only air carrier airport. The other six airports serve effectively as reliever airports in our system. We have gained some practical experience with MLS facilities installed by the Minnesota Department of Transportation at two of our reliever airports and therefore feel competent to evaluate the merits of MLS.

Upon completion of the review of the MLS Transition Plan Draft, it is our recommendation that a combination of alternative strategies be considered. Our specific recommendations are as follows:

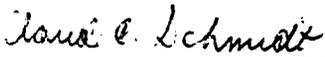
1. The installation of VHF/UHF Instrument Landing Systems (ILS) be terminated as soon as the equipment now in the pipe-line are exhausted.
2. Maximum program funding for Microwave Landing Systems (MLS) be initiated beginning in FY 82.
3. To optimize change over to MLS compatible airborne equipment (receivers), the major hub airports should have a priority for MLS installations.
4. FAA Regional Offices should coordinate with State and Local authorities to develop a strategy for installation of MLS in a network to encourage rapid conversion to MLS avionics of both air carrier, commuter and GA aircraft.

January 26, 1981
Federal Aviation Administration
Page 2

5. Finally, that Runway 11L at Minneapolis-Saint Paul International Airport be programmed to receive one of the next MLS installations. This runway meets all of the criteria established for MLS benefits ie there are siting problems, approaches are made over a large noise sensitive residential area, and there would be more efficient utilization of airspace with a resultant significant fuel saving.

We appreciate the opportunity to comment on this important program proposal and look forward to early world-wide implementation of Microwave Landing Systems.

Yours truly,


Claude C. Schmidt, Director
Operations and Environmental Affairs

CCS:aas

MARQUETTE COUNTY AIRPORT COMMITTEE
ISHPEMING, MICHIGAN 49849

January 27, 1981

Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
FEDERAL AVIATION ADMINISTRATION
Room 939
800 Independence Avenue, S. W.
Washington, D. C. 20591

Dear Mr. Olson:

I have read the testimony, as provided by the Michigan Aeronautics Commission, on the need for the Microwave Landing Systems. I concur with their recommendations and encourage immediate implementation of the buy program. It makes sense to coordinate the acquisition of this system with DOD to take advantage of volume purchasing for both initial acquisition and maintenance costs. However, if necessary, FAA should press on alone, rather than delay this vital program any longer.

The Upper Peninsula communities are uncertain as to what Republic Airlines is planning for their future air service to us. If they decide to withdraw from U. P. markets, commuter type service and general aviation will more than likely be our only alternative, which makes immediate implementation of the MLS program even more imperative. The "Aviation Trust Fund" has got the dollars, so lets use some of them for the MLS.

I hope my comments help in getting the MLS program off the ground during 1981.

Yours truly,



Charles W. Hohman, Jr.
Airport Manager

MARQUETTE COUNTY AIRPORT

CWH:nae

cc: Robert J. Thomas
Michigan Aeronautics Commission



The Commonwealth of Massachusetts
Aeronautics Commission
Boston - Logan Airport, Boston 02128

January 27, 1981

Mr. Marvin Olson, APO-320
Chairman, MLS Transition Plan Working Group
Federal Aviation Administration
800 Independence Ave., S.W.
Washington, D.C. 20591

Dear Mr. Olson:

We believe that the orderly implementation of Microwave Landing Systems (MLS), except in unusual circumstances, should generally follow the plan that the Instrument Landing Systems (ILS) installations originally underwent.

Specifically, installations should first be considered for major U.S. international air carrier airports, followed by installations at major hub air carrier/commuter facilities and then into the heavily used general aviation airports.

Exceptions to this plan should be where any airport, air carrier or general aviation, has a severe ILS siting problem due to terrain or a severe noise problem where residential development has encroached upon the airport and where the installation of MLS could prove to be a distinct advantage by providing relief and thereby making the airport a good neighbor.

We believe that this plan is a sound one. On the rather simple theory that MLS implementation must begin somewhere, it seems logical to initially provide these facilities where they will receive the greatest use by the largest number of users.

Sincerely,

A handwritten signature in cursive script that reads "Arnold R. Stymest".

Arnold R. Stymest
Director of Aeronautics

DWG:ep



Transport Canada Transports Canada

Air Air

Your file Votre référence

Our file Notre référence

Ottawa, Ontario,
K1A 0N8,
January 27, 1981.

6802-44 (SLFA/L)

Mr. Marvin Olson,
APO-320,
Chairman, MLS Transition Plan
Working Group,
Federal Aviation Administration,
Room 939,
800 Independence Avenue, S.W.,
Washington, D.C. 20591

Attention: MLS Transition Plan Comments

Dear Mr. Olson:

Following are comments on the FAA's proposed MLS Transition Plan, confirming the oral statement made at the Public Hearing held in Washington on January 13, 1981.

We in the Canadian Department of Transport are pleased to see MLS transition being pursued with such vigour by the FAA. Such activity will go a long way toward supporting the world-wide plans being discussed within ICAO.

With regard to transition strategies, our preliminary view of the options leads us to favour your Strategy Number 10, which would geographically concentrate early MLS installations. Other options tend to spread MLSs thinly and randomly across the country during early stages of transition, which would not help overcome what we see as a potential stumbling block: a reluctance of users to buy MLS avionics in the early stages of transition. While this is a more serious problem in a country with our small population, it may prove important in the U.S. as well. Unless potential users keep in step with ground installations, there could be an embarrassingly long period when first-generation MLSs are transmitting to very few customers.

As the benefits of MLS become more widely understood, and as the cost of receivers starts to come down, this early reluctance could evolve into a more enthusiastic demand from the users for more systems. To allow for this trend, it would seem wise to prepare for an increased rate of installation some five years or so after the program starts. A slow start, followed by a speed-up, has another advantage in that you wind up with more systems that are second or subsequent generation.

These considerations suggest the following ways to adapt to Strategy 10:

- a. in selecting initial networks of airports, favour those used by airlines which are willing to convert to MLS early on;
- b. waive the conditions of Airways Planning Standards for initial MLS implementation so that the chosen strategy can be given full rein;
- c. rather than a fixed yearly budget, program a spending rate that initially satisfies only one geographic area, then increases so as to handle the whole country by the end of the period designated for MLS transition.

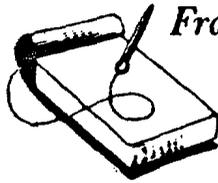
It is hoped the above thoughts prove useful in your upcoming deliberations.

Yours truly,



C. Torontow,
Superintendent, Airspace
and Airport Standards.

Box 14130
S. Lake Tahoe, 95702



From the desk of

COLONEL PETE BOYES

1/27/81

Dear Mr. Olson:

Please find enclosed a copy of my letter to Secretary Lewis with my comments and recommendations concerning the MLS. As I indicated in my letter to him, there is no question in my mind about getting on with the transition from ILS to MLS.

I found the material you sent to me comprehensive and totally supportive of the change. Thanks for the opportunity to comment.

Encl

Sincerely,

A handwritten signature in cursive script that reads "Pete Boyes".

January 28, 1981

The Honorable Drew Lewis
Secretary of Transportation
Department of Transportation
Washington, DC 20590

Dear Mr. Lewis:

Because of your recent appointment and confirmation as Secretary of Transportation, I felt you might be interested in an "outside" opinion on an important navigational system for our airspace users. Because of my many years working in various facets of aviation, I obtained, and have carefully reviewed, the several documents prepared for the Microwave Landing System (MLS) Transition Plan prepared by the FAA working group, Marvin L. Olson, Chairman (The executive summary is enclosed). From that examination I would like to offer you my comments and recommendations.

My first observation is that there is no question the existing Instrument Landing System (ILS), which has served aviation so well for 40 years, needs replacement by better airport approach (and departure) equipment. This equipment is provided by the MLS. The comprehensive FAA MLS Transition Plan thoroughly documents the need for, and the benefits to be derived from, the new system. Two of the principal benefits from MLS are improved safety and reduced flight interruptions. However, it is essential to note the Transition Plan is not an implementation plan and it is the latter which I next wish to address and make specific recommendations.

First of all, I believe it is imperative to implement Phase I of the Service Test and Evaluation Program (STEP) this year. Included in Phase I are Washington National Airport, Philadelphia, and Teterboro plus the necessary airborne equipment provided for in STEP. The airports selected provide the best mix of variables to produce useful data for subsequent installations. Phase II of STEP should be initiated as soon as possible but within one year after the start of Phase I. Inasmuch as no airports were identified for Phase II, I would recommend Los Angeles International Airport and Lindberg Field, San Diego for the same reasons supporting the Phase I selections as well as providing the opportunity to assess, in some measure, the benefit to transcontinental air traffic.

With the conclusion of STEP Phase I and II, one of the ten strategies described in the MLS Transition Plan should be put into action. It is my feeling, after considering all ten of the proposed strategies, that strategy 10 (see enclosure) is the most practical one to be implemented when the STEP phases are completed.

I recommend strategy 10 because of its regional application. For example, starting with JFK as a hub, airlines, commuters, and general aviation immediately become involved, as well as foreign carriers. Selecting LAX as the second hub for the MLS transition, a similar scenario applies, with the added benefit to coast-to-coast flights.

Of course funding for the 20 year program is of major concern. It seems quite logical the existing Aviation Trust Fund, which now exceeds \$5 billion, is the

The Honorable Drew Lewis
January 28, 1981
Page 2

logical source. It would be highly desirable to provide a \$50 million annual funding limit for strategy 10 rather than the \$20 million now presented in the Transition Plan. Although not addressed in the plan, it would be entirely appropriate to modernize all air traffic control equipment, with certain redundancies for safety to be financed by the trust fund. If the MLS transition is accomplished along with new and adequate air traffic control equipment, a critically important element of our air transportation environment will enter the 21st century in very good shape. I am hopeful this information may be of some use to you.

Sincerely,

Peter E. Boyes

Enclosures

cc: Marvin L. Olson

P. O. Box 14130
South Lake Tahoe, CA. 95702

PRESIDENT-ELECT RONALD REAGAN RESPONDS TO AOPA'S QUESTIONS

Prior to the election, AOPA submitted ten pertinent questions to each of the three principal candidates for president. Of the three, only Ronald Reagan replied.

Following are the questions submitted and the answers provided by then-candidate Reagan.

QUESTION 1. The Aviation Trust Fund, supported by taxes on direct users, has an uncommitted surplus of more than \$3.7 billion. Do you favor releasing this money for airport and airways development? If so, in what way?

ANSWER 1. The large Trust Fund surplus exists for many reasons, but the primary reason for its existence is the unified budget procedures used by the Administration. These procedures treat all federal programs alike for the purpose of preparing the budget, regardless of whether they are funded from general revenues or from self-sustaining and user-financed trust funds. This results in the imposition of lower budget ceilings on major aviation safety programs than would otherwise be applicable.

There is legislation pending in the House which would remove the Aviation Trust Fund from the unified budget. I will consider supporting this legislation since it would free up more funds to improve air safety and capacity at our nation's airports.

With the large surplus, we should explore making a concentrated effort to improve flight service station modernization, radar computer equipment needs, instrument and microwave landing systems, and other critical navigation aids.

Secondly, along with this effort to enhance safety, we should consider expediting expenditures for airport development in such areas as runway and taxiway construction and terminal development. These projects will increase system capacity and enhance safety.

Third, sufficient efforts in research and development are necessary to further enhance the safety and navigation capabilities of the airway system. For instance, we should vigorously pursue a collision avoidance system as soon as possible. I find it disturbing that the Federal Aviation Administration has spent so many years on this project but has yet to develop and implement a viable one.

The present Administration would like to milk the Trust Fund surplus for larger increases in operations and maintenance. I believe that O & M should continue to be funded at existing levels with modest increases, but not be greatly increased.

QUESTION 2. The present Secretary of Transportation has testified to a Congressional Committee that he would favor using federal powers to constrain the demand for air travel rather than to build to meet this public demand. Do you support this position?

ANSWER 2. I do not support the Carter Administration's policy of "no growth" in the area of airport and airway capacity. Civil aviation is a great resource and makes a valuable contribution to the national economy. To inhibit the growth of this industry by limiting capacity will do great harm to the nation's air transportation system, and thus our entire economy.

Generally, the en route airspace is not yet crowded, but there are airports where congestion exists, and we can expect more in the future. Rather than constrain growth and add excess restrictions as the Carter Administration would do, we must aggressively pursue the necessary projects to increase capacity to the maximum safe level.

QUESTION 3. Some communities which have received federal assistance for airport development and which receive the services of the Federal Aviation Administration are seeking to deny use of airports to personal aircraft in favor of those operated by airline corporations. What would be your solution to this controversy over airport use?

ANSWER 3. I think it would be prudent to take into account any access recommendations that may be made as a result of the airport access study mandated by the House of Representatives' airport and airway development legislation now under consideration.

However, I believe any airport receiving federal funding and assistance should not be permitted to deny access to any class of users. While the airport sponsor should have control over its airport, particular users should not be unfairly turned away.

Certainly, to help accommodate increasing demand I would favor upgrading general aviation airports as well as reliever airports in metropolitan areas as part of the solution. Increasing capacity at the congested air carrier airports themselves would also have to be accomplished to meet demand.

(over, please ...)



QUESTION 4. There have been proposals to separate the functions of the Federal Aviation Administration and remove the "foster and develop" actions from the regulatory processes. Do you favor this separation, or oppose it?

ANSWER 4. I would like to study such a separation further. There is no question that the documented deficiencies in the air transportation system require immediate and full attention, but a reorganization may not be a cure-all. I would want to first determine whether the FAA's performance can be improved within the existing structure. Failing this, I would then address the issue of reorganization.

QUESTION 5. Aviation fuel is no longer under federal controls. As a result the prices have gone up; 80 octane fuel is being discontinued; and petroleum companies are reducing sales and service to small airports. The companies indicate the volume of aviation gasoline is so small it is not profitable to handle it any other way. What action would you propose to assure fuel availability for general aviation aircraft?

ANSWER 5. The only way to guarantee sufficient availability of fuel is to eliminate all federal price and allocation controls, and increase domestic energy production.

QUESTION 6. The Air Traffic Control System is not able to handle more than one out of every four flights; others operate under Visual Flight Rules. This limitation constrains the growth and efficiency of air transportation. What remedies would you propose?

ANSWER 6. Many studies and investigations have been directed to look at the air traffic control (ATC) system. All have concluded that the current system is outdated, cannot handle present, much less future capacity, and is subject to frequent breakdowns. I would seek to help alleviate this situation by calling for the purchase of state-of-the-art computers and radar systems that were adequately tested. This would include good maintenance during and after the installation, as well as a good backup system. Furthermore, we should consider increasing the number of air traffic controllers, and help modernize flight service stations.

QUESTION 7. Appointments to posts such as Administrator of the Federal Aviation Administration and Chairman of the National Transportation Safety Board have in the past often been filled by politically active people but individuals not technically qualified or experienced in these fields. What is your policy toward such appointments?

ANSWER 7. We should attempt to pick as Administrators of the FAA and Chairman of the NTSB people who have real aviation experience. We would choose someone from the aviation community who is familiar with the problems of the system.

QUESTION 8. Many areas of the nation lack sufficient airport capacity to serve the transportation needs of the communities yet there are in many of these locations under-utilized military airports. Would you favor joint military/civil use of these fields?

ANSWER 8. Although joint-use does exist, we are not taking full advantage of the potential civil aviation capacity at many of our military airfields. We will try, in conjunction with the military, to increase the number of joint-use airports wherever consistent with national security objectives.

QUESTION 9. Approximately half of the airports open for public use are privately owned. In urban areas heavy taxation and inflated land values make it difficult for these airports to continue as private enterprise operations and to improve the facilities by installation of instrument landing systems, lights and other safety features. It has been proposed that these airports become eligible for assistance from the Federal Aviation Trust Fund under certain conditions of permanence, availability to all the public, and other safeguards. Do you favor or oppose such aid?

ANSWER 9. I would prefer, through tax rate and regulatory reductions, to improve the economic viability of such airports.

QUESTION 10. The Federal Aviation Administration often totally ignores comments from the users in the establishment of regulatory acts. What procedures, if any, would you institute to give the direct users of the air transportation system a stronger voice in the regulatory process?

ANSWER 10. Let me say first that there are far too many rulemaking proceedings. You can be assured that under a Reagan Administration the amount of Federal red tape and bureaucrats interfering in the private and business lives of our citizens will be substantially reduced.

On many occasions the Carter Administration has put out a lengthy notice of proposed rulemaking (NPRM) and received mostly negative comments from thousands of people, only to enact the regulations exactly as offered. We will try to modify proposed rules to reflect the comments of those affected.

One option we would consider is a panel of outside aviation experts to help formulate the new rules prior to their proposal.

News in Brief

Reagan supports General Aviation

Republican Presidential Candidate Ronald Reagan has told the Aircraft Owners and Pilots Association he favors using the Aviation Trust Fund money now for airport development and does not agree with the Carter position of "using government power to constrain demand."

Ten questions were posed by AOPA to the three major candidates. Only Reagan responded.

Reagan voiced strong opposition to the apparent lack of aviation experience of those holding politically appointed offices of Administrator of the Federal Aviation Administration and Chairman of the National Transportation Safety Board. "We should attempt to pick as

Administrator of the FAA and Chairman of the NTSB people who have real aviation experience. We should choose someone from the aviation community who is familiar with the problems of the system," Reagan said.

In his comments Reagan favors using the \$3.7 billion surplus of the now defunct Aviation Trust Fund to improve Flight Service Station modernization, radar computer equipment needs, instrument and microwave landing systems and other critical navigation aids. "We should consider expediting expenditures for airport development in such areas as runway and taxiway construction and terminal development," Reagan said, and added, "we should vigorously pursue a collision avoidance system as soon as possible."

The Republican Presidential Candidate also favors upgrading general aviation airports as well as reliever airports in metropolitan areas; believes any airport receiving federal funding and assistance should not be permitted to deny access to any class of user and that particular users should not be unfairly turned away; favors updating the computers and radar systems used in Air Traffic Control and favors joint use of military airports wherever consistent with national security objectives.

Reagan stressed the importance of user involvement in FAA policy decisions and government response to rule making. "On many occasions the Carter Administration has put out a lengthy notice of proposed rule making (NPRM) and received mostly negative comments from thousands of people, only to enact the regulations exactly as offered. We will try to modify proposed rules to reflect the comments of those affected. One option we would consider is a panel of outside aviation experts to help formulate the new rules prior to their proposal," Reagan said.

Carter, Anderson Decline Comment

Reagan Supports GA, Prefers "Experienced" FAA

Washington
Republican presidential candidate Ronald Reagan has told AOPA he favors using the Aviation Trust Fund money now for airport development and does not agree with the Carter position of "using government power to constrain demand."

These points were made in response to 10 specific questions posed to the three major candidates by AOPA. Governor Reagan is the only

candidate to respond to the policy questions. Democratic candidate Jimmy Carter and independent John Anderson declined to comment.

Reagan voiced strong opposition to the apparent lack of aviation experience of those holding politically appointed offices of administrator of the FAA and chairman of the NTSB. "We should attempt to pick as administrator of the FAA and chairman of the NTSB peo-

ple who have real aviation experience. We should choose someone from the aviation community who is familiar with the problems of the system," Reagan said.

In his comments Reagan favors using the \$3.7 billion surplus of the now defunct Aviation Trust Fund to improve FSS's radar computer equipment needs, instrument and microwave landings systems and other critical navigation aids. "We

should consider expediting expenditures for airport development in such areas as runway and taxiway construction and terminal development," Reagan said, and added, "We should vigorously pursue a collision avoidance system as soon as possible."

The Republican presidential candidate also favors upgrading general aviation airports as well as reliever airports in metropolitan areas; believes any airport receiv-

ing federal funding and assistance should not be permitted to deny access to any class of user and that particular users should not be unfairly turned away; favors updating the computers and radar systems used in air traffic control and favors joint use of military airports wherever consistent with national security objectives.

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General Aviation News

"The Green Sheet"

4th

Weekly
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October, 1980
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KANSAS DEPARTMENT OF TRANSPORTATION

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JOHN B. KEMP, Secretary of Transportation

JOHN CARLIN, Governor

January 30, 1981

Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Mr. Olson:

We urge the FAA to give special attention to the immediate implementation of MLS with the funds available and to provide the regulatory changes required to insure a smooth transition period.

This concept is performing satisfactorily in some states and should be adopted now for small community precision microwave landing system obstruction control. This will reduce precision instrumentation cost significantly without compromising safety and will permit more small community installations, which are critical to commuter airline safety, dependability and profitability as well as the economy of many areas through the lack of, or loss of, scheduled air service.

Sincerely,

DIVISION OF AVIATION

RAY ARVIN
Director

RA:jw



STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DELAWARE TRANSPORTATION AUTHORITY
P.O. Box 778
DOVER, DELAWARE 19901

OFFICE OF THE
DIRECTOR

PHONE: (302) 671-4306
736-4597

January 30, 1981

Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Mr. Olson:

We are pleased to have this opportunity to comment on the subject of MLS transition and implementation.

After examination of the ten (10) implementation strategies as outlined in the Federal Register, we wish to make the following comments:

1. MLS should be installed first at those air carrier airports without precision approach facilities. Those airports served by commuters should have the same priority.
2. New Qualifier Airports which handle turbo-jet service and high annual instrument approaches should be provided MLS early in the program.
3. Concur with Strategy 3.
4. Concur with Strategy 4.
5. The 50M annual F&E funding limit would seem to be low. Recommend utilization of increased aviation trust fund monies so as to get this program off and running at the earliest possible date.
6. While we concur with Strategy 6, the 50M F&E funding limit will not provide enough initial funding to meet the objective.
7. Concur with Strategy 7 except for funding level.
8. Concur.
9. Concur.
10. Based on the need for a precision system that would be immediately available, we would make the following recommendations and priorities:

Mr. Marvin Olson
January 30, 1981
Page Two

a. Installation of MLS at those airports without precision approach capability which handle large numbers of turbo-jet air carriers.

b. MLS at those airports in mountainous parts of the continental U.S. utilized by commuters.

c. Precision MLS system installation at all other airports with high commuter operations and corporate traffic.

d. MLS approach system requirements at certain general aviation airports based on number of yearly operations and aircraft types.

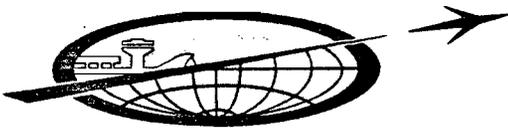
e. Adequate F&E funding must be made available to assure implementation at the earliest possible time.

Thank you for the opportunity to comment on this most important program.

Sincerely,


Rayvon Burleson
Chief of Aeronautics

RB/cld
cc: William C. Reed
Adrian M. Zeffert



February 3, 1981

Mr. Marvin Olson
Chairman, MLS Transition Plan
Working Group
Federal Aviation Administration
APO-320
Room 939
800 Independence Avenue, SW
Washington, D.C. 20591

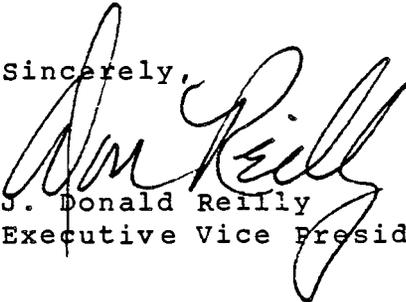
Subject: MLS Transition Plan Comments

Dear Mr. Olson:

The alternative strategies for the implementation of Microwave Landing Systems have been reviewed by the Airport Operators Council International and the following comments are submitted for your consideration. It is our view that the strategy developed by the RTCA Special Committee merits primary consideration. Modifications to the plan can be made to eliminate those MLS locations that would not be cost beneficial.

Airport and airway capacity will be one of the most serious problems facing the air transportation industry in the coming decade. It is therefore imperative that a strategy be adopted that will most ably utilize the strengths of the MLS system in reducing the airport/airway capacity problem.

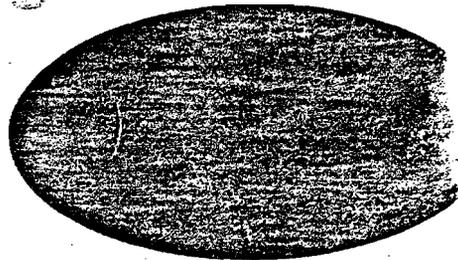
Sincerely,


J. Donald Reilly
Executive Vice President

/jd

ARTCOM

AUDIO. RADIO. TELEVISION CONSULTING & MAINTENANCE. INC



Mr. Marvin Olson, APO-320, Chairman
MLS Transition Plan Working Group
Federal Aviation Administration Room 939,
800 Independence Ave. SW,
Washington, DC 20591

Dear Mr. Olson:

Please consider these comments as relative to the plan to switch the present ILS system to MLS bands of operation.

First of all, I hold an F.C.C. Radio Telephone First and Radio Telegraph Second Class Licenses. I hold an Amateur Advanced License and have been a practicing Amateur for 41 years. I have been commercially licensed for 40 years. I have been a licensed pilot for 10 years and am considered a Microwave expert in my field of endeavor.

I was an airline radio operator back in the low frequency 4-legged range days, when the then CAA didn't even have a communications system. The only time anyone ever became involved in air to ground communications, other than the airline company, was when an airplane came within 3 miles of an airport and was requesting permission to land.

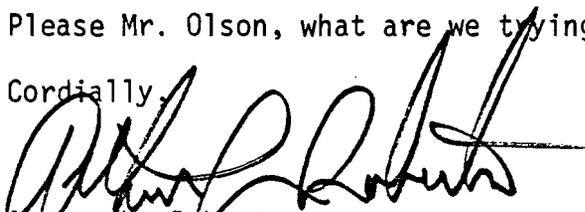
We have come a long way, and I for one, know many parts of the present system are essential to safety and efficient operation. But there is one thing I cannot understand, and perhaps you can enlighten me.

How and under what kind of justification has the F.A.A, grown to be such an inefficient poorly operated giant that it is today, and why, when the F.A.A. hasn't figured out how to operate the present good ILS system, are you now proposing even a larger more technically involved system in the MLS? The MLS does not offer a single advantage to the operation of the aircraft or the safety thereof, as it relates to the passenger.

The only advantage I see is an excuse to enlarge the bureaucracy that operates and maintains the beast, and the equipment manufacturers who will reap a bonanza. It will only cost all aircraft operators an ultimate bundle of cash and will net them no appreciable tangible benefit as it relates to the owning or operating of an aircraft.

Please Mr. Olson, what are we trying to prove?

Cordially,


Arthur L. Robertson

cc: A.O.P.A.

February 4, 1981

Federal Aviation Administration
APO-320
U.S. Department of Transportation
800 Independence Avenue, S.W.
Washington, D.C. 20591

Re: This letter is in response to your request for written comments from the aviation community on the Draft MLS Transition Plan dated 20 October 1980.

Gentlemen:

The FAA has briefed industry and the user community on the status of MLS and the various implementation strategies in the Draft Transition Plan.

Wilcox had representatives at each of the four briefing locations in January 1981. We observed that those who are most interested in MLS implementation are those with unique requirements to land at airports in rugged terrain or where conventional approach paths are not desirable. We also observed a lack of interest from the largest users of ILS, namely the Air Carriers and General Aviation. This seems to confirm our experience that where ILS service is being provided, the users are happy with it. A few users who are not receiving ILS service believe that MLS implementation would provide the landing service they need and it would be better than ILS.

This experience leads to a recommendation for an initial implementation strategy simply stated as follows:

Provide MLS service at those locations where the unique advantages of MLS are important enough to justify an expenditure for MLS avionics by the unique user, and let ILS continue to provide service where the majority of users are happy with ILS.

This scenario provides MLS service to those who need it and are willing to pay for it and at the same time delays the commitment for the expenditure of \$521 Million in ground MLS equipment and perhaps \$1 Billion in MLS Avionics equipment by the aircraft owners, until it's needed and the aviation community can afford it.

Wilcox, with its MLS partner, Interscan of Australia Pty Limited (IAPL), began a dedicated MLS product development program several years ago. The FAA had announced plans for a Service Test and Evaluation Program (STEP) calling for a small procurement of 10 systems beginning in late 1981. As we understand it, no such plan exists in FAA's budget for FY 82. We are very disappointed that the planned STEP has not been recommended for funding.

There are unanswered questions regarding MLS future costs and operational benefits which would have been answered by the STEP. We still support such an evaluation. Perhaps a better name for this would be Operational Test and Evaluation (OT&E). In either case, we support and recommend such a program.

In our opinion, the real need of MLS is for vertical guidance in rugged terrain where the pilot can select the glide angle that is optimum for his aircraft and desired approach path, within safe limits determined in advance by the FAA's Aviation Standards organization.

Several restricted airports with unique user requirements have already been identified with potentially favorable benefits.

1. A straight in conventional ILS precision approach at South Lake Tahoe is not possible. The unique advantages of MLS coupled with a properly equipped STOL aircraft may allow steep angle precision approaches.
2. The Philadelphia - Washington (National) commuter route of Ransome Airlines using short runways and STOL aircraft seems to offer a unique and useful service not possible with ILS.

An orderly OT&E program which would provide MLS service of this kind on 8 to 12 runways should be launched with FY82 funds. We support that kind of OT&E program.

The other MLS implementation strategies require major capital investments by both the government and business which come at a bad time and are not yet justified.

Referring to your Red Book, "Guide to Microwave Landing System Implementation Strategies", strategies 3, 4, 5 & 9 arbitrarily force decommissioning of ILS at a rapid rate which is not in the public interest.

Strategies 1, 2, 6, 7, 8 & 10 would install MLS where ILS are now planned which force the users to incur millions of dollars in avionics cost and there is no proven benefit of MLS over ILS at most of these locations.

Over \$120 Million during the last 10 years has already been invested in a new landing system development (MLS) which is obviously better than ILS was 10 years ago. However, most of the old problems with the ILS have been overcome which today make the advantages of MLS less significant than they were 10 years ago.

The ILS frequency congestion problem can be easily and inexpensively solved by implementation of the other 20 channels of ILS. There are very few users who need ILS service who do not have 40 channel receivers.

The glide slope siting problem has been solved by the development and commissioning by the FAA of the "End Fire" non-imaging glide slope antenna. This antenna is relatively insensitive to snow build up and produces a glide path using conventional ILS electronics equipment without presenting an obstruction in the approach zone.

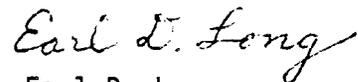
The adequacy of ILS for CAT II and CAT III service has been verified in many locations in an operational environment.

ILS equipment installed by the FAA during the last five years is all solid state and very reliable. Remote maintenance monitoring can be added at those locations where it is justified.

The facts today are that most of the old ILS problems have been solved. ILS can provide good, low cost service to most of the aviation community who are satisfied with safe, conventional, fixed path, straight in approaches and the avionics is already installed and paid for.

We believe that ultimately MLS will be widely implemented on the basis that its superior service will be wanted by the majority of users. The users will gradually swing to MLS when avionics equipment is available and reasonably priced. Then the users will demand more ground stations and the transition will occur naturally without force. The OT&E program is the way to start. We urge the FAA to request funding in the FY82 budget and proceed with orderly MLS implementation based upon user needs.

Sincerely,



Earl D. Long
Manager, Domestic Sales

EDL:jw



City of Cincinnati

SYLVESTER MURRAY
CITY MANAGER

DEPARTMENT OF PUBLIC UTILITIES
LUNKEN AIRPORT
CINCINNATI, OHIO 45226

JOSEPH L. ROCHFORD
DIRECTOR

EDWARD T. KENNY
AIRPORT SUPT.

February 4, 1981

Mr. Marvin Olsen
Federal Aviation Administration
APO-320
800 Independence Avenue
Washington, D. C. 20591

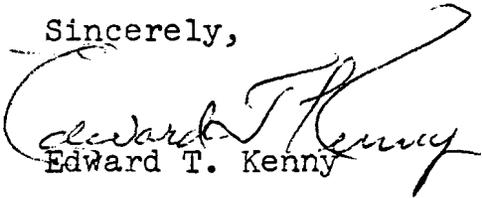
Dear Mr. Olsen:

It has recently come to my attention that you are pursuing the policy of locating Microwave Landing Systems at selected airports in the United States for the purpose of information gathering. We at Lunken Airport in Cincinnati are very interested in the possibility of participating in this study. We have received expressions of interest from several of our corporate tenants and think that we could very easily acquire the required level of participation.

In 1980 Lunken experienced 38,783 IFR operations. We presently have an ILS system on Runway 20L, and would be interested in incorporating an MLS system on our Runway 6-24. I am forwarding to you under separate cover an airport topographical chart.

Please consider this letter an official expression of interest in the project, and forward to me any requests for additional information or requirements.

Sincerely,


Edward T. Kenny

ETK/kms



February 4, 1981

Mr. Marvin Olson, Chairman
MLS Transition Plan Development Group
Federal Aviation Administration APO-320
800 Independence Avenue SW
Washington, D.C. 20591

Dear Sir:

On January 5, 1981 I was pleased to present comments to a public hearing conducted by the FAA regarding the Microwave Landing System Transition Plan. Permit me to convey to you the attached written copy of my comments for your file and to be made part of the record.

Since the date of my presentation, the Burbank-Glendale-Pasadena Airport Authority has given further review to the material on this subject and has taken the position of encouraging public support of MLS as an important technology to further noise abatement at the Burbank Airport.

In addition to this letter, we are therefore encouraging local residents to review the GUIDE TO IMPLEMENTATION STRATEGIES and to convey their support to your office in the near future. We would also plan to distribute a news release on the action of the Authority for even wider public awareness.

Thank you very much for your cooperation and assistance in this very important matter.

Sincerely,

Russell C. Widmar
Deputy Director
Airport Services

RCW:SLJ:lja

Attachment

CC: William B. Rudell,
Commission President

PRESENTATION TO THE FEDERAL AVIATION ADMINISTRATION
PUBLIC HEARING OF JANUARY 5, 1981 IN LOS ANGELES, CALIFORNIA
REGARDING MICROWAVE LANDING SYSTEM TRANSITION PLAN

by
Russell Widmar, Manager-Airport Services
Burbank-Glendale-Pasadena Airport
Burbank, California

Good afternoon, ladies and gentlemen. My name is Russ Widmar. I am pleased to appear here today representing the Burbank-Glendale-Pasadena Airport where my title is Manager of Airport Services.

I have thoroughly reviewed the Microwave Landing System Transition Plan and the Benefit/Cost Study which were forwarded to us. We are strongly in favor of moving forward rapidly with the application of this new technology.

The Burbank-Glendale-Pasadena Airport recognizes that the MLS will offer many operational advantages, and that chief among these will be the noise abatement potentials which are extremely important at this facility.

In brief, our recommendations are that:

- o The Microwave Landing System technology be introduced as rapidly as possible, using the shorter transition period rather than the longer one; and that
- o The Burbank Airport be chosen as a field evaluation site for Phase 2 of the Service Test and Evaluation Program, also known as STEP.

These recommendations are made with the recognition that the transition plan is not an implementation program, and with the full understanding that the choice of transition strategies is operationally and not economically predicated. As I elaborate, you will find that the Burbank Airport represents the potential for optimizing the achievement of STEP program goals and objectives.

AIRPORT BACKGROUND INFORMATION

The Burbank Airport is one of five air carrier facilities which serve the 4,000 square mile metropolitan Los Angeles area. The airport is situated in the eastern portion of the San Fernando Valley, approximately 12 miles northwest of central downtown. The airport is recognized by the California Department of Transportation and the Southern California Regional Systems Plan as a major airport within the region, integral to providing short-haul and medium-haul air carrier service to an air trade area population of nearly 2.5 million people.

The airport is served by the scheduled flights of PSA, Continental, Republic, Aspen, SunAire and Inland Empire Airlines; with a total volume of passengers in calendar year 1980 of approximately 2.3 million. Burbank is ranked nationally as the 53rd busiest air carrier airport and has a complete mix of commercial, military, general and corporate aviation users. It ranks seventh in the state in air carrier enplanements. About one-fifth of the six-million air passengers travelling annually between the greater Los Angeles and San Francisco Bay areas use the airport.

The airport is an IFR facility, providing two, crossing, asphalt-surfaced, grooved runways: 7-25 (east/west), and 15-33 (north/south). The north/south runway is the longer of the two at 6,902 feet, but surrounding terrain makes only runway 7 suitable to be equipped with an Instrument Landing System (ILS). And, as I shall explain, there are certain limitations to this arrangement.

THE TRANSITION OPTIONS

We have thoroughly reviewed the 22 transition options, and the 10 transition strategies. It is our opinion that the earliest implementation of MLS should be targeted at EXISTING LOCATIONS which yield the greatest and most immediate NOISE ABATEMENT benefits and solve the RESTRICTED LOCATIONS problem currently affecting 162 of the 621 full ILS installations in the United States. Each of these is discussed specifically below.

Noise Abatement - The value of precision, curved approaches and departures for noise abatement is especially important to the Burbank Airport where environmental restrictions are particularly significant. The Burbank Airport has been identified as having a noise problem, and applying technological advances to the solution of environmentally based problems is especially desirable here.

For example, the airlines have used an unpublished noise abatement VFR approach to our runway 15 for years with good success. However, MLS may support more noise-effective IFR and VFR approaches to this runway because the VFR approaches are generally restricted to using visual landmarks and thus may be constrained to noisier, lower altitude profiles that would not be required with MLS.

Also, we feel that the day is not far off when the flexibility of our air traffic control system will be additionally restricted by the removal of all discretionary language in the standard instrument departure procedures due to noise abatement. On the surface this may appear as a loss in flexibility of the system. However, this does not necessarily have to be the case as curved, MLS departure profiles from noise sensitive runways may yield overwhelming noise abatement benefits to areas surrounding airports. Flown with the most advanced technology aircraft, these profiles may be the key to keeping airports in noise sensitive areas open and prosperous over the long-term.

Lastly, the Executive Summary indicated that MLS has a direct application in this regard on Runway 28L at San Francisco International. The Burbank Airport can offer you the same application on our Runway 25 with the added incentive of more effectively and efficiently using airspace over residential land rather than water.

Because MLS is capable of providing departure as well as approach guidance, the noise abatement program at our airport would be greatly enhanced. We have recently completed the installation of an approved, permanent noise monitoring system which can provide added data and information about the positive noise abatement results accrued from MLS, and we will make this system available if chosen as a Phase 2 site.

Restricted Locations - Restricted Locations are defined as locations currently equipped with ILS, but have operating restrictions greater than 200' decision height and one-half mile visibility minimums. The Burbank Airport has one of 47 medium-grade restricted instrument landing systems in the United States with a 250' decision height and one-mile visibility requirement. Considering the fact that during much of the year visibility in the Los Angeles basin is limited to one-mile or less simply because of smog, an approach to this airport is essentially Special VFR. The immediate benefits to the air carriers of having full, unrestricted CAT I minimums will be fewer missed approaches, less disruption of flight schedules and improved safety for the traveling public.

Additionally, the Burbank Airport is unique in the nation in that the localizer is placed on the approach end, rather than the far end of the instrument runway. The offset localizer capability of MLS has an immediate application here.

Recognizing that the transition from an ILS to an MLS environment would be both difficult and costly, the national plan for development of MLS has specifically provided for an operational evaluation as a prelude to full-scale implementation. The concept of field evaluation is supported by this airport, and we wish to volunteer this facility as a suitable site for Phase 2 evaluation.

PROGRAM GOALS AND OBJECTIVES

The Burbank-Glendale-Pasadena Airport will contribute meaningfully to the goals and objectives of the STEP program for several reasons.

Maximum User Participation - Installation of an MLS with a curved approach to Runway 15 will yield a high volume of operations and a wide variety of users. The airport is served by the airlines, military, air taxis, business and general aviation, ranking seventh in the FAA Western Region operationally.

Maximum Benefits - While user benefits are readily apparent, the noise abatement benefits would also be significant to the surrounding community. As you may be aware, California leads the nation in environmental concerns, and Burbank Airport often finds itself at the forefront of noise abatement issues. We would be pleased to play a leadership role in the transition to MLS as well.

Challenging Sites - Burbank Airport offers a restricted physical plant, with frequent poor visibility conditions, mountainous terrain on two sides and a crossing approach with the instrument landing system at the Van Nuys Airport. MLS at Burbank would integrate solutions to operational, technical and environmental problems in one complete package.

Maximum Exposure - Four of the nation's ten busiest airports are located in the Los Angeles basin. Accessibility and visibility for the Phase 2 MLS installation are unduplicated anywhere in the country.

SUMMARY

To summarize, we favor moving forward rapidly with the MLS program on the shorter transition schedule. We also feel that the solving of existing problems on existing airports, particularly with respect to noise abatement and restrictions to minimums, should be paramount in the test and implementation programs. Lastly, we wish to volunteer our airport as a field evaluation site during Phase 2 of the Service Test and Evaluation Program.

This concludes my prepared remarks which I have provided in written form to the committee. I would be pleased to respond to any questions which you might have.

Thank you very much for you interest and cooperation.

* * * * *

Presentation by:

Russell Widmar, Manager-Airport Services

Burbank-Glendale-Pasadena Airport

2627 Hollywood Way

Burbank, California 91505

(213) 847-6363



State of Wisconsin \ DEPARTMENT OF TRANSPORTATION



February 5, 1981

BUREAU OF AERONAUTICS
P. O. Box 7914
Madison, WI 53707
(608) 266-3351

Mr. Marvin Olson, APD-32
MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Ave., SW
Washington, D.C. 20591

Dear Mr. Olson:

MLS Implementation Strategies

Wisconsin's primary concern in the implementation of the MLS program is the provision of safe and reliable service to small communities. We are of the opinion that the Deregulation Act mandates the FAA to provide that passengers traveling on commuter air carriers be afforded a level of safety equivalent to that now provided to passengers of air carriers holding certificates of public convenience and necessity. Since the great majority of certificated air carrier airports have precision instrument landing systems, the selected implementation strategy should first concentrate on those airports served by commuter carriers that are without such systems.

A secondary consideration is that the total transition to MLS should take place as rapidly as possible. Toward that end, the existing ILS program for reliever and commuter airports, and the updating of equipment, should be immediately converted to an MLS program with the funding added to the proposed MLS program.

Given those objectives, Strategy #1, with some modifications, should be selected. Those modifications should provide separate MLS establishment criteria, totally independent of Airway Planning Standard #1. That Planning Standard is based on runway annual instrument approaches (AIA's) and, because of the inaccuracy of the AIA counts, does not present a true picture of need.

Priority should be given first to commuter airports, then to instrument relievers, then to each non-ILS airport that meets the less restrictive MLS establishment criteria. We would suggest a formula that utilizes AIA's, (accurately counted), total operations, passenger enplanements and type and mix of aircraft utilizing the facility.

Concurrent with the beginning of the commuter airport installations the first 24 full systems should be installed at 12 air carrier airports with priority determined by operations and enplanements. This would ensure rapid acquisition of airborne equipment by air carriers, commuters and corporate aircraft.

FAA criteria should also be changed to reflect the fact that MLS does not require the excessive physical airport dimensions, such as the 1000' primary surface, currently demanded of precision approach equipped airports.

The implementation program should include provisions for immediate takeover and maintenance of any MLS installations undertaken by the state or local governments, with or without ADAP funds. The ADAP programs should be broadened to make such installations eligible where the priorities of the state differ from those of the federal program.

Thank you for the opportunity to provide input to this very important program.

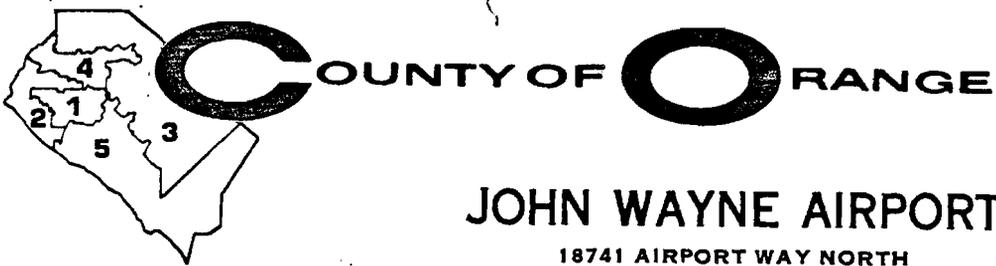
Sincerely,

BUREAU OF AERONAUTICS



F. E. Wolf
Director

FEW:JWA:dkm



JOHN WAYNE AIRPORT

18741 AIRPORT WAY NORTH
SANTA ANA, CALIFORNIA 92707
(714) 834-2400

February 5, 1981

Mr. Marvin L. Olson, Chairman
MLS Transition Plan Working Group
Federal Aviation Administration, Room 939
800 Independence Avenue, S.W.
Washington, D. C. 20591

Dear Mr. Olson:

COMMENTS ON MICROWAVE LANDING SYSTEM TRANSITION PLAN

John Wayne Airport wishes to go on record as recommending Transition Plan Strategy No. 4 as outlined in the October 20, 1980 Microwave Landing System Transition Plan (Draft).

John Wayne Airport, Orange County, is one of the busiest airports in the U.S. It supports both general aviation and air carrier operations. It has both airspace capacity and noise problems that constrain the development and operation of the airport. The airport has both ILS and TVOR. The TVOR is used for the preferred instrument flight approach for noise abatement reasons. However, the TVOR was relocated in 1975 because its radiation pattern was interfered with by industrial construction in the airport area. New construction is now threatening the continued use of the current site and there is no place to relocate the TVOR.

The airport has a complicated SID (MUSEL 2) that uses the Seal Beach VORTAC plus dead reckoning to avoid noise sensitive residential areas. This system is marginally effective.

We understand from Executive Summary Report No. FAA-EM-80-7 (Page 43) that the MLS can be used for more effective use of airspace and can be used for noise abatement purposes for both departing and arriving aircraft. We see the MLS as a possible replacement for both the TVOR and ILS at John Wayne Airport.

Yours very truly,

Murry L. Cable
Airport Manager

MLC:NGE:es



600 South Commonwealth Avenue • Suite 1000 • Los Angeles • California • 90005 • 213/385-1000

February 5, 1981

Federal Aviation Administration
APO-320
U.S. Department of Transportation
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Sirs:

We have reviewed the Draft Microwave Landing System Transition Plan and offer the following comments:

1. SCAG supports accelerated installation of the MLS on a network basis that considers installations at noise-sensitive and air-space/flight path-problem runways as a primary criterion. The concept a network based on aircraft fleets is supported as being most practical and plausible.
2. If not already accomplished, SCAG supports a change in FAA regulations (and legislation, if necessary) that would allow MLS equipment and installation costs as an eligible item under an ADAP-type program*. Eligibility should apply to enplanement, discretionary, or special category (i.e., commuter) funds, providing additional installations over those funded in the F&E budget. Such a provision could accelerate installations by allowing airports not included the early stages of the selected implementation plan to apply for funds for their own system. Depending on the strategy selected, these airports could be, for example, a major air carrier airport with a noise sensitive runway seeking to attract an MLS-equipped fleet, or a commuter service airport seeking to improve its attractiveness to other carriers by providing lower approach minima. Funding needs for this option would depend upon the strategy chosen and may or may not have a significant impact on the dispersion of funds.

Unless Congress and the OMB could be persuaded to allocate additional funds from the Aviation Trust Fund for this purpose, the applicant airports would most likely be faced with a decision between a capital project and an MLS installation. Beyond the national cost/benefit analysis already conducted, an individual airport may find any delay in a capital improvement program offset by the additional revenue sources attracted by the MLS or an improvement in community attitudes toward the airport.

* This suggestion is, of course, predicated on passage of new airport development program-type legislation.

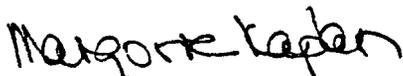
(Letter to FAA 2/5/81
Comments on MLS Plan)

Obviously, eligibility criteria for grant funds for this purpose would have to be developed. The criteria would have to consider the fill-in effect of these supplemental installations on a particular network and should weigh those projects more heavily. Local preference in the matter of a capital project/MLS tradeoff should be an important criterion, as local agencies know community priorities best.

3. In a related vein, airports programmed for basic MLS installation under the installation plan criteria, but with a demonstrable need for a more complex installation, should be eligible for ADAP-type funds to cover costs of upgrading to a more complex MLS facility (prior to actual installation).
4. We urge the FAA not to be bound by their existing F&E criteria. The needs of the airport system, its users, and the general public have changed from the time of building a national airport and airways system. The system we have now, with precious few additions, will be the one we have for the foreseeable future. New criteria are needed which meet the specific requirements of this system, especially in the areas of noise abatement and maximization of airspace and airports.

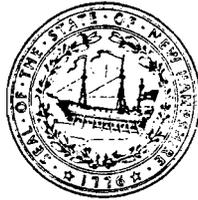
We appreciate this opportunity to be involved in the review process.

Yours truly,



Margorie Kaplan
Assistant Director
of Transportation Planning

MK:LM



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LIVE FREE OR DIE

TELEPHONE
271-2551

NEW HAMPSHIRE AERONAUTICS COMMISSION

MUNICIPAL AIRPORT

CONCORD, NH 03301

6 February, 1981

Chairman, MLS Transition Plan Working Group,
Federal Aviation Administration, Room 939,
800 Independence Avenue,
Washington, D.C. 20591

Subject: Microwave Landing System Transition Plan

Reference: Federal Register dated 13 November, 1980

The New Hampshire Aeronautics Commission forwards the following comments :

. This State agrees in general with the very detailed comments submitted by the State of Michigan in the testimony of Martin F. Schultz, 9 January, 1981.

. In particular, we concur with the State of Michigan in the following statements:

- It is essential that the implementation plan selected meet the needs of all users so total support is possible.

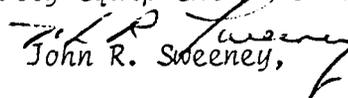
- In addition to the DOD political and program support, the volume of equipment purchased for military needs can have a significant impact on per unit costs and vice versa if acquisition timing is concurrent.

- Operational expense will become a significant factor when implementation of the comprehensive precision programs become a reality.

- Eligibility criteria in the new airport aid legislation must be changed to permit installation of precision systems on a reasonable priority, reduced criteria basis.

- Large user demand will not occur until there are enough ground systems in a region or area to justify airborne instrumentation and until airborne equipment is available at all price ranges including the low cost receiver at less than \$2000.

Our main concern is the transition period. It should not be done such that aircraft owners and operators are forced into costly equipment purchases.


John R. Sweeney,

Director

HOUSE OF REPRESENTATIVES
LANSING, MICHIGAN



108TH DISTRICT
D. J. JACOBETTI
STATE REPRESENTATIVE
LANSING, MICHIGAN 48909
PHONE: 517-373-0498

CHAIRMAN
APPROPRIATIONS COMMITTEE

February 6, 1981

Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Avenue, S.W.
Washington, D. C. 20591

Dear Mr. Olson:

This year will be my 27th in the Michigan Legislature and I represent a district that is located some 490 miles from the state capitol. During all of these years I have commuted by plane from the Marquette Airport in the Upper Peninsula of Michigan to Lansing, the state capitol. We have five to six months of winter and bad weather in the Upper Peninsula, and the importance of safe landing systems is absolutely vital to the safety of the travelling airline passengers.

I have read the information on the MLS landing systems and I believe it should be deployed at all commercial aircraft as rapidly as possible across the Nation, and especially in the northern portion of the states along the Canadian border.

As Chairman of the Appropriations Committee you can be certain that I am interested in investing state funds in the safest, best instrument landing systems available. Accordingly, I think we should reserve our funds for present proposed systems and spend them for the new MLS system. I have read the testimony of the Michigan Department of Aeronautics' representative, Mr. Martin Schultz, at the Chicago hearing on January 9, 1981. I concur in his statement and the recommendations he made to your administration.

In closing, you can be assured that I will work through our Michigan Department of Aeronautics to rapidly deploy the LMS landing system as soon as your Federal Aviation Administration approves its use. Should you desire any further information as to why I believe the MLS system is urgently needed, please communicate with my office.

Sincerely,

Handwritten signature of D. J. Jacobetti in cursive script.

D. J. JACOBETTI, Chairman
Committee on Appropriations

jw



JAY B. DILLINGHAM, *Chairman*
Rm. 926, Livestock Exchange Bldg.
1600 Genesee
Kansas City 64102

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February 6, 1981

TRANSPORTATION
Aviation
Microwave Landing System - Comments

Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Avenue, S. W.
Washington, D. C. 20591

Dear Mr. Olson:

We are glad to furnish comments relative to the implementation of the Microwave Landing System (MLS).

Generally speaking the goals must be to provide an adequate MLS system that is free of frequency congestion, provides a high quality and stable guidance signal, furnishes multiple paths for the various classes of user aircraft, and is of a cost and design that will be reasonably available to all air transportation system users.

Actually, none of the proposed implementation strategies are completely acceptable as we view the need. Of particular concern is the lack of precision approach capability at the majority of smaller airports receiving scheduled air service, primarily from commuter airlines.

The Airline Deregulation Act of 1978 contains a clear congressional mandate to provide an equivalent level of safety to all air carrier operations. There are at present 225 airports in the continental U.S. receiving scheduled air service that have no precision approach capability. Only 19 of these airports are

Mr. Marvin Olson
February 6, 1981
Page two

are scheduled for a precision approach installation in the next few years, while 123 hub airports will reach 349 systems or an average of 2.8 per airport. This programming inequity must not be a part of any MLS implementation strategy.

The strategy that is effected should provide for the urgent implementation of MLS at all non-ILS airports receiving scheduled air service. Attention should be directed to equipping networks of smaller air service airports and the hub they relate to.

High activity reliever airports without precision approaches should also receive first consideration. This will permit the diversion of the less compatible aircraft away from the hubs. The safety advantages of this strategy are significant, particularly under IFR conditions.

Installation of the MLS system must be perhaps the most ambitious program ever undertaken by the FAA. Certainly sufficient money exists in the Aviation Trust Fund to exceed even the proposed 50 million annual figure.

The rapid transition from ILS to MLS is necessary to reduce the time that both systems must be carried in the aircraft. Also, certain cost benefits can be realized if industry knows the implementation strategy calls for rapid, volume production. This is particularly important for the airborne units.

MLS installation should be made eligible, and with priority, under ADAP.

Installation criteria should be modified to reflect the capability of MLS to function in a more restricted environment. Of those plans which we have reviewed, we find the Michigan Aeronautics Commission Plan the most suitable for implementation.

Finally, the eligibility criteria for new-qualifier airports having scheduled air service should be relaxed. Our recommendation would be 2,500 passenger loadings per year or 400 actual instrument approaches per year.

We appreciate the opportunity to comment on this vital matter, and we applaud the FAA for taking this positive action for a system that is long overdue.

Very truly yours,


Chief Engineer



AIRCRAFT
OWNERS
AND
PILOTS
ASSOCIATION

February 9, 1981

Mr. Marvin L. Olson
APO-320
Federal Aviation Administration
Room 939
800 Independence Avenue, SW
Washington, DC 20591

Re: MLS Transition
Plan Comments

Dear Mr. Olson:

This responds to the Public Notice contained in 45FR75042 regarding systemwide implementation strategies for Microwave Landing Systems.

These comments are filed on behalf of more than 255,000 aircraft owners and pilots who have authorized the Aircraft Owners and Pilots Association to represent their interests in aviation matters.

What specific MLS implementation scheme should be used remains in doubt because questions remain unanswered. A study of the four documents received at the recent MLS hearing does not provide the answers. For example, it's unclear what MLS ground system configuration is to be established at small community airports. As stated in our comments to the proposed FAR Part 171 concerning non-federal MLS systems, we do not agree that systems provided for small communities need to meet the same requirements with regard to signal coverage, etc., that a system for implementation at a high traffic air carrier served airport does. Numerous "small community" airports have operational limitations that MLS will relieve. However, "small communities" and general aviation cannot afford and should not be required to pay for more capability or features than necessary to alleviate the operational limitations.

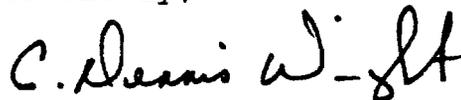
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Mr. Marvin L. Olson
February 9, 1981
Page 2

We can support any implementation strategy that offers MLS to airports having operational restrictions which would be alleviated by a precision approach capability, provided the MLS system does not provide much more capability than is required.

Thank you for this opportunity to comment.

Cordially,



C. Dennis Wright, Director
Airspace Technology Department

Enclosure: FAR Part 171 Comments



AIRCRAFT
OWNERS
AND
PILOTS
ASSOCIATION

November 7, 1980

Federal Aviation Administration
Office of the Chief Counsel
Attn: Rules Docket AGC-204
800 Independence Avenue, S. W.
Washington, D. C. 20591

Gentlemen:

This responds to Docket No. 20669; Notice No. 80-15; Non-federal Navigation Facilities; Proposed Microwave Landing System requirements.

These comments are filed on behalf of more than 250,000 aircraft owners and pilots who have authorized the Aircraft Owners and Pilots Association to represent their interests in aviation matters.

We are not opposed to the establishment of FAR Part 171.300 to provide for nonfederal installations of the Microwave Landing System. We are, however, very disappointed in FAR Part 171.300, as proposed in the above-referenced docket. This proposal is not aimed at providing for a rapid and widespread implementation of Nonfederal Microwave Landing Systems. In fact, we feel at this point very few nonfederal MLSSs will be established if they are required to meet the standards contained in this Notice of Proposed Rule Making. We have always felt the segment of aviation that will benefit most from low cost precision instrument approach capabilities would be general aviation at smaller airports.

Specifically, we have the following concerns:

1. As proposed, FAR Part 171.300 includes requirements for both glide slope and azimuth. We wonder if consideration has been given to the installation of a microwave azimuth station without an accompanying glide slope installation.

2. The requirement that these nonfederal MLS installations are required to meet FAA-G-2100 specification for quality control, type testing, reliability, and maintainability will result in MLS equipment that is too costly to be afforded by smaller airports. It would seem better to specify a mean time between failure (MTBF) and a mean correction time (MCT). If a facility can meet those two requirements, why should they also have to meet the 2100 specification?

3. The stated approach azimuth accuracy and glide slope accuracy is excessive. All that is required is a specification of ground system accuracy comparable to Category I ILSs.

4. The service volume requirement, i.e., signal coverage to 20,000 feet altitude at 20 nautical miles 40° each side of runway centerline is excessive. Most small community airport installations could meet the operational requirements without a coverage volume this extensive.

5. Most applications probably will not require $\pm 40^\circ$ coverage, and outside of the minimum proportional guidance sector, in the absence of a multipath problem, no signals are required. This would be identical to current ILS installations.

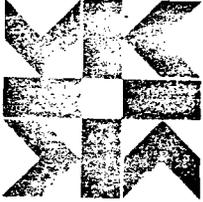
In summary, this Notice of Proposed Rule Making is exactly like the current MLS program, i.e., the ground equipment and SARPS written to date are aimed at installations at large air carrier served airports. This has been done in the face of the fact that other segments of aviation have no stated need for MLS service. Meanwhile, the segment of aviation that could benefit the most from lower cost precision approach capability, i.e., general aviation, continues with unanswered operational needs.

Thank you for this opportunity to comment.

Cordially,

C. Dennis Wright

C. Dennis Wright, Director
Airspace Technology Department



CITY OF KALAMAZOO, MICHIGAN

February 9, 1981

Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Mr. Olson:

The Kalamazoo Municipal Airport Advisory Board at its regular February 6, 1981, meeting made a motion to support the proposal of the new Microwave Landing System (MLS), provided that the present UHF/VHF Instrument Landing System (ILS) in use is maintained until such time as the majority of the aircraft using the Kalamazoo Municipal Airport are equipped with the Microwave Landing System.

We understand the savings and reliability of this system but it would be unwise to have a system where only a small percentage of the airport users can use.

Sincerely,

KALAMAZOO MUNICIPAL AIRPORT

Robert F. Wilson
Airport Director

RFW:hr

(COUNTY OF LIVINGSTON
LIVINGSTON COUNTY AIRPORT
3480 W. GRAND RIVER
HOWELL, MICHIGAN 48843

FEBRUARY 9, 1981

Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
Federal Aviation Administration Room 939
800 Independence Avenue, S.W.
Washington, D.C. 20591

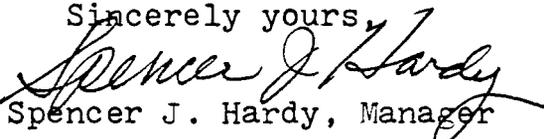
Ref: FAA Invitation for Comment Regarding Systemwide
Strategies for Microwave Landing Systems
Federal Register Volume 45, Number 221, Thursday
November 13, 1980

Dear Mr. Olson:

Lets get the job done. Why spend money on the
ILS system when the MLS is so much better and costs
less initially and less to maintain. The only way
to get the job done is to get moving.

We never could justify an ILS system at Howell,
Michigan, Livingston County Airport but sure could
use the MLS at much lower cost. We are in the indus-
trial center of Michigan and need the facility. It
is in our Master Plan.

Sincerely yours,


Spencer J. Hardy, Manager
Livingston County Airport.

Florida

BOB GRAHAM
GOVERNOR



Department of Transportation

Haydon Burns Building, 605 Suwannee Street, Tallahassee, Florida 32301, Telephone (904) 488-8541

WILLIAM N. ROSE
SECRETARY

February 9, 1981

Mr. Marvin Olson APO-320
Chairman
MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
Washington, DC 20591

Dear Mr. Olson:

As suggested in the Federal Register November 13, 1980; please find the comments of the Florida Bureau of Aviation, regarding the FAA Transition Plan for Microwave Landing System Deployment.

Florida is interested in cooperating in early deployment as several chronic airport problems would be reduced in magnitude as a result of the technical superiority of MLS over ILS.

Additional precision landing equipment is urgent in Florida to meet expanding commuter activity resulting from both energy and deregulation considerations.

It's very important that the Florida Bureau of Aviation be informed as the time phasing for the final deployment evolve. The thrust of the attached comments is meant to convey the urgency for swift deployment.

Sincerely,

A handwritten signature in cursive script, appearing to read "Grover E. Jones", is written over the typed name and title.

Grover E. Jones, Chief
Bureau of Aviation

GCJ:mc

ENCLOSURE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
BUREAU OF AVIATION
COMMENTS CONCERNING IMPLEMENTATION STRATEGIES
FOR
MICROWAVE LANDING SYSTEMS

The Florida Bureau of Aviation is agrees with the need for expeditious deployment of Microwave Landing Systems. In so concurring, it neither sanctions nor opposes the technical decision to proceed with MLS at this time. Once begun, the transition to MLS should occur as rapidly as possible to avoid needless duplication of precision systems in airports and aircraft.

EXISTING ILS PROGRAMS

It appears that 300 to 500 ILS systems are to be deployed to replace tube electronic ILS systems at reliever and commuter airports. Considering the cost of the replacement, it would appear that the replacement should be by MLS provided that transition constraints do not do a disservice to some members of the aviation community. At least, an opportunity exists to accelerate MLS deployment.

Stop-gap measures such as 50 kilohertz 40 channel ILS as an expedient to relieve frequency congestion should be abandoned to avoid purchase by the industry of equipment subject to early obsolescence.

MLS FUNDING & ELIGIBILITY

FAA Facilities and Equipment (F&E) funding will not be able to meet the rate of spending needed to rapidly deploy MLS. Use of ADAP in the past has been slowed by eligibility constraints. MLS will require different maintenance programs than those existent with ILS. Implied are training and provisioning at all maintenance levels, all of which require money.

Although precision landing is the more sought after commuter and carrier airfield requirement, airports have been more able to obtain funding for airport improvements of much lower airside importance.

Eligibility for precision runways should be afforded priority attention in any new airport aid legislation. Network and regional system criteria should be favored.

DEPLOYMENT TIME IS CRITICAL

Successful deployment of MLS will depend heavily upon widespread use of the system. Widespread use of the system will depend upon low cost aircraft electronics. Cautious or deliberate deployment of MLS will not cause rapid industry manufacturing interest and will not promote competitive pricing.

Implementation should be based on a Hub Region and Hub Network basis. Each particular Region/Network will imply a particular strategy which will assure the greatest number of MLS users in the shortest time. To reduce duplication, new Qualifier Airports/Runways should next be equipped.

It would seem that the other options listed in the deployment plan would be quickly accommodated in the Baseline Deployment so long as baseline deployment is complete in the third step.

FLORIDA PROGRAMS ARE IMPACTED

There are communities in Florida attempting to develop scheduled air service. The State of Florida has an ongoing program to develop commuter service between small cities and the nearest Hub airport. It is therefore important to Florida that Hubs, Relievers and Commuter airports be developed as a Hub region. Florida also has clusters of airports which suffer from channel congestion. These clusters are important to general aviation and would also benefit from the Hub Region scenario. Florida is in the process of updating its Florida Aviation System Plan (FASP) which should furnish criteria and priority for the deployment.

RECOMMENDED PLAN

Based on the many factors provided in the Transition Plans documents and the previously outlined considerations, the Florida Bureau of Aviation does not totally concur with the strategies of Page 14 of the Questionnaire, but sufficient agreement exists to suggest a slightly different strategy.

The Florida Aviation Bureau recommends the following plan:

- 1) Begin implementation at new qualifier airports, particularly those which are Hub, Relievers or Commuters. Place priority on weather and traffic problem airports.
- 2) Continue with the Hubs on a network basis. Whether or not ILS exists. Florida priority should be compatible with the Florida Aviation System Plan.
- 3) Complete the Baseline Program.

- 4) Divert funds allocated for planned new ILS systems to expedite MLS transition.
- 5) Review Eligibility criteria in keeping with the Hub Region/Network approach to assure placing MLS where it will most enhance the National Airport System Plan.
- 6) Seek legislation dedicated to ADAP funding of MLS airport projects and divert trust fund resources to augment Facilities and Equipment funds.

Florida compliments the FAA for publishing the plans/options, but fears that the questionnaire requires indepth cognizance on the part of aviation. It may promote some confusion.

Florida urges the greatest possible dispatch in planning since delay would cause more disservice than is represented in the difference between the alternate options. Of the strategies, Florida would recommend No. 4 were it to be expanded to explain implementation of Hub, Commuter and Reliever airports.

Air Transport Association



OF AMERICA

1709 New York Avenue, N.W.
Washington, D. C. 20006
Phone (202) 872-4000

WALTER A. JENSEN
Vice President
Operations and Engineering

February 10, 1981

Mr. Marvin Olson, APO-320
Chairman, MLS Transition Plan Working Group
Federal Aviation Administration
800 Independence Ave., S. W., Rm. 939
Washington, D. C. 20591
Attention: MLS Transition Plan Comments

Dear Mr. Olson:

This letter is in response to the FAA Notice in the Thursday, November 13, 1980, Federal Register, entitled "Invitation for Comment Regarding Systemwide Implementation Strategies for Microwave Landing Systems".

ATA member airlines, including essentially all U. S. scheduled air carriers, have supported the development of the microwave landing system (MLS) for many years and participated in a number of industry/government planning efforts for potential MLS implementation. During this period, it was anticipated that MLS technical and operational features would have become fully accepted prior to consideration of implementation, and that this acceptance would come about through a widespread demonstration program which established both the achievable benefits and the basis for MLS operational criteria permitting these benefits. In reviewing the FAA Notice, we find ourselves trying to assess a series of alternatives without the demonstration being an accomplished fact. Yet we all know MLS has potential benefits. A major question is how much of this potential can be achieved in practical applications of MLS in the National Aviation System under the constraints of the operational criteria (which have yet to be coordinated). If one were to say stop and wait for the criteria and the demonstration, it could result in a significant delay while funding is negotiated. As we don't wish to request such a potentially endless delay, we are faced with the question of how to address MLS implementation without information which is considered essential. Ideally, we would like to be in a position to encourage MLS installation to meet all needs, particularly those at commuter and reliever airports not served by ILS. However, sufficient information is not available and a premature full implementation decision could adversely affect all users.

Before proceeding with a proposed solution to the dilemma, we would like to comment on our understanding of the impact of the Notice and comments thereto. In referring to the systems acquisition management process in the Notice, the statement is made, "A key decision to be made by the FAA Administrator is the transition from development to implementation. For designated systems which involve a large number of facilities and services or which require substantial capital investment over several budget years, a transition plan is developed. The transition plan provides an integrated package to support the decision process." This statement indicates that comments on the MLS transition plan (incorporated in the Notice by reference) will in effect be comments on whether or not to begin MLS implementation, as well as comments on the proposed method of implementation.

The question of whether to begin MLS implementation may be considered in two ways. The way suggested in the Notice would be a decision which would likely commit civil aviation to MLS for at least the next two decades, and probably three or more, and would commit to decommissioning of ILS. A possible alternative to this would be for the FAA to decide on a two-stage decision process with the long-term decisions on MLS and ILS deferred to the second stage. In absence of much needed information, at this time, we recommend that FAA change its approach and use such a two-stage ground facility implementation process (which would effectively be an "eleventh" strategy), providing initial facilities for all users in the first stage. It should be clearly understood that this recommendation is in no way to be considered a lessening of airline support for MLS development or a delaying tactic but only a means to obtain information vital to implementation decisions and alternative strategies.

We note that all the alternative strategies, but one, in the Notice include one form or another of time ordered implementation. However, the proposals appear to state that steps following the first would automatically be initiated following fulfillment of the preceding step. We believe adoption of this automatic feature would be inadvisable at this time, and therefore would not include it in the two-stage process.

We suggest that the two-stage process adopt a network concept from the "tenth strategy" identified in the Notice, previously developed by RTCA Special Committee SC-125. Stage One would consist of one or two networks as described in the tenth strategy under the Short Term Period, including a dozen or two ground facilities. These should include the various classes of ground facilities and be distributed in a way that provides an opportunity for all classes of civil aviation users to voluntarily obtain experience using MLS. Means should be included to document this experience. Stage One would also encompass any facilities, airborne equipment and results from FAA's elusive MLS Service Test and Evaluation Program (STEP). The

planned full capability certified MLS installation in a civil widebody aircraft with current day avionics should be completed, whether under STEP or otherwise.

Stage Two of this "eleventh" strategy would nominally be the nationwide implementation; it would include the remainder of the Short Term Period, the Middle Term Period, and the Long Term Period from the tenth strategy, but would be subject, prior to initiation, to a full review of the results of the first stage, and the perceived user needs at that time. Prior to initiating Stage Two, a comprehensive analysis of achievable benefits and costs should be prepared, and the Government should document the interrelationship between MLS implementation and plans for associated systems such as advanced flow management (AFM) and wake vortex avoidance systems and other potential new systems upon which benefits may depend. An opportunity should also be provided to consider the relationship of MLS to other capital needs in the Government and industry portions of the National Aviation System.

As in the RTCA recommendations, Stage One (at least) should include a comprehensive proviso that installation of airborne equipment is to be voluntary, and that no user should be pressured in any way to install MLS equipment; in our opinion, such decisions should only be addressed with full knowledge of system benefits.

Stage One should not be initiated until adoption of a U. S. National Standard for MLS and satisfactory resolution of user concerns regarding the proposed ICAO MLS Standards and Recommended Practices. Further, the strategy should specify that those facilities installed at locations served by air carriers are to radiate a signal format which permits addition of all MLS growth features which have been a part of the MLS concept for so many years. (Thus, high rate azimuth should not be utilized and all front azimuth facilities should utilize a single function identification).

Closely related is the question of ground facility performance. We believe that all MLS ground facilities will not achieve identical performance in practice because of factors such as the multipath environment. The Notice refers to Category I, II, and III MLS. While these have never been coordinated with industry, we do believe that recognition of more than one level is a more realistic than the approach in the proposed ICAO standards. Where practical, the facilities installed for air carrier use should be suitable for automatic landing, but not all such facilities need to radiate MLS flare guidance during Stage One.

The FAA Notice also refers to MLS establishment criteria. Such criteria have yet to be coordinated, and we do not believe that FAA meant for this Notice to be the means of coordination. Further, in our opinion, reasonable decisions on such criteria would require the knowledge to be gained in Stage One. Clearly Stage One should be exempt from such criteria which might otherwise frustrate the entire intent of providing balanced exposure to different users. It should also be recognized that at this time, the airlines strongly oppose any restraints on the continuation of ILS implementation. Thus, we must oppose the rules developed for decommissioning of ILS discussed in the Draft Microwave Landing System Transition Plan on pages 37 and 3-26.

If the FAA should adopt a different strategy, these comments notwithstanding, the airlines would have no choice at this time but to request the criteria provide for MLS implementation on runways already served by ILS (with continuation of ILS service) and those runways used by commuters, plus installation at air carrier and commuter airports which do not presently have an ILS. Such a strategy would insure availability of facilities for air carrier use when the need becomes established, and would insure a gradual transition with no pressure applied to prematurely retrofit. It would also be consistent with the MLS uses where benefits may exceed costs, as suggested by FAA's Cost Benefit analysis (Report No. FAA-EM-80-7).

In summary, we appreciate the opportunity to participate in FAA planning for MLS, and regret that the necessary information on achievable benefits is not presently available to justify the long term commitments involved. We have proposed a two-stage implementation process with suitable controls which should provide an acceptable alternative method of proceeding with MLS, deferring decisions on the major investment and the decommissioning of ILS to a later date. We recommend FAA adopt this proposal and look forward to your response.

Sincerely,



Walter A. Jensen
Vice President
Operations & Engineering

PEPP TASK FORCE

Positive Economic Potential Projects

A special task force whose charge will be to seek out, evaluate and aggressively pursue projects which possess positive economic potential for our area

Affiliated with the Ludington and Scottville Chambers of Commerce

Date: February 10, 1981

To: Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Avenue, S. W.
Washington, D. C. 20591

REF: FAA Invitation for comment regarding Systemwide Strategies
for Microwave Landing Systems

Understanding that our remarks will reach you after the deadline for comment regarding systemwide strategies for Microwave Landing Systems (MLS). We still feel it most important to make known our concern for immediate systemwide implementation of Microwave Landing Systems.

Mason County, Michigan is serviced by a local airport without scheduled air service. It would be doubtful that commuter service could provide consistent air service without a precision landing system into our airport, therefore losing the full economic benefit to our community from our airport development.

The State of Michigan has a Precision Instrument Master Plan which programs a MLS for every airport with scheduled air service. However without a systemwide strategy influencing development, production, and cost the State of Michigan's Plan may fall short of its desired goal.

PEPP Task Force supports the immediate implementation of a national MLS system plan as recommended by the Michigan Aeronautics Commission.

Sincerely,



R. Thomas Plank
PEPP Task Force



Minnesota
Department of Transportation
Transportation Building
St. Paul, Minnesota 55155

February 11, 1981

Phone 612-296-8046

Mr. Marvin Olson, APO 320
MLS Transition Plan Working Group
Federal Aviation Administration
Room 309
800 Independence Avenue Southwest
Washington, D. C. 20591

Dear Mr. Olson:

The State of Minnesota recognizes the importance of microwave ILS and urges the FAA to get on, as soon as possible, with the implementation of the TRSB microwave program.

We suggest that one microwave ILS system should be installed on each large major airport in the United States for alleviating noise problems that plague those airport communities. Providing a facility with available curved approaches to the runway with major noise sensitive areas should be the first priority, but we feel that no more than one MLS should be installed at major airports early in the implementation program.

Airports that have a need and capability for short or special landing/takeoff areas, that can be used by commuter-type aircraft or others that will relieve traffic and increase capacity, should be considered as a second priority.

Where there are no facilities but the airport has scheduled airline mail, air freight, or corporate operations, the installation of an MLS at these airports is next on our list of priorities.

When these needs are satisfied, then the priorities should shift to the airports that have ILS's. A program to replace these systems must be adopted which has definite discontinuance dates for the old style ILS's and start-up dates for the new style TRSB MLS's, with very short periods of overlapping due to the large cost of operation and maintenance of two complete systems at the same time. We see no good reason for installing an MLS alongside of an ILS and then operating both facilities for 10, 15 or 20 years. There seems to be some large duplication of effort and waste of money in that kind of an arrangement which should be avoided.

February 11, 1981

The airway planning standards should be adjusted or modified so that they more correctly represent the airport needs where there are special conditions that dictate the need rather than basing it only on the number of instrument approaches.

We also feel like Michigan on this same subject--that the airport zoning requirements and the safety areas and the approach areas to an airport are in need of adjusting so that smaller airports can have the precision instrument approach capability with no compromise of safety. The Michigan program, outlined in their report of comments on the same subject, seemed to be very appropriate and we support their ideas. Safety criteria established some twenty years ago may certainly be amended or adjusted to present-day standards considering the new precision approach equipment and its ability to be less affected by buildings, hangars, etc., near the runway.

The FAA must make a serious effort to abandon most of the ILS program if it expects to change to an MLS program in the near future. The present procurement program calls for up to 150 new ILS's at airports around the country and we feel that every time you install an old-fashioned ILS that you prevent the installation of a new style MLS for many years to come. We feel that the only way to implement the future MLS program is to make a cut off in the present procurement and abandon the program, except for possibly upgrading present facilities that are billed "difficult to maintain-type". A decision to abandon the ILS installation program will enhance the installation of the MLS's. A plan to program the decommissioning of the present existing old-style ILS facilities is the key in which the FAA should base their MLS installation program.

There may be some problem sites of very difficult terrain and other restraints that may require MLS installation and should be considered as special, and not be considered with the general overall implementation program.

Minnesota has at present six FAA-approved Standard Microwave ILS installations. These installations were planned and installed with the purpose of providing precision approach facilities during the interim period between the present time and when the TRSB microwave ILS's are available. Now that the MLS program is reaching the diminutive stage, we are giving consideration towards replacing our present microwave ILS's with the new TRSB MLS facilities and we want to be sure that you understand that we are very much in favor of the future microwave ILS implementation program, and we are not in any way hesitant in supporting this program even though we own

Mr. Marvin Olson

-3-

February 11, 1981

our six interim standard microwave ILS's. These interim standard ILS's will be discontinued or replaced as soon as we can figure out the method we need to use to make the program fit with the future.

On closing, we want to reiterate our position that we support the new microwave ILS implementation program by the FAA and by others who may want to install the microwave systems and we feel that it is the way to go.

Sincerely,

for Robert K Engelhardt

Lawrence E. McCabe
Assistant Commissioner
Division of Aeronautics
Room 417

LEM:CS

Hazeltine

Corporation

Greenlawn, N.Y. 11740 (516) 261-7000

February 12, 1981
Serial: XXX-81-AS1612

FAA
800 Independence Ave. S.W.
Washington, D.C. 20591

Attention: Mr. Marvin Olson - APO-320

Subject: MLS Transition Recommendations

Reference: U.S. National Microwave Transition Plan Draft
and Cost Benefit Study Report No. FAA-EM-80-7

Dear Sirs:

We are pleased to provide our comments on the draft Transition Plan for MLS. As a developer of TRSB MLS equipment, Hazeltine has had an opportunity to view the aviation industry from various perspectives both operational and manufacturing.

It has been our longstanding observation that early requirements for MLS are concerned with hub and spoke networks supporting commuter and short haul trunk service between small communities and the primary and secondary hub airports.

Accordingly, we recommend scenario 10 described in the Plan as modified by testimony given by Martin F. Schultz at the January 9 hearings in Chicago, with particular emphasis on the following recommendations:

- 1) Lowering F/E and ADAP eligibility criteria.
- 2) FAA provision of additional MLS receiver manufacturing incentives.
- 3) \$50 million F/E allocation per year (instead of \$20M) on the basis that implementation of 1,250 systems over 20 years requires an average expenditure of \$62M per year.
- 4) Development of new reduced primary and final approach surface requirements for MLS equipped runways.

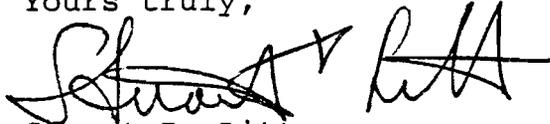


February 12, 1981
XXX-81-AS1612
Page 2

- 5) Early implementation of systems on airports with: noise problems, snow and terrain problems, new qualifier runways, and tube ILS where these airports are served by commuters and short haul trunks in a network.

We trust that the results of public comment will enable FAA to move forward swiftly in developing and executing a national implementation plan for MLS. We at Hazeltine stand ready, as always, to assist wherever possible.

Yours truly,

A handwritten signature in black ink, appearing to read "Stuart P. Litt", with a large, stylized flourish extending to the right.

Stuart P. Litt
Associate Product Line Director
Communications Systems Product Line

SPL/jd

SPOKANE AIRPORTS

P.O. Box 19186, Spokane, Washington 99219 SPOKANE INTERNATIONAL & FELTS FIELD AIRPORTS (509) 624-3218

February 13, 1981

Mr. Marvin Olson, APO-320
Chairman, MLS Transition Plan Working Group
Federal Aviation Administration, Room #309
800 Independence Avenue, S.W.
Washington, DC 20591

Dear Mr. Olson:

Thank you for the opportunity to comment on the MLS Transition Plan.

One prime consideration in implementing MLS should be to provide increased safety benefits to the maximum number of people in the shortest possible time. Therefore, it seems that early phases of MLS implementation should be at large and medium hub air carrier airports, with priorities established by annual instrument approaches based on actual IFR weather conditions to determine airport needs for MLS.

It seems likely that air carriers, other commercial and military users will be most responsive to equip their fleets with MLS avionics. Traditionally, the private sector of general aviation has resisted attempts to introduce new concepts into the national air transportation system.

Mentioned briefly in the transition plan was the situation of conflicting traffic at adjacent airports, but was not selected as a criterion for the installation sequence. It seems, however, that if such air traffic situations involve several air carrier aircraft, there is a significant safety requirement to warrant installation of MLS at both airports involved.

The situations existing at Spokane, Washington create an opportunity to test the operational advantages of MLS. We have two active airports with ILS: Spokane International and Fairchild Air Force Base. Both airports would be good candidates for Phase Two of the Service, Test and Evaluation Program (STEP) for the following reasons:

1. The ILS approach paths of both Airports intersect near the middle marker for Spokane International. These approach paths bring all IFR traffic over a densely populated residential portion of Spokane (Figure 1).
2. Curved approaches to either or both airports could eliminate conflicting approach paths, aid in ATC separation and permit simultaneous approaches at both Airports (Figure 2).
3. Between these two Airports, the Spokane TRACON facility handled a total of 120,387 instrument approaches in 1980.

-81-

Mr. Marvin Olson
February 13, 1981
Page Two

4. Local climatic conditions require numerous days of IFR operations per year because of a high incidence of fog, low clouds and winter storms.
5. Local residents are heavily impacted by aircraft noise emanating from B-52 and KC-135 aircraft flying into Fairchild Air Force Base. A curved approach from west of the city limits would eliminate most of this problem.

With the above-cited situations, I believe the two Airports mentioned would provide the kind of challenge which will demonstrate the ability of MLS to mitigate operational, technical and environmental problems. I recommend Spokane be considered as a field test location during STEP, Phase Two.

Sincerely,



FLOYD R. CREASMAN
AIRPORTS DIRECTOR

DL/sc

Attachments

cc: George Cambridge
FAFB

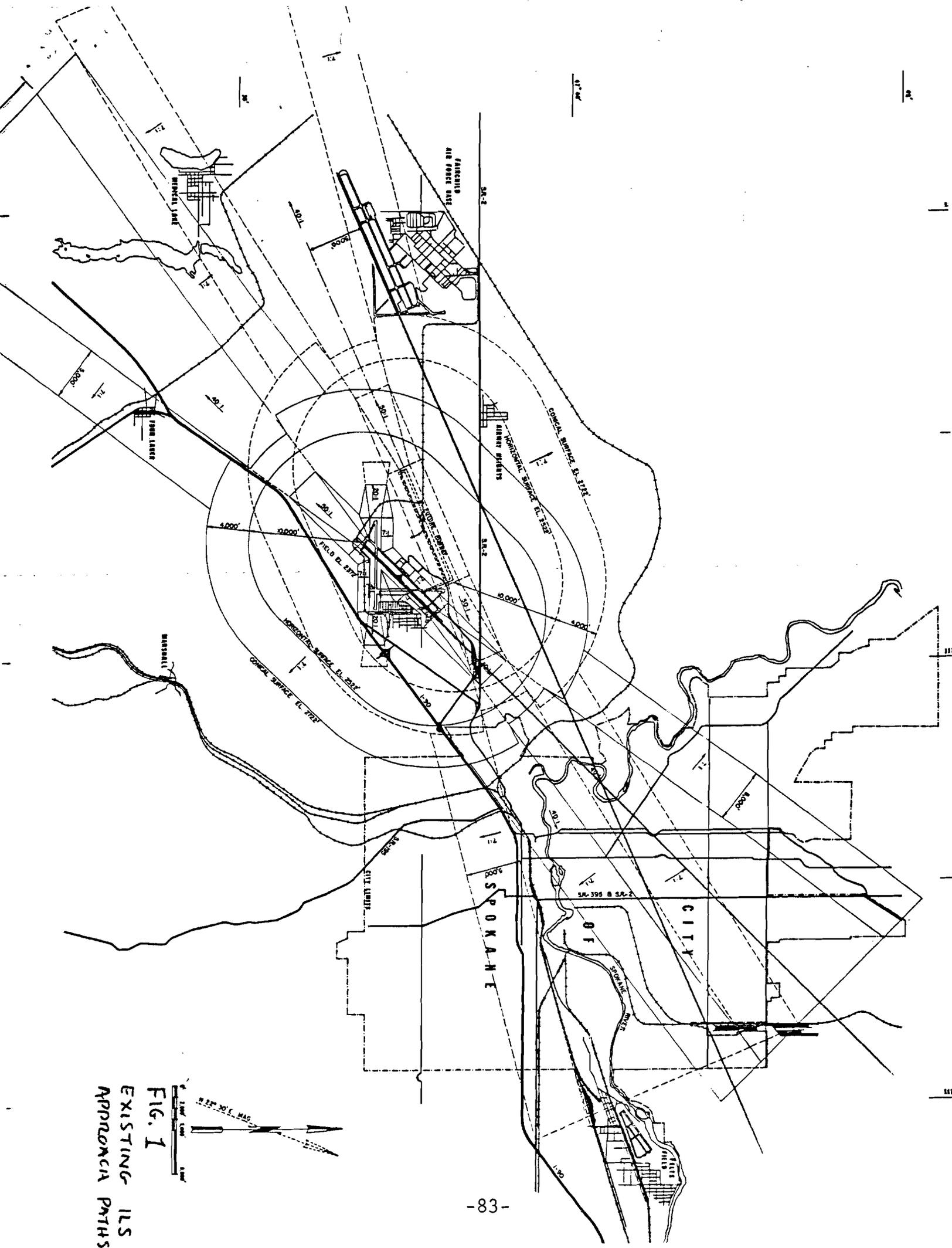
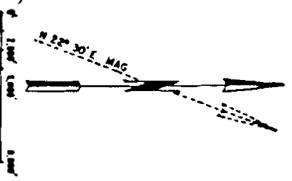
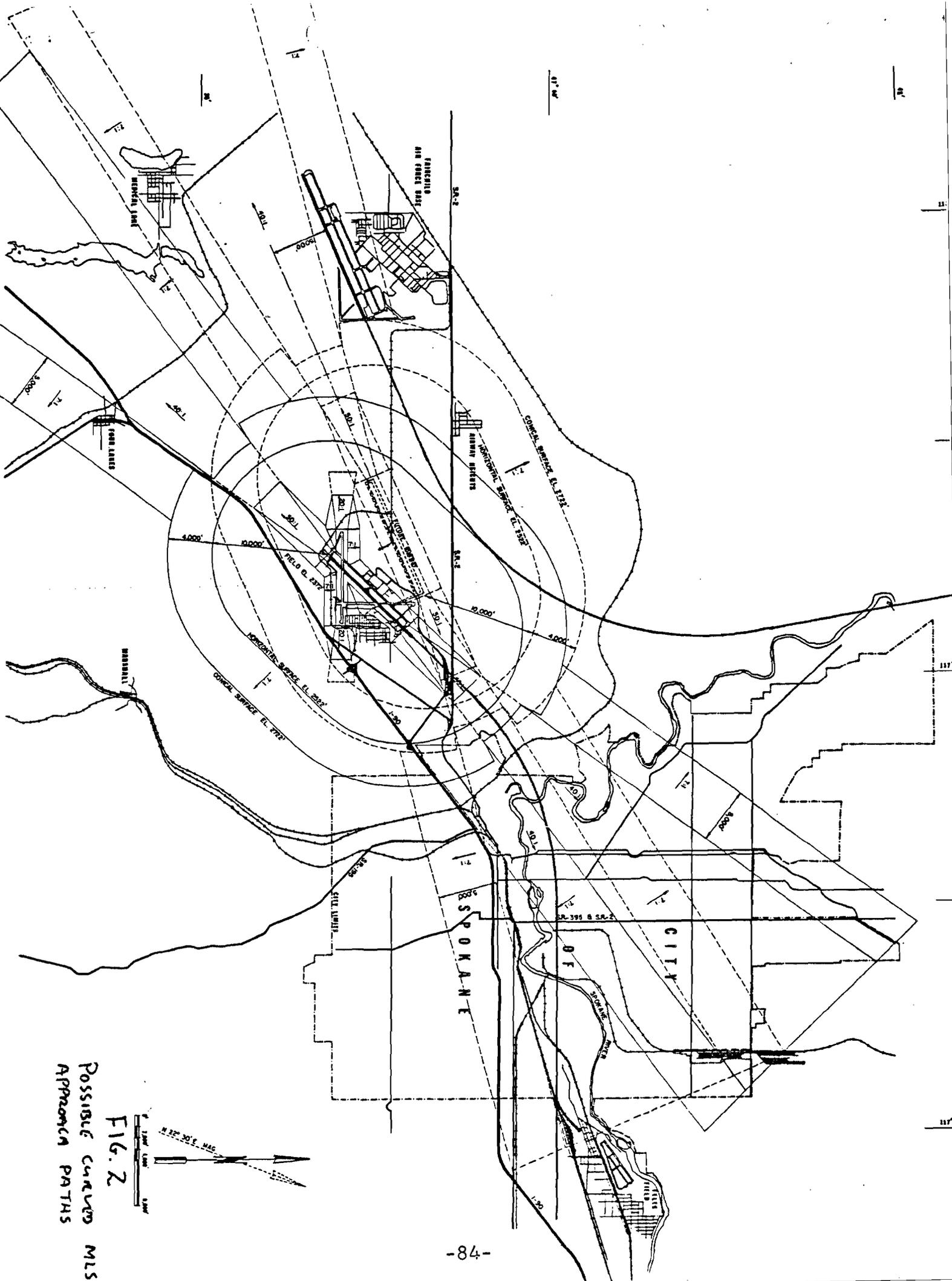


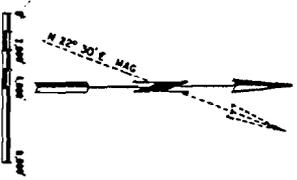
FIG. 1
 EXISTING ILS
 APPROXIMATE PATHS





POSSIBLE CURVED MLS
APPROACH PATHS

FIG. 2



CITY OF STURGIS

MUNICIPAL OWNED LIGHT AND POWER

STURGIS, MICHIGAN 49091

P. O. BOX 280

PHONE: 651-2321

February 17, 1981

Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
Federal Aviation Administration
Room 939
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Mr. Olson:

Mr. Robert J. Thomas, Director of Michigan Aeronautics Commission, has sent me a copy of the Commission's comments for strategies to transition from ILS to a precision Microwave Landing System by the year 2000.

As Secretary of the Sturgis Commuter Air Service Committee I would like to state that we endorse the position taken by the commission and support immediate implementation of the MLS plan.

Michigan has developed a precision Instrument Master Plan which programs an MLS for every airport with scheduled air service and basically at least one 5000 foot, hard surface precision instrumented runway in each county. Sturgis, the largest city in St. Joseph County has a 5700-foot runway built in 1974, with a landing capacity of one hundred thousand pounds. A visual approach slope indicator and runway-end identifier lights are located at both approach ends of the runway. A 4450-foot northeast-southwest runway also provides instrument approach. The instrument approach end is equipped with a visual approach-path-indicator and runway end identifier lights. Other improvements in 1974 included taxiways, apron and a new terminal building.

Sturgis is attempting to attract scheduled air service. Precision instrumentation would be an important consideration.

The opportunity to present our views on this important subject is very much appreciated.

Sincerely,



Alden W. Peterson, Secretary
Sturgis Commuter Air Service Committee

Copy Robert J. Thomas, Director
Michigan Aeronautics Commission



Illinois Department of Transportation

Division of Aeronautics
One Langhorne Bond Drive/Capital Airport
Springfield, Illinois/62706

February 23, 1981

Mr. Marvin Olson, APO-320
MLS Transition Plan Working Group
Federal Aviation Administration, Room 939
800 Independence Avenue, S.W.
Washington, D. C. 20591

Dear Mr. Olson:

The State of Illinois was represented, but did not testify, at the January 9, 1981 public meeting held in Chicago, Illinois. We are very interested in the Microwave Landing System (MLS) and the benefits that it can provide.

We feel that the States of Michigan and Minnesota, with their experience with MLS, offered several good suggestions for your consideration. We, in Illinois, ask only that we move forward as soon as possible with the implementation of the MLS program.

With the concurrence of the City of Chicago we would like to install an MLS System at Meigs Field on the Lakefront. An MLS at this location would not only alleviate the problems associated with the adjacent bodies of water but would also allow for curved approaches and departures away from the city.

Sincerely yours,

A handwritten signature in cursive script, reading "Robert L. Donahue".

Robert L. Donahue
Director

RLD/RHB/csb



OFFICE OF THE SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

20 MAR 1981

A170-2
APO-300
Olsen

DFA 10-52/81

Mr. Thomas Messier
Deputy Director of Aviation
Policy and Plans
APO-2
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Mr. *Tom* Messier

After our meeting last December on the Microwave Landing System (MLS) Transition Plan, I asked our Working Group members to review your Plan and provide comments. This was done and our comments are attached.

We would appreciate your taking into consideration our comments along with those you received during the field visit of your briefing team. If you desire, I would be pleased to arrange a meeting between our respective organizations so that we can develop a valid/credible document that both of us can use in our mutual programming/budgeting process.

Your careful consideration of our comments and recommendations would be appreciated.

Sincerely,

THOMAS S. FALATKO
Executive Secretary
DOD Advisory Committee on Federal Aviation

Attachment
Comments

MICROWAVE LANDING TRANSITION PLAN

1. General:

Although titled as a "Transition Plan", the document does not in fact present a specific "Plan". Instead, it presents 10 different strategies which may be used as a basis for developing a specific "Plan". It does not provide any overall FAA strategy for the most important aspect of the plan - the actual transition from MLS development to MLS implementation. This transition period is covered by an ephemeral STEP program which is loosely considered to be a three year period with an unknown starting date.

2. Strategies:

a. Most of the strategies in the MLS Transition Plan propose an installation of about 600 MLS facilities in the first ten years. Properly distributed, 600 facilities would allow the military to convert to MLS by the early 1990's. Unfortunately, only strategy 4 and, by virtue of their high funding profiles, strategies 5 and 6 lead to early equipage of the ILS runways currently used by the military. To be acceptable any strategy selected must include an option for equipping runways needed by the DOD within the first ten years of the program. In most cases these would be runways currently ILS equipped and would often be runways with low traffic counts. The military is caught in a catch 22 situation - we cooperate with the FAA and civil aviation community by operating in areas with least interference with civil aviation which places us at airports where traffic activity is low thereby denying that airport up graded facilities by FAA's traffic count criteria.

b. Of all the strategies, only 10 bears the approval of the FAA. This group of aviation community representatives provided a strategy that would promote the adoption of MLS by all users at an early date. It is this strategy then that should be considered. However, the F&E limit (\$20M) used with the strategy was difficult to find (Table 5, pp 53) in the discussion of the RTCA strategy. Perhaps RTCA should explore this further using the \$50 million dollar annual F&E limit.

c. Selection of a preferred strategy from the 10 presented may, in finality, not be of great significance to military MLS planning. It would be of more significance that a specific strategy be selected and development of a "National MLS Implementation Plan" be initiated to show specific airfields, schedule, and costs.

d. To assure interoperability at affordable cost any strategy selected for civil sector implementation must meet the following criteria:

(1) ILS service must be available at civil airfields used by the military for ten years after the DoD implements an MLS program. The DoD, with Congressional funding, must convert 8,000+ airplanes