MLS PERFORMANCE ASSESSMENT
TASK IV
VOLUME 2: LITERATURE SEARCH ABSTRACTS

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Abstract

A collection of available Microwave Landing System (MLS) literature is presented, as a result of searches conducted by computer through files of the National Technical Information Service, (NTIS), the Engineering Index(TM), and the INSPEC database, produced by IEE.

Key Words

Microwave Landing System, MLS, STEP Program, standards, tolerances, flight-check, position reference, light-aircraft, navaid, light-aircraft, flight check, digital telemetry, theodolite

Distribution Statement

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I. INTRODUCTION

In support of the design effort to produce data-collection and recording hardware and flight procedures for measurement of Microwave Landing System (MLS) parameters under the FAA System Test and Evaluation Program (STEP), a computer literature search has been conducted and is reported here. The abstracts presented are the result of searches conducted on the files of the National Technical Information Service, the Engineering Index (TM) and the INSPEC database, produced by IEE. These abstracts have been collected as a guide to project team members during the design effort, and for reference in future work.

II. MICROWAVE LANDING SYSTEM LITERATURE ABSTRACTS

A. NTIS Files.
Parallel Approach Surveillance

Massachusetts Inst of Tech Lexington Lincoln Lab (207650)
AUTHOR: Allen, J. B.; Dentinger, E. J.
ASSISTANT FL; 176, 18, 51F GMA17220
14 Aug 72 95p
Rept No: ATC-13
Contract: DOT-FH72WAC-261, F19628-70-C-0230
Project: FAA-024-24-012
Monitor: FAA-RD-72-77
Report on Project "Discreet Address Beacon System."

Abstract: The report investigates the requirements imposed on a surveillance system for supporting independent approaches to closely spaced parallel runways. Based on a proposed procedure for monitoring aircraft approach paths and controlling deviations from proper approach paths, the required spacing between runway centerlines is derived as a function of surveillance system characteristics and other parameters. Potential trade-offs between the surveillance system characteristics are then investigated to determine whether the DABS sensor might be utilized for position measurement and/or communication in such a surveillance system. The results indicate that the required runway spacing is more sensitive to delays and data update intervals than to position measurement accuracies. And that, if DABS is to perform the communication function in the system, it should probably be used for position measurement as well. (Author)


Identifiers: DABS(Discrete Address Beacon System). Discrete address beacon system

AD-747 744 NTIS Prices: PC A02/MF A01

Nis System Dem Power Amplifier - Systeme MLS DME Chaine de Puissance

Laboratoire Central de Recherches Thomson-CSF, Orsay (France)
AUTHOR: Ambiart, Y.; Bonnier, J. J.; Ermoglio, R.
C121144 FL: 155 STAR1113
28 Aug 72 17p
Monitor: 18
Language French

Abstract: An airborne C band pulse transmitter was developed for use with an ILS system. Transmitter characteristics include a transmitting frequency of 5057 to 5124 MHz, frequency number of 20 spaced 3 MHz, 1 second switching time, 0.00002 stability, and a 2 kW maximum power, 205 mW average power, 0.6641 microsec pulse width, 40 Hz repetition frequency, and a 2 spaced between 10 and 30 microsec pulse number. (Author)


Identifiers: NASA

N73-22086 NTIS Prices: PC A02/MF A01
Microwave Landing System Integration Study. Volume III. Appendices

Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering (012225)

Final rept. 25 Jun 73-4 Mar 74
C258361 File: I7G, 85A GRA17410
4 Mar 74 253p
Rept No GSE/SE/74-1-Vol-3
Project: AF-404L
Monitor: 18
See also Volume 2, AD-775 711.

Abstract: Contains computer programs and data in support of the study.

Descriptors: Landing aids, Microwave equipment, Computer programs, Aircraft antennas, Microwave antennas, Signal processing, Costs, Life cycles, Cost analysis, Avionics, Jet transport planes, Jet fighters, Fighter bombers, Systems engineering

Identifiers: Microwave landing systems, C-130 aircraft, C-130E aircraft, C-5 aircraft, C-5A aircraft, F-15 aircraft, F-111 aircraft, FB-111A aircraft, AF

AD-775 724/A NTIS Prices: PC E09/AF A01

Microwave Landing System Integration Study. Volume I. Summary Report

Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering (012225)

Final rept. 25 Jun 73-4 Mar 74
C258344 File: I7G, 85A GRA17410
4 Mar 74 85p
Rept No GSE/SE/74-1-Vol-1
Project: AF-404L
Monitor: 18
See also Volume 2, AD-775 711.

Abstract: The integration of the Microwave Landing System (MLS) into a representative selection of United States Air Force aircraft is investigated to identify problems affecting Air Force requirements for MLS. Antenna configurations and signal processing and interface designs are developed for the C-130E, C-5A, FB-111A, and F-15. These configurations and designs provide data for the environmental, cost, and systems effectiveness analyses presented in this report. A comparative analysis of different approach capabilities is carried out, using the C-130E as an illustration. These capabilities include straight, curved, and stepped approach paths as well as approaches into forward operating bases. (Modified author abstract)

Descriptors: Landing aids, Microwave equipment, Microwave antennas, Aircraft antennas, Signal processing, Avionics, Costs, Life cycles, Cost analysis, Jet transport planes, Jet fighters, Fighter bombers, Systems engineering

Identifiers: Microwave landing systems, C-130 aircraft, C-5 aircraft, FB-111A aircraft, F-15 aircraft, F-111 aircraft, C-130E aircraft, C-5A aircraft, AF

AD-775 703/2 NTIS Prices: PC E04/AF A01
Microwave Landing System Integration Study: Volume II. Engineering and Cost Analysis Report

Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering (012225)

Final rept. 25 Jun 73-3 Mar 74
C258284 Flg: 17G, 85A GRA7410
4 Mar 74 268p
Rept No: GSE/SE/74-1-Vol-2
Project: AF-404L
Monitor: 18
See also Volume 1, AD-775 703 and Volume 3, AD-775 724.

Abstract: The integration of the MLS into the avionics subsystems of selected Air Force aircraft was investigated in this study. Antenna configurations and signal processing and interface designs were developed. These designs were the basis for avionics environment, cost, and system effectiveness analysis of the retrofit of MLS into the C-130E, C-5A, FB-111A, and the F-15. The C-130E study was used for the comparative analysis of different approach capabilities and MLS configurations.

Descriptors: Landing aids, Microwave equipment, Microwave antennas, Antennas, Aircraft antennas, Signal processing, Avionics, Costs, Life cycles, Cost analysis, Jet transport planes, Jet fighters, Fighter bombers, Systems engineering

Identifiers: Microwave landing systems, C-130 aircraft, C-130E aircraft, C-5 aircraft, C-5A aircraft, F-111 aircraft, FB-111A aircraft.

AD-775 711/5 NTIS Prices: PC EO9/MF AO1

Air Force Avionics Standardization: an Assessment of System/Subsystem Standardization Opportunities

AirResearch Corp Annapolis Md (400247)

Final rept.
AUTHOR: Bailey, S.; Martinec, D. A.; Savisaar, A.; Sullivan, N.
Mar 78 67p
Rept No: 1910-13-2-1722
Contract: F09603-76-A-3231
Monitor: 18

Abstract: The following specific contractual tasks were defined for ARINC Research by Aeronautical Systems Division avionics planning directorate ASD/FX: Task I: Provide Engineering Support in Preparation for Future INS Procurement Activities -- Perform the analyses and trade-off studies to support the Air Force INS Single Agency in the preparation of the RFP and source selection tools for use on the initial standard INS procurement. (This effort was limited to support during the RFP preparation phase only). Task II: Provide Engineering Support in Analyzing New Opportunities for Specification Development -- Investigate and analyze Air Force avionics requirements to determine the patterns, the extent of force applications, and the commonality of force needs. Organize data by class of equipment, quantities, timeframe, application, and other pertinent market survey parameters. Develop criteria for weighing standardization opportunities and ranking opportunities as they are identified. Task III: Provide Engineering Support to Develop, Refine, and Update Avionics Planning Baseline Document -- Perform the Analyses and data collection necessary to develop, refine, and update the Avionics Planning Baseline document.

Descriptors: Standardization, Avionics, Systems engineering, Inertial navigation, Terminals, target acquisition, Command and control systems, Position finding, Interfaces, Feasibility studies, Microwave landing systems, Navigation satellites, Mission profiles

Identifiers: Weighting, Ranking, NTIS0074A
AD-A052 235/9ST NTIS Prices PC A04/MF AO1
Aircraft Antenna Analysis and Microwave Landing System (MLS) Applications

West Virginia Univ Morgantown Dept of Electrical Engineering (410279)

Final rept. 1 Jan 74-31 Dec 75
AUTHOR: Balazs, Constantine A.; Cheng, Yuk-Bun
D3015K3 FD 18, 9F, 17G, 51B, 49A, 76C GRI7719
31 Jan 76 223p
Contract: DOT-05-40013
Monitor: FAA-RO-76-37

Abstract: The purpose of this investigation was to develop analytical methods for predicting the radiation characteristics of antennas on aircraft. Diffraction techniques in conjunction with other classical electromagnetic methods were used to take into account contributions from various structural features of an airframe (tail, nose, wings, and main fuselage). Computed values were compared with measured data of antennas on scaled model aircraft such as 1/35 scale space shuttle, 1/11 scale Boeing 737, and 1/25 scale KC-135. A very good agreement between theory and experiment was indicated. With the availability and versatility of the analytical techniques, computations were made for antennas on full scale aircraft such as the Boeing 737, Boeing 747, and KC-135. The frequency of operation of the antennas on the full scale models was 5.1 GHz which is within the proposed band for the MLS. Of the antennas, locations, and aircraft examined in this investigation, a circumferential aperture, which is vertically polarized, mounted below the nose (station 169) or above the cockpit (station 306) of a Boeing 747 provides the most attractive coverage for MLS application. A vertical dipole also demonstrates good coverage, but it is not as attractive as that of the circumferential aperture. (Author)


Identifiers: NTIS0000A
AD-A041 484/75T NTIS Prices: PC A10/MF A01

EXPERIMENTATION WITH FLARESCAN VERTICAL GUIDANCE LANDING SYSTEM

National Aviation Facilities Experimental Center Atlantic City NJ (00000)

Final rept.
AUTHOR: Bancivenga, V.
EXPERIMENTATION WITH REGAL VERTICAL GUIDANCE LANDING SYSTEM

National Aviation Facilities Experimental Center Atlantic City N J (000000)

Final rept.
AUTHOR: Bencivenga, V.; Murphy, E. J.
1772D4 USGDR6507
Nov 64 2p
Rept No: RD-64-149
Project: 114 009 OOX

Abstract: Static and dynamic tests were conducted on REGAL (Range and Elevation Guidance for Approach and Landing), a vertically scanned microwave guidance system, to determine its suitability for use in all-weather landing system. Areas of investigation included low-angle coverage, position determining accuracy, site effect, noise content, scan rate, scan direction, method of signal coding, type of antenna pattern, weather effects, interference susceptibility, optimum flight path characteristics, etc. Aircraft using REGAL guidance information, coupled to various approach and flare couplers, were flown to touchdown using both manual and automatic control. Flight tests were conducted in a C-54G, Aerocommander, J-1318 and B-25 aircraft in both clear and adverse weather including rain, snow and fog with wind directions varying from direct head winds to tail wind components of 20 to 25 knots. During the test program, more than 200 automatic landings were accomplished using various combinations of approach paths, flare paths and error signals. The results of these tests as well as design changes and future program requirements are discussed in this report.

Descriptors: (ALL-WEATHER AVIATION, INSTRUMENT LANDINGS), (INSTRUMENT LANDINGS, GLIDE PATH SYSTEMS), (GLIDE PATH SYSTEMS, MICRO Wave EQUIPMENT), (AVIATION SAFETY, INSTRUMENT LANDINGS), RANGES (DISTANCE), APPROACH, FLIGHT PATHS, GUIDANCE, LANDING AIDS, FLIGHT TESTING, FEASIBILITY STUDIES, CIVIL AVIATION, RADIO SCANNING

Identifiers: REGAL
AD-611 446 CFSTI Price: PC A02

Test and Evaluation of a Portable Scanning Beam Guidance System

National Aviation Facilities Experimental Center Atlantic City N J (240550)

Final rept. Oct 68-Jun 70
AUTHOR: Bencivenga, Vincent L.
A4001J9 Fld: 1E, 17B, 51E, 61C GRA17209

Mar 72 137p
Rept No: FAA-NA-72-26
Project: FAA RD 074-319-03X, FAA RD 720-204 03X
Monitor: FAA RD 72-16

Abstract: A portable scanning beam guidance system was installed and tested at 26 field locations. The sites selected were located at 16 different airports in the eastern United States and were known to be difficult instrument landing systems (ILS) sites. The system was tested both as a glide slope and as a localizer. The system was installed, calibrated, and initially aligned without the need for extensive flight testing to verify system performance. Results are reported, largely in oscillogram form. (Author)

Descriptors: (Landing aids, Microwave equipment), (ALL-WEATHER AVIATION, LANDING AIDS), Glide path systems, Civil aviation, Radio scanning, Terrain, Instrument landings, Programming(Computers), Portable, Reliability(Electronics)

Identifiers: Evaluation, Difficult instrument landing sites
AD-739 256 NTIS Prices: PC A07/ MF A01
Test and Evaluation of an Advanced Integrated Landing System for All-Weather Landing

National Aviation Facilities Experimental Center Atlantic City N J (240550)

Final rept. Aug 65-Feb 70
AUTHOR: Bencivenga, Vincent L.
A121140 Fld: 17G, 51F USGRDR7101
Aug 70 114p;
Rept No: FAA-NA-70-26
Project: FAA-320-204-01X
Monitor: FAA-RD-70-28

Abstract: Test and evaluation of an Advanced Integrated Landing System (IALS) was conducted. The IALS is a microwave, scanning beam system and provides precision azimuth and elevation guidance signals to an aircraft. The system incorporates a distance measuring equipment (DME) function, as well as a radar function for providing precision approach radar (PAR) type monitoring of an approach. During the test program, IALS approaches were made in fixed-wing aircraft, both prop and jet, including short take-off and landing (STOL) aircraft. Based on evaluation of the data collected, it was determined that (1) the IALS is capable of providing air-derived space position information to the following accuracies: DME data to plus or minus 100 feet or 1 percent of distance, whichever is greater, azimuth angle data to plus or minus 0.05 deg 1 sigma, and elevation angle data to plus or minus 0.03 deg 1 sigma; (2) the system is not adversely affected by overflying aircraft, and taxing aircraft and/or other vehicles only affect performance when stopped so that they effectively shadow a transmitting antenna; (3) there is no system deficiencies exist. Proposed corrective measures are discussed. (Author)

Descriptors: (+Doppler navigation, Microwave equipment), (+Terminal flight facilities, +Air traffic control systems), Multipath transmission, Instrument landings, Frequency modulation, Pulse code modulation, Distance measuring equipment, Automatic gain control, Microwave equipment

Identifiers: Doppler scanning beam, MLS(Microwave Landing Systems), Microwave landing systems

AD-755 940 NTIS Prices: PC A09/MF A01

Investigations of Microwave Landing System Conventional and Doppler Scanning Beam Techniques

Cornell Aeronautical Lab Inc Buffalo N Y (098300)

Final rept. Jun 71-Sep 72
AUTHOR: Baneke, J.; Wightman, C. W.; Becker, H. D.; Kassel, C. E.
Multipath and Performance Tests of TRSB Receivers

Calspan Corp Buffalo N Y (407727)

Interim rept. 74 Mar 77
AUTHOR: Beneke, J.; Wightman, C. W.; Vallone, C. B.; Offt. A. M.

D211221 Fl: 17G. 760, 85A GRA17720
Mar 77 210p
Rept No: CALS/PAN AG-5580-E-1
Contract: DOT-PA74WA-3445
Monitor: FAA-RD-78-66

Abstract: A landing system simulation program has been carried out in support of the Microwave Landing System (MLS) program of the Federal Aviation Administration. Both scanning beam and doppler scan techniques were simulated and several angle processors were tested with each technique. This report contains the results of extensive simulation evaluations on the time reference scanning beam (TRSB) system. The results of the doppler simulation tests are published in the Calspan Technical Notes. A representative set of multipath parameters was selected and used to explore the dynamic characteristics of the TRSB technique. Tests were run to determine the multipath error magnitude as a function of separation angle, amplitude, scanning frequency and different processor parameters. These tests were conducted on a TRSB simulator that uses a computer to control the multipath parameters for each scan. Typical multipath scenarios were programmed that represented the signals an aircraft would receive when flying through a multipath interference region. Some of the multipath scenarios used in the ICAO AWOP were simulated. The receivers used in the ICAO flight test program were evaluated in the simulator. A broadband processor was developed that operates as a dwell gate processor, similar to the flight test receivers, or as a single edge processor (SEP) to evaluate the flare system. A closed loop simulation, including aircraft and autopilot characteristics. MLS signals with dynamic multipath characteristics and the MLS processor, were used to determine the aircraft perturbations resulting from hangar multipath reflections.


Identifiers: Time referenced scanning beams. NTIS 50000A

AD-405B 891/3ST NTIS Prices PC A10/MF A01

Time Reference Scanning Beam Multimode Digital Processor

Calspan Corp Buffalo N Y (407727)

Final rept 1974-Apr 78
AUTHOR: Beneke, J.; Wightman, C. W.; Vallone, C. B.; Offt. A. M.

E754551 Fl: 17G, 98, 85A, 498 GRA17824
Apr 78 74p
Rept No: CALS/PAN AG-5580-E-2
Contract: DOT-PA74WA-3445
Monitor: FAA-RD-78-84

Abstract: Landing system simulations have been carried out in support of the Microwave Landing System (MLS) program of the Federal Aviation Administration. The results of these simulations have been published in an interim report and in Calspan Technical Notes. This report contains the results of extensive simulation evaluations of a multimode digital processor developed for the time reference scanning beam (TRSB) system. Four processing algorithms were developed for the TRSB system. Simulation tests showed that the algorithms developed for the dwell gate processor were less sensitive to multipath errors and had less processing noise than the flight test phase 3 receivers. The split gate processor had smaller multipath and noise errors than the dwell gate processor. Two asymmetrical processing algorithms were implemented that had multipath errors of less than half the magnitude of the dwell gate or split gate techniques. The single edge processor (SEP) is effective for reducing elevation multipath errors from hangar reflections and ground reflections in flare data. An adaptive SEP was developed that can be used for azimuth or elevation data and is effective in reducing errors from multipath that occurs on either edge of the beam. The algorithms for the four processors were implemented in an LSI-11 microprocessor packaged for convenient field and flight tests.


Identifiers: LSI-11 computers. TRSB system. SEP (Single Edge Processors). Single edge processors. NT1SO000A. NT1SO01FAA

AD-3058 883/7ST NTIS Prices PC A04/MF A01
A Method for Mechanical Frequency Allotment for Radio Communication within the ICAO European Region Method for Marking Frequentist Allotting for Radiokommunikation inom ICAO Europaregion

Research Inst. of National Defence, Stockholm (Sweden)

AUTHOR: Bergman, L. C240511
Fid: 17B, 61C, 45C STAR1204
Dec 71 53p
Rept No: FDR-3-A-3753-E2
Monitor: IB

Abstract: Three aids for allotting frequencies within the communication band 118 to 136 MHz are considered, namely: a map drawing program, the matrix method, and the allotment program. Programs for preparing separation and allotment matrices for the method and also for the allotment program are described. (Author)


Identifiers: NASA

NTU-12861/2 NTIS Prices: PC EO2/MF AO1

Systems Integration: RNAV and the Upgraded Third Generation System

Champlain Technology Industries Palo Alto CA Federal Aviation Administration, Washington, DC Systems Research and Development Service (410102)

Final rept: Jul 75-Dec 76
AUTHOR: Bolz, E. H.; Scott, R. W.; Stephensen, A. R.; Heine, W.
F20241 Fid: 17G, 85A GRA17923
Dec 76 225p
Contract: DOT-FAT20A-3098
Monitor: FAA-RO-77-22

Abstract: This document presents the results of an analysis of the features of the Upgraded Third Generation ATC System in a program of evaluation of the impact of the implementation of Area Navigation on the other features of the UG3RD System. This analysis includes evaluations of the impact of RNAV on the performance and costs of these UG3RD features and, in turn, their impact on the performance, costs and benefits attendant to the implementation of RNAV. As a part of this study of UG3RD System has been examined from the systems integration point of view. One result of the study is the establishment of the effects which RNAV could have on UG3RD feature implementation schedule tradeoffs and interactions. These judgments were based upon a study of the problems of the existing ATC system, and the capabilities of each UG3RD feature, including RNAV, for solving each of these problems. Overall RNAV implementation costs and benefits (airline, general aviation, ATC system and airline passenger) are projected annually to the year 2000. These annual figures have been discounted to present value totals (1976), according to guidelines issued by the Office of Management and Budget, and the resulting benefit/cost ratios of RNAV are presented herein.


Identifiers: NTIS00XXA, NTIS00YFA

AD-A070 775/251 NTIS Prices: PC A10/MF AO1
A Joint Army/Air Force Investigation of Reflection Coefficients at C and Ku Bands for Vertical, Horizontal and Circular System Polarizations

IIT Research Inst Chicago III (175350)

Final rept. Nov 75-Feb 76

AUTHOR: Brindley, A. E.; Calhoun, L. C.; Patton, T. N.
DO12383 Fld: 2ON, 171, 1D, 17G, S5A, 63H, 46H, 760 GRAI 7701
Jul 76 160p
Contract: F33615-76-C-3044
Project: AF-4040124
Monitor: AFFDL-TR-76-67

Abstract: This report describes an experimental effort to measure the reflection coefficients of typical airport structures at C-Band (5000 MHz) and Ku Band (15,000 MHz) for vertical (VP), horizontal (HP), and circular (CP) system polarizations. The choice of polarization is of vital concern in the implementation of microwave landing systems since it offers the designer an opportunity to minimize multipath reflections - the most critical factor limiting system performance. The measurements were made on buildings along the flight lines of Areas B and C at Wright-Patterson AFB, Ohio. It is shown for sixteen different combinations of frequency, grazing angle and reflecting surface that vertical polarization produced more severe specular reflections than either horizontal or circular radiation in every case. The HP measurements showed an advantage of at least 3 dB over VP for 81% of the cases and in 88% of the cases the CP exhibited a similar advantage over VP.

Descriptors: •Radar reflections, •Microwave landing systems, •Multipath transmission, Reflectivity, C Band, Vertical orientation, Horizontal orientation, Circular, Polarization, Ku band, Joint military activities, Coefficients, Fresnel zone, Ground level, Illumination, Grazing, Angles, Multiple operation, Airports, Buildings, Bistatic radar

Identifiers: Reflection coefficients. NTISDDAD

AD-A031 403/9ST NTIS Prices: PC A08/MF A01

Analysis, Test and Evaluation Support to the USAF Advanced Landing System Program. Volume I. Program Description and Results

IIT Research Inst Chicago III•Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. (175350)

Final rept. Jan 72-May 74

AUTHOR: Brindley, A. E.; Calhoun, L. C.; Patton, T. N.; Valocik, L.

IIT Research Inst Chicago III*Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. (175350)

Final rept. Jan 72-May 74
AUTHOR: Brindle, A. E.; Calhoun, L. C.; Patton, T. N.; Valcik, L.
C419535 Fid: 17G, 85A GRA17507
Aug 74 257p
Contract: F33615-72-C-1024
Monitor: AFFDL-TR-74-62- Vol-3-Pt-1
See also Volume 2, AD/A-004 420, and Volume 3, Part 2, AD/A-004 422.

Abstract: Volume III. Part 1 contains guidance error data for the Doppler MLS computed from the Digital Optical Tracking System (DOTS) information. Separate plots are included for the azimuth system and the elevation system. Volume III, Parts 1, 2, and 3 contain the data used in determining the findings presented in Volume I.


Identifiers: *Microwave landing systems. NTIS000DAF
AD/A-004 421/4ST NTIS Prices: PC A12/MF AO1

Analysis, Test and Evaluation Support to the USAF Advanced Landing System Program. Volume II. Index of Approaches

IIT Research Inst Chicago III*Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. (175350)

Final rept. Jan 72-May 74
AUTHOR: Brindle, A. E.; Calhoun, L. C.; Patton, T. N.; Valcik, L.
C4195F4 Fid: 17G, 85A GRA17507
Aug 74 73p
Contract: F33615-72-C-1024
See also Volume 1, AD/A-004 419, and Volume 3, Part 1, AD/A-004 421.

Abstract: Volume II is an index of the approaches flown during the MLS Concept Validation Program. Part I lists the approaches in the order that they were flown. It also contains information on the magnetic storage location of reduced data. An explanation of the terms used is given as is a code for the notes used on the index of data. Data from these approaches are plotted and contained in Volume III. Part II is a listing of the approaches after sorting. The sorting brings together similar approaches for comparison purposes.


Identifiers: *Microwave landing systems. NTIS000DAF
AD/A-004 420/6ST NTIS Prices: PC A04/MF AO1


IIT Research Inst Chicago III*Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. (175350)

Final rept. Jan 72-May 74
AUTHOR: Brindle, A. E.; Calhoun, L. C.; Patton, T. N.; Valcik, L.
C4195G3 Fid: 17G, 85A GRA17507
Aug 74 282p
Contract: F33615-72-C-1024
Monitor: AFFDL-TR-74-62-Vol-3-Pt-3
See also Volume 3, Part 2, AD/A-004 422.

Abstract: Volume III. Part 3 is a collection of the guidance error data for the Doppler Microwave Landing System (DMLS) which was computed from the M-33 tracking radar information. Separate plots are included for the azimuth system and the elevation system. Part 3 contains data from test flights flown between 12 September 1973 and 29 January 1974. Volume III Parts 1, 2, and 3 contain the data used in determining the findings presented in Volume I.


Identifiers: *Microwave landing systems. NTIS000DAF
AD/A-004 423/0ST NTIS Prices: PC A13/MF AO1

IIT Research Inst Chicago III-Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. (175350)

Final rept. Jan 72-May 74
AUTHOR: Brindley, A. E.; Calhoun, L. C.; Patton, T. N.; Valcik, L.
C419502 / Fd: 17G, 85A GRAI7507
Aug 74 322p
Contract: F33615-72-C-1024
See also Volume 3, Part 1, AD/A-004 421, and Volume 3, Part 3, AD/A-004 423.

Abstract: Volume III, Part 2 is a collection of the guidance error data for the Doppler Microwave Landing System (DMLS) which was computed from the N-33 tracking radar information. Separate plots are included for the azimuth and elevation system. Part 2 contains data from test flights flown between 22 June 1973 and 10 September 1973. Volume III, Parts 1, 2, and 3 contain the data used in determining the findings presented in Volume I.

Descriptors: Landing aids, Microwave equipment, Instrument landings, Doppler systems, Systems engineering, Errors, Guidance, Radar tracking

Identifiers: Microwave landing systems, NTISDDAF

AD/A-004 422/25T NTIS Prices: PC A14/MF A01

Multipath Environment Evaluation

IIT Research Inst Chicago III-Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. (175350)

Final rept. May-Nov 74
AUTHOR: Brindley, A. E.; Calhoun, L. C.; Patton, T. N.
C419514 / Fd: 17G, 17B, 76C, 458 GRAI7507
Nov 74 54p
Contract: F33615-72-C-1024
Project: AF-404L
Monitor: AFFDL-TR-74-150

Abstract: This report describes an experimental program aimed at evaluating the multipath environment typical of that which will challenge C-band microwave landing systems. The report describes the ground and air testing conducted in the area 8 complex of Wright-Patterson Air Force Base, Ohio, and includes a wealth of data gathered with the aid of MLS hardware used on the prior phase of this program. A substantial fraction of the effort was devoted to measurements made on a large reflecting screen used by FAA in the test phase of Phase II of the National Landing Plan. It is concluded from the data gathered at Wright-Patterson AFB, that multipath signals generated by the use of the screen in isolation (as at NAFEC and Wallops) are quite dissimilar to those observed from real-life structures in their spatial characteristics. It is further concluded that these hangars have quite similar reflection characteristics, almost independent of their constructional details.

Descriptors: Landing aids, Multipath transmission, Doppler systems, Specular reflection, Continuous waves, Antenna radiation patterns, C band

Identifiers: Microwave landing systems, NTISDDAF

AD/A-004 422/15T NTIS Prices: PC A14/MF A01
FAA/DOD Liaison in Management of the National Aviation System

Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering (012225)

Master's thesis
AUTHOR: Brooks, Ronald S.; Beatty, Jerry L.
C375133 FL: 17G. 85A GRA17426
Sep 74 159p
Rept No: G5M/SA/745-2
Monitor: 18

Abstract: This study describes and analyzes military and FAA liaison efforts which impact on the management of the National Aviation System. It begins with the historical development of the National Aviation System (NAS). The system is evolutionary in nature and most innovations have come from use demands and outside sources. Long term government responsibility to manage the system has been secondary to the operation and maintenance functions. There has been duplication of effort due to poor coordination on developing technology that led to improvement of the system. The methodology used was research of historical and contemporary literature, supplemented by personal interviews with individuals currently involved directly in the liaison process. The combination of extensive personal interviews and the many general and technical reports available emphasize the fractionalized responsibilities within the system and provide a diverse information base that is unavoidably large. (Modified author abstract)

Descriptors: Air traffic control systems, United States government, Department of Defense, Technology, Transfer, Landing aids, Air traffic, Theses

Identifiers: Federal Aviation Administration, Liaison, Microwave landing systems, NTIS0004F
AD-787 208/5SL NTIS Prices: PC A03/MF A01

The Effect of Measurement Errors and Computational Approximations on a Perspective Infrared Radar Image

National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.
AUTHOR: Bundick, W. T.
C3114G2 FL: O18, 518 STAR1316
1975 151p
Rept No: NASA-TM-X-72685
Monitor: 18

Abstract: The effect was examined of aircraft position and attitude, of measurement errors, and of computational approximations on the size, shape, and position of a perspective radar image of an airport runway as might be displayed by an independent landing monitor in transport aircraft. The effect on runway image geometry was examined for different aircraft attitudes and different aircraft positions relative to a standard three degree glide slope. Measurement errors investigated were errors in radar azimuth angle and range, and errors in those aircraft parameters supplied to the radar. For use in converting the radar image into a perspective format (namely pitch, roll, and attitude) also investigated were the effects of using certain mathematical approximations, such as small angle, in the coordinate transformation which converts the image to a perspective format. (Author)

Descriptors: Imaging techniques, Microwave landing systems, Radar imagery, Runways, Computer techniques, Error analysis, Flight paths, Numerical analysis, Transport aircraft

Identifiers: NTIS NASA
N75-24764/3ST NTIS Prices: PC A03/MF A01

Special Analysis of Doppler MLS Video Data

ITT Research Inst Chicago III+Air Force Flight Dynamics Lab
Wright-Patterson AFB, Ohio. (176350)

Final rept. 26 Aug-16 Dec 74
AUTHOR: Calhoun, L. C.; Kazel, S. S.; Brindley, A. E.
C436384 FL: 17G, 760, 854 GRA17509
Jan 75 29p
Contract: F33615-72-C-1024
Project: AF-404L
Monitor: AFFDL-TR-75-6

Abstract: The report describes an experimental effort to examine the spectral content of flight test data recorded during Phase II of the National Landing Plan. The data examined here were obtained from the IIT and Hazelton doppler systems flown at NAEC and Wadsworth Station respectively. A primary objective of the effort was to determine from the spectra whether in fact either of the systems experienced significant multipath interference during flight tests. The hardware used for this analysis was an improved version of that generated by IITRI for the USAF's Concept Validation Program.

Descriptors: Instrument landings, Landing aids, Video signals, Spectrum analysis, Spectra, Time division multiplexing, Doppler systems, Multipath transmission, Flight testing

Identifiers: Microwave landing systems, NTIS000AF
AD/A-006 436/05T NTIS Prices: PC A03/MF A01
The Design, Development, and Flight Test Results of the Boeing 737 Aircraft Antennas for the ICAO Demonstration of the MLS Microwave Landing System

National Aeronautics and Space Administration
Langley Research Center, Langley Station, Va.

AUTHOR: Campbell, T. G.; White, W. E.; Gilreath, W. C.
DOID: 82526
FID: 176, 9E, 85A, 76C, 62B, 49A, STAR1433
17 Aug 76 96p
Rept No: NASA-TM-X-73943
Monitor: 18

Abstract: The Research Support Flight System, a modified Boeing 737, was used to evaluate the performance of several aircraft antennas and locations for the Time Reference Scanning Beam (TRSB) Microwave Landing System (MLS). The two test aircraft were conducted at the National Aviation Facilities Experimental Center (NAFEC), Atlantic City, New Jersey on December 18, 1975. The flight tests measured the signal strength and all pertinent MLS data during a straight-in approach, a raceback approach, and ICAO approach profiles. Using the independent antenna-receiver combinations simultaneously on the aircraft. Signal dropouts were experienced during the various approaches but only a small percentage could be attributed to antenna pattern effects.

Descriptors: Aircraft antennas, Antenna design, Boeing 737 aircraft, Flight tests, Microwave landing systems, Antenna radiation patterns, Civil aviation, Instrument approach, Scanners

Identifiers: NTIS/NAIA

N76-32146/25T NTIS Prices: PC AOS/MF A01

Multipath Parameter Computations for the MLS Simulation Computer Program

Massachusetts Inst of Tech Lexington Lincoln Lab (207650)

Project Ref.

AUTHOR: Capon, Jack

C6024K FID: 1C, 17B, 9E, 85A, 76C, 62B, 49A, 17614
8 Apr 76 194p
Rept No: ATC-68
Contract: DOT-FA74-1461
Monitor: FAA-BD-76-55

Abstract: A set of mathematical models and computer programs have been developed to characterize multipath propagation in an airport environment. When combined with system mathematical models, these models are intended to provide a firm technical basis for assessing the performance of candidate Microwave Landing Systems (MLS) in realistic airport environments. The two most important issues investigated in this research have been (1) validation of the actual field test data and (2) computer running time. The obstacles modeled include buildings and aircraft, as well as the ground which can cause both specular reflections and diffuse scattering. In addition, the shadowing effects due to runway humps and aircraft buildins are included. Computational procedures are presented for obtaining the salient multipath parameters, i.e., relative magnitude, phase, directional angles, Doppler frequency, and time delay. Computer programs have been developed for these algorithms using the Fortran programming language. The structured programming methods, such as Iftran, employed whenever possible. A new method is given for computer validation data for the computational procedures. A comparison of these computer validation results with experimental field data demonstrates good agreement in all cases of interest. The computer running time for these computer programs is quite reasonable.

Identifiers: IBM 370 computer, model 168. Structured programming, NTIS00DX, NTIS00DFAA, NT5001FAA

AD-A024 350/1ST NTIS Prices: PC A09/MF A01
Theory and Experiments on Precision L-Band DME

Fondazione Ugo Bordoni, Rome (Italy).

AUTHOR: Chiariotti, F.; Falciasecca, G.; Graziani, D.
F19781 Fl: 17G, 85A, SAT1178
Dec 77 25p
Rept No: FUB-44-1977
Monitor: 18

Abstract: A preliminary report is given on studies and experiments conducted on the problems of increasing the accuracy of existing DME systems for use with microwave landing systems (MLS). Studies made on multipath errors suggested the use of a computer model which includes the area, the airport, and the receiver model. A mathematical expression of the receiver model is given. Improvement in accuracy can be obtained if the processing of many measurements is adapted to estimating the aircraft position. This procedure, however, was proved to reduce only the errors due to the electronic equipment. As an example of a simple data processing procedure is given. The relationship between shape and frequency spectrum of a pulse was analyzed. A pulse synthesizer built to facilitate the generation of special pulse shapes is described. Results of these investigations are given.

Descriptors: Distance measuring equipment, Microwave landing systems, Ultrahigh frequencies, Aircraft landing, Computerized simulation, Multipath transmission, Pulse frequency modulation, Signal processing

Identifiers: NTISNASAE, NTISFNIT

N79-27124/35T NTIS Prices: PC A02/MF A01

Position Determination Accuracy from the Microwave Landing System

National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AUTHOR: Cicolani, L. S.
C059371 Fl: 17G, 51F, STARR1106
Jan 73 39p
Rept No: NASA-TN-D-7116; A-4176
Monitor: 18

Abstract: Analysis and results are given for the position determination accuracy obtainable from the microwave landing guidance system. Siting arrangements, coverage volumes, and accuracy standards for the azimuth, elevation, and range functions of the microwave system are discussed. Results are given for the complete coverage of the systems and are related to flight operational requirements for position estimation during flare, glide slope, and general terminal area approaches. Range rate estimation from range data is also analyzed. The distance measuring equipment accuracy required to meet the range rate estimation standards is determined, and a method of optimizing the range rate estimate is also given.

Descriptors: Aircraft landing, Aircraft safety, Distance measuring equipment, Instrument landing systems, Microwave equipment, Approach control, Approach indicators, Navigation aids, Terminal facilities

N72-15581 NTIS Prices: PC A03/MF A01
Tower-Related Major System Development Programs

Transportation Systems Center Cambridge Mass (407082)

Interim rept. Apr-Jun 77
AUTHOR: Clapp, D.; Rempfer, P.; Devoe, D.; Bellantoni, J.; Stevenson, L.
E170314 Fl: 17G, 98, 1E, 85A, 85D GRA17817
Mar 78 317p
Rpt No: TSC-FAA-78-2
Monitor: FAA-EM-77-16
See also Rpt. nos. TSC-FAA-77-19, FAA-EM-77-10, AD-AO48 306

Abstract: This report is devoted to the present and near future states of the tower cab environment, addresses those MSOP systems which may have an impact on the current tower cab environment, systems and/or operations. The systems included are: Discrete Address Beacon System (DABS), Airport Surface Detection Equipment III (ASDE III), Tower Airport Ground Surveillance (TAGS), Terminal Information Processing System (TIPS), ARTS II and ARTS III enhancements, Flight Service Station Automation (FSSA), Vortex Advisory System (VAS), Wake Vortex Avoidance System (WVAS), Wind Shear Detection system (WSD) and Microwave Landing System (MLS). Each system is described in terms of its functional objectives, planned equipment, interfaces with other systems and with controllers, failure modes, and current development/deployment status. This report is a continuation of report No. FAA-EM-77-10/(DOT-TSC- FAA-77-19) entitled: 'Characterization of Current Tower Cab Environments', dated November 1977 (240 pages). (Author)

Descriptors: *Air traffic control systems. *Air traffic controllers, *Display systems, *Airport control towers, Data processing, Plan position indicators, Microwave landing systems, Vortices, Airport radar systems

Identifiers: Tower cab systems. BRITE displays. Airport surveillance. Wake, Vortex avoidance systems. Vortex advisory systems, Discrete address beacon systems, Wind shear detection systems. NTIS000DA

AD-AO54 806/5ST NTIS Prices: PC A14/MF AO1


Facility Checking Squadron (1866th) (AFCS) Scott AFB IL (408827)

Final rept.
AUTHOR: Clark, Allen D.
G1988U1 Fl: 17G, 85A GRA18021

30 May 80 48p
Rpt No: 80/665-197
Availability: Microfiche copies only.

Abstract: This special evaluation was conducted to determine if the SSILS was performing optimally and if not, would a different equipment configuration improve performance. The equipment was reconfigured to capture effect and recommissioned by the 1866 Facility Checking Squadron.

Descriptors: *Glide slope, Air force facilities, Florida, Airports, Runways, Microwave landing systems, Solid state electronics, Antenna radiation patterns, Area coverage, Operational effectiveness, Performance(Engineering), Flight testing, Measurement


AD-A086 153/4 NTIS Prices: MF AO1

Facility Checking Squadron (AFCS) Scott AFB IL (408827)

Final rept.

AUTHOR: Clark, Allen D.

GO812K4 Flid: 1E, 17G, 85A GRAB0511

Dec 79 98p

Rept No: 79/685-183

Abstract: This report presents the results of the 13-25 Aug and 7-14 Nov 1979 TRACALS Evaluation of the Ellsworth AFB AN/GRN-29(V) SSILS serving Runway 12. The evaluation was conducted to determine if the SSILS was performing optimally in its present location and if not, what a different equipment configuration or new location would improve performance. Results presented in this report can be used as a guide to anticipated performance until there is a change in ground equipment, phased, sites, environment, screening or operational use. (Author)

Descriptors: Microwave landing systems, Instrument landings, Air traffic control systems, Ground support equipment, Air Force facilities, Airports, Glide slope, Test and evaluation, South Dakota

Identifiers: AN/GRN-29, TRACALS project, Ellsworth Air Force Base, NT15000NX

AD-A088 546/7 NTIS Prices: PC AO5/MF AO1

METEOROLOGICAL ANALYSIS OF 1964-65 ICAO TURBULENCE DATA

Weather Bureau, Silver Spring, Md. Techniques Development Lab. (402 455)

Technical memo.

AUTHOR: Colson, Dever

538564 Flid: 4B USGDR6902

Oct 68 85p

Rept No: WBTM-TDL-14

Abstract: Summaries are given of clear air turbulence (CAT) data over Alaska, Canada, Greenland, North Atlantic, Caribbean, Mexico, and Central America during four 5-day periods (December 1964, March, June, and September 1965) in the ICAO worldwide high-level turbulence collection program. Turbulence reports are summarized by intensity, altitude range (<30,000, 30,000-33,999, >34,000 ft.), and location by 5-degree latitude-longitude square. Meteorological analyses are presented showing probability of moderate or greater turbulence in relation to 300-mb circulation patterns, jet streams, isobars, horizontal wind shear, and contour gradients. While no sharply defined criteria are established for routine prediction of occurrence of intensity of CAT, some interesting meteorological phenomena associated with unusually turbulent conditions are shown. The study illustrates the importance of large values of wind speed, wind shear, and contour gradients and also rapidly increasing values of these parameters. The study particularly shows the importance of sharply curved flow patterns around troughs and ridges. In general, the probability of both light or greater, and moderate or greater turbulence decreased with increasing altitude, but severe turbulence was more frequent in the top layer than in the two lower layers. (Author)

Descriptors: (Clear air turbulence, Meteorological parameters, Periodic variations, Probability, Altitude, Intensity, Velocity, North America, Atlantic Ocean)

Identifiers: North Atlantic Ocean

PB-180 268 CFSTI Prices: PC AO5/MF AO1
Predictions of Interference-Reflection Zones for Scanning Beam Instrument Landing Systems

Army Electronics Command Fort Monmouth N J (O37620)

Research and development technical rept.
AUTHOR: Cornaltous, Eddie L.
C328461 Flid: 17G, 85A GRA17407
Jan 74 55p
Rept No: ECDR-4188
Project: DA-1-F-162202-AA-97
Task: 1-F-162202-AA-9715
Monitor: 18

Abstract: To predict reflection/interference zones for scanning beam Instrument Landing Systems, representative situations for an airport environment were selected in developing multipath models. Interfering signals reflected from a large building near a runway will usually be confined to well defined specular regions. The interfering reflecting signal magnitude in these regions can be large. The report presents these regions of interfering reflections in graphic form for various reflecting surface orientations and lateral distances between the radiating source and the reflecting surface. (Author)


Identifiers: Microwave landing systems. A

AD-773 B22/2 NTIS Prices: PC A04/MF A01

Scale Model Glide Slope Facility

All Farmingdale N y Federal Aviation Administration.
Washington, D.C. Systems Research and Development Service. (407487)

Interim rept. Sep 73-Jun 75
AUTHOR: Creedon, Neil J.
C5781D Flid: 17G, 85A, 76D GRA17603
Jul 75 22p
Rept No: ALL-FGS-4414-1
Contract: DOT-FAD74WA-3345
Monitor: FAA-RD-75-202

Abstract: The report describes the fabrication of a 1/30 Scale Model Glide Slope system. The process used to achieve the required amplitude modulation of a 9 GHz carrier is detailed.

Descriptors: *Glide slope. Scale models. Glide path systems. Microwave equipment. Instrument landings

Identifiers: DOT/412/ID. Microwave landing systems. NITISO0FAA
AD A018 436/BST NTIS Prices: PC A02/MF A01

Combining Data for MLS Implementation Applications


Final rept.
AUTHOR: Crawwell, T. L.
C5781D Flid: 17G. 98. 85A GRA17604
Jun 75 60p
Rept No: AV-MLS-75-3
Monitor: FAA-RD-75-200
See also report dated Jun 74. AD-785 220.

Abstract: The report describes the combination of data for Microwave Landing System Implementation planning. Special computer programs were developed and applied to extract, sort, combine and produce sample applications of information derived from the FAA. Airport Master Record File, Facility Master File, Air Traffic Activity tapes and other sources of pertinent data.


Identifiers: DOT/412/ID. Criteria NTIS00FAA. NTIS00FAA
AD A018 850/BST NTIS Prices: PC A02/MF A01
Cost Analysis of the Microwave Landing System Program

Mitre Corp McLean Va (402364)

Final rept.
AUTHOR: Croswell, Thomas L.
A378244 Fld. 17G, 51F, 51H GRA17207
Dec 71 108p
Rept No: NTR-6068
Contract: DOT-FADA4-2448
Monitor: FAA-EMT-71-1

Abstract: The report describes a cost study performed for the new replacement all weather instrument landing system. Costs are determined for two Scenarios: A - following the National Plan for Microwave Landing Systems, and B - those currently operational systems (GCA - ILS ...). Expected to exist in the absence of the national MLS. For civil ground systems, Scenario A (MLS) produces a significant cost saving, resulting principally from the elimination of restrictive site requirements and reduced frequency of flight inspections. Military ground systems also favor MLS due to earlier retires of GCA systems. Both of these cost savings are offset by the extra cost of airborne MLS, especially to the more than 700,000 general aviation aircraft projected for the year 2000. Over a 30-year period, the total costs to the nation under the MLS plan are not significantly higher than costs of continuing with current systems. The conclusion is that the lack of a cost penalty, combined with the performance, safety, and economic benefits, make a solid case for MLS. (Author)


AD-737 036 NTIS Prices: PC A06/MF A01

Development of Microwave Landing System Implementation Criteria

Avcon Universal Consultants Corp Baden Pa Federal Aviation Administration Washington, D.C. Systems Research and Development Service. (408868)

Final rept.
AUTHOR: Croswell, Thomas L.
C3535K4 Fld. 17G, 85A GRA17423
Jul 74 56p
Rept No: AV-MLS-74-1
Monitor: FAA-RD-74-122

Abstract: The study derives guidelines for MLS implementation planning from basic safety requirements for landing systems. From contemporary qualification criteria and from existing system status. A quantitative method is developed to facilitate evaluation of alternative MLS implementation plans, based on the conclusion that instrument approaches to MLS and MLS represent an increase in safety over approaches made to non-precision facilities. Substantiation of this conclusion, validation of the method, projection of instrument approaches, and other steps leading to a detailed MLS implementation schedule are defined and their accomplishment recommended. (Author)

Descriptors: *Landing aids, Microwave equipment, Planning

Identifiers: *Microwave landing systems, NTIS-JDFAA, NTISDOT
AD-785 220/5 NTIS Prices: PC A03/MF A01

Processing Instrument Approach for Microwave Landing System Implementation

Avcon Universal Consultants Corp Baden Pa Federal Aviation Administration Washington, D.C. Systems Research and Development Service. (408868)

Final rept.
AUTHOR: Croswell, Thomas L.
C591263 Fld. 17G, 6B, 85A GRA17606
Jun 75 68p
Rept No: AV-MLS-74-2
Monitor: FAA-RD-74-122

Abstract: The report describes the special computer programs developed under this contract and their application to Microwave Landing System (MLS) implementation planning. It provides familiarization with the data sources, programs and applications; reference documentation for the programs developed; and a training guide and applications manual for these programs. This study produced a specially tailored database combining information from several sources to facilitate the use of this information in the development of MLS implementation programs.

Descriptors: *Microwave landing systems, *Computer programs, FORTRAN, Data processing, Instrument flight

Identifiers: DOT/41Z/ID, NTISDOTAAA, NTISDOTFAA
AD-A019 762/457 NTIS Prices: PC A04/MF A01
Utilizing Facilities Master File Data for Microwave Landing System Implementation

Avcon Universal Consultants Corp, Baden PA. Federal Aviation Administration, Washington, D.C. Systems Research and Development Service. (408868)

Final rept.
AUTHOR: Croswell, Thomas L.
C412443
cite: 17G, 98, 85A GRA17506
Oct 74 31p
Rept No: AV-MLS-74-3
Monitor: FAA-RQ-74-183

Abstract: The report describes the development of specialized computer programs to incorporate data from the Airway Facilities Master File (FMF) and their applications to Microwave Landing System (MLS) implementation planning. The objectives of this study, descriptions of the FMF, listings of the programs developed and examples of the MLS applications of the annual listings of commissioned Instrument Landing System (ILS) facilities derived from the FMF data are included.


Identifiers: DOT/412/10. *Microwave landing systems. Instrument landing systems. NTIS000FAA. NTIS007

AD/A-003 818/25T NTIS Prices: PC A03/MF A01

Flight Simulation Study to Determine MLS Lateral Course Width Requirements on Final Approach for General Aviation

Crumline (Ralph J.), Olath, Kans.
AUTHOR: Crumline, R. J.
D0023044 Fld: 17G, 1C, 76C, 51C STAR1422
Jul 76 35p
Rept No: NASA-CA-137859
Contract: NASA ORDER A-15538-8
Monitor: 13

Abstract: An investigation of the effects of various lateral course widths and runway lengths for manual CAT I Microwave Landing System instrument approaches was carried out with instrument rated pilots in a General Aviation simulator. Data are presented on the lateral dispersion at the touchdown zone, and the middle and outer markers, for approaches to 3,000, 8,000 (and trial 12,000 foot) runway lengths with full scale angular lateral course widths of + 1.19 deg, + 2.35 deg, and + 3.63 deg. The distance from touchdown where the localizer deviation went to full scale was also recorded. Pilot acceptance was measured according to the Cooper-Harper rating system. (Author)
Refinement and Validation of Two Digital Microwave Landing System (MLS) Theoretical Models

Atlantic Research Corp., Alexandria, Va. EMM Dept
AUTHOR: Duff, W. G.; Guarino, C. R.
CSE 941111 Fld: 17G, 76C, 85A STARC1320
15 Aug 75 83p
Rept No: NASA-CR-132719
Contract: NAS1-13663
Monitor: 18

Abstract: Two digital microwave landing system theoretical models are considered which are generic models for the Doppler and scanning-beam frequency reference versions of the MLS. These models represent errors resulting from both system noise and discrete multipath. The data used for the validation effort were obtained from the Texas Instrument conventional scanning beam and the Hazelwood Doppler feasibility hardware versions of the MLS. Topics discussed include tape read software, time history plots, computation of power spectral density, smoothed power spectra, best-fit models, different equations for digital simulation, and discrete multipath errors. (Author)


Identifiers: NTIS NASA
N75-29066/8ST NTIS Prices: PC A05/MF A01

Curved Approach Path Study

Collins Radio Co Cedar Rapids Iowa (087800)

Final rept.
AUTHOR: Dunag, K. E.; Hemesath, N. B.; Hickok, C. W.; Lammas, D. G.; Goema, W. L.
C1312412 Fld: 17G, 51F GRAI7317
Apr 73 182p
Rept No: 523-0764756-0011M
Contract: DOT-FAG20-2824
Monitor: FAA-RO-72-143

Abstract: The application of MLS (microwave landing systems) to provide increased operational flexibility and improved capacity in the terminal area is discussed. The performance characteristics of the various classes of CTOL aircraft which influence terminal area flight path design are identified and documented. Terminal area operational concepts and flight path families for use in the MLS environment are developed, and examples of special noise abatement paths are discussed. The implications upon cockpit equipment of flying flexible paths in the MLS environment are addressed, and the performance of current flight control systems in tracking segmented paths is examined. (Author)


Identifiers: *Microwave landing systems. FAA
AD-768 603 NTIS Prices: PC A05/MF A01

Control-Display Testing Requirements Study

Collins Radio Co Cedar Rapids Iowa (087800)

Final rept. 24 Jan-24 Jul 72
AUTHOR: Dunag, Kenneth E.; Hickok, Craig W.; Emerson, Kenneth C.; Clement, Warren F.
C082411 Fld: 17G, 51H, 51F, 95D GRAI7317
Dec 72 182p
Rept No: 523-0764465-0011M
Contract: F 33615-72-C-1022
Monitor: AFFDL-TR-72-122

Prepared in cooperation with Systems Technology, Inc., Princeton, N.J.

Abstract: Control-display problems in terminal area navigation and zero visibility landing are identified along with related considerations for control laws and computations and requirements for sensors. Test and development program plans for research, development, and testing of controls and displays for full use of the capabilities of the microwave landing system are presented. Criteria and measurements for development and testing controls and displays are discussed. Procedures for evaluation of system performance, pilot performance, pilot acceptance, and safety are included. Alternative techniques for measuring pilot workload are outlined. Coordinated use of theoretical analysis, simulation, and flight test for development and testing of control-display systems is discussed. (Author Modified Abstract)


Identifiers: Microwave landing systems. AF
AD-759 539 NTIS Prices: PC A05/MF A01
Flight Test Demonstration of Automatic Landings Based on Microwave Landing System Guidance

Air Force Flight Dynamics Lab Wright-Patterson AFB Ohio (012070)

Final rept. Mar-May 76

AUTHOR: Eastman, Don; Clough, P.

D013511 Fld. 10, 17G, 18, 51C, 518, 76 GRAI7701

Aug 76 55p

Rept No: AFFDL-TR-76-105

Monitor: 18

Abstract: This report describes the USAF participation in the gathering of data for the United States submission to the International Civil Aviation Organization of a Non-Visual Precision Approach and Landing System for International Aviation. The report contains data on the use of the test aircraft during automatic approaches and landings. The USAF modified T-39 aircraft was capable of flying at night and automatic approaches and landings. The USAF modified T-39 aircraft was capable of flying at night and automatic approaches and landings. The purpose of the flight testing was to determine how much MLS data could be provided rather than to provide a great amount of MLS accuracy or performance data. (Author)


Identifiers: NTISDODX

AD-A031 777/6ST NTIS Prices: PC A04/MF A01

DME-Based System for Enroute/Terminal Navigation, All-Weather Landing and Air Traffic Control

Standard Elektric Lorenz A.G., Stuttgart (West Germany).

AUTHOR: Eckert, K. O.

E190314 Fld. 17G, 85A, 760 STAR1614

1976 13

Monitor: 18

Abstract: The DME system, which has found widespread worldwide application in the civil and military area as well, includes, due to its ingenious signal format and the very economic channeling scheme, a considerable potential for additional applications. Today's navigation and air traffic control systems have at least partly reached their limits of improvement and extension as the call for a Microwave Landing System (MLS) proves. The growth potential of the ICAO-standardized Distance Measuring Equipment (DME) allows for various operational extensions by improving the distance measuring system to Precision Distance Measuring System (PDME). and using DME interrogations by direction finders on the ground, measuring azimuth and elevation. The operational applications of these features are the DME-based Landing System (DLS), the FRG's contribution to the International MLS competition of ICAD, the additional use of the DLS-A ground subsystem as TMA-navigator, the extension of this principle to the en route-navigating DENS for DME-based Enroute Navigation System, the universal DLS/DME/DENS + DENS airborne equipment, and last but not least the step into the ATC/CAS-field with DACS (DME-based Air traffic Control System). The paper explains the systematic and technical background of this aeronavigational system. An analysis of the various subsystems detailing these advantages compared to today's installations dealing with the areas of operational performance and economic efficiency mainly, is given.


Identifiers: West Germany, NTISNASAE

NTB-23078/6ST NTIS Prices: "C A02/MF A01

DIALOG file date: NTIS - 64-B1/iss01 (Copr. NTIS) (item 52 of 257) user 3007 5jan71
MILS Multipath Studies, Phase 3. Volume I. Overview and
Propagation Model Validation/Refinement Studies

Massachusetts Inst of Tech Lexington Lincoln Lab Federal
Aviation Administration Washington, DC: Systems Research and
Development Service (207650)

Final rept.

AUTHOR: Evans, J. E.; Dornier, S. J.; Sun, D. F.; Shnidman, D. A.

G247203 Fld: 17G, 85A GRIA18026
25 Apr 79 333p
Rept No: ATC-88-VOL-1
Contract: DOT-FTA74WA1-461
Monitor: FAA-RD-79-21-VOL-1
See also Volume 1, AD-A087 827

Abstract: This report presents work done during phase 3 of the
US national Microwave Landing System (MILS) program toward
the development of a computer simulation model of MILS multipath
effects, the experimental validation of the model, and the
application of the model to investigate multipath performance
of ICAO proposals for the new approach and landing guidance
system. The second volume of the report presents the
mathematical models and validation data for the MILS techniques
which were assessed in detail by the All Weather Operations
Panel of the International Civil Aviation Organization. The
specific techniques modeled are: 1. The Time Reference Scanning
Beam (TRSB) system proposed by the United States (US) and
Australia, with prime emphasis on the US equipment
implementation and field test data. 2. the Doppler scan (DMLS)
proposed by the United Kingdom. 3. the DME Based Landing
System (DLS) proposed by the Federal Republic of Germany.

Descriptors: Microwave landing systems, Doppler systems,
Multipath transmission, Aircraft landings, Diffraction, Landing fields,
Experimental data, Measurement, Simulation, Landing, Validation,
Obstruction, Guidance

Identifiers: Shadowing, NTIS0000X, NTIS01TFAA
AD-A087 827/2 NTIS Prices: PC A15/MF A01

MILS Multipath Studies, Phase 3. Volume II. Development and
Validation of Models for MILS Techniques

Massachusetts Inst of Tech Lexington Lincoln Lab Federal
Aviation Administration Washington, DC: Systems Research and
Development Service (207650)

Final rept.

AUTHOR: Evans, J. E.; Dornier, S. J.; Shnidman, D. A.;
Burchsted, R. C.
Abstract: This report summarizes MLS multipath work carried out at Lincoln Laboratory from March 1974 to Sept. 30, 1975. The focus of the program is the development of realistic models for (1) the multipath in representative real-world environments and (2) the multipath characteristics of candidate MLS techniques. These multipath and system models are used in a comprehensive computer simulation to predict the strengths and weaknesses of major MLS systems when subjected to representative real-world environments. The report is organized into two volumes. Volume I describes the algorithms and validation of various portions of the program. In Volume II, the simulation (or selected portions thereof) is applied to key multipath related MLS issues. Mathematical models are given for the major MLS multipath sources (ground reflections, building and aircraft reflections, and shadowing by objects and humped runways), and it is shown that they agree well with field data (including the Lincoln measurements at Logan Airport). Models for the techniques (Doppler and scanning beam) considered in phase II of the U.S. MLS program are presented together with validation by comparison with theory and bench tests. Also presented are the results of a general study in motion averaging. The (validated) computer simulation (and portions thereof) is then applied to studying (1) the critical areas required by the TRSB system to avoid excessive reflection effects, 2) the expected TRSB performance with vertical polarization and benefits that might be derived with an alternative polarization and 3) sitting of a specific TRSB system at Friendship International Airport (MD). (Author)

Descriptors: Microwave landing systems, Instrument landings, Multipath transmission, Aircraft, L band, C band, Computerized simulation, Algorithms, Scattering, Reflection, Runways, Electromagnetic wave reflections, Buildings

Identifiers: NTIS00DXA, NTIS00DFAA, NTIS00DFAA
AD-A025 108/2ST NTIS Prices: PC E04/MF A01
Dual Band Airborne Antenna Study

Michigan Univ Ann Arbor Radiation Lab Army Electronics Command, Fort Monmouth, N.J. (294200)

Final rept. 30 Jun 73-28 Feb 74
AUTHOR: Ferris, Joseph E.
C396492 Fld: 9E. 49A GRAI7503
Oct 74 110p
Rept No: UMICH-012126-1-F
Contract: DAB07-73-C-0337
Monitor: ECOM-73-0337-F

Abstract: The design and fabrication of two antenna systems is described and experimental results are presented. Each includes two antennas, one of which operates in the C band and the other operates at Ku band. Both antennas in the first system are vertically polarized while those in the second system are horizontally polarized. The antenna systems are designed for airborne use and they are interchangeable with respect to the physical mounting arrangements. Extensive data is given on pattern characteristics, on interband isolation, on gain and on the input VSWR.

Descriptors: Microwave antennas, Aircraft antennas, C band, Ku band, Dual channel, Polarization, Landing aids, Microwave equipment, Gain, Antenna radiation patterns

Identifiers: Microwave landing systems NTIS5000A

AD/A-002 045/8ST NTIS Prices: PC AO6/MF AO1
Compatibility Analysis of the Texas Instruments, ITT/Gliffillian, Bendix, and Hazeltine Microwave Landing System Proposals

IIT Research Inst Annapolis Md* Federal Aviation Administration, Washington, D.C..Electromagnetic Compatibility Analysis Center, Annapolis, Md. (175300)

Final rept.
AUTHOR: Frazier, Robert A.
CJ791C3 Fld: 17G, 85A, 76D GRAI7426 Jun 74 27p
Contract: F19628-73-C-0031, DOT-FA7021-175
Monitor: ECAC-PR-74-021

Abstract: The Texas Instruments Microwave Landing System (TIMS) proposal was modeled in a 1960 high density environment. Its channel scheme and signal format were analyzed with the aid of a computer program to determine its adequacy in such a high density environment. Three other MLS proposals (ITT Gliffillian, Hazeltine, Bendix) were also examined. A comparison was made between the technical parameters of each and the parameters recommended by the Radio Technical Commission for Aeronautics Special Committee-117 (RTCA SC-117) to determine if the results of a previous analysis of the SC-117 MLS format could be applied to any of the three proposals. (Author)


Identifiers: Microwave landing systems, NTISDDFAA, NTISDOT
AD-787 180/9SL NTIS Prices: PC A02/MF A01

In-Band Compatibility Analysis of the RTCA-Proposed Microwave Landing Guidance System (LGS) and Candidate Interim Systems

Electromagnetic Compatibility Analysis Center Annapolis Md (125350)

Final rept.
AUTHOR: Frazier, Robert A.
CONIC3 Fld: 17G, 85A, 76D GRAI7312 Jul 72 27p
Rept No: ECAC-PR-72-069
Contract: DOT-FA7021-175
Monitor: FAA/RT-72-82

Abstract: The electromagnetic compatibility among the proposed RTCA SC-117 next generation microwave landing guidance system (LGS) and several existing microwave landing guidance systems proposed as interim candidates was analyzed. The signal format for LGS was developed by Special Committee 117 of the Radio Technical Commission for Aeronautics. The angle data link system and glideslope portions of the systems were deployed in an FAA-predicted high density 1980 environment and the possibility of compatible operation was assessed with the assistance of a computer analysis. The compatibility among the systems' NME functions was analyzed using frequency/distance considerations. The EMC between the landing guidance systems and other aircraft and ground systems and between the LGS and a foreign microwave enroute guidance satellite system (DIOSSCORS) were analyzed using frequency/distance considerations. (Author)


Identifiers: Microwave landing systems. Landing guidance systems, FAA
AD-759 145 NTIS Prices: PC A11/MF A01

A Comparison of the Frequency Requirements of an Earlier Design MLS and TRSB MLS

IIT Research Inst Annapolis Md (1175300)

Final rept.
AUTHOR: Gathrop, Philip E.
E128411 Fld: 17G, 85A, 76D GRAI7814 Mar 76 27p
Contract: F19628-76-C-0017, DOT-FA7021-175
Project: 649F
Monitor: FAA/RT-77/108

Abstract: Channel assignments for an earlier design Microwave Landing System (MLS) and the Time Reference Scanning Beam (TRSB) MLS are compared. This comparison shows the advantages of the TRSB MLS signal format and channel plan over that of the earlier design system format and channel plan. This report considers the TRSB MLS design as it was at the time the study was completed. Since that time a number of design changes have been made and are not addressed in this report. (Author)


Identifiers: Time reference scanning beam. Signal formats. NTISDDFAA. NTISDOTFAA
AD-8052 364/755 NTIS Prices: PC A03/MF A01
Microwave Landing System Intra-Aircraft EMC Analysis

Electromagnetic Compatibility Analysis Center Annapolis Md (125350)

Final rept.

AUTHOR: Gawthrop, Philip E.

E1f541 Fld: 17G, 76D, 85A, 51E GRA17813

Mar 76 48p

Rept No: ECAC-PR-76-006

Contract: DOT-FATOWA-173

Monitor: FAA-RD-77-109

Abstract: This report discusses the electromagnetic compatibility of the Time-Reference Scanning-Beam Microwave Landing System (MLS) with other radiating systems on-board nine types of aircraft. These aircraft are the McDonnell Douglas DC-10, DC-9, DC-8, Boeing 747, 737, 727, 707, Lockheed TriStar L-1011, and the North American Rockwell T-39 Sabreliner. The MLS interferences analysis was performed by calculating the interference power level at a particular antenna, comparing this power with a user-specified interference threshold, and determining the potential problems. This report considers the TR8 MLS design as it was at the time the study was completed. Since that time a number of design changes have been made and are not addressed in this report. (Author)


Identifiers: "MLS (Microwave Landing System), DC-10 aircraft, DC-9 aircraft, 747 aircraft, 737 aircraft, 727 aircraft, 707 aircraft, Microwave landing systems, NTIS000X, NTIS000Y

AD-A052 063/5ST NTIS Prices: PC A03/MF A01

The Development of Advanced Automatic Flare and Decracking for Powered Lift Short Haul Aircraft Using a Microwave Landing System


AUTHOR: Gevaert, G. T. Feinreich, B.

E2282L1 Fld: 01C, 18, 17G, 51C, 51B, 76C STAR1514

Apr 77 276p

Rept No: NASA-CR-151948

Contract: NAS2-9068

Monitor: 18

Abstract: Advanced automatic flare and decracking control laws were developed for future powered lift STOL aircraft using the NASA-C-6A augmentor wing vehicle as the aircraft model. These longitudinal control laws utilize the throttle for flight path control and use the direct lift augmentor flap chokes for flight path augmentation. The elevator is used to control airspeed during the approach phase and to enhance path control during the flare. The forward slip maneuver was selected over the climb decracking technique for runway alignment because it can effectively handle the large crosswind conditions obtained at STOL airport approach and takeoff. Performance evaluation of selected systems configurations were obtained over the entire landing environment. Limitations were defined and critical failure modes assessed. Pilot display concepts are discussed.


Identifiers: NTIS NASA

N77-20093/657 NTIS Prices: PC A13/MF A01

Trials of the Doppler Microwave Landing System at London (Gatwick) Airport, August 1977

Royal Aircraft Establishment Farnborough (England) Defence Research Information Centre, Orpington (England) (310450)

Technical rept.

AUTHOR: Gibson, P. C.

E1835Q Fld: 17G, 1E, 85A GRA179231

10 Oct 78 84p

Rept No: RAE-TR-78124

Monitor: DRIC-BR-66981

Abstract: This report contains typical data collected from the trials at Gatwick and analysis of the results shows that the Doppler Microwave Landing System met the performance requirements at this airport for line of sight propagation paths. No specific technique-related effects were seen, and the results are regarded as typical of C-band MLS performance at this airport. (Author)


Identifiers: Doppler microwave landing system, Gatwick Airport, London (England), NTIS000X, NTIS000Y

AD-A069 78995ST NTIS Prices: PC A05/MF A01
Trials of the Doppler Microwave Landing System at London (Gatwick) Airport, August 1977

Royal Aircraft Establishment, Farnborough (England)

AUTHOR: Gibson, P. L.
D017114 Fld: 17G, 85A STAR1723
Aug 77 83p
Rept No: RA8-TR-78124: B86981
Monitor: 18
Sub-Sponsored by Min. Of Defence.

Abstract: The trials of the Doppler microwave landing (DMLS) at Gatwick formed part of a series conducted at operational airports to collect data for the ICAO evaluation program. Typical data collected from the trials at Gatwick and analysis of the results show that DMLS met the performance requirements at this airport for line of sight propagation paths. No specific technique-related errors were seen and the results are regarded as typical of C band MLS performance at this airport.

Descriptors: +Microwave landing systems, Aircraft landing, Data acquisition, Doppler radar, Performance tests, Air traffic control, Aircraft safety, C band, Great britain, Instrument landing systems

Identifiers: NTISNASAE, NTISFNMUK
N79-32194/9 NTIS Prices: PC A05/MF A01

Airborne Antenna Polarization Study for the Microwave Landing System

National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

AUTHOR: Gilreath, M. C.
D161304 Fld: 17G, 9E, 85A, 76C, 49A STAR1502
1976 112p
Rept No: NASA-TM-X-73952
Monitor: 18
Misc-Original Contains Color Illustrations.

Abstract: The feasibility of the microwave landing system (MLS) airborne antenna pattern coverage requirements are investigated for a large commercial aircraft using a single omnidirectional antenna. Omnidirectional antennas having vertical and horizontal polarizations were evaluated at several different station locations on a one-eleventh scale model Boeing 737 aircraft. The results obtained during this experimental program are presented which include principal plane antenna patterns and complete volumetric coverage plots. (Author)

Descriptors: +Aircraft antennas, +Directional antennas, +Microwave landing systems, +Omnidirectional antennas, +Polarization characteristics, Antenna radiation patterns, Commercial aircraft, Feasibility analysis, Scale models

Identifiers: NTISNASA
N77-11266/251 NTIS Prices: PC A05/MF A01

Preliminary Analysis of Several Microwave Landing System Flare Elevation Configurations

Avionics, Inc., Sunnyvale, Calif.

AUTHOR: Gokn, T.
C5114F1 Fld: 01B, 54B STAR1316
May 75 19p
Rept No: NASA-CR-137673
Contract: NAS2-8380
Monitor: 18

Abstract: Configurations of MLS Flare Elevation Systems that can be considered reasonable and practical in actual implementation are identified. Each of these is analyzed and compared with respect to (1) computational requirement, (2) required coverage, and (3) accuracy including altitude and sink-rate estimation error performance. (Author)

Descriptors: +Glide paths, +Microwave landing systems, Algorithms, Azimuth, Error analysis, Mathematical models, Range errors

Identifiers: NTISNASA
N75-24759/351 NTIS Prices: PC A02/MF A01
Impact of FAA E and D Elements--Eight Airport Summary. Volume 8

Mitre Corp Mclean Va Metrek Div  (409890)

Final rept.
AUTHOR: Maines, A. L.
E191C2 Fld: 17G, 1E, 1B, 5A, 5D  GRA17817
Jan 78 7ip
Rept No:  NTR-7350-VOL-8
Contract:  DDT-F730A-4075
Monitor:  FAA-EM-78-4-VOL-8

Abstract: The potential benefits of implementing the products of selected FAA Engineering and Development Programs at eight major airports are surveyed. Best estimates of the expected performance of the Vortex Advisory/Wake Vortex Avoidance Systems (VAS/WVAS), Metering and Spacing (M and S) part of the ATC System Automation program, and the Discrete Address Beacon System are used as basis for estimating the increase in airport capacity that might be realized from the collective use of these systems in a pre-1985 case and a post-1985 case. Best estimates of the expected performance of the Airplane Surface Traffic Control (ASTC) system, the Microwave Landing System (MLS), and Area Navigation Equipment (RNAV) plus results of recent FAA/TSC studies are used as the basis for estimating the individual impacts of those systems on controller workload, changes in air routes to reduce time and fuel, and ILS interference problems at the eight airports. This report summarizes the potential benefits. (Author)

Descriptors: Air traffic control systems, Air traffic control terminal areas, Airports, Airport radar systems, Discrete address beacon systems, Microwave landing systems, Wake, Trailing vortices, Collision avoidance, Instrument landings, Air traffic controllers, Flight paths, Scheduling, Fuel consumption, Terminal flight facilities

Identifiers: NTISNASA

NT7-25149/4ST NTIS Prices: PC AO4/MF AO1

Monitor 18

Abstract: A longitudinal digital guidance and control law for steep glideslopes using MLS [Microwave Landing System] data is developed for CTOL aircraft using modern estimation and control techniques. The control law covers the final approach phases of glideslope capture, glideslope tracking, and flare to touchdown for automatic landings under adverse weather conditions. The control law uses a constant gain Kalman filter to process MLS and body-mounted accelerometer data to form estimates of flight path errors and wind velocities, including wind shear. The flight path error estimates and wind estimates are used for feedback in generating control surface commands. Results of a digital simulation of the aircraft dynamics and the guidance and control law are presented for various wind conditions.

Descriptors: Approach control, Automatic control, Glide paths, Optimal control, Digital navigation, Kalman filters, Microwave landing systems, Runway lights

Identifiers: NTISNASA

AO-A054 245/6ST NTIS Prices: PC AO4/MF AO1

Development of a Digital Automatic Control Law for Steep Glideslope Capture and Flare

Virginia Univ., Charlottesville.

Final Report.
AUTHOR: Haeio, N.
D3173F3  Fld: 1B, 17G, 51B, 76A  STAR1516
Jun 77 60p
Rept No: NASA-CR-2834
Contract: NASA-12754
Development of a Digital Guidance and Control Law for Steep Approach Automatic Landings Using Modern Control Techniques

Analytical Mechanics Associates, Inc., Hampton, VA.

Final Report.

AUTHOR: Halyo, N.

F098381 Fld: 17G, 1D, 1B, 85A, 51B STAR1708
Feb 79 72p
Rept No: NASA-CR-3074; AM-AO-77-24
Contract: NAS1-14088
Monitor: 18

Abstract: The development of a digital automatic control law for a small jet transport to perform a steep final approach in automatic landings is reported, along with the development of a steady-state Kalman filter used to provide smooth estimates to the control law. The control law performs the functions of localizer and glideslope capture, localizer and glideslope track, decrab, and place. The control law uses the microwave landing system position data, and aircraft body-mounted accelerometers, attitude and altitude rate information. The results obtained from a digital simulation of the aircraft dynamics, wind conditions, and sensor noises using the control law and filter developed are described.

Descriptors: *Aircraft guidance, *Automatic landing control,
*Control theory, Digital techniques, Digital simulation, Kalman filters, Microwave landing systems, Transport aircraft

Identifiers: NTISNASA

N76-29160/85T NTIS Prices: PC A05/MF A01

Development of an Optimal Automatic Control Law and Filter Algorithm for Steep Glideslope Capture and Glideslope Tracking

Virginia Univ., Charlottesville.

Final Report.

AUTHOR: Halyo, N.

C774182 Fld: 17G, 1C, 76C STAR1420
Aug 76 94p
Rept No: NASA-CR-2720
Contract: NAS1-10210
Monitor: 18

Abstract: A digital automatic control law to capture a steep glideslope and track the glideslope to a specified altitude is developed for the longitudinal/vertical dynamics of a CTOL aircraft using modern estimation and control techniques. The control law uses a constant gain Kalman filter to process guidance information from the microwave landing system, and acceleration from body mounted accelerometer data. The filter...
Multiple Curved Descending Approaches and the Air Traffic Control Problem

National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

AUTHORS: Hart, C. G.; McPherson, D.; Kreifeldt, J.; Wemple, T. E.

Abstract: A terminal area air traffic control simulation was designed to study ways of accommodating increased air traffic density. The concepts that were investigated assumed the availability of the microwave landing system and data link and included: (1) multiple curved descending final approaches; (2) parallel runways certified for independent and simultaneous operation under IFR conditions; (3) closer spacing between successive aircraft; and (4) a distributed management system between the air and ground. Three groups of three pilots and two air traffic controllers flew a combined total of 350 approaches. Piloted simulators were supplied with computer generated traffic situation displays and flight instruments. The controllers were supplied with a terminal area map and traffic status information. Pilots and controllers also reported that the distributed management procedure was somewhat more safe and orderly than the centralized management procedure. Flying precision increased as the amount of turn required to intersect the outer kink decreased. Pilots reported that they preferred the alternate of multiple curved descending approaches with wider spacing between aircraft to closer spacing on single, straight-in finals while controllers preferred the latter option. Both pilots and controllers felt that parallel runways are an acceptable way to accommodate increased traffic density safely and expeditiously.


Identifiers: NTISNASA
N77-32104/O5T


STOL Aircraft Instrument Landing System

Epsco Inc Westwood Mass (131200)

Final rept.
AUTHOR: Hills, Robert S.  
A2471F1  Flg. 17G, 5IF GRL17116  
Feb 71 86pp
Contract: DOT-FA69MA-2098  
Project: FAA-330-114-02N  
Monitor: FAA-RD-71-17

Abstract: The report describes the development of a Microwave Scanning Beam Instrument Landing System for STOL aircraft and airports (MOILS). It is a flexible system meeting or exceeding Category III requirements with a growth potential for handling all types of aircraft in Categories II and III by modular additions. In azimuth it provides plus or minus 0.5 degree accuracy with pilot selected course width between plus or minus 2 degrees and plus or minus 10 degrees within a 60 degree course sector. A left or right skew course, as well as a centerline course is selectable. In elevation it provides plus or minus 0.1 degree accuracy of a pilot selected glide slope between 3 degrees and 12 degrees and path width of plus or minus 1 to plus or minus 5 degrees. Integral DME functions are provided with an accuracy of plus or minus 0.01 nautical miles plus or minus 1% of range to a range of approximately 10 nautical miles. The ground station is entirely dualistic except for antennas. Switch-over from main to standby equipment is controlled by integral dual monitor units operating in parallel. (Author)

Descriptors: *(Instrument landings, Microwave equipment), ( 
*Short take-off planes, Instrument landings), Radio scanning, Airports, Azimuth, Glide path systems, Distance-measuring equipment

Identifiers: MOILS(Modular Microwave Instrument Landing Systems). *Modular microwave instrument landing systems

AD-725 705 NTIS Prices: PC A04/MF A01

Improvement of Standard ILS While Retaining Compatibility Verbesserung des Standard-ILS Unter Beibehaltung der Kompatibilität

Standard Elektrik Lorenz A.G., Stuttgart (West Germany).  
Erzeugnisgebiet Navigation.  
AUTHOR: Hoefgen, G.  
G206581  Flg: 1B  STAR1123  
1973 7p
Rept. No: DGLR-PAPER-73-018  
Monitor: 1B

Abstract: Two methods of improving the standard instrument landing system, while retaining compatibility, are presented. The compatible instrument landing system (CILS) consists of the following components: (1) standard ILS for clearance, and (2) microwave ILS 5 GHz. based on conventional principle (90/150 Hz) only for approach sector. In being compatible with the existing two carrier systems with 9 kHz difference carrier frequency, the microwave oscillator frequency is also radiated. The precision instrument landing system (PILS) necessitates more onboard equipment and includes linear antenna arrays, consisting of elements sequentially radiating signals. An advantage over standard ILS is that the glide angle can be selected at random onboard.


Identifiers: NASA

NTS-325243/3 NTIS Prices: PC A02/MF A01
The Measurement of Microwave Multipath in an Airport Environment

Office of Telecommunications Boulder Colo Inst for Telecommunication Sciences (406445)

Final rept.  
AUTHOR: Hubbard, R. W.; Pratt, L. E.; Hartman, W. J.  
D2143241 Fld: 17G, 20H, B5A, 46H, 76D GRA17712  
Jan 77 740  
Contract: DOT-FRA4WA1-471  
Monitor: FAA-RD-76-163  

Abstract: Multipath in an operating airport, and its impact on the performance of a Microwave Landing System (MLS) is an important aspect of the development of these systems. Test programs on the candidate MLS systems developed in the U.S. were conducted in areas that do not emulate large commercial airports. In order to better evaluate multipath in a realistic environment, measurements of reflected signals at the MLS operating frequency were performed, and the results used to develop or modify a computer simulation program. Both a cw system and a pseudorandom noise (PN) channel were used in the measurement program. This report presents the results of multipath measurements made on (1) airport terminal buildings, (2) large maintenance hangars, and (3) aircraft on the surface of the airport. Results indicate that significant reflection levels are prevalent from these sources, and could produce a multipath reception problem at the receiver of an aircraft approaching the runway. (Author)

Descriptors: Microwave landing systems, Microwave transmission, Airports, Microwave receivers, Microwave transmission, Antenna radiation patterns, Channels, Pseudo noise systems, Response, Microwave equipment  
Identifiers: Time delay, NTISDDEA4X  
AD-A037 791/1ST NTIS Prices: PC A04/MF A01

Optimal Control Aircraft Landing Analysis

Air Force Flight Dynamics Lab Wright-Patterson AFB Ohio (012070)  

Technical rept. Jan 72-Jul 73  
AUTHOR: Huber, Robert E. Jr  
C265564 Fld: 1B, 1E, 51B, 76A GRA17411  
Dec 73 136p  
Rept No: AFFDL-TR-73-141  
Monitor: 18  

Abstract: A digital computer analysis technique was developed to predict aircraft longitudinal landing performance to touchdown. A microwave landing system provided sampled data elevation, angle guidance and assumed continuous DME (distance measuring equipment) information. The linearized longitudinal equations for perturbations about trimmed flight were used for the aircraft model. Atmospheric disturbances, including deterministic winds and random gusts were modeled. The deterministic gusts included headwinds and wind shears. The random gusts included longitudinal and normal gusts which were modeled as first order Gauss Markov processes. The microwave landing system noise was also included. (Modified author abstract)

Descriptors: Aircraft landings, Landing aids, Microwave equipment, Automatic pilots, Computer applications, Mathematical prediction, Performance (Engineering), Visibility, Trajectories, Optimization, Statistical analysis, Mathematical models, Atmospheres, Noise (Electrical and electromagnetic)  
Identifiers: Microwave landing systems, AF  
AD-776 316/2 NTIS Prices: PC A07/MF A01

A Scoring System for the Quantitative Evaluation of Pilot Performance During Microwave Landing System (MLS) Approaches

Aeronautical Systems Div Wright-Patterson AFB Ohio (008800)  

Interim technical rept. Oct 74-Jan 75  
AUTHOR: Hyatt, Christopher J.; Deberg, Oak H.  
C679414 Fld: 51, 1B, 92B, 51B GRA17616  
Aug 75 22p  
Rept No: ASD-TR-75-17  
Monitor: 18  
See also report dated Jul 74, AD-A000 422.

Abstract: The Crew Station Design Facility's scoring system for ILS approaches and landings has been extended for use with Microwave Landing System (MLS) approaches. The philosophy of scoring systems is briefly discussed, and the rationale for this application is developed.

Descriptors: Performance (Human), Pilots, Aircraft landings, Microwave landing systems, Assessment, Approach, Technology transfer, Computerized simulation, Time, Flight paths, Equations, Methodology  
Identifiers: Scoring systems, NTISDDEA5  
AD-A025 782/4ST NTIS Prices: PC A02/MF A01


Technical rept.

AUTHOR: Iyer, R. R.


Jul 75 52p

Rept No: NTR-6951-Vol-2

Contract: DOT-F/A700A-2448

Monitor: IB

Abstract: Projected benefits of curved approaches during marginal VFR and IFR weather conditions provided by implementing MLS at LaGuardia and Kennedy are investigated. It is shown that the operational flexibility due to MLS contributes the following benefits: increases in capacity at LGA during IFR and marginal VFR conditions, reductions in airport noise exposure over populated areas around JFK and LGA, reductions in NASCOM delays at LGA and savings in operating costs for airlines by terminal route reductions.

Descriptors: Aircraft landings, Microwave communication, Approach, Noise reduction, Benefit cost analysis, Flight paths, Air traffic control.


PB-274 585/95T NTIS Prices: PC A04/MF A01

Microwave Landing System Accuracy Requirements for Automatic Flare-Out

Royal Aircraft Establishment Farnborough (England) (310450)

Technical memo.

AUTHOR: James, P. W.

D1135L1 Fld: IB, 17G, 9B, 85A GRI7705

Mar 78 37p

Rept No: RAE-TR-79052-VOL-3

Monitor: DRIC-ER-7373

Abstract: The report describes adaptation of a computer based simulation of a transport aircraft automatic landing system to enable study of microwave landing system (MLS) flare guidance. The simulation was used to examine the allowable errors from the range and elevation angle measuring sub-systems of the MLS flare system. (Author)

Descriptors: Microwave landing systems, Flareout, Computerized simulation, Elevation, Transport aircraft, Errors, Great Britain, Automatic, Accuracy, Distance measuring equipment, Mathematical analysis, Sensitivity, Elevators.

Identifiers: NTISD00DXA

AD-A033 372/4ST NTIS Prices: PC A03/MF A01

Contributions to the UK Microwave Landing System Research and Development Programme 1974 to 1978. Volume 3

Royal Aircraft Establishment Farnborough (England): Defence Research Information Centre, Orpington (England) (310450)

Technical rept.

AUTHOR: Jones, J. M.

G1901L3 Fld: 17G, 85A GRI8020

May 79 238p

Rept No: RAE-TR-79052-VOL-3

Monitor: DRIC-ER-7373

See also Volume 1. AD-A085 478

Availability: Microfiche copies only.

Abstract: For abstract see AD-A085 478

Descriptors: Microwave landing systems, Doppler systems, Landing aids, All weather aviation, Multiplexing, Hybrid simulation, Flight testing, Systems analysis, C band, Performance/Engineering

Identifiers: Foreign technology, UMLS(Doppler Microwave Landing System), Time division multiplexing, Ground testing, Frequency division multiplexing, NTISD00DXA, NTISF9UK

AD-A085 480/2 NTIS Prices: MF A01
Contributions to the UK Microwave Landing System Research and Development Programme 1974 to 1978. Volume 1

Royal Aircraft Establishment Farnborough (England) Defence Research Information Centre, Orpington (England) (310450)

Technical rept.
AUTHOR: Jones, J. M.
G190111 Fld: 17G. 88A GRA18020
May 78 242p
Rept No: RAE-TR-79052-VOL-1
Monitor: DRIC-BR-73155
_See also Volume 3, AD-A085 480_

Abstract: In support of the UK MLS programme, Doppler Microwave Landing System (DMLS) equipment operating on both frequency division and time division multiplex formats has been extensively evaluated by means of analysis, ground and flight tests and hybrid simulation. The results of this programme have shown that the use of the Doppler technique leads to simple and reliable equipment with performance well inside the operational requirements. In particular, a full understanding of the possible environmental effects on system performance at 5 GHz has been obtained. (Author)


Identifiers: *Foreign Technology, DMLS(Doppler Microwave Landing System), Time division multiplexing, Frequency division multiplexing, Ground testing, NTISDDX, NTISFNUK

AD-A085 479/4 NTIS Prices: MF AO1

Microwave Scanning Beam Approach and Landing System Phased Array Antenna

Transportation Systems Center Cambridge Mass (407082)

Annual rept Jul 70-Jul 71
AUTHOR: Kalafus, R. M.; Harris, P.; Larussa, F. J.; Bishop, G. J.; Pantano, P. J.
A3842H2 Fld: 17G. 88E. 57F. 66A GRA17208
Sep 71 314p
Rept No: TSC-FAA-RDD-71-29
Monitor: FAA-RD-71-87

Abstract: The feasibility of the use of phased arrays for the proposed microwave landing guidance system (MLGS) is discussed. The effects of the use of planar and conical beam guidance on the choice of system configurations is investigated. The design of an experimental antenna to demonstrate feasibility is given. (Author)

Descriptors: *(Glide path systems, *Antenna arrays, *(Commercial planes, Instrument landing), Approach, Phased arrays, Microwave equipment, Antenna feeds, Networks, Radiofrequency power, Lens antennas

Identifiers: *Microwave landing guidance systems, MLGS(Microwave Landing Guidance Systems)

AD-737 511 NTIS Prices: PC A14/MA AO1
Microwave Scanning Beam Approach and Landing System Phased Array Antennas. Volume II

Transportation Systems Center Cambridge Mass (407082)

Annual rept. no. 2, Jul 71-Jun 72
AUTHOR: Kalafus, R. M.; Bishop, G. J.; LaRussa, F. J.; Pantano, P. J.; Wade, W. R.
C080548 Fld: 17G, 9E, 85%, 66A, 5IF GRIA73032
Feb 73 205p
Rept No: TSC-FAA-72-41-Vol-2
Contract: DOT-PFA-FA-208
Monitor: FAA RD-72-128 Vol-2
See also Volume 1, AD-759 097.

Abstract: Contents: Evaluation of an R-2R lens as a component in a C-Band phased array; Azimuth component specifications and test results: Elevation component specifications.

Descriptors: ±Phased arrays, Reliability(Electronics), ±Landing aids, Phased arrays, ±ACI traffic control systems, ±Microwave equipment, Glide path systems, Antenna components, C band, Phase shifters, Power dividers, Electromagnetic lenses, Specifications

Identifiers: ±Microwave landing systems, Azimuth scanning antennas, Near field effects, FAA
AD-759 096 NTIS Prices: PC A10/MF A05

Microwave Scanning Beam Approach and Landing System Phased Array Antenna. Volume I

Transportation Systems Center Cambridge Mass (407082)

Annual rept. no. 2, Jul 71-Jun 72
AUTHOR: Kalafus, R. M.; Bishop, G. J.; LaRussa, F. J.; Pantano, P. J.; Wade, W. R.
C080534 Fld: 17G, 9E, 85%, 66A, 5IF GRIA7312
Feb 73 241p
Rept No: TSC-FAA-72-41-Vol-1
Contract: DOT-PFA-FA-208
Monitor: FAA RD-72-128 Vol-1
See also Volume 2, AD-759 098.

Abstract: The use of phased arrays for the proposed landing system (MLS) is discussed. Studies relating to ground reflections, near field focusing, and phased array patterns are presented. Two experimental antennas which were fabricated and tested are described. Complete component specifications as well as test results are included. (Author.Modified

Descriptors: ±Phased arrays, Reliability(Electronics), ±Landing aids, Phased arrays, ±ACI traffic control systems, ±Microwave equipment, Glide path systems, Antenna components, C band, Phase shifters, Power dividers, Electromagnetic lenses, Specifications

Identifiers: ±Microwave landing systems, Azimuth scanning antennas, Near field effects, FAA
AD-759 097 NTIS Prices: PC A10/MF A05
An Avionics Sensitivity Study. Volume 3: Automated RNAV/MLS Transition

AUTHOR: Karmarker, J. S.
D308201 Fld: 77G, 1B, 51E, 51B, 85A STAR1515
Mar 77 36p
Rept No: NASA-CR-145109
Contract: NAS1-14144
Monitor: 18

Abstract: An automated algorithm for transitioning from RNAV to MLS is described. The algorithm generates guidance commands to enable the pilot to automatically switch from RNAV to MLS and effectively correct any offset errors during this transition. Software/hardware implementation details pertinent to the TCV Boeing 737 avionics are also considered.


Identifiers: NTISNASA

NT7-24064/4ST NTIS Prices PC A03/4F A01

Organization and Use of a Software/Hardware Avionics Research Program (SHARP)

AUTHOR: Karmarker, J. S.; Karasemi, M. N.
C339411 Fld: 01C, 09B, 51C STAR1407
Jul 76 110p
Rept No: NASA-CR-137676
Contract: NAS2-8344
Monitor: 18

Abstract: The organization and use is described of the software/hardware avionics research program (SHARP) developed to duplicate the automatic portion of the STOLAND simulator system, on a general-purpose computer system (i.e., IBM 360). The program's uses are: (1) to conduct comparative evaluation studies of current and proposed airborne and ground system concepts via single run or Monte Carlo simulation techniques, and (2) to provide a software tool for efficient algorithm evaluation and development for the STOLAND avionics computer. (Author)


Identifiers: STOLAND system, NTISNASA

N75-16062/1ST NTIS Prices PC A05/4F A01

Analytical Evaluation of Ilm Sensors. Volume 2: Appendices

Honeywell, Inc., Minneapolis, Minn. Systems and Research Center.
AUTHOR: Kirk, R. J.
C53551F1 Fld: 01E STAR1322
Sep 75 112p
Rept No: NASA-CR-132687-VOL-2
Contract NAS1-13489
Monitor: 18

Abstract: The applicability of various sensing concepts to independent landing monitor systems was analyzed. Microwave landing system MLS accuracy requirements are presented along with a description of MLS airborne equipment. Computer programs developed during the analysis are described and include a mathematical computer model for use in the performance assessment of reconnaissance sensor systems. A theoretical formulation of electromagnetic scattering to generate data at high incidence angles, atmospheric attenuation of microwaves, and microwave radiometry programs are described. The results include improved accuracy and increased delivery of information. (Author)


Identifiers: NTISNASA

N75-31046/6ST NTIS Prices PC A06/4F A01
Analytical Evaluation of IGLS Sensors, Volume II

Honeywell Inc., Minneapolis, Minn. Systems and Research Center

Final Report

AUTHOR: Kirk, R. J.
C555254 Fld: 016, 01E, 51B, 76C STAR1322
Sep 75 527p
Rept No: NASA-CR-132687-VOL-1; F-2132-VOL-1
Contract: NAS1-13489
Monitor: IB

Abstract: The functional requirements and operating environment constraints are defined for an independent landing monitor ILM which provides the flight crew with an independent assessment of the operation of the primary automatic landing system. The capabilities of radars, TV, forward looking infrared radiometers, multilateration, microwave radiometers, interferometers, and nuclear sensing concepts to meet the ILM conditions are analyzed. The most critical need for the ILM appears in the landing sequence from 1000 to 2000 meters from threshold through rollout of the sensing concepts analyzed, the following show potential of becoming feasible ILM’s: redundant microwave landing systems, precision approach radar, airborne triangulation radar, multilateration with radar altitude, and nuclear sensing. (Author)


Identifiers: NTISNASA

N75-31045/8ST NTIS Prices: PC A23/MF A01

Algorithms and Logic for Incorporating MLS Back Azimuth Information into the NASA TCV B-737 Airplane Area Navigation System

National Aeronautics and Space Administration, Langley Research Center, Hampton, VA

AUTHOR: Knox, C. E.
F110111 Fld: 17G, 76D STAR1708
Jan 79 21p
Rept No: NASA-TM-80039
Monitor: IB

Abstract: Navigation position estimates are based on range information from a randomly located DME and MLS back azimuth angular information. The MLS volumetric coverage checks are performed to ensure that proper navigation inputs are being utilized. These algorithms and volumetric checks were designed so that they could be added to most existing area navigation systems with minimum software modifications.

Descriptors: *Air navigation, *Boeing 737 aircraft, *Microwave landing systems, NASA programs, Terminal configured vehicle program, Algorithms, Azimuth, Distance measuring equipment, Error analysis, Estimates, Logic design, Range-finding, Signal processing, Volumetric analysis

Identifiers: Area navigation systems, NTS NASA

N79-17843/8ST NTIS Prices: PC A02/MF A01

Experimental Determination of Position-Estimate Accuracy Using Back-Azimuth Signals from a Microwave Landing System

National Aeronautics and Space Administration, Langley Research Center, Hampton, VA

AUTHOR: Knox, C. E.
G0522U3 Fld: 17G, 85A, 76D STAR1804
Dec 79 37p
Rept No: NASA-TP-1574; L-13074
Monitor: IB

Abstract: Flight tests using the Boeing 737 airplane to obtain position estimates with back azimuth signals from a microwave landing system (MLS) are discussed. The equations and logic used to generate a navigation position estimate in the MLS back azimuth signal environment are described. The error in the navigation position estimate is determined. A summary of the Boeing 737 position estimate update process is described. The navigation position estimate error is calculated. Flight data and radar tracking information is analyzed. The position estimate error data using the MLS inputs are compared with error data obtained during dual distance measuring equipment updates.


Identifiers: Radio navigation, NTS NASA

N80-13020/6 NTIS Prices: PC A03/MF A01
Experimental Determination of Position-Estimate Accuracy Using Back-Azimuth Signals from a Microwave Landing System

National Aeronautics and Space Administration Langley Station, Virginia Langley Research Center, National Aeronautics and Space Administration, Washington, DC (387543)

Technical report
AUTHOR: Knox, Charles E.
GOS:SH Fld: 17G, 85A, 76D GRA18008
Dec 79 37p
Rept No: NASA-L-13074
Monitor: NASA-TP-1574

Abstract: This paper presents the results of flight tests using the NASA Terminal Configured Vehicle (TCV) Boeing 737 airplane to obtain position estimates with back-azimuth signals from a microwave landing system. The most accurate position estimates were obtained from a combination of back-azimuth and distance-measuring-equipment (DME) signals. Less accurate position estimates were obtained with back-azimuth signals alone; the least accurate position estimates were obtained with dual DME signals. (Author)

Identifiers: *Position finding, *Microwave landing systems, Aircraft landings, Approach, Radio navigation, Distance measuring equipment, Azimuth, Radio signals, Estimates

AD-A078 614/5 NTIS Prices: PC A03/MF A01

Civil aviation, Radar beacons, Distance-measuring equipment, Data transmission systems

An Investigation of Microwave Landing Guidance System Signal Requirements for Conventionally Equipped Civilian Aircraft

Transportation Systems Center, Cambridge Mass (407082)

Technical report
AUTHOR: Luman, Maurice H. III
A37731 Fld: 17G-85A, 76D SIF, SIG GRA17207
Jun 71 189p
Rept No: DOT-TSC-FAA-71-24
Monitor: FAA-RT-71-86

Abstract: The report describes efforts leading to the determination of minimum suitable scan rates for the azimuth and elevation functions of the microwave landing guidance system (MLS) proposed by RTCA SC-117, based on performance requirements of two conventionally equipped civilian aircraft. Two complementary methods are used: one involving a full nonlinear digital simulation, the other involving direct covariance matrix propagation. Wind and turbulence models, aircraft models and MLS models are described in detail. (Author)

Identifiers: *Microstrip path systems, Microwave frequency, Instrument landings, Scanning, Mathematical analysis

AD-A078 614/5 NTIS Prices: PC A03/MF A01

Accurate Surveillance in the Terminal Area

Transportation Systems Center, Cambridge Mass (407082)

Final rept.
AUTHOR: Kulke, B.: Minkoff, R. T.; Harmoles, G. G.
A3355 31. Fld: 17G, 85A, SIF, SIG GRA17223
Sep 71 41p
Rept No: TSC-FAA-71-26
Monitor: 18

Abstract: The problem of deriving surveillance information from the MLS has been analyzed in terms of the available air-to-ground communication links. The results of this study indicate that the use of this approach is feasible and it is recommended that the configuration based on the DABS data link be included in an upgraded third-generation design to meet the high-density terminal-area surveillance requirements. (Author)

Identifiers: *Air traffic control systems, *Position finding, *Air traffic control terminal areas, Aviation safety
Microwave Landing System Signal Requirements for Conventional Aircraft

Transportation Systems Center Cambridge Mass (407082)

Final rept. 1971-72
AUTHOR: Leman, Maurice H. III
CO3832 Fld: 17G, 51F GRAI7306
Jul 72 140p+
Rept No: TSC-FAA-72-30
Monitor: FAA-RD-72-86

Abstract: The results of analysis directed towards determining Microwave Landing System (MLS) signal requirements for conventional aircraft are discussed. The phases of flight considered include straight-in final approach, flareout, and rollout. A limited number of detailed problems in performance analysis are studied. Data from computer simulation, covariance propagation and system optimization, with a careful selection of variables provides a means for generalizing from the results of specific experiments to more comprehensive functional, data rate, beam noise, and control system requirements for automatic landing in turbulence. (Author)


Identifiers: *Microwave landing systems

AD-754 892 NTIS Prices: PC A07/MF A01
An Experimental Investigation of Control-Display Requirements for a Jet-Lift VTOL Aircraft in the Terminal Area

Calspan Corp Buffalo NY + Naval Air Development Center, Warminster, PA (407727)

Final rept. Jun 76-Jul 78
AUTHOR: Lebcaez, J. V.; Redford, R. C.; Bellman, J. L.
F173203 Fd: IC, 1B, 10, 51C, 51B, 51E GRA17920
Jul 77 3970
Rept No: CALSPAN-ET-5985-F-1
Contract: N62269-76-C-0370
Monitor: NASA-176999-60

Abstract: The fourth flight research program using the variable stability, variable display X-22A VTOL research aircraft was undertaken with the objective of expanding the operational capability of VTOL aircraft under adverse weather conditions. The experiment investigated a matrix of control display and task variables for the landing approach task in a ground simulation phase followed by an in-flight simulation phase. Aerodynamic characteristics of the McDonnell-Douglas AV-8B Advanced Harrier were simulated for a prescribed decelerating approach profile using the X-22A's variable stability system. Around this simulation, an analog of the AV-8B control system was implemented to investigate a range of feasible control system designs. Combinations of these control concepts and a variety of head-up display formats and information levels were evaluated in flight for simulated instrument approaches.


Identifiers: V-8 aircraft. AV-8B aircraft. X-22 aircraft. X-22A aircraft. NTIS000DXA. NTIS000D

AD-A068 818/4ST NTIS Prices: PC A17/MF A01

SSILS Initial Evaluation Report. Myrtle Beach AFB, South Carolina

Facility Checking Squadron (1866th) (AFCS) Scott AFB IL (408827)

Final rept.
AUTHOR: Leister, Harvey J.
G081282 Fd: 1E, 17G, 85A GRA18011
26 Oct 79 125p
Rept No: 79/66N-191

TRACALS Evaluation Report. Special Evaluation Report 00T and E of the AN/GN-29(V) SSILS. Wright-Patterson AFB, Ohio. 10-19 April 1979

Facility Checking Squadron (1866th) (AFCS) Scott AFB IL (408827)

Final rept.
AUTHOR: Leister, Harvey J.
F2024AG Fd: 170, 1E, 85A GRA17923
10 Jun 79 105p
Rept No: 79/665-166
Monitor: 19

Abstract: This report presents the results of the 10-19 April 1979 TRACALS evaluation of the Wright-Patterson AN/GN-29(V) SSILS for runway 05. The evaluation was conducted to determine the capabilities and limitations of the system in its installed environment. Results presented in this report can be used as a guide to anticipated performance until such time as there is a significant change in ground equipment, sitting environment, screening, or operational use. (Author)


Identifiers: AN/GN-29(V), Wright-Patterson Air Force Base. NTIS000DXA

AD-A070 792/5ST NTIS Prices: PC A06/MF A01
Display Processor for Aircraft Landing System

Department of the Navy Washington DC (001840000)

Patent

AUTHOR: Lewis, Bernard L.
G1994-A Fld: 17G, 10, 51E, 85A, 90, GRAI8021
Filed 13 Feb 79, patented 8 Apr 80 9p
Rept No: PAT-APPL-6-011 834; PATENT-4 197 543
Supersedes PAT-APPL-011 834-79, AD-0005 828
Availability: This Government-owned invention available for
U.S. licensing and, possibly, for foreign licensing. Copy of
patent available Commissioner of Patents, Washington, DC 20231
$0.50.

Abstract: A circuit for processing the azimuth error video
signal of a monopulse receiver in an aircraft to separately
but simultaneously display the heading and position of the
aircraft. The azimuth error signal is simultaneously applied to a
sample-and-hold (SAH) circuit, a delay means and a one-shot
multivibrator (MV). The MV opens the SAH to accept the first
ground-transmitter signal in a sequence, the SAH charging a
capacitance to the magnitude of the signal, and then prevents
the SAH from accepting any further signals in the sequence.
The output of the SAH is subtracted from the delayed signal to
obtain a video signal indicative of aircraft position, and the
output of the first subtractor is subtracted from the delayed
signal to obtain a video signal indicative of the Aircraft
heading. (Author)

Descriptors: Patents, Microwave landing systems, Video
signals, Signal processing, Microwave receivers, Cathode ray
tube screens, Azimuth, Errors, Multivibrators. Circuits,
Monopulse radar, Landing aids, Instrument landings, Position
finding

Identifiers: PAT-CL-343-112, Sample and hold circuits, NTISGPN
AD-0007 343/7 NTIS Prices: Not available NTIS

Angle Data Processor for Reciprocating Narrow Scanning Beams

Department of the Air Force Washington DC (109850)

Patent Application

AUTHOR: Litchford, George B.
C2904L Fld: 17G, 76C, 906, GRAI7414
Filed 2 Aug 73 8p
Rept No: PAT-APPL-011 557
Monitor: 1B
Government-owned invention available for licensing. Copy of
application available NTIS.

Abstract: The patent application relates to an angle data
processor apparatus for determining the glide angle of an
aircraft which is derivable from transmitted narrow
reciprocating scanning beams.

Descriptors: Aircraft landings, Microwave equipment, Patents,
Landing aids, Data processing, Glide path systems

AD-164 554/8 NTIS Prices: PC E02/MF A01

Study and Analysis of SC-117, National and USAF Plans for a
New Landing System

Litchford Systems Northport NY (388480)

Final rept: May 71-Apr 72
AUTHOR: Litchford, George B.
AS9204A Fld: 17G, 10, 51E, 61C, GRAI7222
Jul 72 243p
Rept No: L-AP-05
Contract: F33615-71-C-1601
Monitor: AFFDL-TR-72-76 Pt-1

Abstract: With SC-117, national, and USAF plans partially
formulated for the design of a new Microwave Landing System
(MLS) to meet common civil/military and common CTOL/VTOL
requirements, attention is now focused on technical and
operational areas of landing. Where critical decisions must be
made to narrow the competing criteria to a single national
standard. The Air Force mission utilizes not only
conventional, fixed MLS installations, but also mobile MLS
units quickly installed at remote or foreign airfields. A
design of a very-low-cost MLS is outlined since the number of
military aircraft to be equipped with MLS will be determined
by the minimum cost (and minimum service configurations)
of the national MLS system. (Author)

Descriptors: (Glide path systems, Multipath transmission), (A
Air traffic control systems, Microwave equipment), Reviews,
Antenna radiation patterns, Aircraft antennas, Flight paths,
Phase-locked systems, Cost effectiveness

Identifiers: SC-117 landing system, Microwave landing systems
AD-749 505 NTIS Prices: PC A11/MF A01
Test and Evaluation of Phase III Bendix Basic Narrow and Small Community Time Reference Scanning Beam Microwave Landing System

National Aviation Facilities Experimental Center Atlantic City NJ (240550)

Final rept. Sep 76-Sep 77
AUTHOR: Mackin, Clifford W.
F0711E4 Fid: 17G, 18, ID, 85A GRA17910 Nov 78 104p
Rept No: FAA-NA-78-29
Monitor: FAA-RD-78-127

Abstract: Two models of the Time Reference Scanning Beam Microwave Landing System (MLS), the Basic Narrow and Small Community systems designed and built by the Bendix Corporation to FAA specifications, were examined with regard to functional requirements, and compliance with contract specifications. (Author)


Identifiers: Time reference scanning beams. NTISDDXD4. NTISDD0FFA
AD-8062 860/1ST NTIS Prices: PC A06/MF A01

Consideration of Near Field Effects in Microwave Landing System (MLS) Feasibility Evaluation


AUTHOR: Marsh, H. S.
C3523204 Fid: 17G, 85A GRA17423 Jul 74 35p
Rept No: NTR-2808
Contract: F19628-73-C-0001
Project: AF-6430
Monitor: ESD-TR-74-184

Abstract: The near field MLS beam pattern may be troublesome if C-band flare guidance is used. One of the complications introduced by defocusing or broadening of the beam received by an aircraft located in the near field of the antenna. With a C-band flare elevation subsystem, the antenna near field will extend a distance from the antenna sufficient to contain the aircraft during flare and touchdown, and so the precise characteristics of the near field signals must be understood. The effects of beam broadening on system accuracy and signal processing requirements are briefly examined, and experimental investigations are recommended. A short discussion of antenna aperture optimization is also presented, and parallels are drawn between Doppler MLS and synthetic aperture radar. (Author)


Identifiers: Microwave landing systems. NTISDDOAF
AD-784 854/2 NTIS Prices: PC A03/MF A01

EMC Analysis of JTIIS in the 980-1215 MHz Band. Volume 5

Office of Telecommunications, Annapolis, Md.

AUTHOR: Mayher, Robert J.
E1642E4 Fid: 17B, 45A, 45C, 49, 85X GRA17916 Mar 78 174p
Rept No: OTR-78-140-S
Project: NBS-9018150
Monitor: 18

See also Volume 4, PB-281 120, and Volume 6, PB-281 122. Also available in set of 8 reports PC E99. PB-281 115-SET.

Abstract: *Contents: Beacon overflight statistical analysis and data.


Identifiers: *Joint tactical information distribution systems. Spread spectrum communication systems. Air traffic control radar beacon systems. Discrete address beacon systems. Beacon collision avoidance systems. Microwave landing systems. Spread spectrum. NTISCOMTEL
PB-281 121/4ST NTIS Prices: PC A08/MF A01
EMC Analysis of JTIDS in the 960-1215 MHz Band. Volume 8
Office of Telecommunications, Annapolis, Md.
AUTHOR: Mayher, Robert J.
E1642F1 Fld: 17B, 45A, 45C, 49, 86X GRA17816
Mar 78 377p
Rept No: OTR-78-140-6
Project: NBS-9018510
Monitor: 18
See also Volume 5, PB-281 121, and Volume 7, PB-281 123. Also available in set of 8 reports PC E99, PB-281 115-SET.

Abstract: :Contents: Avionics flight-test data and test plan; Avionics bench test data and test plan. (Portions of this document are not fully legible)


Identifiers: *Joint tactical information distribution systems. Spread spectrum communication systems. Air traffic control radar beacon systems. Discrete address beacon systems. Beacon collision avoidance systems. Microwave landing systems. Spread spectrum. NTISCOMTEL

PB-281 122/2ST NTIS Prices: PC A17/MF A01

EMC Analysis of JTIDS in the 960-1215 MHz Band. Volume 7
Office of Telecommunications, Annapolis, Md.
AUTHOR: Mayher, Robert J.
E1642F2 Fld: 17B, 45A, 45C, 49, 86X GRA17816
Mar 78 363p
Rept No: OTR-78-140-7
Project: NBS-9018510
Monitor: 18
See also Volume 6, PB-281 122. Also available in set of 8 reports PC E99, PB-281 115-SET.

Abstract: :Contents: Test plan and data from ATCRBS bench tests and flight tests; JTIDS/MLS/DME test plan: Beacon collision avoidance system (BCAS) flight test data and test plan: Test plan and data from discrete address beacon system (DABS) flight tests: Baseline characteristics of JTIDS: ATC system technical baseline characteristics: Propagation model runs: (Portions of this document are not fully legible)


Identifiers: *Joint tactical information distribution systems. Spread spectrum communication systems. Air traffic control radar beacon systems. Discrete address beacon systems. Beacon collision avoidance systems. Microwave landing systems. Spread spectrum. NTISCOMTEL

PB-281 123/0ST NTIS Prices: PC A16/MF A01

EMC Analysis of JTIDS in the 960-1215 MHz Band. Volume 4
Office of Telecommunications, Annapolis, Md.
AUTHOR: Mayher, Robert J.
E1642F3 Fld: 17B, 45A, 45C, 49, 86X GRA17816
Mar 78 323p
Rept No: OTR-78-140-4
Project: NBS-9018510
Monitor: 18
See also Volume 3, PB-281 119, and Volume 5, PB-281 121. Also available in set of 8 reports PC E99, PB-281 115-SET.

Abstract: :Contents: JTIDS TACAN/DME beacon bench test statistical analysis and data.


Identifiers: *Joint tactical information distribution systems. Spread spectrum communication systems. Air traffic control radar beacon systems. Discrete address beacon systems. Beacon collision avoidance systems. Microwave landing systems. Spread spectrum. NTISCOMTEL

PB-281 123/0ST NTIS Prices: PC A16/MF A01
EMC Analysis of JTIDS in the 980-1215 MHz Band. Executive Summary

Office of Telecommunications, Annapolis, Md.

AUTHOR Mayher, Robert J.
E164292 Fld 17B, 45A, 45C, 49, 85X NIALIN
Mar 78 17p

Also available in set of 8 reports PC E99, PB-281 115-SET

Abstract: The report presents the findings of an investigation to determine the Electromagnetic Compatibility of the Joint Tactical Information Distribution System (JTIDS) Phase I wide-band system with Air Traffic Control (ATC) systems in the 980-1215 MHz band. The 980-1215 MHz band is being used by the Tactical Air Navigation (TACAN)/Distance Measuring Equipment (DME), and Air Traffic Control Radar Beacon system (ATCRBS). Firmly planned ATC systems for this band include the Discrete Address Beacon System (DABS), Beacon Collision Avoidance System (BCAS), and Microwave Landing System (MLS)/DME. An extensive measurement and analysis program was undertaken by a group composed of representatives from FAA, DOD, FCC, OT, ECAC, AINC Research Corporation and Radio Technical Commission for Aeronautics (RTCA). The measurement program consisted of both bench and flight tests. The test and analysis efforts demonstrated that the Phase I wide-band JTIDS signals have no effect or only minimal operational effects on current designs of existing and firmly planned ATC systems equipment. The minimal effects occur only when the ATC systems are receiving desired signals that are at or near their performance limits (near threshold) while simultaneously receiving maximum strength JTIDS signals.

Descriptors: \*Military communication, \*Pulse communication, \*Electromagnetic compatibility, Radio communication, Ultrahigh frequencies, Radio navigation, Identification systems, Electromagnetic interference, Collision avoidance, Broadband, TACAN, Distance measuring equipment, Analyzing, Air traffic control systems, Radio signals

Identifiers: \*Joint tactical information distribution systems, Spread spectrum communication systems, Air traffic control radar beacon systems, Discrete address beacon systems, Beacon collision avoidance systems, Microwave landing systems, Spread spectrum, NTISCOMTEL

PB-281 119/85T NTIS Prices: PC A7/MF A01

EMC Analysis of JTIDS in the 980-1215 MHz Band. Volume 3

Office of Telecommunications, Annapolis, Md.
EMC Analysis of JTDIS in the 960-1215 MHz Band. Volume 2

Office of Telecommunications, Annapolis, Md.

AUTHOR: Mayher, Robert J.

E164281 Fld 17B, 45A, 45C, 49, 86X GRA17816

Mar 78 277p

Rept No: QTR-78-140-2
Project: NBS-9018510
Monitor: 18

See also Volume 1, PB-281 117, and Volume 3, PB-281 119.

Also available in set of 8 reports PC E99, PB-281 115-SET.

Abstract: Contents: Analysis of beacon bench- and flight-test data; Analysis of avionics bench- and flight-test data.

Identifiers: JTDIS operational considerations: ATC radio navigation operational considerations: Operational evaluation of JTDIS in the ATC environment

Descriptors: Joint tactical information distribution systems, Spread spectrum communication systems, Air traffic control radar beacon systems, Discrete address beacon systems, Beacon collision avoidance systems, Microwave landing systems, Spread spectrum, NTISCONTEL

PB-281 117/251 NTIS Prices: PC A14/MF A01

EMC Analysis of JTDIS in the 960-1215 MHz Band. Volume 1

Office of Telecommunications, Annapolis, Md.

AUTHOR: Mayher, Robert J.

E164280 Fld 17B, 45A, 45C, 49, 86X GRA17815

Mar 78 316p

Rept No: QTR-78-140-1
Project: NBS-9018510
Monitor: 18

See also Executive summary, PB-281 116, and Volume 2, PB-281 118.

Also available in set of 8 reports PC E99, PB-281 115-SET.

Abstract: Contents: Introduction; Conclusions and recommendations: Analysis approach: JTDIS operational considerations: ATC radio navigation operational considerations: Operational evaluation of JTDIS in the ATC environment

Descriptors: Military communication, Pulse communication, Electromagnetic compatibility, Ultrahigh frequencies, Radio communication, Radio navigation, Identification systems, Electromagnetic interference, Collision avoidance, Broadband, Tacan, Distance measuring equipment, Air traffic control systems, Analyzing, Radio signals

Optimization of MLS Receivers for Multipath Environments

Virginia Univ., Charlottesville, School of Engineering and Applied Science

Interim Report

AUTHOR: McHale, G. A.; Highfill, J. H.

C6754F2 Fld 17G, 85A STAR1411

Mar 76 37p

Rept No: NASA-CR-146664, EE 4033-107-76

Grant NG-1128

Monitor: 18

Abstract: The design of a microwave landing system (MLS) aircraft receiver, capable of optimal performance in multipath environments found in air terminal areas, is reported. Special attention was given to the angle tracking problem of the receiver and includes tracking system design considerations, study and application of locally optimum estimation involving multipath adaptive reception and then envelope processing, and microcomputer system design. Results show processing is competitive in this application with IF signal processing performance-wise and is much more simple and cheaper. A summary of the signal model is given. (Author)

Descriptors: Equipment specifications, Microwave landing systems, Multipath transmission, Receivers, Aircraft equipment, Cost analysis, Performance, Signal processing, Tracking (Position)

Identifiers: NTIS NASA

NTS-20-102/951 NTIS Prices: PC A03/MF A01
Optimization of MLS Receivers for Multipath Environments

Virginia Univ., Charlottesville, Dept. of Electrical Engineering.

Abstract: Optimal design studies of MLS angle-receivers and a theoretical design study of MLS DME-receivers are reported. The angle-receiver results include an integration of the scan data processor and tracking filter components of the optimal receiver into a unified structure. An extensive simulation study comparing the performance of the optimal and threshold receivers in a wide variety of representative dynamic interference environments was made, the optimal receiver was generally superior. A simulation of the performance of the threshold and delay-and-compare receivers in various signal environments was performed. An analysis of comparisons is made due to lateral reflections from vertical structures with small differential path delays, specular ground reflections with negligible differential path delays, and thermal noise in the receivers is provided.

Descriptors: *Design analysis, *Microwave landing systems, *Receivers, Systems engineering, Mathematical models, Multipath transmission, Optimization

Identifiers: NTISNASA

N78-11284/65T NTIS Prices: PC A11/MF A01

Optimization of MLS Receivers for Multipath Environments

Virginia Univ., Charlottesville, School of Engineering and Applied Science.

Abstract: A receiver is designed for aircraft (A/C), which, as a component of the proposed Microwave Landing System (MLS), is capable of optimal performance in the multipath environments found in air terminal areas. Topics discussed include the angle-tracking problem of the MLS receiver, signal modeling, preliminary approaches to optimal design, suboptimal design, and simulation study. (Author)


Identifiers: NTISNASA

N78-14056/75T NTIS Prices: PC A08/MF A01

Optimization of MLS Receivers for Multipath Environments

Virginia Univ., Charlottesville, School of Engineering and Applied Science.

Abstract: Reduced order receiver (suboptimal receiver) analysis in multipath environments is presented. The origin and objective of MLS is described briefly. Signal modeling in MLS the optimum receiver is also included and a description of a computer oriented technique which used in the simulation study of the suboptimal receiver is provided. Results and conclusion obtained from the research for the suboptimal receiver are reported.

Descriptors: *Approach indicators, *Microwave landing systems, Multipath transmission, Optimization, Aircraft equipment, Control theory, Flight simulation, Optimal control, Signal transmission

Identifiers: *Receivers, NTISNASA

N78-32080/15T NTIS Prices: PC A04/MF A01
Optimization of MLS Receivers for Multipath Environments


Final Report:
AUTHOR: McAlpine, G. A.; Highfill, J. H. III
F 7724A Fld: 17G. 98. 85A STAR17
Jun 79 303p
Rept No: NASA-CR-158714; UVA/528062/EE79/107
Grant: N5G-1128
Monitor: 18

Abstract: The angle tracking problems in microwave landing system receivers along with a receiver design capable of optimal performance in the multipath environments found in terminal areas were studied. Included were various theoretical and evaluative studies such as: (1) signal model development; (2) derivation of optimal receiver structures; and (3) development and use of computer simulations for receiver algorithms evaluation. The development of an experimental receiver for flight testing is presented. An overview of the work and summary of principal results and conclusions are reported.


Identifiers: NTIS NASA, NTIS NSF

N79-24973/657 NTIS Prices: PC A14/MF AO1

Slotted Waveguide Shaped Beam Antenna at Ku Band

Rome Air Development Center Griffiss AFB NY (309050)

Rept. for 1 Nov 75-31 Aug 77
AUTHOR: McGahan, Robert V.
EOO1593 Fld: 9E. 17G. 49A, 85A GRI7801
Jun 77 18p
Rept No: RADC-TR-77-205
Project: 4600
Task: 16
Monitor: 18

Abstract: A Ku band slotted waveguide antenna having a cosecant squared radiation pattern is described. The antenna was designed and constructed by means of a method utilizing displaced, inclined, shunt slots in the broad face of WR 62 waveguide. A gain of 12 dB at 15.84 GHz was measured, with crosspolarization rejection of 20 dB. Design equations and curves are included. (Author)


Identifiers: Cosecant squared patterns, *Microwave antennas, NTIS5000A

AD-A045 586/657 NTIS Prices: PC A02/MF AO1

Far Field Monitor for Instrument Landing Systems

Westinghouse Electric Corp Baltimore MD-Federal Aviation Administration, Washington, DC. Systems Research and Development Service (375500)

Interim rept on Phases I and 2
AUTHOR: More, R.; Bradley, J. C.; Newman, B.
G07448E Fld: 17G. 85A GRA18001
Nov 75 31p
Contract: DOT-FA76WA-369
Monitor: FAA-RD-79-70

Abstract: This report describes a study performed to determine the nature of scattering of ILS radiated signals by objects on the airport property. These objects included taxiing and overflying aircraft. The interaction of this scattered energy with the direct radiation was studied to determine the derrogating effects of ILS guidance. This resulted in the development of four system level concepts for detecting glide path derogation. One technique, the vector DDM, was selected as being most practical from a sensitivity, reliability, and cost point-of-view. (Author)

Descriptors: *Microwave landing systems, *Monitors, Glide slope, Operational effectiveness, Degradation, Microwaves, Scattering, Monitoring, Far field

Identifiers: Localizers, Derogation, Instrument landing systems, NTIS5000X, NTIS5001FAA

AD-A079 663/1 NTIS Prices: PC A14/MF AO1
Comparative Study of Flare Control Laws

Old Dominion Univ., Norfolk, VA.


AUTHOR: Nadeau, A. A.; Braedlove, W. J. Jr

FO983A Fld: 17G. 10. 18, 518, 85A STAR1708

Feb 79 72p

Rept No: NASA-CR-158114

Grant: NSG-1480

Monitor: 18

Abstract: A digital 3-D automatic control law was developed to achieve an optimal transition of a B-737 aircraft between various initial glide slope conditions and the desired final touchdown condition. A discrete, time-invariant, optimal, closed-loop control law presented for a linear regulator problem, was extended to include a system being acted upon by a constant disturbance. Two forms of control laws were derived to solve this problem. One method utilized the feedback of integral states defined appropriately and augmented with the original system equations. The second method formulated the problem as a control variable constraint, and the control variables were augmented with the original system. The control variable constraint control law yielded a better performance compared to feedback control law for the integral states chosen.

Descriptors: Approach control, Automatic landing control, Glide path, Air traffic control, Boeing 737 aircraft, Terminal configured vehicle program, Aircraft landing, Digital navigation, Mathematical models, Microwave landing systems, Noise reduction, Wind profiles

Identifiers: NTISNASA

N79-16822/551 NTIS Prices: PC A04/ MF A01

Interference Analysis between TRSB Microwave Landing System and Adjacent C-Band Radars

IIIF Research Inst Annapolis Md (1/5/70)

Final rept

AUTHOR: Nanda, Ved

EO78103 Fld: 1E, 9C, 17G, 17l, 49, 85A. 63H GRA17809

Feb 76 65p

Contract: FA9628-76-C-0017, 001 TA109A1-175

Project: 649E

Monitor: ECAS-PR-76-004

Abstract: The Electromagnetic Compatibility between the Time Reference Scanning Beam (TRSB) Microwave Landing System (MLS) and adjacent C-band radar systems is investigated. Distance constraints required for compatible operation between these systems are established for the three proposed MLS plans of frequency assignment. An addendum to this report contains the data pertaining to those radars with classified characteristics. NOTE: This report considers the TRSB MLS design as it was at the time the study was done. Since that time, a number of design changes have been made. These changes are not addressed in the report. (Author)

Descriptors: Microwave landing systems, Radar interference, Electromagnetic compatibility, C Band, Aircraft landings, Aviation safety, Meteorological radar, Search radar, Height finding, Emission spectra, AN/TPS-40, AN/SPS-10, AN/AVS-10, Sensitivity, Range, Distance

Identifiers: AN/TPS-40, NTISDOOXA, NTISDOF1AA

AD-A049 882/4ST NTIS Prices: PC A04/MF A01
Development Program Advanced Integrated Landing System (AILS)

Airborne Instruments Lab, Deer Park, N.Y. (014700)

Final rept.  
AUTHOR: O'Connor, John L.  
A3014H1  File: 17G, 1B, 5IF  GRA17122  
Feb 68  175p  
Contract: FA-WA-4816  
Project: ALL-2209, FAA-320-204-01W  

Abstract: The report describes the design, development, and field and flight tests of an all-weather landing system developed for the FAA. This system, which uses scanning microwave antennas, provides precision azimuth, elevation, and range guidance information to equipped aircraft, and also provides aircraft space position information to a ground monitor radar console. This report provides basic design information on the system and the various units that make up the system. A description of the delivered equipment is also presented. Various tests that were conducted with the equipment, in order to indicate conformity with the contract specification, are also described. The report concludes that the objectives of the development and test program to provide highly accurate space position data for guidance and control of approaching and landing aircraft to touchdown were met. It recommends that more extensive accuracy tests be conducted, that operational tests be started, and that further system analysis be performed, and that specifications be prepared and procurements be initiated for ‘next generation’ equipments.  


Identifiers: AILS (Advanced Integrated Landing System). Advanced integrated landing system

AD-730 523  NTIS Prices: PC A09/MF A01

Development Program Advanced Integrated Landing System (AILS)

Airborne Instruments Lab., Deer Park, N.Y.  
AUTHOR: O'Connor, J. L.  
A3538L1  File: 17G, 1B, 5IF  STAR022  
Sep 71  180p  
Contract: DOT-FAMA-4616  

Abstract: The report describes the design, development, and field and flight tests of an all-weather landing system developed for the FAA. This system, which uses scanning microwave antennas, provides precision azimuth, elevation, and range guidance information to equipped aircraft, and also provides aircraft space position information to a ground monitor radar console. This report provides basic design information on the system and the various units that make up the system. A description of the delivered equipment is also presented. Various tests that were conducted with the equipment, in order to indicate conformity with the contract specification, are also described. The report concludes that the objectives of the development and test program to provide highly accurate space position data for guidance and control of approaching and landing aircraft to touchdown were met. It recommends that more extensive accuracy tests be conducted, that operational tests be started, and that further system analysis be performed, and that specifications be prepared and procurements be initiated for ‘next generation’ equipments.  


Identifiers: IMPAT diodes. Microwave landing systems. FAA

AD-772 770/4  NTIS Prices: PC A09/MF A01
Control-Display Testing Requirements Study. Volume I

Boeing Commercial Airplane Co Seattle Wash (390145)

Final rept., 24 Jan-24 Aug 72
AUTHOR: Parks, D. L.; Fadden, D. M.; Fries, J. R.
C075341 Fld 71G, 51F GRA17311
Jan 73 135p
Rept No: D6-80162
Contract: F33615-72-C-1663
Project: AF-404L
Monitor: AFDL-TR-121-Vol-1
See also Volume 2, AD-758,792.

Abstract: Control-display test development requirements are defined for the microwave landing system portion of the Air Force Advanced Landing System Program. Included are individual test plans, a test integration plan, and program schedules. The approach to deriving test requirements is outlined, including results of surveys and analyses covering the microwave landing system, Air Force users, and landing display systems, and the system analyses to define basic data requirements and to collate system user data based on functional flows and action-information requirements. Details of plan development and supporting data are presented as reference material for use in subsequent test design and test program, conduct and for trade data to support on-line decisions. (Author)


Identifiers: Microwave landing systems. AF
AD-758 792 NTIS Prices: PC AO9/MF AO1

Control-Display Testing Requirements Study. Volume II

Boeing Commercial Airplane Co Seattle Wash (390145)

Final rept., 24 Jan-24 Aug 72
AUTHOR: Parks, D. L.; Fadden, D. M.; Fries, J. R.
C075342 Fld 71G, 51F GRA17311
Jan 73 133p
Rept No: D6-80162-1
Contract: F33615-72-C-1663
Project: AF-404L
Monitor: AFDL-TR-121-Vol-2
See also Volume 1, AD-758,791.

Abstract: As an appendix to volume 1 of the Control-Display Testing Requirements Study, this report contains two appendices relevant to control display-plnnt factor testing for the Air Force in the Microwave Landing System (MLS) Program. Appendix 1: Facilities. Facility resource summaries covering resources available or negotiable for Air Force use in the MLS test program, and Appendix 2: Derivation of Action-Information Requirements. These requirements are based on a systems analysis covering approach functions, required actions, and resulting information requirements. (Author)

Descriptors: (+Microwave equipment, Test methods). (+Terminal flight facilities. +Glide path systems). Radar landing control. Distance-measuring equipment. Display systems. Pulse communication systems. Test facilities. Doppler systems. Ground support equipment

Identifiers: Microwave landing systems. AF
AD-758 792 NTIS Prices: PC AO9/MF AO1
GROUND-BEacon ANTENNAS FOR MONITOR DISPLAY SYSTEM

Bendix Corp Southfield Mich (000000)

Final rep
AUTHOR: Peace, G. M.; Jacobie, W. G.; Horton, M. C.
7744J USGDRS0508
Oct 64 2p
Contract: DA44559
Project: 114 140
Monitor: 520S-R0-64-102

Abstract: The results of a development program directed toward
our design of improved ground-beacon antennas for use with an
airborne monitor display system are presented. Design goals
for the ground-beacon antennas are postulated to provide
sufficient energy coverage in the runway approach corridor
while minimizing energy in directions easily intercepted by
reflecting obstacles. Synthesis technique studies were
conducted to permit the calculation of an antenna aperture
distribution required to radiate a shaped beam pattern. A
synthesized aperture distribution was realized by employing
complex slots in the broad face of rectangular waveguides.
Experimental measurements verified the antenna design
techniques. The improved ground-beacon antenna was realized
by utilizing the complex-slotted waveguide array as a feed for
a parabolic cylindrical reflector and as the basic element of
a planar array. Flight test results established the
improvement of these shaped-beam antennas over the previous
antennas used as ground beacons. (Author)

Descriptors: (+ANTENNAS, LANDING AIDS), (+RUNWAYS, BEACONS), (+BEACONS, ANTENNAS), (+DISPLAY SYSTEMS, MONITORS), GROUND-CONTROLLED APPROACH RADAR, WAVEGUIDE SLOTS, MICROPHONE EQUIPMENT, ELECTROMAGNETIC WAVES, ANTENNA CONFIGURATIONS, ANALOG COMPUTERS, DIGITAL COMPUTERS, INTEGRAL TRANSFORMS, FOURIER ANALYSIS, BEAMS (ELECTROMAGNETIC), PARABOLIC ANTENNAS, AIRBORNE, DESIGN

Identifiers: MICROVISION, FOURIER INTEGRAL ANALOG COMPUTER

AD-611 811 CFIST Price: PC A02

Digital Recording and Processing of Doppler Microwave Landing System Data

Royal Aircraft Establishment Farnborough (England):Defence
Research Information Centre, Melton (England). (310450)

Technical memo.
AUTHOR: Peake, G. E. J.
CS503.1 Fld: 176, 89 A GRAI7526
Sep 74 31p
Rept No: RAF-TM-RAD-1063

Abstract: the feasibility demonstration stage in the
development of the Doppler Microwave Landing System to meet
the ICAO OR involves the collecting and processing during the
9 month trials period of a large amount of data. A description
is given of the effect of the various decisions made to ensure
satisfactory collection, treatment and presentation of the
trials results together with the necessary systems
descriptions. Most of the DMLS information is in digital form
as is the position reference information derived from
kinetometers. One hundred hours flying consisting of some
500 runs is planned.

Descriptors: Microwave landing systems, Doppler systems,
Digital systems, Digital recording systems, Data processing,
Great Britain, Data acquisition

Identifiers: NTIS0050
AD-A016 385/7ST NTIS Prices: PC A03/MP A01

Hughes Aircraft Co., Fullerton Calif. (172-350)

Technical rept. 6 Mar - 6 Oct 73

AUTHOR: Pico, Louis

C737272 Cpl: 1C, 178, 3IC GRA17622

Apr 74 252p

Rept No: FR-74-16-271/49098

Contract: F33657-73-C-0664

Monitor: ASD-TR-74-4-Vol.3-P-10

See also Volume 3, Part ll, AD-530 024L

Distribution limitation now removed.

Abstract: Direct and remote control and display of tactical RPV having onboard automatic control and remote data link control/monitor capability, utilizing ground based landing aids, suitable displays for manual override monitor and control, during the all-weather test phase has been analyzed to define an optimum launch and recovery control system. Launch and recovery concepts necessary to support the probable mechanisms envisioned for present, near-term, and future RPVs have been collected, evaluated and final recommendations made.

Descriptors: ![Remote controlled vehicles. Trade off analyses.](#)

![Launchers, Remote controlled vehicles.](#)

![Display system. Monitoring. Override control. Automatic pilots.](#)

![Landing aids, Microwave landing systems.](#)

![Mission profiles, Surveillance drones, Air strikes,](#)

![Computer graphics, Mission profiles. Flow charts](#)

Identifiers: DCDRS(Drone control and data retrieval system), Drone control and data retrieval system, Design, Drone control facilities. Rocket assisted takeoff, Glide chutes, Rogallo wings, Life cycle costing, NTISD00D0

AD-910 805/25T NTIS Prices: PC A10/MF A01

Automated Landing, Rollout, and Turnoff Using MLS and Magnetic Cable Sensors


Final Report.

AUTHOR: Pines, S.; Schmidt, S. F.; Mann, F.

EO425G4 Cpl: 17G, 1B, 76E, 51B STAR1601

Oct 77 152p

Rept No: NASA-CR-2907: AMA-77-3

Contract: NAS1-14311

Monitor: 18

Abstract: A description of the simulation program used to study the landing approach, rollout and turnoff of the B-737 100 aircraft utilizing MLS and a buried magnetic leader cable as navigation aid is presented. Simulation results are given and show the concept to be both feasible and practical for commercial type aircraft terminal area control.

Descriptors: ![Aircraft maneuver, Flight control,](#)

![Computerized simulation, Dynamic models, Approach, Computer programs, Microwave landing systems, Navigation aids.](#)

Identifiers: NTISNASA

N76-10042/7ST NTIS Prices: PC A08/MF A01

Simulation, Guidance and Navigation of the B-737 for Rollout and Turnoff Using MLS Measurements


AUTHOR: Pines, S.; Schmidt, S. F.; Mann, F.

C63904K2 Cpl: 17G, 76E, 85A ST R1413

Dec 75 58p

Rept No: NASA-CR-144959: AMA-75-40

Contract: NAS1-13746

Monitor: 18

Abstract: A simulation program is described for the B-737 aircraft in landing approach, a touchdown, rollout and turnoff for normal and CAT III weather conditions. Preliminary results indicate that microwave landing systems can be utilized in place of instrument landing systems landing aids and that a single magnetic cable can be used for automated rollout and turnoff. Recommendations are made for further refinement of the model and additional testing to finalize a set of guidance laws for rollout and turnoff. (Author)

Descriptors: ![Boeing 737 aircraft, Flight simulation,](#)

![Microwave landing systems, Aircraft landing, Automatic landing control, Guidance (Motion), Navigation aids.](#)

Identifiers: NTISNASA

N76-22179/5ST NTIS Prices: PC A04/MF A01
Propeller Modulation Effects on a Scanning Beam Microwave Landing System

National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

AUTHOR: Pope, W. M.; Stehue, W. H.
C572184  Fd 17G, 760  STAB1221
Jul 74  42p
Report: NASA-TR-X-62368
Monitor: 6

Abstract: An investigation to assess the modulation effects on microwave signals transmitted through rotating propeller blades. Interruption of the antenna line-of-sight signal by the rotating propeller causes a variation of path loss, which produces essentially an amplitude modulation of the received signal. This interruption or blockage effect is generally only partial because of edge diffraction around the particular interfering propeller blade. Signals reflected from the rotating propeller will also cause Doppler frequency shifts to be present in the received signals for display. The effects of propeller modulation were studied by varying the following parameters: (1) spacing between propeller and receiving antenna, (2) propeller dimensions, (3) propeller speed (rpm), (4) number of propeller blades, (5) system data rate, (6) receiver response time, and (7) receiver antenna aperture. (Author)


Identifiers: NTISNASA
NT4-31617/557 NTIS Prices: PC A03/MF A01

The Effects of Stability Augmentation on the Gust Response of a STOL Aircraft During a Curved Manual Approach

Air Force Flight Dynamics Lab Wright-Patterson AFB Ohio  (012070)

Final rept. Jun 71-May 75
AUTHOR: Porter, Milton B.
C5221C1  Fd 200, 18, 1C, 51B  GAI7522
Jun 75  228p
Report: AFFDL-TR-75-63
Project: AF-8219, AF-1986
Task: 126602
Monitor: 18

Doctoral thesis

Abstract: The multiple precision approach paths which are possible with microwave landing systems pose new lateral separation problems for the simultaneous optimum curved approach trajectories. Separation criteria for these new multiple paths will be influenced by aircraft path tracking performance. Manually piloted STOL aircraft will be particularly sensitive to atmospheric turbulence during precision tracking. In this study a parametric variation of the open loop poles of a STOL aircraft was made using stability augmentation system (SAS) gains, and the gust response of the manually piloted aircraft was analyzed at points on an MLS approach path. The study was reduced to two quadratic optimal control problems for linear infinite time stochastic systems: (1) to compute the SAS gains using a rate model in the performance index, pole placement algorithms, and (2) to calculate the pilot gains and system gust response using a quadratic optimal pilot model. Both the SAS and pilot gains calculation yielded reasonable low gains for all cases, and the four lateral directional poles and the longitudinal short period poles could be placed accurately. The most significant improvement in lateral error was achieved by increasing roll stability. The variation in lateral path error with bank angle was also significant and the nature of the variation was strongly influenced by the specific augmented poles. There was a conflict between good conventional flying qualities and optimum gust response since increased Dutch roll frequency yielded the greatest reduction in the objectionable lateral and directional modes coupling while increasing the lateral gust response error.


Identifiers: Stability augmentation system, SAS (Stability augmentation system), NTIS0000X, NTIS0000Ye
AD-A014 301/65T NTIS Prices: PC A11/MF A01
Precision L-Band DME Tests

Federal Aviation Administration Technical Center Atlantic City NJ
Federal Aviation Administration, Washington, DC. Systems Research and Development Service (411863)

Interim rept. May-Nov 78
AUTHOR: Pastel, Harold
O260511 Fld: 170, 85A GRA18101
Aug 80 43p
Rept No: FAA-CT-80-25
Monitor: FAA-RD-80-74

Abstract: This phase of the project was performed under Technical Program Document (TPD) 04-109, subprogram 075-725-210. The report covers the findings on system accuracy and stability of the L-Band Precision Distance Measuring Equipment (PD'ME). The results showed differences in bias under varying conditions of approaches, orbits, radials, and river runs. The 24-hour overall stability of the system was recorded. Further testing should be performed with simulators that have the desired accuracy required for testing a PD'ME system so that a baseline can be established. (Author)


Identifiers: NTIS0000X. NTISO00FAA
AD-A089 053/3 NTIS Prices: PC A03/MF A01

Definition of a Data Collection System for U.S. Army Tactical Microwave Landing System Evaluation

Stanford Research Inst Menlo Park Calif (332500)

Supplemental final rept. Mar-Sep 76
AUTHOR: Przedborski, J. H.; Stolitz, P. G.
O300561 Fld: 1B, 1E, 170, 518, 76C GRA17719
Sep 76 65p
Rept No: SRI-4462-Suppl
Contract: DAA807-75-C-0906
Monitor: ECOM-75-0906-5F
Supplement to report dated Oct 75. AD-8010 929.

Abstract: The data to be collected for flight test performance evaluation of Tactical Microwave Landing System (TMLS) by the Army is defined. Data rates, data formats, and data processing requirements are developed. Data recording options are considered and a preliminary design for a TMLS airborne data collection system is presented.


Identifiers: NTIS0000X
AD-A041 230/4ST NTIS Prices: PC A04/MF A01

Upgraded Third Generation (UG 3rd) Air Traffic Control System: Implications and Impact on General Aviation

Quinby (Gilbert F) Fort Washington Pa (40972)

Final rept.
AUTHOR: Quinby, Gilbert F.
C671363 Fld: 1B, 1E, 170, 76, 85A GRA17615
Apr 76 48p
Grant: WI-76-1453-1
Monitor: FAA-RD-76-81

Abstract: Interviews were conducted with seven General Aviation Organizations on the subject of the Upgraded Third Generation System of Air Traffic Control. Spokesmen for General Aviation had a good understanding of the functions and the characteristics of the Upgraded Third Generation ATC System, particularly in those areas of serious interest to General Aviation System Users. With a few exceptions, such as the need for improved weather detection and reporting and other flight services, it appeared that the provisions of the existing generation of Air Traffic Control is reasonably adequate to the present requirements of General Aviation Users. All spokesmen, however, anticipated substantial growth in the demands imposed on the system over the next decade and agree that some improvements in capacity and safety are needed. The report includes a series of matrices showing the degree of importance attached by each segment of General Aviation interviewed to each of the major elements of the Upgraded Third Generation Air Traffic Control System. (Author)


Identifiers: *General aviation. Upgraded third generation. NTIS0000X. NTISO00FAA. NTISO00FAA
AD-A025 236/1ST NTIS Prices: PC E02/MF A01
New Design and Operating Techniques and Requirements for Improved Aircraft Terminal Area Operations

National Aeronautics and Space Administration, Langley
Research Center, Langley Station, Va.

AUTHOR: Reeder, J. P.; Taylor, R. T.; Walsh, T. M.

C424382 Fld: 17G, 76C STAR1304
Dec 74 71g
Rept No: NASA-TM-X-72006
Monitor: 18

Conf-Presented at the 3rd Air Transportation Meeting, Dallas, 30 Apr. - 2 May 1974.

Abstract: Current aircraft operating problems that must be alleviated for future high-density terminal areas are safety, dependence on weather, congestion, energy conservation, noise, and atmospheric pollution. The Microwave Landing System (MLS) under development by FAA provides increased capabilities over the current ILS. The development of the airborne system's capability to take maximum advantage of the MLS capabilities in order to solve terminal area problems are discussed. A major limiting factor in longitudinal spacing for capacity increase is the trailing vortex hazard. Promising methods for causing early dissipation of the vortices were explored. Flight procedures for avoiding the hazard were investigated. Terminal configured vehicles and their flight test development are discussed. (Author)

Descriptors: Microwave landing systems, Operational problems, Terminal facilities, Air pollution, Aircraft safety, Energy conservation, Instrument landing systems, Noise reduction

Identifiers: NTIS/NASA

NTIS-12911/4ST NTIS Prices PC A04/MF A01
Potential Interference to 6 cm CONUS Radio Astronomy Observatories from MLS C-Band A/G DME

IIT Research Inst Annapolis Md (175300)

Final rept.
AUTHOR: Rocca, R. P. Jr
E242262 Fid: 38, 176, 178, 54C GRA7823
Jun 78 70p
Contract: F19628-78-C-0006, DOT-FATWA1-175
Monitor: FAA-RD-77-111

Abstract: An analysis was performed to determine the potential for interference to radio astronomy observatories operating in the band 4.99-5.00 GHz from the C-band DME (air-to-ground) associated with the Time Reference Scanning Beam Microwave Landing System, as a function of proposed MLS DME frequency assignment plans. (Author)


Identifiers: NTIS00DXA. NTIS00FAA

AD-4057 368/3ST NTIS Prices: PC A04/MF A01

Microwave Landing Guidance Systems Initial Concept Validation Tests

Ballistic Memorial Inst Columbus Ohio Columbus Labs (401817)

Final technical rept.
AUTHOR: Buck, George T.
A153223 Fid: 176, 511 USGRD7105
Dec 70 62p
Contract: F33615-70-C-1795
Project: AF-404L
Monitor: AFFDL-TR-70-156

Abstract: The report outlines in a very general sense an Air Force microwave landing guidance system concept-validation program. This is to provide the necessary background for the bulk of the report which is concerned with an identification of the critical areas of the RTCA signal format and system description, and some initial tests designed to validate some of the critical features of the RTCA format. The initial tests addressed are laboratory and field tests that can be conducted with standard laboratory equipment and/or equipment currently under procurement by AFFDL. These tests are concerned with those critical areas of the RTCA format that can be validated without flight testing and without requiring special purpose
Flight Path Control Equipment for Producing Curved Flight Path Profiles with Microwave Landing Systems

Kanen (Leo) Associates, Redwood City, Calif.

AUTHOR: Schenker, G.
C3030413 Fld: 18, 516 STAR1215
Jun 74 34p
Rept No: NASA-TF-15608: DGLR-73-016
Contract: NASA-2481
Monitor: 18


Abstract: The characteristics of a flight path control instrument for producing curved approach profiles and guidance along these profiles are presented. For safety reasons, steep noise abatement approaches must be flown along curved profiles. The problems of flyability, accuracy, and the requirements to be placed on the FFR beacon system and on the flight control system are discussed. Flight tests have shown that the techniques discussed contribute to a reduction in the burden on the pilot.


Identifiers: NASA
N74-26150/4 NTIS Prices: PC EO2/MF A01

Flight Path Control Equipment for Producing Curved Flight Path Profiles in Microwave Landing Systems Flugbahnauffahrungsgerat Zum Erzeugen Gekruegter Flugbahnprofile an Mikrowellen-Landesystemen

Bodenseewerk Geratezentrum GmbH., Ueberlingen (West Germany).

AUTHOR: Schenker, G.
C308583 Fld: 18, 516 STAR1123
1973 36p
Rept No: DGLR-PAPER-73-016
Monitor: 18

Language in German.

Abstract: The properties of a flight control display device for producing curved approach profiles, and the flight control along these profiles, are discussed in the case of a microwave instrument landing system. The problems of maneuverability, accuracy, and the stability of aircraft motions are treated, and the requirements of the glide beam system and flight control system are formulated. Flight tests have shown that the methods discussed contribute to a reduction in pilot workload.

Descriptors: +Approach, +Display devices, +Flight control, +Instrument landing systems, +Landing flight, Aircraft landing, Flight paths, Glide paths, Microwave frequencies

Identifiers: NASA
N73-32536/8 NTIS Prices: PC A03/MF A01

Navigation Systems for Approach and Landing of VTOL Aircraft


AUTHOR: Schmidt, S. F.; Mohr, R. L.
G1082L3 Fld: 17G, 76D, 51E STAR1810
Oct 79 63p
Contract: NAS2-9430

Abstract: The formulation and implementation of navigation systems used for research investigations in the V/STOLAND avionics systems are described. The navigation systems prove position and velocity in a cartesian reference frame aligned with the runway. They use filtering techniques to combine the raw position data from navails (e.g., ACAN, MLS) with data from onboard inertial sensors. The filtering techniques which use both complementary and Kalman filters, are described. The software for the navigation systems is also described.

Descriptors: +Avionics, +Digital navigation, +UH-1 helicopter, +Vertical takeoff aircraft, Aircraft landing, Approach control, Kalman filters, Microwave landing systems, Tacan

Identifiers: NASA
N80-19055/6 NTIS Prices: PC A04/MF A01
Mixed Ctol/Qtol Traffic Gelischartter Ctol/Qtol-Verkehr

Wesselsmutter-Boekow-Blaha, G.m.b.H., Ottobrunn (West Germany).

AUTHOR: Schoenberger, F.

C308262 Fld: 18 STAR1122
15 Apr 73 30p

Rept No: MB8-UH-05-73-0: DLG-PAPER-73-014
Monitor: 18

Conf: Presented at the Dglr-Dgon Symp. On Neue Anflug- und

Language in German.

Abstract: The results of the transition period when
conventional air traffic (CTOL) will be replaced by quiet
takeoff and landing (OTOL) traffic, are reviewed. The
introduction of OTOL aircraft from about the year 1978 will
entail the simultaneous operation of present CTOL and OTOL
aircraft types. The effects of this transition period, to be
felt by introduction of microwave instrument landing systems
and area navigation, are surveyed.

Descriptors: Air traffic, Area navigation, Instrument
landing systems, Forecasting, Microwave frequencies, Noise
reduction

Identifiers: NASA

N73-32525/0 NTIS Prices: PC A03/MF A01

A Theory of Scattering by Sinusoidal Metal Surfaces

Army Electronics Command Fort Monmouth N.J. (037620)

Research and development technical rept.

AUTHOR: Scherwing, F.; Whitman, G.

C30721C Fld: 2ON, 46H GRA17716
May 77 41p

Rept No: ECOM-4-496

Project: 11161102831A

Task: 01

Monitor 18

Abstract: A rigorous theory of plane wave scattering by
periodic metal surfaces is presented. The physical optics
approximation is used to determine the current distribution on
the metal surface to first order, but this approximate
distribution is modified by multiplication with a Fourier
series, whose fundamental period is that of the surface
profile (Floquet’s theorem). The coefficients of the Fourier
series are determined by invoking the condition that the field
radiated by the current distribution into the lower (shielded)
half-space cancels the primary plane wave in this space range.
The scatter problem is thereby reduced to the familiar task of

solving a system of linear equations. For certain basic types
of surface profiles, the coefficients of the linear system are
obtained in closed form (Bessel functions for the sinusoidal
profiles considered here, and exponential functions for
piecewise linear profiles). Thus, the method requires no
umerical integral evaluation and, consequently, is
computationally efficient. Since the boundary condition of
tangential electric field at the metal surface is not
utilized, the field within the grooves of the periodic scatter
need not be known—a definite advantage of the new method.

In addition to a summary of the theory, numerical results for
TE, TM, and circular polarization of the incident plane wave
are presented. (Author)

Descriptors: Electromagnetic scattering, Microwave,
Surfaces, Periodic variations, Sin waves, Metals, Harmonics,
Boundary value problems, Microwave landing systems, Roofs,
Polarization, Plane waves, Fourier analysis, Bessel functions

Identifiers: NTISDODXA

A0-A040 002/BST NTIS Prices: PC A03/MF A01
An Avionics Sensitivity Study. Volume I: Operational Considerations

Champlain Technology, Inc., West Palm Beach, Fla.


AUTHOR: Scott, R. W.; McConkey, E. D.

D3082F3 Fld: 17G, 18, 51E, 51B, 85A STAR1515

Sep 75 230p

Rept No: NASA-CR-145107

Contract: NASA-14144

Monitor: 18


Abstract: Equipment and operational concepts affecting aircraft in the terminal area are reported. Curved approach applications and modified climb and descent procedures for minimum fuel consumption are considered. The curved approach study involves the application of MLS guidance to enable execution of the current visual approach to Washington National Airport under instrument flight conditions. The operational significance and the flight path control requirements involved in the application of curved approach paths to this situation are considered. Alternative flight path control regimes are considered to achieve minimum fuel consumption subject to constraints related to air traffic control requirements, flight crew and passenger reactions, and airframe and powerplant limitations.


Identifiers: NTISNASA

N77-24082/8ST NTIS Prices: PC A11/MF A01

Effect of External Disturbances and Data Rate on the Response of an Automatic Landing System Capable of Curved Trajectories

National Aeronautics and Space Administration Langley Research Center, Langley Station, Va.

AUTHOR: Sherman, W. L.

C5555F3 Fld 17G, 01C, 76C, 51C STAR1322

Sep 75 46p

Rept No: NASA-11-79175: L-10040

Monitor: 18

Abstract. The effects of steady wind, turbulence, data sample rate, and control-actuator natural frequency on the response of a possible automatic landing system were investigated in a nonstatistical study. The results indicate that the system, which interfaces with the microwave landing system, functions well in winds and turbulence as long as the guidance law contains proper compensation for wind. The system response was satisfactory down to five data samples per second, which makes the system compatible with the microwave landing system. No adverse effects were observed when actuator natural frequency was lowered. For limiting cases, those cases where the roll angle goes to zero just as the airplane touches down, the basic method for computing the turn-algorithm gains proved unsatisfactory and unacceptable landings resulted. Revised computation methods gave turn-algorithm gains that resulted in acceptable landings. The gains provided by the new method also improved the touchdown conditions for acceptable landings over those obtained when the ga..c were determined by the old method. (Author)


Identifiers: NTISNASA

N75-31048/25T NTIS Prices: PC A03/MF A01
Preliminary Study of a Possible Automatic Landing System

National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

AUTHOR: Sherman, W. L.; Winfrey, S. W.
C351482 Fl: 176, 518, 76C, STAR1218
Jul 74 68p
Rept No: NASA-TN-D-7611: L-9246
Monitor: 16

Abstract: Navigation and control laws for a possible automatic landing system have been investigated. The system makes use of data from an inertial table and either an airborne or ground radar to generate signals that guide the airplane to a landing. All landing maneuvers take place within a zone that extends 6000 m from the touchdown point and 500 m high. The results show that the system can adequately control the airplane on steep, curved decelerating approaches to a landing that takes place with small errors from the desired landing point and desired airplane attitude. The system studied would interface well with the scanning beam microwave landing system (MLS). The use of this system with the MLS makes it possible to incorporate an independent landing monitor. (Author)

Descriptors: +Aircraft landing, +Automatic landing control, +Terminal facilities, +Flight safety, +Inertial platforms, +Microwave frequencies, +Systems engineering

Identifiers: NTIS/NASA
N74-29119/6 NTIS Prices: PC A05/MF A01

Airport Survey for MLS Multipath Issues

Massachusetts Inst of Tech Lexington Lincoln Lab•Department of the Air Force, Washington, D.C. • Federal Aviation Administration, Washington, D.C. Systems Research and Development Service. (207650)

Project rept.
AUTHOR: Shniday, D. A.
C635551 Fl: 176, 85A GRAI7811
18 Dec 75 85p
Rept No: ATC-58
Contract: F19628-76-C-0002, DOT-FAA441-461
Monitor: FAA R0-75-195

Abstract: Eight major U.S. civilian airports were visited and data on the surface material of all sizable buildings visible from the runways were obtained. This information is catalogued herein. It is only with the aid of such information that we can address issues such as the likelihood of a system performance changes due to polarization, pattern control and coverage control. A total of 93 buildings and 123 surfaces are included and the breakdown between the various surfaces is as follows: 74 surfaces were corrugated; 17 surfaces were cinder block; 16 surfaces were brick; 9 surfaces were concrete; and 5 surfaces were smooth metal. Of the 74 corrugated surfaces 18 were of the 'flat' variety, 34 were one of five sub-categories and the remaining 22 needed another 15 sub-categories for classification.

Descriptors: +Microwave landing systems, +Multipath transmission, +Airports, +Buildings, +Surfaces, +Performance(Engineering), +Surveys

Identifiers: NTISDOOFAA, NTISDOOFAA, NTISDOOFAA
AD-A022 937/75 T NTIS Prices: PC A05/MF A01
The Logan MLS Multipath Experiment

Massachusetts Inst of Tech Lexington Lincoln Lab Federal Aviation Administration, Washington, D.C. Systems Research and Development Service. (207650)

Project rept.

AUTHOR: Shnidman, D. A.
CS572U3 Fld: 1E, 17G, 2ON, 85A, 760 GRAI7601
23 Sep 75 900
Rept No: ATC-55
Contract: F19628-76-C-0002, DDT-F4744AI-461
Monitor: FAA-RO-75-130

Abstract: The National Plan for a Microwave Landing System (MLS) has specified a carrier frequency for the system in the vicinity of 5.1 GHz. At that frequency, no multipath data taken at a major civilian airport existed. The purpose of this experiment was to obtain such data at Logan International Airport in order to ascertain: (1) whether or not the reflections from these objects can be satisfactorily simulated by the Lincoln computer model and, if so, how complicated must that model be, and (2) if the characteristics of multipath provide a significant discriminant between the Doppler and scanning beam techniques. It was found in the experiment that regions where reflections were noted could be predicted from ray optics and diffraction. No measurable reflections were noted elsewhere. For the purpose of modeling for multipath, building surfaces could be characterized as a flat plate with a reflection coefficient determined by measurement if it were a complicated surface, or by the dielectric properties of the surface material, if a simple surface. The airplane reflection model was also found to agree well with measurements. (Author)

Identifiers: NTIS00DXA
AD-A044 297/OST NTIS Prices: PC A05/MF A01

Microwave Landing System Utilization and Conventional Avionics

Aeronautical Systems Div Wright-Patterson AFB Ohio (008800)

Final rept. 15 Aug-1 Nov 74
AUTHOR: Showalter, Thomas W.
D3584D4 Fld: 1G, 1E, 51, 1B, 85A, 51B, 85D GRAI7724
May 76 66p

Rept No: A50-TR-76-7
Monitor: 18

Abstract: The study examined the effects of flying different microwave landing system approach profile designs with various types of conventional avionics. All the conventional systems used possessed similar limitations in that they were unable to present course guidance throughout the microwave landing system profiles. The loss of course guidance adversely affected pilot performance and, on occasion, made for unsafe conditions. (Author)

Identifiers: NTIS00DXA
AD-A044 106/3ST NTIS Prices: PC A05/MF A01

Microwave Landing System Utilization and Conventional Avionics

Aeronautical Systems Div Wright-Patterson AFB Ohio (008800)

Final rept. 15 Aug-1 Nov 74
AUTHOR: Showalter, Thomas W.
D3584D4 Fld: 1G, 1E, 51, 1B, 85A, 51B, 85D GRAI7724
May 76 66p

Rept No: A50-TR-76-7
Monitor: 18

Abstract: The study examined the effects of flying different microwave landing system approach profile designs with various types of conventional avionics. All the conventional systems used possessed similar limitations in that they were unable to present course guidance throughout the microwave landing system profiles. The loss of course guidance adversely affected pilot performance and, on occasion, made for unsafe conditions. (Author)

Identifiers: NTIS00DXA
AD-A044 106/3ST NTIS Prices: PC A05/MF A01
Airborne Antenna Coverage Requirements for the TCV B-737 Aircraft

National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

AUTHOR: Southall, W. A. Jr. White, W. F.

EO92264 Fld: 9E. 17G. 49A. 85A STAR1606

Jan 78 35p

Rept No: NASA-TM-78647

Monitor: 18

Abstract: The airborne antenna line of sight look angle requirement for operation with a Microwave Landing System (MLS) was studied. The required azimuth and elevation line of sight look angles from an antenna located on an aircraft to three ground based antenna sites at the Wallops Flight Center (FPS-16 radar. MLS azimuth, and MLS elevation) as the aircraft follows specific approach paths selected as representative of MLS operations at the Denver, Colorado, terminal area are presented. These required azimuth and elevation look angles may be interpreted as basic design requirements for antenna of the TCV B-737 airplane for MLS operations along these selected approach paths.


Identifiers: Boeing 737 aircraft. NTNFSNA

N78-15325/1ST NTIS Prices: PC A03/MF A01

An RF Link Analysis of MSBLS During Alt


AUTHOR: Spur, R. E. D04412 Fld: 17G. 76C. 85A. 84E STAR1424

5 Sep 75 35p

Rept No: NASA-CR-151019; REPT-1.3-DT-CO303-009

Contract: N59-13970

Monitor: 18

Abstract: An analysis of the microwave scanning beam landing system (MSBLS) ground station to orbiter radio frequency (RF) link was made to determine if the expected signal levels will be compatible with orbiter receiver capabilities. Of primary interest was whether or not loss of data will occur due to Interference caused by the orbiter 101 nose boom which provides additional air data during the approach and landing test. The results of the analysis indicate that a small amount of data loss may occur due to the proximity of the MSBLS antennas and the nose boom. Tabulated data of antenna radiation patterns are given. (Author)


Identifiers: NTNFSNA

N76-33863/2ST NTIS Prices: PC A03/MF A01

Analysis of Army Operational Requirements for the Tactical Microwave Landing System

Stanford Research Inst Menlo Park Calif. (272 500)

Final report: Jun-Oct 75

AUTHOR: Stoltz, P. G. Priedeigelt, J. H. D0271F1 Fld: 17G. 76G. 85A GRAI7702

Oct 75 87p

Contract: DAAB07-75-C-0906

Project: SRL-4462

Monitor: ECOM-75-0906-F

Distribution limitation now removed.

Abstract: A definitive set of test requirements are developed for the U.S. Army evaluation of the Microwave Landing System (MLS). The approach taken is to (1) compare the 1980-1990 operational requirements to the FAA Engineering requirements for the tactical MLS configuration. (2) recommend specific tests to be made by the Army during the MLS Phase-3 evaluation. (3) review of five computer models for suitability to calculate MLS guidance accuracy in a multipath propagations environment. (Author)


Identifiers: Operational requirements. Air space. NTIS000010

AD-8010 929/BST NTIS Prices: PC A05/MF A01
Simulation of an Automatically-Controlled STOL Aircraft in a Microwave Landing System Multipath Environment

National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

AUTHOR: Toda, H.; Brown, S. C.; Burrous, C. N.

DISTRIBUTION: Fd: 17G, 85A, 760 STAR1502

Jul 76 42p

Rept No: NASA-TM-X-73154; A-6693

Monitor: 18

Abstract: The simulated response is described of a STOL aircraft to Microwave Landing System (MLS) multipath errors during final approach and touchdown. The MLS azimuth, elevation, and DME multipath errors were computed for a relatively severe multipath environment at Crissy Field California, utilizing an MLS multipath simulation at MIT Lincoln Laboratory. A NASA/Ames six-degree-of-freedom simulation of an automatically-controlled demauland C-130A STOL aircraft was used to determine the response to these errors. The results show that the aircraft response to all of the Crissy Field MLS multipath errors was small. The small MLS azimuth and elevation multipath errors did not result in any discernible aircraft motion, and the aircraft response to the relatively large (200-ft (61-m) peak) DME multipath was noticeable but small. (Author)

Descriptors: Microwave landing systems, Microwave approach spacing, Aircraft landing, Instrument landing systems

Identifiers: NTISNASA

N75-32084/65T NTIS Prices: PC A10/MF A01

Models for Estimating Runway Landing Capacity with Microwave Landing System (MIL)

California Univ., Berkeley, Institute of Transportation and Traffic Engineering.

AUTHOR: Todic, V.; Moronoff, R.

DISTRIBUTION: Fd: 17G, 01B, 76C, S1C STAR1323

Sep 75 204p

Rept No: NASA-CR-137746

Grant: NCG-2046

Monitor: 18

Abstract: A model is developed which is capable of computing the ultimate landing runway capacity, under MLS and ILS conditions, when aircraft population characteristics and air traffic control separation rules are given. This model can be applied in situations when only a horizontal separation between aircraft approaching a runway is allowed, as well as when both vertical and horizontal separations are possible. It is assumed that the system is free of errors. That is, that aircraft arrive at specified points along the prescribed flight path precisely when the controllers intend for them to arrive at these points. Although in the real world there is no such thing as an error-free system, the assumption is adequate for a qualitative comparison of MLS with ILS. Results suggest that an increase in runway landing capacity, caused by introducing the MLS multiple approach paths, is to be expected only when the aircraft population consists of aircraft with significantly differing approach speeds and particularly in situations when vertical separation can be applied. Vertical separation can only be applied if one of the types of aircraft in the mix has a very steep descent angle. (Author)

Descriptors: Microwave landing systems, Aircraft approach spacing, Aircraft landing, Instrument landing systems

Identifiers: NTISNASA

N77-11063/3ST NTIS Prices: PC A03/MF A01
The Effect of Landing System Coverage and Path Geometry on Lateral Position Errors at the Runway Threshold

National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

AUTHOR: Vicroy, D. D.

E229334 FL 176. 1E, 85A STAR1618

Jun 78 25P

Rept No: NASA-TM-78744

Monitor: 18

Abstract: The results of an analytical study performed to determine the effect of the azimuth coverage of a Microwave Landing System (MLS) on the ability of an airplane, with an initial navigation position estimate error, to navigate to the runway threshold are presented. The test path chosen for this study consists of an initial straight segment leading into a 130 deg turn with a 2286 m radius and ending in a straight-in final approach segment. The test path configuration was varied by changing the MLS azimuth coverage angle and the final approach length. The aircraft was positioned with an initial offset to the left or right of the desired path along the line of intersection with the MLS azimuth coverage. A fast time computer simulation program, using a simplistic point mass model of the airplane, was used for this study. The data from this study indicates that the lateral position errors at the runway are primarily a function of the final approach length. The effect of the azimuth coverage on the lateral position errors was restricted by the turn characteristics of the horizontal steering control laws.


Identifiers: NTIS/NASA

N78-27100/45T NTIS Prices: PC A02/AF A01

 FAA National Microwave Landing System Development. NELC has studied the electronic pitch stabilization method proposed by Lit Lilfin and determined the stabilization errors resulting from it. The method is shown to have significant errors. It cannot uniformly correct for the errors caused by ship motion over the entire system coverage volume. Residual error after pitch compensation: a function of aircraft position, elevation antenna offset, and selected pitch compensation angle causes the aircraft to approach the carrier via an undulating path. Residual errors can be reduced by changing the Lilfin pitch angle, but they remain significant (Author)


Identifiers: MLS (Microwave Landing Systems). Microwave landing systems. NTIS/0001

AD-782 352/9 NTIS Prices: PC A03/MF A01

Doppler Microwave Landing System Electronic Pitch Stabilization

Naval Electronics Lab Center San Diego Calif (403940)

Technical document

AUTHOR: Wagner, R. J.

C325483 FL 176. 18, 76C, 518 GRAI7419

Jun 74 37p

Rept No: NELC-70-323

Project: WFL/211/001. XF21-232

Task: XF21-232-017, 64

Monitor: 18

Abstract: As part of the Navy R and D effort in support of the
Trials of the Doppler Microwave Landing System at Manchester International Airport. October/November 1977

Royal Aircraft Establishment, Farnborough (England).

Rept No: RAE-TR-78144; BR67351
Monitor: IB Sub-Sponsored by Min. Of Defence

Abstract: Tests performed at Manchester to determine the multipath environment are described. High levels of azimuth system multipath were found close to the runway threshold but azimuth systems with as small an aperture as 20 wavelengths (1.2 m) gave the equivalent of ILS Category III accuracy. No isolated sources of elevation multipath were found and a 39 wavelength aperture system (2.3 m) gave the equivalent of ILS Category III accuracy for 3 deg approaches. The coverage requirement of 20 n mile range and = 0 deg azimuth was achieved at heights sufficient to give clear line of sight, but at elevation angles below about 1.5 deg, shadowing caused signal loss and large errors. Autolands were demonstrated using the 54 wavelength aperture systems. No specifically technique related effects were seen and the results are regarded as representative of typical C-band MLS performance.

Descriptors: Microwave landing systems, Aircraft landing, Doppler effect, Performance tests, Air traffic control, Aircraft safety, C band, Great Britain, Instrument landing systems, Multipath transmission

Identifiers: NTISNASAE, NTISFMAK

N79-32195/6 NTIS Prices: PC A07/MF A01

Trials of the Doppler Microwave Landing System at Manchester International Airport October/November 1977

Royal Aircraft Establishment, Farnborough (England)-Defence Research Information Centre, Orpington (England) (310450)

Technical rept.

AUTHOR: Walker, D. F19255H Fld: 17G, 1E, 85A GRAI7922 Nov 78 131p
Rept No: RAE-TR-78144
Monitor: DRIC-IR-67351

Abstract: This report describes tests performed at Manchester to determine the multipath environment at the airport, and to assess the accuracy and coverage of the Doppler Microwave Landing System in this environment. High levels of azimuth system multipath were found close to runway threshold but
Test and Evaluation of Texas Instruments Small Community Microwave Landing System

National Aviation Facilities Experimental Center Atlantic City NJ Federal Aviation Administration Washington, DC Systems Research and Development Service (240550)

Final rept. Feb 77-Aug 78
AUTHOR: Warren, John
G2801G2 Fld: 17G. 85A GRI8101
May 80 169D
Rept No: FAA-NA-79-34
Monitor: FAA-RD-80-49

Abstract: The purpose of this program was to test the Texas Instruments (TI) model of time reference scanning beam (TRSB) known as the 'Small Community Airport Microwave Landing System' (SCAMLS) for conformance with the contractual proportional coverage and accuracy specifications. The SCAMLS is a prototype system intended to provide approach and landing guidance in a low-cost package to relatively low-density, short-runway feeder and general aviation airports. Flight and static tests determined the azimuth and elevation angular errors of the system. Results indicate that the guidance signals from the TI SCAMLS were within contractual specifications. (Author)


Identifiers: TRSB(Time Reference Scanning Beam), Angular errors, Elevation errors, GIPG(Glide Path Intercept Point), Small airports, NTISDOOAX. NTISD00TFAA

AD-AOBB 852/9 NTIS Prices: PC A08/MF A01

Air Traffic Control

Massachusetts Inst of Tech Lexington Lincoln Lab (207650)

Quarterly technical summary 1 Feb-30 Apr 72
AUTHOR: Weiss, Herbert G.
A4761C4 Fld: 17G. 17I. 51F GRI7216
15 May 72 16D
Contract: F19628-70-C-0230
Project: AF-649L
Monitor: ESD-TR-72-86
See also report dated 15 Feb 72. AD-740 877.

Abstract: The report summarizes the progress on the Air Traffic Control tasks. The principal effort was directed toward reaching a status which will permit the presentation of tentative conclusions and reports because several of the tasks must be terminated in FY 72. The radar MTI study effort will continue under FAA sponsorship, and the analysis of microwave landing guidance systems will be maintained for the Air Force. Discussions are underway concerning the scope and level of future Air Force-supported effort on airborne graphical displays and CNI system performance analysis. (Author)

Descriptors: *Air traffic control systems, *Doppler radar. Moving target indicators. Display systems. Multipath transmission

Identifiers: Microwave landing systems

AD-744 826 NTIS Prices: PC A02/MF A01
Flight Performance of the TCV B-737 Airplane at Jorge Newberry Airport, Buenos Aires, Argentina Using TRSB/MLS Guidance

National Aeronautics and Space Administration, Langley Research Center, Langley Station, VA.

AUTHOR: White, W. F.; Clark, L. V.

GO055C4 Fld: 17G, 5B, 85A, 51B STAR1809

Jan 80 41p

Rept No: NASA-TM-80223

Abstract: The flight performance of the Terminal Configured Vehicle airplane is summarized. Demonstration automatic approaches and landings utilizing time reference scanning beam microwave landing system (TRSB/MLS) guidance are presented. The TRSB/MLS was shown to provide the terminal area guidance necessary for flying curved automatic approaches with final legs as short as 2 km.


Identifiers: NTISNASA

N80-18021/9 NTIS Prices: PC A03/MF A01

Flight Test Demonstration of Selected Curved-Segmented Approach Paths Based on Microwave Landing System Guidance

Air Force Flight Dynamics Lab Wright-Patterson AFB Ohio

Final rep. Jul-Oct 75

AUTHOR: Wyatt, J.; Eastman, D.

C6783L3 Fld: 17G, 85A GRA17416

Jan 76 140p

Rept No: AFFDL-TR-76-43

Monitor: 18

Abstract: The report contains aircraft and pilot performance parameters, such as aircraft tracking errors, response characteristics, and pilot acceptance for eight representative Microwave Landing System Profiles. The USAF T-39 aircraft was capable of flying fully coupled and automatic curved and segmented approaches using MLS position information. The nature of the testing was designed to demonstrate an inherent MLS capability and trend rather than to provide a great amount of statistical data on the feasibility or acceptability of certain curved or segmented approaches. It is concluded from the flight test data gathered at AFEC, Atlantic City, N.J., that the selected Microwave Landing System can be used to generate sufficient and accurate airborne data to safely perform curved and segmented approaches to landing.


Identifiers: Time referenced scanning beams. NTISDOOA

AD-A025 501/85T NTIS Prices: PC A07/MF A01
Mls Airborne Antenna Research

Ohio State Univ., Columbus. ElectroScience Lab.

AUTHOR: Yu. C. L.; Burnside, W. D.
C575582 Fld: 09E, 49A STAR1401
May 75 57p
Rept No: NASA-CR-145393; SAR-2902-22
Contract: NGL-36-002-138
Monitor: 18

Abstract: The geometrical theory of diffraction was used to analyze the elevation plane pattern of on-aircraft antennas. The radiation patterns for basic elements (infinitesimal dipole, circumferential and axial slot) mounted on fuselage of various aircrafts with or without radome included were calculated and compared well with experimental results. Error phase plots were also presented. The effects of radiation patterns and error phase plots on the polarization selection for the Mls airborne antenna are discussed. (Author)


Identifiers: NTISNASA

N76-10378/75T NTIS Prices: PC A04/MF A01

Research on Mls Airborne Antenna

Ohio State Univ., Columbus. ElectroScience Lab.

AUTHOR: Yu. C. L.; Burnside, W. D.
C683583 Fld: 09E, 49A STAR1412
Apr 76 52p
Rept No: NASA-CR-146844; SAR-2902-23
Contract: NGL-36-008-138
Monitor: 18
Misc-Original Contains Color Illustrations.

Abstract: Numerical solutions for the radiation patterns of antennas mounted on aircraft are developed. The airborne antenna problem associated with the Microwave Landing System (MLS) are emphasized. Based on the requirements of the MLS, volumetric pattern solutions are essential. Previous attempts at solving for the volumetric patterns were found to be far too complex and very inefficient. However as a result of previous efforts, it is possible to combine the elevation and roll plane pattern solutions to give the complete volumetric pattern. This combination is described as well as the aircraft simulation models used in the analysis. A numerical technique
Volumetric Pattern Analysis of Fuselage-Mounted Airborne Antennas

Ohio State Univ., Columbus. ElectroScience Lab.
Ph.D. Thesis.
AUTHOR: Yu, C. L.
C0891034 FID: 0E4.178.49A.45B STAR1413
Apr 76 200p.
Rept No: NASA-CR-147099; TR-2902-24
Contract: NGL-36-008-13B
Monitor: 18

Abstract: A volumetric pattern analysis of fuselage-mounted airborne antennas at high frequencies was investigated. The primary goal of the investigation was to develop a numerical solution for predicting radiation patterns of airborne antennas in an accurate and efficient manner. An analytical study of airborne antenna pattern problems is presented in which the antenna is mounted on the fuselage near the top or bottom. Since this is a study of general-type commercial aircraft, the aircraft was modeled in its most basic form. The fuselage was assumed to be an infinitely long perfectly conducting elliptic cylinder in its cross-section and a composite elliptic cylinder in its elevation profile. The wing, cockpit, stabilizers (horizontal and vertical) and landing gear are modeled by N-sided bent or flat plates which can be arbitrarily attached to the fuselage. The volumetric solution developed utilizes two elliptic cylinders, namely, the roll plane and elevation plane models to approximate the principal surface profile (longitudinal and transverse) at the antenna location. With the help of coordinate system transformations, the solution can be used to predict the volumetric patterns of airborne antennas in an accurate and efficient manner. Applications of this solution to various airborne antenna problems show good agreement with scale model measurements. Extensive data are presented for a microwave landing antenna system. (Author)

Descriptors: *Antenna radiation patterns. *Commercial aircraft
Mathematical models. Microwave landing systems. Numerical
analysis. Scale models

Identifiers: *Aircraft antennas. NTISNASA
N78-22419/5ST NTIS Prices: PC AO9/MF A01
An Overview and Assessment of Plans and Programs for the Development of the Upgraded Third Generation Air Traffic control System

Witze Corp. McLean Va + Federal Aviation Administration, Washington, D.C. Office of Systems Engineering Management (402364)
C4625K Fld; 17G, 85A+ GRA17513
Mar 75 227p
Rept No: N73-237-Rev-1
Contract: DOT-FA07WA-2448
Monitor: FAA-EM-75-5

Abstract: The document presents information on the scope, rationale, costs, schedules, and possible benefits of the air traffic control system being developed for operational use in the 1980’s and well into the 1990’s. The ATC system currently in use, the Third Generation ATC System, is described and the need for improvements are identified. The goals and objectives of the upgraded Third Generation System (UG3RD) are discussed. Forecasts of future air traffic through 1975 are shown. The fact that the need for development of the major features of the UG3RD is relatively independent of forecasts of traffic growth is shown. The nine major features of the UG3RD are discussed in some length including need, objectives, technical description, benefits, major issues, implementation considerations, benefits, and schedules, major milestones and resource requirements through FY83. The way in which each major feature contributes toward achieving the overall goals and objectives is discussed. Overall development costs are presented along with gross estimates of F and E costs. The needs for longer term improvements are mentioned.


Identifiers: DOT/412/10. *Discrete address beacon systems. DABS(Discrete Address Beacon Systems). Microwave landing systems. Wake vortex avoidance systems. NTIS000FAA. NTISDOT
AD-4008 940/937 NTIS Prices: PC A11/MF A01

Applications of Advances in Navigation to Guidance and Control

Advisory Group for Aerospace Research and Development Neuilly-Sur-Seine (France) (400043)

Conference proceedings. E14214 Fld; 17G, 17C, 760, 76B, 75B GRA17815
Feb 78 284p
Rept No: AGARD-CP-220
Monitor: 18

Presented at the Technical Meeting of the Guidance and Control Panel Symposium (24th) held on 10-13 May 77 at Stuttgart (West Germany).


Identifiers: NATO furnished, AN/ARN-101. *Meetings. NTIS000DA
AD-A052 862/OSR NTIS Prices: PC A13/MF A01


Technische Universitaet, Brunswick (West Germany). Sonderforschungsbereich 58 Flugfuehrung. E0181B3 Fld; 17G, 18, 18C, 85A STAR1523
Sep 76 91p
Rept No: TUBS/SFB58/M1-P1
Monitor: 18
Seri-2.
Partly in German and English.

Abstract: No abstract available.


Identifiers: West Germany. NTISNSAET
N77-32105/75T NTIS Prices: PC A05/MF A01
Contributions to the Evaluation of the German Proposal DIS for a New Microwave Landing System, Part 2 Beiträge zur Erforschung des Deutschen Vorschlages DIS für ein Neues Mikrowellenlandesystem, 2. Teil

Technische Universität, Brunswick (West Germany), Sonderforschungbereich 58 Flugfuehrung.

E018184 Fld: 17G, 1B, 76C, 85A STAR1523
Mar 77 719p
Rept No: TUBS/5FB58/M2-PT-2
Monitor: 1B
Ser 1-2.
Partly in German and Partly in English.

Abstract: No abstract available.

Descriptors: Distance measuring equipment, Microwave landing systems, Austria, Elevation angle, Instrument landing systems, Landing simulation, Mountains, Multipath transmission, Null zones, Propagation modes

Identifiers: West Germany, NTIS/NSAE
N77-32112/3ST NTIS Prices: PC A05/MF A01

D. C. Systems Research and Development Service, United States Microwave Landing System (MLS) Development Program Symposium

Federal Aviation Administration Washington D C Systems Research and Development Service (340170)
C137402 Fld: 17G, 5I, SIF GRA17318
Jun 73 333p
Rept No: FAA-RD-73-95
Project: FAA-075-325
Monitor: 1B

Abstract: The purpose of the meeting was to inform the aviation community of the progress and results achieved to date and to provide an open forum for the exchange of information and views on the program. The document, which is a record of the symposium, includes an overview of the background and current status of the program and detailed information on the four MLS system approaches that will be field tested in the Phase II Feasibility Demonstration Program. (Author)

Descriptors: Glide path systems, Symposia, Microwave equipment, Instrument landings, Automatic pilots, Reviews

Identifiers: Microwave landing systems, FAA

AD-763 917 NTIS Prices: PC E10/MF A01

Discrete Address Beacon System (DABS) Front End Processor/En Route Central Computer Complex Protocol

Federal Aviation Administration Washington DC Systems Research and Development Service (340170)

Final rept.
Apr 80 17p
Rept No: FAA-RD-80-37

Abstract: The FAA has developed the Discrete Address Beacon System (DABS) as an evolutionary replacement for the current Air Traffic Control Radar Beacon System (ATCRBS). The DABS sensor, singly and in cooperation with other DABS sensors, will provide surveillance of, and two-way digital communications with aircraft equipped with DABS transponders, and provide surveillance of ATCRBS-equipped aircraft. Surveillance data and data link services will be provided via suitable land lines to Air Traffic Control (ATC) facilities (terminal and en route). The DABS/ATC interface consists of two digital links to each facility: a two-way communications link and a one-way surveillance link from sensor to ATC. The Common ICAO Data Interchange Network (CIDIN) protocol is used on the two-way communications data link. When DABS is interfaced to an en route ATC facility, a special device, called the front end processor (FEP), is used to perform translation between the CIDIN protocol and the protocol used by the En Route Central Computer Complex (CCC). This document defines the protocol to be used between the FEP and the En Route CCC. (Author)

Descriptors: Discrete Address Beacon Systems, Data links, Control systems, Computer applications, Message processing, Formats, Communications networks, Transponders, Data reduction, Air traffic control systems, Front end processors

Identifiers: CIDIN (Command ICAO Data Interchange Network), Protocols, NTIS/DoD/AA
AD-A085 482/8 NTIS Prices: PC A02/MF A01
Engineering and Development Program Plan - Concepts, Design, and Description for the Upgraded Third Generation Air Traffic Control System

Mitre Corp Mclean Va (402364)
C0311C2 FlO: 17G, 5IF, GRA17305
Aug 72 151p
Rept No: NTR-6152-Rev-1
Contract: DOT-FA708-2448
Monitor: FAA-ED-01-IA
Supersedes report dated January 1972. AD-743 635.

Abstract: The Air Traffic Control (ATC) system for the next 10 to 20 years is described in two parts. CONUS AIR TRAFFIC CONTROL (includes FSS automation), and OCEANIC AIR TRAFFIC CONTROL (includes AEROSAT applications). The design of both systems is based upon significant improvements in the Third Generation ATC System now being deployed. Key features are: Metering and Spacing Automation, Intermittent Positive Control (IPC), ATC data link services, the Discrete Address Beacon System (DABS), the application of Area Navigation to ATC, the Microwave Landing System (MLS), and the application of satellites to oceanic ATC. The role of automation in both ATC and the delivery of flight services will be greatly expanded to ensure system safety, while increasing airport and control system efficiencies in a productive manner. Future features are integrated into the expected overall system configuration, and its "fail operational" features are identified. (Author)


Identifiers: Discrete address beacon systems, Microwave landing systems, Area navigation, Oceanic air traffic control

AD-753 988 NTIS Prices: PC A02/MF A01


Federal Aviation Administration Washington D C (402370)
C5724B1 FlO: 17B, 17G, 1B, 85A, 45C, GRA17603
11 Jul 75 142p
Rept No: FAA-INACS-011-221-OR
Monitor: 1B

Abstract: This document is intended to provide the operating/maintenance requirements/goals for future National Airspace System communications system designs and developmental efforts, and the vehicle for discussion and coordination with the various policy, planning, operating, maintenance, and engineering activities concerned with FAA Communications. Requirements submitted by Air Traffic and

Airway Facilities Services have been used and augmented by inputs from SRDS, MITRE and the Computer Sciences Corporation. Communications requirements are established for all national airspace environments. This document provides the basic sets of requirements applicable to each of the environments and their subsets, i.e., voice/data air/ground communications, voice ground/ground communications and data ground/ground communications. These requirements will be utilized to derive the detailed functional and design requirements to be incorporated in all Integrated National Airspace Communication System (INACS) specifications.


AD-398 312/8 NTIS Prices: PC A28/MF A01
Microwave Landing System (MLS) Development Plan as Proposed by Raytheon During the Technical Analysis and Contract Definition Phase of the National MLS Development Program. Volume I. Executive Summary

Raytheon Co Wayland Mass (298350)
C2272H1 Fld: 17G. 85A GRA17406
Sep 7 350
Contract: DOT-FA72WA-2803
Monitor: FAA-RD-73-150-1
See also Volume 2, AD-772 781.

Abstract: Volume 1. Executive Summary, presents a short overview of Raytheon's system approach and post technique analysis and contract definition (TACD) plans.

Descriptors: *Landing aids, Microwave equipment, Beams(Radiation), Scanning, Electronic switching, C-band, K band, Electronic equipment, Multipath transmission

Identifiers: *Microwave landing systems, MLS(Microwave Landing Systems), FAA

AD-772 780/3 NTIS Prices: PC AO3/MF AO1

Microwave Landing System (MLS) Development Plan as Proposed by ITT/Gliffilan During the Technical Analysis and Contract Definition Phase of the National MLS Development Program. Volume II. Appendices. A1, A2, O, G, I, J, L, M, N, Q and R

C345662 Fld: 17G. 85A GRA17422
27 Sep 72 355p
Contract: DOT-FA72WA-2806
See also Volume 1, AD-784 609.

Abstract: Contents: Principles of the doppler technique; Signal format specification microwave landing system; Multipath problem analysis; Spectrum of the doppler signal; Processor theory of image rejection; Theory of high scaloping rate problems; Delay line processors; Description of an advanced multimode processor mechanization; Theory of multimode digital processor acquisition; Bench simulation program; Doppler field test results; Intermodulation interference design considerations; Angular filters study results.

Descriptors: *Landing aids, Microwave equipment, C-band, Engineering, Systems analysis, Doppler systems, Signals, Signal processing, Digital systems, Processing equipment, Intermodulation, Interference
Microwave Landing System (MLS) Development Plan as Proposed by Texas Instruments Inc. During the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Volume V. Appendices E1 and E2

Texas Instruments Inc Dallas, Federal Aviation Administration, Washington, D.C. (347650)
C407501 Fld: 17G, 760, 85A GRIA17505
27 Sep 72 263d
Contract: DOT-FAT2WA-2802
Project: FAA-075-325-013
Monitor: FAA-RD-74-170-5
See also Volume 4, AD/A-003 377 and Volume 7, AD/A-003 380.


Identifiers: DOT/412/10. Microwave landing systems. Instrument landing systems. NTISDD0FAA. NTISDD0T
AD/A-003 378/75T NTIS Prices: PC A12/MF A01

Microwave Landing System (MLS) Development Plan as Proposed by Hazeltine Corporation during the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Volume II. Multipath, Shadowing and Terrain

Hazeltine Corp Greenlawn N Y (406971)
C285004 Fld: 17G, 85A GRIA17413
27 Sep 73 608p
Rept No: 10926-Vol-2
Contract: DOT-FAT2WA-2804
Project: FAA-075-325-013
Monitor: FAA-RD-73-185-2
See also Volume 1, AD-770 215 and Volume 3, AD-778 140.

Abstract: Volume II covers multipath, shadowing and terrain; propagation and polarization; DME verification. Identification and resolution of remaining technical problems. System trades; system compatibility; system performance summary; and signal format summary. (Modified author abstract)


Identifiers: Microwave landing systems. FAA
AD-778 118/0 NTIS Prices: PC E08/MF A01
Microwave Landing System (MLS) Development Plan as Proposed by Bendix Corporation During the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Volume I. Technique Analysis Program

C4242K3 File: 17G, 85A GRA17510
27 Sep 72 504p
Contract: DOT-FA72WA-2801
Monitor: FAA-RD-74-152-1
See also Volume 2, AD/A-006 993.

Abstract: The report details technical aspects of Bendix proposed MLS hardware development. Volume I covers the Technique Analysis Program.


Identifiers: *Microwave landing systems. DOT/41Z/10.
NTISDD08A, NTIS007
AD/A-006 970/85T NTIS Prices: PC A17/MF A01

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C345993 File: 17G, 85A GRA17422
27 Sep 72 473p
Contract: DOT-FA72WA-2805
Monitor: FAA-RD-74-118Vol-3
See also Volume 2, AD-784 343.


Identifiers: *Microwave landing systems. NTISDD08A, NTIS007

Raytheon Co Wayland Mass (298350)
C2272H2 Fld: 17G. 85A GRAI7406
Sep 72 383p
Contract: DOT-F472WA-2803
See also Volume 1. AD-772 780 and Volume 3. AD-772 782.

Abstract: Volume II covers the proposed system approach, functional requirements, supporting studies, and feasibility hardware specifications.


Identifiers: *Microwave landing systems. MLS(Microwave Landing Systems). FAA

AD-772 781/1 NTIS Prices: PC A17/MF A01

Microwave Landing System (MLS) Development Plan as Proposed by Texas Instruments, Inc. During the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Volume III: Portion of System Performance Summary and Signal Format Summary

Texas Instruments Inc Dallas. Federal Aviation Administration. Washington, D.C. (347650)
C4075C3 Fld: 17G. 760. 85A GRAI7505
27 Sep 72 374p
Contract: DOT-F472WA-2802
Project: FAA-075-225-013
Monitor: FAA-RD-74-170-3
See also Volume 2. AD/A-003 375 and Volume 4. AD/A-003-377.

Abstract: Contents: Updated civil/military operational requirements. Functional requirements summary. Conceptual system operation: MLS configurations; and Signal format summary.


Identifiers: DOT/412/ID. *Microwave landing systems. Instrument landing systems. NTISDD0FAA. NTISDDOT

AD-784 609/O NTIS Prices: PC A20/MF A01
Microwave Landing System (MLS) Development Plan as Proposed by AIL During the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Part 1.0 Volume 1.2 Book II. Post TACD Development Plan

All Deer Park N Y (404967)
C2361F2 Fld; 17G, 85A GRA17407
27 Sep 72 373p
Contract: DOT/F472WA-1900
Monitor: FAA-8D-73-166-Vol.-1.2-2
See also AD-772 595.

Abstract: The report covers plans for feasibility demonstration, prototype systems development, and limited production option.

Descriptors: *Landing aids, Microwave equipment, Ku band, C band, Scanning, Feasibility studies, Antennas, Systems analysis

Identifiers: *Microwave landing systems, FAA
AD-773 6754 NTIS Prices: PC E11/MF AO1

Microwave Landing System (MLS) Development Plan as Proposed by AIL During the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Part 3.0 Volume 3.1 Book 1. Compilation of Critical Technical Area Reports

All Deer Park N Y (404967)
C226JU Fld; 17G, 85A GRA17406
27 Sep 72 344p
Contract: DOT/F472WA-1000
Project: FAA-807-325-013
Monitor: FAA-8D-73-166-Vol.-3.1-1
See also AD-772 595 and AD-772 597.


Descriptors: *Landing aids, Microwave equipment, Systems engineering, C band, Ku band, Scanning, Engineering, Multipath transmission, Electronic equipment

Identifiers: *Microwave landing systems, MLS(Microwave Landing Systems), FAA
AD-772 5963 NTIS Prices: PC A15/MF AO1

Microwave Landing System (MLS) Development Plan as Proposed by Texas Instruments Inc Dallas Federal Aviation Administration. Washington, D C (347650)
C4075CA Fld; 17G, 76D, 85A GRA17505
27 Sep 72 160p
Contract: DOT/F472WA-2002
Project: FAA-875-325-013
Monitor: FAA-8D-74-170-4
See also Volume 3, AD/A-003 376 and Volume 5, AD/A-003 378.

Abstract: The appendix presents the detailed supporting analyses for accuracy, range, stabilization, etc. of the proposed military configurations. The summarized results of these analyses were presented as part of the general system description.

Descriptors: *Landing aids, Instrument landings, Microwave systems engineering, C band, Ku band, Military applications, Performance(Engineering)

Identifiers: DOT/412/10, *Microwave landing systems, Instrument landing systems, NT5000FAA, NT500T
AD/A-003 377/95T NTIS Prices: PC A08/MF AO1

Program. Volume IV. Appendix D, Supplementary Military Systems Analysis

Texas Instruments Inc Dallas Federal Aviation Administration. Washington, D C (347650)
C4075CA Fld; 17G, 76D, 85A GRA17505
27 Sep 72 160p
Contract: DOT/F472WA-2002
Project: FAA-875-325-013
Monitor: FAA-8D-74-170-4
See also Volume 3, AD/A-003 376 and Volume 5, AD/A-003 378.

Abstract: The appendix presents the detailed supporting analyses for accuracy, range, stabilization, etc. of the proposed military configurations. The summarized results of these analyses were presented as part of the general system description.

Descriptors: *Landing aids, Instrument landings, Microwave systems engineering, C band, Ku band, Military applications, Performance(Engineering)

Identifiers: DOT/412/10, *Microwave landing systems, Instrument landing systems, NT5000FAA, NT500T
AD/A-003 377/95T NTIS Prices: PC A08/MF AO1
Microwave Landing System (MLS) Development Plan as Proposed by AIL During the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Part 1.0 Volume 1.2 Book 1. Post TACD Development Plan

AIL Deer Park N Y (404967)
C226314 Fld: 17G, 85A GRAI7406
27 Sep 72 409p
Contract: DOT-FA72WA-2800
Project: FAA-075-325-013
Monitor: FAA-RD-73-166-Vol-1 2-1
See also AD-772 596.

Abstract: Part 1.0 Volume 1.2. Books I and II cover plans for feasibility demonstration, prototype systems development, and limited production option.

Descriptors: +Landing aids, Microwave equipment, Feasibility studies, C band, K band, Scanning, Multipath transmission, Electronic equipment, Engineering, Systems engineering

Identifiers: +Microwave landing systems, MLS(Microwave Landing Systems), FAA

AD-772 595/5 NTIS Prices: PC A18/MF A01

Microwave Landing System (MLS) Development Plan as Proposed by Texas Instruments, Inc. During the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Volume VIII. Appendix F1

Texas Instruments Inc Dallas - Federal Aviation Administration, Washington, D C (347650)
C407504 Fld: 17G, 760, 85A GRAI7505
27 Sep 72 263p
Contract: DOT-FA-72WA-2802
Project: FAA-075-325-013
Monitor: FAA-RD-74-170-8
See also Volume 7, AD/A-003 380 and Volume 9, AD/A-003 382.

Abstract: The volume presents the angle data rate study of the flight factor studies.

Descriptors: +Landing aids, Microwaves, Instrument landings, C band, Ku band, Angles, Data rate

Identifiers: 007/412/10. +Microwave landing systems, Instrument landing systems, NTIS000FAA, NTIS007

AD-4-003 381/38T NTIS Prices: PC A13/MF A01
Microwave Landing System (MLS) Development Plan as Proposed by Raytheon during the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Volume IV, System Considerations 1.1.2 Through 1.1.5

Raytheon Co Wayland Mass (298350)
C2272H4 Fd: 17G. B5A GRA17406
Sep 72 155p
Contract: DOT-F472WA-2803
Monitor: FAA-RD-73-150-4
See also volume 3A, AD-772 782. Volume 5. AD-772 784.

Abstract: Volume IV relates studies and analyses supporting the Raytheon proposed MLS development.


Identifiers: *Microwave landing systems, *MLS(Microwave Landing Systems). FAA

AD-772 783/7 NTIS Prices: PC A08/MF A01

Microwave Landing System (MLS) Development Plans as Proposed by Raytheon during the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Volume V. Post TA/CD Plans Management Performance

Raytheon Co Wayland Mass (298350)
C2272H1 Fd: 17G. B5A GRA17406
Sep 72 277p
Contract: DOT-F472WA-2803
See also Volume 4. AD-772 783. Volume 6. AD-772 785.

Abstract: Volume V describes the Raytheon plans for feasibility demonstration. prototype development. and limited production. Certain sections of this volume not relating to the Raytheon technique analysis. system description. or development plans are not included.


Identifiers: *Microwave landing systems, MLS(Microwave Landing Systems). FAA

AD-772 784/5 NTIS Prices: PC A13/MF A01
Microwave Landing System (MLS) Development Plan as Proposed by Texas Instruments, Inc. During the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Volume 2. Performance Validation, System Trades and System Compatibility


Contract: DOT-F872-WA-2802
Project: FAA-075-325-013
Monitor: FAA-RO-74-170-2
See also Volume 1, AD/A-003 374 and Volume 3, AD/A-003 376.

Abstract: The volume reports the analytical and experimental studies performed to resolve the critical technical issues: the system trade-off studies and system rationale; and the system compatibility studies.

Descriptors: *Landing aids, Instrument landings, Systems engineering, Microwave, C band, Ku band, Performance(Engineering), Trade-off analyses, Compatibility

Identifiers: DOT/412/ID, *Microwave landing systems, Instrument landing systems. NTIS000FAA, NTI500T

AD/A-003 375/3ST NTIS Prices: PC A12/MF A01

Microwave Landing System (MLS) Development Plan as Proposed by Bendix Corporation During the Technique Analysis and Contract Definition Phase of the National MLS Development Program. Volume IV. Notes MLS-BCD-40 through 45, 46 addendum, 48, 49, 52-54, 57, 58, 60-70, 72-74


Contract: DOT-F872WA-2802
Monitor: FAA-RO-74-152-4
See also Volume 3, AD/A-006 971 and Volume 5, AD/A-006 973.

Abstract: The report details technical aspects of Bendix proposed MLS hardware development. Volume IV contains technical notes MLS-BCD-40 through 45, 46 addendum, 48 and 49, 52 through 54, 57 and 58, 60 through 70, and 72 through 74.

Descriptors: *Landing aids, Microwave equipment, Specifications, Scanning, Beams(Radiation), Multipath transmission, Errors, Antennas, Power, Clutter, Planning

Identifiers: *Microwave landing systems, DOT/412/ID.
Microwave Landing System (MLS) Development Plan as Proposed by Texas Instruments, Inc. During the Technique Analysis and Contract Definition Phase of the National MLS Development Program, Volume IX, Appendices F2 and F3

Texas Instruments Inc Dallas-Federal Aviation Administration, Washington, D.C. (347650)
C40751 Fid: 17G, 760, 85A GRA17505
27 Sep 72 308p
Contract: DOT-FA72WA-2802
Project: FAA-075-325-013
Monitor: FAA-RD-74-170-9
See also Volume 8, AD/A-003 381 and Volume 1, AD/A-003 374.

Abstract: Airborne interface and pilot factors study: ATC and navigation system interfaces.

Descriptors: Landing aids, Microwave, Instrument landing, C band, Ku band, Interfaces, Man machine systems, Air traffic control systems, Navigation

Identifiers: DOT/4ID/ID, Microwave landing systems, Instrument landing systems, NTIS000FAA, NTIS000
AD/A-003 382/95T NTIS Prices: PC A14/MF A01

Microwave Landing System (MLS). Phase III (Basic Narrow and Small Community Configurations). Volume II

Bendix Corp Baltimore MD Communications Div (402895)

Final rept.
G0892G3 Fid: 17G, 1E, 85A GRA18012
Jun 78 357p
Rept No: BCD-R-2801-1-VOL-2
Contract: DOT-FA72WA-2801
See also Volume 1, AD-A08I 133

Abstract: This report describes the design, fabrication, and testing of a Basic (Narrow) and a Small Community Configuration for the Microwave Landing System (MLS). A detailed description of the ground and airborne subsystems and equipments, and a summary of flight test data taken at the National Aviation Facilities Experimental Center (NAFEC) are presented. The sitings of the two configurations at NAFEC are described. A summary of the reliability and maintainability analysis is given; the detailed R&M analysis is presented in Vol. II, Appendices B thru E. (Author)

Descriptors: Microwave landing systems, Electronic scanners, Radio beams, Clutter, Radio interference, Electronic equipment, Antennas, Circuit analysis, Antenna radiation patterns, Site selection, Reliability, Maintainability

Identifiers: DOT/4ID/ID, NTIS000DA
AD-A08I 233/9 NTIS Prices: PC A16/MF A01
Microwave Scanning Beam Landing System Compatibility and Performance: Engineering Analyses 75-1 and 75-2

Airborne Instruments Lab., Farmingdale, N.Y.

Final Report.
D3173C4 Fld: 17G, 85A, 760, 84C STAR1516
Apr 77 F478p
Rept No: NASA-CR-151428
Contract: NAS9-14543
Monitor: 18

Abstract: The microwave scanning beam landing system (MSBLS) is the primary position sensor of the Orbiter's navigation subsystem during the autoland phase of the flight. Portions of the system are discussed with special emphasis placed on potential problem areas as referenced to the Orbiter's mission. Topics discussed include system compatibility, system accuracy, and expected RF signal levels. A block and flow diagram of the MSBLS system operation is included with a list of special tests required to determine system performance.


Identifiers: NTISNASA

77-25133/8ST NTIS Prices: PC A21/MF A01

Microwave Scanning Beam Landing System, Ground Station: Performance Test Report. Volume I: Executive Summary

E0814AA Fld: 17G, 85A STAR1805
20 Aug 77 17p
Rept No: NASA-CR-151582; JSC-11525-V-1
Contract: NAS9-14543
Monitor: 18

Abstract: Conclusions and recommendations are presented based on data evaluation as developed to date and detailed in Engineering Test Summary Reports.

Descriptors: *Ground stations, *Microwave scanning beam landing system, *Performance tests, Aircraft landing, Landing instruments, Microwave landing systems

Identifiers: NTISNASA

78-14021/7ST NTIS Prices: PC A02/MF A01

Modeling and Simulation of Avionics Systems and Command, Control and Communications Systems

Advisory Group for Aerospace Research and Development
Neuilly-sur-Seine (France) (400043)

Conference proceedings
G117113 Fld: 9C, 7B, 81C, 51E, 45C GBA18014
Jan 80 555p
Rept No: AGARD-CP-268

Abstract: These Proceedings consist of the papers and discussions presented at the Avionics Panel Meeting on Modeling and Simulation Held in Paris, France, October 1979. Papers were divided as follows: 6-Tutorial, 8-C3 System Simulation, 5-Airborne Surveillance System Simulation, 5-Manned Flight Simulators, 4-Identification, Communication, Navigation, and Countermeasure Simulation, and 11 on Avionics System Simulation. (Author)


Identifiers: *Foreign Technology, NATO furnished, Joint Tactical Information Distribution System, Aerial surveillance, *Meetings, NTIS0002X, NTISFNFR

AD-A082 012/6 NTIS Prices: PC A24/MF A01
National Plan for Development of the Microwave Landing System

Federal Aviation Administration Washington D.C. (403270)
A3302C3 Fld: 17G, 18, 51F GRA17202
Jul 71 Oct
Prepared in cooperation with Department of Defense, Washington, D.C., and National Aeronautics and Space Administration, Washington, D.C.

Abstract: A plan for the development of a new civilian/military microwave landing system (MLS) is presented. It delineates the five (5) year program of integrated activity deemed necessary to provide a MLS that meets the wide range of user operational requirements. The substance of the work and the goals achieved under the initial plan have occurred essentially as planned except for the schedule. The TRSB (Time Reference Scanning Beam) technique selection was made about one year later than originally planned and considerable time and resources were devoted to ICAO activities that were not initially envisioned. A major milestone in the MLS program was achieved in April 1971 at the 11th Weather Operations Divisional meeting of ICAO, when the U.S. WO system was selected to be the standard system for international civilian use as a replacement for ILS.

Descriptors: Microwave landing systems, Civil aviation, Military applications, Global, Planning, Long range (Time), Prototypes

Identifiers: Development, NTISDDX5A

AD-4058 548/95T NTIS Prices: PC A05/MF A01

National Plan for Development of the Microwave Landing System - June 1976 Update

Federal Aviation Administration Washington D.C. Systems Research and Development Service (340170)
E261H3 Fld: 17G, 76D, 85A GRA17825
Jun 76 98p
Rept No: FAA-ED-07-2A
Monitor: 18

Abstract: An updated plan for the development of an interoperable civilian/military microwave landing system (MLS) is presented. The original plan delineated a five (5) year program of integrated activity deemed necessary to provide a MLS that meets the wide range of user operational requirements. The substance of the work and the goals achieved under the initial plan have occurred essentially as planned except for the schedule. The TRSB (Time Reference Scanning Beam) technique selection was made about one year later than originally planned and considerable time and resources were devoted to ICAO activities that were not initially envisioned. A major milestone in the MLS program was achieved in April 1971 at the 11th Weather Operations Divisional meeting of ICAO, when the U.S. WO system was selected to be the standard system for international civilian use as a replacement for ILS.
Potential Benefits to the Scanning Beam Microwave Landing System


Final rept.
C3902K3 Fld: 17G. 760 GRAI 7502
Mar 73 28p
Contract: DOD-F422-3142
Monitor: FAA-NAV-73-2

Abstract: The report examines the potential benefits of a scanning beam microwave landing system (MIS). The weather benefits estimated in Potential Economic Benefits of Fog Dispersal in the Terminal Area are examined using sensitivity analysis. This analysis reveals that the most important variable to refine in improving the benefit estimate is the value of passenger time. It is then recommended that passenger interviews are the best way to obtain the information necessary to refine the estimate of the value of time. Six areas of non-weather benefit which are frequently attributed to a MLS are examined. Facilities and circumstances which are needed in addition to a MLS are identified.

Descriptors: *Landing aids. Microwave equipment. Beams (Radiation), Scanning. Benefits
Identifiers: *Microwave landing systems. Sensitivity analysis. NTIS 503974. FAA. NTIS 5007

AD/A-001 347/455 NTIS Prices: PC A04/MF A01

Status of the Federal Aviation Administration's Microwave Landing System


Report to the Congress
F021311 Fld: 17G. 85A* GRAI 7903
19 Oct 78 53p*
Rept No: PA-78-149
Monitor: 18

Abstract: The Federal Aviation Administration's new common civil/military microwave landing system is about 5 years behind schedule and research and development will cost between $182 to $192 million-about $90 to $100 million more than originally estimated. Large amounts of money are still being invested for ground equipment for the existing system. Recognizing these continued investments, along with the probable extension to 1995 of instrument landing systems at international airports, existing instrument landing systems at U.S. domestic airports should be continued in accordance with a mutually agreeable microwave landing system implementation plan.

Identifiers: *Microwave landing systems. NTIS 5007
PB-287 275/257 NTIS Prices: PC A04/MF A01
TRSB Microwave Landing System Demonstration Program at Jorge Newbery Aeroparque Buenos Aires, Argentina

National Aviation Facilities Experimental Center Atlantic City NJ (240550)

Final rept.
E1695F3 Fl d: 1E. 17G, 85A, 76C GRAJ7517
4 Nov 77 38p
Rept No: FAA-NA-78-14
Monitor: FAA-RO-78-14

Abstract: The FAA is conducting operational demonstrations of several TRSB hardware configurations at selected airports in the United States and abroad. The first demonstration was at Cape May, NJ, using the Small Community System. The second demonstration was at Jorge Newbery Aeroparque in Buenos Aires, Argentina, using the Basic Narrow TRSB collocated with UHF/VHF ILS. This system was designed for azimuth proportional guidance 40 degrees about the runway centerline, elevation proportional guidance from 1 degree to 15 degrees, and coverage of at least 20 nautical miles in heavy rain. Most of the flights were in the NASA B-737 terminal configured vehicle which recorded TRSB angle data, together with ground tracking data from radio theodolite and optical television tracking equipment. Flight profiles included completely coupled, descending, curved paths to a close-in intercept (2.0 and 1.1 nautical miles) of runway centerline, followed by autorotation and roll-out on runway. Results using the Basic Narrow System are: can be collocated without adversely affecting ILS performance. The TRSB system required minimal site preparation and installation time. Signal guidance quality appeared to be excellent. Guidance signal quality within ICAO requirements for a 'full capability system' and requirements for FAA proposed 'TRSB Autorotation': The system demonstrated near total immunity to interference from propeller modulation; and with precision DME, the system can be used for noise abatement procedures, including segmented elevation angles and curved approaches. (Author)

Descriptors: Microwave landing systems, Argentine. Noise reduction, Distance measuring equipment

Identifiers: TRSB(Time reference scanning beam). Basic narrow system. NTISDD0XA, NTISDOF1AA

AD-A054 298/5ST NTIS Prices PC A05/MF A01

TRSB Microwave Landing System Demonstration Program at Brussels, Belgium

National Aviation Facilities Experimental Center Atlantic City NJ (240550)

Final rept.
E169203 Fl d: 1E. 17G. 85A. 76C GRAJ7517
Feb 78 84p
Rept No: FAA-NA-78-18
Monitor: FAA-RO-78-18

Abstract: The demonstrations at Brussels, Belgium were the sixth in a series of FAA conducted operational demonstrations of several TRSB system configurations at selected airports in the United States and abroad. The Basic Wide aperture TRSB was installed to service Runway 07L which was the longest of three major runways at the airport. Operational demonstrations and data acquisition flights were made using FAA CV-880 and B-727 aircraft. One-third of the landings were autorotation. Flight profiles included straight-in and curved approaches, radials, and partial orbits. Some flight tests were also made by British Civil Aviation Authority personnel using TRSB equipment installed in a FAA flight inspection aircraft. Results of these operational demonstrations indicate that the performance of the TRSB Basic Wide system configuration meets the ICAO full capability system requirements.

Descriptors: Microwave landing systems. All weather aviation, Demonstrations, Belgium. Configurations. Comparison

Identifiers: Time referenced scanning beams. NTISDD0XA, NTISDOF1AA

AD-A054 298/5ST NTIS Prices PC A05/MF A01
TRSB Microwave Landing System Demonstration Program at Toncontín International Airport Tegucigalpa, Honduras

National Aviation Facilities Experimental Center Atlantic City N J (240550)

Final rept.
E1695F4 Fid: TF, 17G, 85A, 76C GRAI/817
26 Nov 77 43p
Rept No. FAA-NA-78-15
Monitor: FAA-RD-78-15

Abstract: The FAA is conducting operational demonstrations of several TRSB hardware configurations at selected airports in the United States and abroad. The first demonstration was at Cape May, New Jersey, using the Small Community System. The second demonstration was at Jorge Newbery Aeroparque in Buenos Aires, Argentina. The third demonstration, using the Small Community System at Toncontín Airport in Honduras, presented a geographical challenge to the operation of any precision landing system. Mountainous terrain and minimal NAV-AIDS and runway lights limit scheduled airline flights to daylight hours. Terrain features necessitated offset approach paths for Runway 19, with azimuth and elevation sites collocated. This TRSB configuration provides azimuth proportional guidance + or - 10 deg about the runway centerline, with directional guidance from 10 deg out to 40 deg. Elevation proportional guidance from 2 deg to 11 deg, with fly-down clearance from 11 deg to 15 deg, is provided. Coverage distance is at least 20 nautical miles under heavy rain. Results using the TRSB System are: (1) The system required minimal site preparation and installation time; (2) demonstrations of several offset approach angles indicated TRSB guidance flexibility; (3) the TRSB system was judged subjectively as providing excellent guidance signals; (4) the TRSB 'Small Community System' was demonstrated to meet its design specifications; and (5) for this airport and runway, the data indicates that guidance signal quality, with no filtering, is well within ICAO noise requirements for a 'reduced capability system.'


Identifiers: B-737 aircraft. John F. Kennedy International Airport. NTISDDX. NTISDDOTFAA
AD-A054 447/7ST NTIS Prices: PC A07/MF A01

TRSB Microwave Landing System Demonstration Program at John F. Kennedy International Airport, Long Island, New York, U.S.A

National Aviation Facilities Experimental Center Atlantic City N J (240550)

Final rept. 2 Dec 77-4 Jan 78.
TRSB Microwave Landing System Demonstration Program at Kristiansand, Norway

National Aviation Facilities Experimental Center Atlantic City N J (240550)

Final rept.
E203013 Fld: 1B, 17G, 85A, 518 GRAI7820
Jan 78 80p
Rept No: FAA-NA-78-17
Monitor: FAA-RD-78-17

Abstract: The demonstration at Kjøvik Airport, Kristiansand, Norway, was the fifth in a series of operational demonstrations of several TRSB system configurations at selected airports in the United States and abroad. Two TRSB system configurations, Basic Narrow Aperture and Small Community Systems, were installed to service the non-instrument Runway 22 which has a normal 4 deg approach glidepath. Approach to this runway is along a valley with surrounding terrain obstructions that tend to elevate angles to 2.8 deg within 20 deg of runway centerline. Operational demonstrations and data acquisition flights were made utilizing an FAA Boeing 727 test aircraft. Flight profiles included approaches, radials, and partial orbits perpendicular to the runway centerline. Some flight tests were also made by Norwegian and British Civil Aviation Authority personnel using TRSB equipment installed in their respective aircraft and test equipment. Results of the operational demonstrations indicated that the performance of both system configurations was well within their respective U.S. Phase III program design requirements and also met ICAO (ANWP) 'full capability system' requirements. (Author)

Descriptors: Microwave landing systems, Flight testing, Rain

Identifiers: TRSB (Time Reference Scanning Beam), Small community systems, Cape May New Jersey, DC-6 aircraft, Twin Otter aircraft, Radio theodolites. NTISDDX, NTISDDTFAA

AD-A054 605/1ST NTIS Prices: PC A05/MF A01

TRSB Microwave Landing System Demonstration Program at Cape May, New Jersey, U.S. A

National Aviation Facilities Experimental Center Atlantic City N J (240550)

Final rept. 27 Sep-8 Oct 77.
E170311 Fld: 17G, 1E, 85A, 760 GRAI7817
8 Oct 77 32p

Rept No: FAA NA-78-13
Monitor: FAA-RD-78-13

Abstract: The Small Community (SC) TRSB MLS built by the Bendix Corporation was demonstrated at the Cape May County Airport, September 27 to October 8, 1977. The SC system provides proportional guidance over an azimuth sector of + or - 10 degrees about the runway centerline with clearance signals out to + or - 40 degrees. Proportional guidance is provided in elevation from 2 degrees to 11 degrees. Fly-down clearance is provided from 11 degrees to 15 degrees. System coverage is at least 20 nautical miles in heavy rain. Demonstration flights were conducted using a DC-6 and a 'Twin Otter'. Data were collected utilizing a radio theodolite. Results of these tests indicate: (1) The system required minimal site preparation and installation time; (2) The system was subjectively determined to have very good guidance characteristics; (3) The 'Small Community System' exceeds its design specifications; (4) For this airport and runway, guidance signal quality is well within ICAO requirements for a 'reduced capability system'; and (5) The 'Small Community' TRSB configuration path and course signal structure meets Category II MLS requirements. (Author)

Descriptors: Microwave landing systems, Flight testing, Rain

Identifiers: TRSB (Time Reference Scanning Beam), Small community systems, Cape May New Jersey, DC-6 aircraft, Twin Otter aircraft, Radio theodolites. NTISDDX, NTISDDTFAA

AD-A054 605/1ST NTIS Prices: PC A05/MF A01
TRSB Microwave Landing System Demonstration Program at Shiraz, Iran

National Aviation Facilities Experimental Center Atlantic City NJ (240550)

Final rept.
E2035L4 Fld: 18, 17G, BSA, 51B GRA17820
Mar 78 49p
Rept No: FAA-NA-78-23
Monitor: FAA-RD-78-23

Abstract: The system was flown to Shiraz in an FAA Boeing 727 testbed aircraft and installed on Runway 29R. Data acquisition and operational demonstration flights were flown with the FAA B-727 aircraft over the period March 3-8, 1978. During the flights, a radio telemetry theodolite was used for aircraft space-position data. Flight profiles included straight-in approaches at various elevation angles, level runs at 2000 feet altitude on centerline, and + or - 10-degree offsets, + or - 5-degree offsets, and 5-nautical mile partial orbits at 1500-feet altitude. Results of the flight tests indicate that the performance of the TRSB Small Community System was within the design requirements.

Descriptors: Microwave landing systems, Demonstrations, Iran, Performance (Engineering), Accuracy, Site selection, Installation

Identifiers: Boeing 727 aircraft, Time reference scanning beams, NTISDDXXA, NTISD07FAA

TRSB Microwave Landing System Demonstration Program at Nairobi, Kenya

National Aviation Facilities Experimental Center Atlantic City NJ (240550)

Final rept.
E1704G2 Fld: 17G, 1C, BSA, 76D GRA17817
Feb 78 46p
Rept No: FAA-NA-78-22
Monitor: FAA-RD-78-22

Abstract: The operational demonstration at Embakasi International Airport serving Nairobi, Kenya, was the ninth in a series of TRSB worldwide demonstrations. Previous demonstrations of the TRSB Small Community System, the most economical TRSB configuration, were held at five other sites in the United States, Central America, Europe, and West Africa. The system was flown to Nairobi in an FAA Boeing 727 testbed aircraft and installed on the same runway as a commissioned ILS. Data acquisition and operational demonstration flights were flown with the FAA B-727 aircraft over a period of 5 days (February 20-24, 1978). During the flights, a radio telemetry theodolite and an optical electronic tracker were used for aircraft space-position data. Flight profiles included straight-in approaches at various elevation angles, level runs at 1500 feet altitude on centerline, and + or - 10-degree offsets, + or - 5-degree offsets, and 5-nautical mile partial orbits at 3500-feet altitude. Results of the flight tests indicate that the performance of the TRSB Small Community System was within the U.S. Phase III Program design requirements. The ICAO 'reduced capability system' requirements, and the ICAO 'full capability system' requirements. The TRSB system installation did not adversely affect the ILS (Author)

Descriptors: Microwave landing systems, All weather aviation, Airports, Kenya, Aircraft landings, Flight testing, Performance (Engineering), Passenger aircraft, Global

Identifiers: Time reference scanning beams, TRSB (Time Reference Scanning Beams), Small community systems, Nairobi (Kenya), NTISDDXXA, NTISD07FAA

AD-4054 646/SST NTIS Prices: PC A03/MF A01

TRSB Microwave Landing System Demonstration Program at Nairobi, Kenya

National Aviation Facilities Experimental Center Atlantic City NJ (240550)

Final rept.
E1704G2 Fld: 17G, 1C, BSA, 76D GRA17817
Feb 78 46p
Rept No: FAA-NA-78-22
Monitor: FAA-RD-78-22

Abstract: The operational demonstration at Embakasi International Airport serving Nairobi, Kenya, was the ninth in a series of TRSB worldwide demonstrations. Previous demonstrations of the TRSB Small Community System, the most economical TRSB configuration, were held at five other sites in the United States, Central America, Europe, and West Africa. The system was flown to Nairobi in an FAA Boeing 727 testbed aircraft and installed on the same runway as a commissioned ILS. Data acquisition and operational demonstration flights were flown with the FAA B-727 aircraft over a period of 5 days (February 20-24, 1978). During the flights, a radio telemetry theodolite and an optical electronic tracker were used for aircraft space-position data. Flight profiles included straight-in approaches at various elevation angles, level runs at 1500 feet altitude on centerline, and + or - 10-degree offsets, + or - 5-degree offsets, and 5-nautical mile partial orbits at 3500-feet altitude. Results of the flight tests indicate that the performance of the TRSB Small Community System was within the design requirements.

Descriptors: Microwave landing systems, Demonstrations, Iran, Performance (Engineering), Accuracy, Site selection, Installation

Identifiers: Boeing 727 aircraft, Time reference scanning beams, NTISDDXXA, NTISD07FAA

TRSB Microwave Landing System Demonstration Program at Nairobi, Kenya

National Aviation Facilities Experimental Center Atlantic City NJ (240550)

Final rept.
E1704G2 Fld: 17G, 1C, BSA, 76D GRA17817
Feb 78 46p
Rept No: FAA-NA-78-22
Monitor: FAA-RD-78-22

Abstract: The operational demonstration at Embakasi International Airport serving Nairobi, Kenya, was the ninth in a series of TRSB worldwide demonstrations. Previous demonstrations of the TRSB Small Community System, the most economical TRSB configuration, were held at five other sites in the United States, Central America, Europe, and West Africa. The system was flown to Nairobi in an FAA Boeing 727 testbed aircraft and installed on the same runway as a commissioned ILS. Data acquisition and operational demonstration flights were flown with the FAA B-727 aircraft over a period of 5 days (February 20-24, 1978). During the flights, a radio telemetry theodolite and an optical electronic tracker were used for aircraft space-position data. Flight profiles included straight-in approaches at various elevation angles, level runs at 1500 feet altitude on centerline, and + or - 10-degree offsets, + or - 5-degree offsets, and 5-nautical mile partial orbits at 3500-feet altitude. Results of the flight tests indicate that the performance of the TRSB Small Community System was within the design requirements.

Descriptors: Microwave landing systems, Demonstrations, Iran, Performance (Engineering), Accuracy, Site selection, Installation

Identifiers: Boeing 727 aircraft, Time reference scanning beams, NTISDDXXA, NTISD07FAA
TRSB Microwave Landing System Demonstration Program at Charleroi, Belgium

National Aviation Facilities Experimental Center Atlantic City NJ (240590)

Final rept.
E2054C1 Fld: 10, 18, 17G, 85A, 51B GRA17820
Feb 78 53p
Rpt No: FAA-NA-78-19
Monitor: FAA-RD-78-19

Abstract: The demonstration at Gosselies Airport, Charleroi, Belgium, was held in conjunction with the United States TRSB demonstration program, and was the sixth in a series of operational demonstrations of several TRSB system configurations at selected airports in the United States and abroad. The TRSB Small Community System was installed to service Runway 25, the runway with a commissioned Instrument Landing System. Flight checks established that no mutual interference resulted. Operational demonstrations were made utilizing FAA Boeing 727 and Convair 880 test aircraft. Flight performance data was acquired with the Boeing 727 test aircraft only. Flight profiles included approaches on centerline and offset plus and minus 1 and 2 degrees at various elevation angles, and radials at constant altitude on centerline and offset plus and minus 10 degrees. Results of the operational demonstrations indicated that performance of the TRSB Small Community azimuth subsystem met ICAO (AMOP) 'full capability system' requirements. Although an accurate assessment of the elevation subsystem performance was not possible due to lack of adequate tracking data, the elevation angle deviations about an averaged value were well within ICAO (AMOP) 'full capability system' error limit boundaries.

Descriptors: Microwave landing systems, Instrument landing systems, Aircraft landings, Aircraft landings, Flight control systems, Performance, Systems engineering, Aircraft landings, Flight testing, Passenger aircraft, Global 

Identifiers: Boeing 727 aircraft, Convair 880 aircraft, NT1500DXXA, NT1500DFAA

AD-A054 645/7ST NTIS Prices PC A04/MF A01
B. Engineering Index Files.
1087489  ID NO.- E1801287489
SIMULATION INVESTIGATION ON THE FEASIBILITY OF CURVED APPROACHES UNDER MLS GUIDANCE.
Erkelens, L. J. J.,
Natl Lucht Ruimtevaartlab Versl Verh n 78035 U 1978 100 p
CODEN: VNKL42
The limitations of the instrument landing systems (ILS) are assessed. The advantages of the new approach system using microwaves (MLS) are evaluated with respect to reliability and precision in approach guidance. In the present simulator investigation the utility of seven laterally curved approaches with various turn angles and final intercept altitudes, executed with a B-747 aircraft, have been investigated. 7 refs.
DESCRIPTORS: (+AIRCRAFT, +Control).
CARD ALERT: 652, 651

1080091  ID NO.- E180180091
EXPERIMENTAL DETERMINATION OF POSITION-ESTIMATE ACCURACY USING BACK-AZIMUTH SIGNALS FROM A MICROWAVE LANDING SYSTEM.
Knox, Charles E.
NASA, Langley Res Cent, Hampton, Va
NASA Tech Pap n 1574 Dec 1979 36 p CODEN: NTPADG
This paper presents the results of flight tests using the NASA Terminal Configured Vehicle Boeing 737 airplane to obtain position estimates with back-azimuth signals from a microwave landing system. The most accurate position estimates were obtained from a combination of back-azimuth and distance-measuring equipment (DME) signals. Less accurate position estimates were obtained with back-azimuth signals alone; the least accurate position estimates were obtained with dual DME signals. 6 refs.
DESCRIPTORS: (+AIRCRAFT, +Landing), (MICROWAVE DEVICES, Applications), AIR NAVIGATION.
IDENTIFIERS: MICROWAVE NAVIGATION SYSTEMS
CARD ALERT: 652 714, 715
DESIGN OF AN ELECTRONIC MODEL OF A MICROWAVE AIRCRAFT LANDING SYSTEM.
Nikitin, A. O.
Telecommun Radio Eng v 33-34 n 6 Jun 1979 p 83-85 CODEN: TCREAG
An electronic model of an actual radio system for improving the efficiency of microwave landing systems and a method of modeling their signals at the second IF of the onboard receiver are proposed. 5 refs.
DESCRIPTORS: (+RADIO SYSTEMS. +Computer Simulation.).
IDENTIFIERS: ELECTRONIC MODEL
CARD ALERT: 716, 723, 652

AEROSPACE AND MILITARY.
Lombardo, Thomas G.
IEEE Spectrum v 17 n 1 Jan 1980 p 75-80 CODEN: IEEESAM
ISSN 0018-9235
The most significant aviation-aerospace and military developments of 1979 are surveyed: the Microwave Landing System, which was begun by the Federal Aviation Administration, the Navstar Global Positioning System; Voyager and Pioneer space probes; Viking landers and the Very High Speed Integrated Circuit (VHSC) program.
DESCRIPTORS: +AEROSPACE ENGINEERING, MILITARY ENGINEERING.
CARD ALERT: 855, 856, 404, 901
GUIDANCE ACCURACY CONSIDERATIONS FOR THE MICROWAVE LANDING SYSTEM L-BAND PRECISION DME.

Kelly, R. J.; LaBerge, E. F. C.
Bendix Corp., Baltimore, Md.

The microwave landing system (MLS) developed by the FAA it to be a common civil-military system and provide a level of operations and equipments for all classes of users. Integral to the MLS concept is the distance measuring equipment (DME), which measures range to touchdown. Requirements dictate aircraft range and range rate measurements with an accuracy at least an order of magnitude more precise than those needed for the conventional terminal DME application. Key to this precision DME (PDME) achieving its operational objectives is a complete accuracy specification and its rationale, including a measurement methodology. Not only must the error budget allocations between equipment instrumentation errors and multipath-induced errors be specified, but also the degree of airborne interrogator output data smoothing. These PDME filter time constants must be compatible with the flight control system characteristics of the aircraft to be served. This paper presents a consistent accuracy specification suitable for MLS operational requirements and a PDME implementation common for CTOL, STOL, and V/STOL. 26 refs. DESCRIPTORS: (AIRCRAFT. (Landing). (AIRCRAFT INSTRUMENTS. Microwave). IDENTIFIERS: DISTANCE MEASURING EQUIPMENT. MICROWAVE LANDING SYSTEM.

CARD ALERT: 431, 716

LES SYSTEMES DE MESURE DE DISTANCE TYPE DME $left double quotes DME $right double quotes ETAT ACTUEL ET DEVELOPPEMENTS FUTURS. $left double quotes DME $right double quotes TYPE DISTANCE MEASURING SYSTEMS: PRESENT STATE AND FUTURE DEVELOPMENTS $right brackets.

Schiiller, H.
Le Maitre Teleph. Boulogne-Billancourt, Fr

DME with VOR can be used for medium range navigation. Its use with ILS and microwave landing systems for accomplishing landing is also foreseen. After outlining DME's principles of operation, improvements which can be achieved through new technology are discussed. In French DESCRIPTORS: AIR NAVIGATION. RADIO NAVIGATION. IDENTIFIERS: DISTANCE MEASURING EQUIPMENT.

CARD ALERT: 711, 652
ADVANCED BRAKING CONTROLS FOR BUSINESS AIRCRAFT

Longyear, D. W.; Hirzel, E. A.
Crane Co. Hydro-Aire Div SAE Prepr no 79059 for Meet Apr 3-6 1979 p 14 CODEN SEPPBA

This paper discusses the phenomenon involved in stopping an aircraft and the capabilities required to meet microwave landing system operations. Today's major terminals are becoming saturated, primarily because of the increased commercial traffic and to relieve the pressure, business aircraft are being relegated to outlying fields in some areas. They are severely restricted or outlawed. The microwave landing system opens new vistas for the entire aviation industry because it greatly expands the access to the terminal and thereby offers additional landing windows for the business aircraft operators. However, to operate in the microwave landing system, the nonscheduled operator will be required to have avionics equipment similar to the larger commercial aircraft. Also, if he is to take full advantage of the landing facilities, he will require full automatic braking capability. 3 refs.

DESCRIPTORS: (+AIRCRAFT. +Brakes)
IDENTIFIERS: BUSINESS AIRCRAFT, MICROWAVE LANDING SYSTEM
CARD ALERT: 652, 602, 632

LE CHOIX D'UN NOUVEAU SYSTEME D'ATTERRISSAGE INTERNATIONAL PAR L'OACI. $Left brackets Choice of a New International Landing System by the ICAO $Right brackets

Foumbonne, M. P.

Thomson-CSF, Paris, Fr
Onde Electr v 58 n 11 Nov 1978 p 715-720 CODEN: ONELAS ISSN 0030-2430

The International ILS (Instrument Landing System) which was standardized in 1947, is plagued with constitutional deficiencies that a more modern system might not present. Since 1969, various solutions proposed by several nations, among them France, have been compared and evaluated. This intense technical effort culminated in April 1978 when ICAO (International Civil Aviation Organisation) selected the time reference scanning beams system proposed by the United States and Australia as successor of ILS. This system, which operates at 5 GHz, indicates the aircraft azimuth and elevation inside a wide volume and should be less sensitive than ILS to site effects. In French

DESCRIPTORS: (+AIRCRAFT. +Landing). (AIR NAVIGATION, Control Equipment)
CARD ALERT: 652, 715, 716, 431, 732
LANDING AIRCRAFT UNDER POOR CONDITIONS

Kelly, Robert J.; Redden, Henry W.; Shapena, Jack L.

Bendix Corp., Towson, Md

IEEE Spectrum v 15 n 9 Sep 1978 p 52-57 CODEN IFESAM

The time reference scanning-beam microwave landing system (TRSB MLS) is a system approach to the landing guidance problem. It can meet a wide variety of diverse performance, economic, and safety requirements and still supply a universal airborne receiver/processor able to operate with all ground systems. The TRSB is an air-derived scanning-beam system operating in the C-band. Ground-based equipment supplies signals to a receiver in the landing aircraft to determine position information: two angle coordinates and a range coordinate. The angle information is derived by measuring the time difference between the successive passages of highly directive, narrow fan beams. One beam scans in azimuth and one in elevation. The range information is derived from equipment similar to conventional L-band distance-measuring equipment (DME) modified for additional precision.

DESCRIPTORS: (AIRCRAFT. Landing), (AVIONICS. Microwaves), (AIR TRANSPORTATION. Traffic Control).

IDENTIFIERS: AIRCRAFT LANDING SYSTEMS

CARD ALERT: 652, 715, 431

914033 ID NO.: E1790314033

914074 ID NO.: E1790314074

SIMULATION AUTOMATISCHER LANDEANFLUÈGE FÜR VERKEHRSFLUGZEUGE
AM BEISPIEL EINER BOEING 707. Simulation der landeabsicherung für ein Beispiel eines BOEING 707.

Georg Chr. Regelschütz. Technologische Universität Braunschweig, Ger

Regelungstechnik v 26 n 8 Aug 1978 p 251-258 CODEN RLESA5

New procedures for the improvement of air traffic in the close-range of airports are investigated in the special research section. Guidance principles, which are used to improve the safety and capacity of the flight controller, can be improved by computer simulations. The limit case of the completely automatic approach, according to the noise reducing system, is solved by computer simulation and the results are to be used as a reference basis for manually controlled approaches. 12 refs. In German.

DESCRIPTORS: (AIRCRAFT. Transport. Landing), (COMPUTER SIMULATION).

IDENTIFIERS: PASSENGER PLANES

CARD ALERT: 723, 652, 731

914033 ID NO.: E1790314033
900210  ID NO.: E1790100210
STEEP GRADIENT APPROACH SYSTEMS RESEARCH FOR ALL-WEATHER OPERATIONS.
Brown, A. D.
R Aircraft Establ, Bedfordshire, Engh
This paper describes some aspects of steep gradient approach research carried out at RAE Bedford between 1975 and 1977 using flight trials, piloted simulation and theoretical studies. Because only conventional aircraft were available, the flight program was oriented toward establishing the limitations of such types and their associated avionics equipment when used for R/STOL operations. Only performance data for the twin turboprop RAC 1-11 and the twin turboprop HS 748 are presented in the paper. Aspects considered include the determination of the maximum usable glideslope angle and the optimum beamwidths for azimuth and elevation radio guidance to permit R/STOL operations using a standard autopilot. It is suggested that MLS (Microwave Landing System) with DME (Distance Measuring Equipment) range information will overcome some of the limitations identified. Manual approach performance results are also presented which indicate the need for 150-200 ft decision heights. Pilot simulation research has shown a requirement for approach lighting comparable to existing Category 2 patterns for poor visibility operations. Even then, it is unlikely that acceptable missed approach rates can be achieved unless RVs are in excess of 1000 meters. 13 refs.
DESCRIPTORS: (AIRCRAFT, MILITARY, *Landing), (AIR NAVIGATION, Control Systems), AVIONICS.
CARD ALERT: 404, 452, 471, 731, 715

900187  ID NO.: E1790100187
DME-BASED SYSTEM FOR ENROUTE/TERMINAL NAVIGATION. ALL-WEATHER LANDING AND AIR TRAFFIC CONTROL
Ekarek, K. D.
Staet Elektro Lorenz, Stuttgart, Ger
Three significant extensions of the standard DME system are discussed, namely, the Precision DME (Integrated Navigation System including a microwave landing system), the application of direction-finding principles using the DME signal format, and the integration of ground-to-air data transfer into the DME system. Examples of operational applications of the combination of precision distance measurement and ground derived direction finding in the field of radio navigation and air traffic control are cited.
DESCRIPTORS: (AIRCRAFT, *Landing), (AIR TRANSPORTATION, Traffic Control), AIR NAVIGATION, AVIONICS.
CARD ALERT: 652, 431, 715

900208  ID NO.: E1790100208
PROPAGATION INTEGRITY FOR MICROWAVE INSTRUMENT LANDING SYSTEMS.
Densko, Paul S.
US Army Avionics Res & Dev Act
Testing at airfields at microwave landing system frequencies, using typical realistic multipath geometries and prototypical microwave landing system antenna radiation patterns, has indicated the existence of a multipath problem that must be reckoned with if the next generation microwave landing system can be used. It may be, in the event of operational utility and safety. There is strong evidence to support a contention that the choice of the correct polarization is fundamentally the surest way to relieve the next generation precision approach and landing systems from the burden of unnecessary multipath signals. The data weigh

heavily in favor of circular polarization. 13 refs.
DESCRIPTORS: (AIRCRAFT, MILITARY, *Landing), (AIR NAVIGATION, Control Systems), AVIONICS.
CARD ALERT: 404, 452, 471, 731, 715
AUTOMATIC FLIGHT PERFORMANCE OF A TRANSPORT AIRPLANE ON COMPLEX MICROWAVE LANDING SYSTEM PATHS.


In May 1976, the National Aeronautics and Space Administration, through its Langley Research Center Terminal Configured Vehicle (TCV) Program, participated with the Federal Aviation Administration (FAA) in a demonstration of the U. S. A. microwave landing system. During this demonstration the microwave landing system was utilized to provide the TCV B-737 airplane with guidance for automatic control on complex, curved descending paths with precision turns into short final approaches terminating in landing and roll-out, even when subjected to strong and gusty tail- and cross-wind components and severe wind shear. The data collected from more than fifty approach flights during the demonstration provided an opportunity to analyze airplane flight performance on a statistical basis rather than on a single flight record basis as is customary done with limited data replication. Mean and standard deviation data are presented for approach flight path tracking parameters. In addition, the adverse wind conditions encountered during these flights are described using three-dimensional wind vector characteristics computed from the extensive on-board sensor data. 4 refs.

DESCRIPTORS: (AIRCRAFT, Landing), (AIR NAVIGATION, Control Systems).
CARD ALERT: 652, 431, 731


Anon
AGARD, Guid and Control Panel, Neuilly-sur-Seine, Fr.

This conference proceedings contains 24 papers on the modes of guidance and control of aircraft subject to special environmental conditions near the ground. Of these papers 21 are indexed separately. Topics discussed include open-loop compensation of wind-shear effects in low-level flight, a flight control system for achieving ride smoothing under low-altitude high-speed flight conditions, human engineering evaluation of a cockpit display/input device, a radar navigation system for low-altitude and terminal-area flight, a ground avoidance system for fighter aircraft, signal format, current technology in solid-state digital circuitry, and modern antenna design. A C-band system can be produced that is simple yet capable of providing man, new landing functions for aircraft.

DESCRIPTORS: (AIRCRAFT, Landing).
IDENTIFIERS: AIRCRAFT TRANSPORTATION, Traffic Control, AIRCRAFT, Landing.
CARD ALERT: 431, 652

GET ACQUAINTED WITH SCANNING-BEAM MLS.

Nelson, James R.
Fed Aviat Adm, Washington, DC
Microwave V 17 n 6 Jun 1978 p 68-59, 72, 74-77 CODEN: MCWRA.

The operation and requirements of the time-reference, scanning-beam (T/R) microwave landing system recently endorsed by the International Civil Aviation Organization (ICAO) are reviewed. MLS, as endorsed by ICAO, operates at C-band which permits ranges of up to 30 nm to be reliably achieved with modest transmitting powers. Even under adverse conditions of heavy rainfall, these frequencies will also permit the use of much smaller antennas compared to the UHF/VHF frequencies used by ILS. When combined with a proper signal format, current technology in solid-state digital circuitry, and modern antenna design, a C-band system can be produced that is simple yet capable of providing man, new landing functions for aircraft
COMPARISON STUDY OF MLS AIRBORNE SIGNAL PROCESSING TECHNIQUES


Early in the prototype hardware phase of the U. S. program for TRSB, the Dwell Gate Processor which operates on the received beam envelope was selected because of its simplicity. This technique permitted significant reductions in the size, complexity and production cost of the avionics through the use of a readily available, low-cost microprocessor (e.g., the Intel 8080). The study discussed in this paper was undertaken to review this decision in the light of work that has been done on other processor mechanizations in the interim. The comparison study was based on both computer and receiver bench tests. The test results compared favorably with the theoretical predictions. It was concluded that the Dwell Gate Processor is the appropriate choice for general TRSB processing requirements.

CARD ALERT: 652, 715, 716, 431

MICROWAVE LANDING SYSTEMS. (CITATIONS FROM THE ENGINEERING INDEX DATA BASE).

Reed, William E. (Ed.)

NTIS, Springfield, Va


The bibliography cites papers from worldwide literature on the planning, development, and operation of microwave landing systems including feasibility, systems engineering, equipment, signal propagation, and cost analysis. This updated bibliography was prepared by searching the 1970-Jul 1977 data base of Engineering Index. It contains 80 abstracts, 11 of which are new entries to the previous edition.

CARD ALERT: 652, 711, 715, 912

MICROWAVE LANDING SYSTEMS. (CITATIONS FROM THE NTIS DATA BASE).

Reed, William E. (Ed.)

NTIS, Springfield, Va


A description is given of the interim Microwave Instrument Landing System selected by the U. S. Federal Aviation Administration until such time as the International Civil Aviation Organization develops and approves the Standards and Recommended Practices for the system finally chosen. This system, manufactured by Tull Aviation Corporation, is essentially a microwave version of ILS. The system operates at 6000 to 6250 MHz and uses a scanning beam technique to provide ease of installation and sitting. However, the system uses the ILS signal format of 90 and 150 Hz in order to provide compatibility with aircraft ILS/ILS receivers. Users need only add an antenna, a frequency converter unit, and a small mod kit inside their ILS receiver, in order to receive the MLS signals. Operation is essentially identical to ILS, so that retraining of flight personnel is not required. The use of this system to provide precision approaches for helicopters shuttling workers between the Edison and Coal Valley hospitals in Alberta in support of the Lescar Ltd. mining operation is reviewed.

CARD ALERT: 652, 716, 711
879497  ID NO.: E1781179497
MICROWAVE LANDING SYSTEMS.
Pogust, Frederick
Airborne Instrum Lab, Cutler-Hammer
As microwave landing system technology enters its third
decade, competing approaches contend for standardization at
the international level. MLSs have long been considered the
preferred alternative for the two landing guidance techniques
developed during World War II and now in use $EM$ DASH$ the
instrument landing system and the ground-controlled approach.
This article examines the critical issues involved.
DESCRIPTION: (AIRCRAFT, Landing), (AVIONICS, Microwaves).
CARD ALERT: 652. 715

879498  ID NO.: E1781179498
SCANNING-BEAM MICROWAVE LANDING SYSTEM INCORPORATING DOPPLER
CODING.
Glasgow, J. A.
GEC-Marconi Electron Ltd, Res Lab, EngI
GEC J SCI Technol v 44 n 2 1978 p 87-92 CODEN: GUSTAE
A new landing guidance system for aircraft is required to
replace the present-day instrument landing system, which
provides guidance for only a single line of approach to the
runway. With the new microwave landing system (MLS), the
approach path can be suited both to particular aircraft and to
the current traffic. A number of alternative techniques have
been proposed, the two main contenders being the
time-referenced scanning beam (TRS$B$) and the Doppler system.
This paper describes a technique for forming a TRS$B$ system
that has exceptional precision with regard to position and
time, while an accurate frequency coding may be applied to it
as a modulation, so that it may be interpreted by a form of
Doppler processor. 4 refs
DESCRIPTION: (AIRCRAFT, Landing).
IDENTIFIERS: MICROWAVE LANDING SYSTEM
CARD ALERT: 652. 716

879484  ID NO.: E1781179484
RADIO LANDING SYSTEMS.
Darrington, P. R.
Wireless World v 84 n 1508 Apr 1978 p 38-43 CODEN: WRLAIW
WINADA
The background to radio blind landing aids are reviewed with
reference to the decision of the International Civil Aviation
Organization to adopt a microwave landing system for
international use. The several competitors are described.
DESCRIPTION: (AIRCRAFT, Landing).
CARD ALERT: 431. 652

871194  ID NO.: E1781071194
SYSTEM REQUIREMENTS FOR TRANSITION FROM ENROUTE TO APPROACH
GUIDANCE.
Meyer, D. H.
Rockwell Int, Cedar Rapids, Iowa
Navigation v 24 n 4 Winter 1977-1978 p 317-328 CODEN:
NAVIB3
The airborne system operational/functional requirements
from navigation using enroute aids to navigation using
approach guidance are examined for the transitional phase of
an aircraft flight. The automated navigation systems (using
nominal navigation aids and the ILS) MLS system capabilities
are described, and the complementary nature of each is treated.
In the full potential of approach guidance, it is suggested that on
being used the navigation systems will be an important aid to exploit
fully the resulting operational capabilities. Improved
microwave landing system capabilities suggest new operational
procedures for preflight navigators in the terminal area such
as close-in captures and complex approach paths. These
operational procedures, although only partially available at
this time, can be expanded upon based on the operational
advantages of the system. Equipment configurations are
presented to demonstrate the system requirements. 6 refs
DESCRIPTION: (AIR NAVIGATION, RADIO NAVIGATION).
CARD ALERT: 431. 716
Spiral APPROACH NAVIGATION CONCEPTS FOR VTOL AIRCRAFT USING A MICROWAVE LANDING SYSTEM.

McGeer, Leonard A.
NASA, Ames Res Cen, Moffet Field, Calif

Spiral approaches adjacent to the active runways of commercial airports have been proposed as a means of effectively interfacing CIDL and VTOL landing operations. Assuming an airport equipped with a Microwave Landing System (MLS), a VTOL aircraft following a spiral approach path might, depending on the specific trajectory, pass alternately in and out of the linear coverage of the MLS and thereby suffer degraded navigation performance. The objective of this study was to employ essentially state-of-the-art aided inertial navigation concepts to explore the expected navigation performance operating in the environment just described. Results show that aided inertial concepts utilizing simple body-mounted inertial systems may be adequate for an instrument landing if the MLS azimuth and distance measuring equipment (DME) signal coverages extend within a few feet of the ground. 3 refs.

DESCRIPTORS: (AIRCRAFT, VTOL/STOL, (Landing), (AIR NAVIGATION, Inertial Systems).

CARD ALERT: 652, 431

PRECISION ONE FOR NEW LANDING SYSTEM: FAST OR SLOW PULSE?

Graziani, Danio
FACE-Stamp, Milan, Italy
Electr Commun v 52 n 4 1977 p 289-292 CODEN: ELCMA

Recent proposals for the new precision distance measuring equipment to be collocated with the proposed microwave landing system are based on two main techniques the fast and slow pulse. This paper analyzes the factors involved in using both these techniques and compares the anticipated costs. Comparison shows that the fast pulse method will probably have technical and economic advantages over the slow pulse technique. 6 refs.

DESCRIPTORS: (=MECHANICAL VARIABLES MEASUREMENT, =Distance), AIRCRAFT LANDING GEAR, MICROWAVES, IDENTIFIERS, MICROWAVE LANDING SYSTEMS

CARD ALERT: 943, 652, 711

When an approach and landing system with statistical interrogations is measured, the entire air traffic that influences system reply efficiency and accuracy has to be considered. If this traffic load is simulated, statistical generators In this article the development of suitable simulation equipment based on a traffic model is described. The suitability of the equipment is demonstrated by means of some measuring results gained from test measurements with the microwave landing system MLS developed in West Germany. 4 refs. In German

DESCRIPTORS: (AIR TRANSPORTATION, Traffic Control), (AIRCRAFT, Landing)

CARD ALERT 431, 642

MICROWAVE LANDING SYSTEM (MLS) IMPLEMENTATION, VOLUME 1 AND 2. 1977

Anon
RTCA (Radio Tech Comm for Aeronaut) Washington, DC
Microwave Landing System (MLS) Implementation Publ by RTCA (Radio Tech Comm for Aeronaut) 1977 2 vol. 154 pp

This two-volume book is designed to show the benefits and operational capabilities of a microwave landing system (MLS) and in addition proposes short, middle, and long term strategies for implementing the transition from the currently used VHF/UHF instrument landing system (ILS) to a standard nationwide MLS. Separate appendices present the reports of informal working groups of Special Committee 125 of the Radio Technical Commission for Aeronautics (RTCA) regarding MLS benefits, short-term implementation strategies, and airborne systems operational capabilities.

DESCRIPTORS: (AIRCRAFT, (Landing), (AIR TRANSPORTATION, Traffic Control)

CARD ALERT 652, 431

SIMULATION DER VERKEHRSBELASTUNG BEI ANFLUG- UND LANDESYSTEMEN MIT STATISTISCHER ABFRAGE.

Fenselken, Wolfgang; Ulrich, Rainier
Tech Univ Braunschweig, Ger
Frequen v 31 n 8 Aug 1977 p 246-253 CODEN: FQZAI

Simulation of Traffic Load for Approach and Landing Systems with Statistical Interrogations $height brackets

Frequen v 31 n 8 Aug 1977 p 246-253 CODEN: FQZAI
DIALOG File: COMPENDEX - 70-80/Dec (Copr. Engineering Index Inc.) (Item 4R of 14R) User 3/917 StanR1

847363 ID NO.: E1780747363
DOPPLER MLS. THE UK SOLUTION.
Ford, Terence
Aircr Eng v 50 n 2 Feb 1978 p 4-7 CODEN: AIREAC
In the Doppler MLS, a source of radiation is moved at a constant velocity along the ground and compared with a stationary frequency in an airborne receiver. The frequency difference represents a direct measure of the angle of the receiver from the array boresight. A practical and economic Doppler MLS system is obtained by commutating a radiating source along a short array of closely spaced elements in a repetitive manner. The Doppler MLS is a frequency measurement system and is not sensitive to amplitude effects, and hence, the interference to ILS normally caused by other aircraft movements on and over the airfield is not seen in the new system. As it is structurally small, the Doppler MLS does not cause interference to ILS. For this reason, it is possible for both ILS and Doppler MLS to co-exist on the same runway, with each serving appropriately equipped aircraft during the transitional period.
DESCRIPPERS: (AIRCRAFT. *LANDING), (AIR TRANSPORTATION, Traffic Control), (ANTENNAS, Arrays).
CARD ALERT: 652, 431, 716

830822 ID NO.: E1780530822
AIRBORNE NAVIGATION SYSTEM PERFORMANCE DURING RNAV/MLS TRANSITION.
Heine, Walter
Syst Control, Inc. (Vt), Palo Alto, Calif
Aircraft position error sensitivity to sensor errors and flight path geometry is analyzed during RNAV/MLS transition using a digital computer simulation. The avionics sensitivity data provides information necessary to establish requirements for additional guidance law design and to establish airspace requirements for maneuvering to null out any residual RNAV errors upon MLS transition. The data base is also beneficial as planning information for subsequent flight testing. The parameters varied during the generation of the data base include flight profile, error source content and magnitude, ground facility location, runway/flight path orientation and navigation mode. The avionics, autopilots and aircraft dynamics correspond to the existing NASA Terminal Configured Vehicle. 10 refs.
DESCRIPPERS: *AIR NAVIGATION.
CARD ALERT: 431
SCANNING-BEAM MICROWAVE LANDING SYSTEM SEM DASHES MULTIPATH-ERRORS AND ANTENNA-DESIGN PHILOSOPHY.

Lopez, Alfred
Haritzine Corp., Greenbriar, NY


CODEN: IETRAK

Multipath reception can cause guidance-angle errors in a microwave landing system (MLS). The antenna radiation-control system for a scanning-beam MLS is defined and analyzed. It is shown that a helpful design philosophy for the ground antennas is that the maximum guidance-angle error is proportional to 1) the amplitude of the indirect signal, 2) the antenna beamwidth, and 3) the time derivative of the indirect signal as the direct beam and scan is the receiver. This result is used in developing a rationale for the selection of the antenna beamwidth and sideline level (aperture size and excitation) for the azimuth and elevation guidance functions. 7 refs.

DESCRIPTORS: *AIRCRAFT INSTRUMENTS, (ANTENNAS, Design), CARD ALERT 652, 716

TRANSPORTATION: SOME GOOD NEWS.

Freidelander, Gordon D

IEEE Spectrum vol 14 n 1 Jan 1977 p 70-73 CODEN: IESAM

Developments during 1976 in transportation are reviewed. The discussion includes the performance evaluation of Amtrak's advanced hybrid-controlled all-electric Swedish-built ASEA RC4 locomotive, the testing of an SNCF (French National Railways) CC 21000 class six-axle locomotive by Amtrak, and the United States' debut of French-designed Seattle double-decked RTG (right double-decked) class turbo trains. An automated marshaling yard is described. A new generation of U.S. built hydrofoil vessels went into service in ferrying passengers across the rough ocean channels that separate the principal islands of the Hawaiian chain. Highlights in the areas of military, air carrier, and general aviation included progress in the automation of the National Airspace Program and in the enhancement of the Automated Radar Terminal System, and completion of Microwave Landing System Phase II development.

DESCRIPTORS: (*TRANSPORTATION, *Reviews), (RAILROADS, Reviews), (AVIATION, Reviews), HYDROFOILS, LOCOMOTIVES, ELECTRIC, RAILROAD YARDS AND TERMINALS, CARD ALERT 431, 581, 433, 434, 682, 674

RADARS SEE BETTER: VIKINGS SOAR, ROOST, TEST, AND TELL.

Torres, Edward A

IEEE Spectrum vol 14 n 1 Jan 1977 p 74-78 CODEN: IESAM
ANTENNA RADIATION MODELING FOR MICROWAVE LANDING SYSTEM.
Balais, Constantine A.; Cheng, Yuk Bun
MW Univ. Morgantown
CODEN: IETPAK

Geometric optics and diffraction techniques are used to develop radiation models of antennas mounted on an aircraft structure. Measurements at 35 GHz on a 1/35 scale model space shuttle and 1/11 scale Boeing 737 are used for comparison with computed patterns and are in very good agreement. Radiation coverage in the elevation plane on full scale Boeing 737 and Boeing 747 at 5 GHz, as applied to the microwave landing system (MLS), is examined for vertically and horizontally-polarized antennas mounted at different locations on the aircraft. 15 refs.

DESCRIPTORS (ANTENNAS. Radiation). (AIRCRAFT. Landing).
MICROWAVES.
IDENTIFIERS: MICROWAVE LANDING SYSTEM (MLS)
CARD ALERT 716. 652. 741.
745709  ID NO. - E177045709

CONCERTATED DOPPLER MICROWAVE LANDING SYSTEM FOR AIRCRAFT SEM DASH 3
Barrett, R. S.; Lawson, R. W.
Plessey Radar Res Cent, Havant, Eng
Syst Technol n 25 Dec 1976 p 32-40 CODEN SYTFXK
The first two parts of this series of articles on the Microwave Landing System (MLS), which will eventually replace the Instrument Landing System (ILS) appeared in earlier issues (part 1 by Ron S. Barrett published in Syst Technol n 21 Jun 1974 p 15-21; part 2 published by R. S. Barrett and J. M. Chambers in Syst Technol n 23 Mar 1976 p 21-28), these articles gave the background to MLS and a description of the ground subsystem. The present article summarizes the two earlier articles and goes on to describe in detail the airborne subsystem and some of the trials results. 2 refs.
DESCRIPTORS: (+AIRCRAFT; +Landing), (ELECTRONIC EQUIPMENT, Microwaves).
CARD ALERT: 652, 715

745708  ID NO. - E177045708

DESIGN CONSIDERATIONS FOR A FLARE GUIDANCE SUBSYSTEM
Hodgkins, P. D.; Caffarelli, N. J.
Fed Aviat Adm, Washington, DC
Navigation v 23 n 3 Fall 1976 p 249-256 CODEN NAVIB3
These five design considerations associated with the development of a flare guidance subsystem for the time reference scanning beam (TRSB) microwave landing system (MLS). The two basic concepts for providing MLS flare guidance information are examined: the touchdown zone and wind model are defined; technologies and equipment that are candidates for providing flare guidance are identified; the advantages of the MLS in providing a transition capability from glide slope to altitude are discussed; various flare algorithms are tabulated; flare antenna option is presented with configuration decision guidelines; and flight test results are shown that demonstrate the guidance capability of the elevation antenna in the approach threshold vicinity. 3 refs.
DESCRIPTORS: (+AIRCRAFT; +Landing), AVIONIC.
CARD ALERT: 652, 715

745704  ID NO. - E177045704

TRENDS IN AIRCRAFT LANDING SYSTEMS
Moore, R. A.; Cooper, H. W.; Littlepage, R. S.
Westinghouse Def & Electron Syst Cent, Baltimore, Md
IEEE Electron and Aerosp Syst Conv (EASCON '76), Rec.
Washington, DC. Sep 26-29 1976 Publ by IEEE (Cat n 76CH1514-4 EASCN), New York, NY. 1976 Pap 114, 14 p
This paper describes the present anticipated contributions of two systems of approach and landing guidance: (1) DASH 3, VHF/UHF Instrument Landing System (ILS), and Microwave Landing System (MLS). The first part of the paper is a brief history of aircraft approach and landing guidance. This is followed by a discussion of the large recent improvements in ILS through new engineering developments. Key features of the five national proposals for MLS competing for being identified as the international standard are described along with the most apparent improvements the MLS systems will provide. 24 refs.
DESCRIPTORS: (+AIRCRAFT; +Landing), IDENTIFIERS, INSTRUMENT LANDING SYSTEMS.
CARD ALERT: 652

743329  ID NO. - E177061329

MODERNIZED SSR SYSTEM
Hisarima, Yozo; Koshio, Tatsukichi; Tanaka, Hikao; Suzuki, Saku; Okada, Kazunisa
NEC, Tokyo, Jpn
Nec Res Dev n 43 Oct 1976 p 69-78 CODEN NECREU
The secondary surveillance radar system (SSR), together with primary radar, has been widely employed as a sensor for air traffic control (ATC) according to the ICAO recommendations. For the past several years, ATC automation, involving SSR Mode-C data, has been promoted on a world-wide basis, and the importance of the SSR has been increasing year by year. From this point of view, the technical problems confronting the SSR and their solutions, such as sharp cutoff antenna, monopulse technique, improved SLS (side lobe suppression), data processing, etc., and the standard SSR sensor involving the beacon target extractor applying some of these new techniques are discussed. 9 refs.
DESCRIPTORS: (+RADAR; +Surveillance Application), (AIR TRANSPORTATION, Traffic Control).
CARD ALERT: 716, 431

729263  ID NO. - E1770529263

MIKROWELLEN-ANFLUG- UND LÄNDERSYSTEME, $left brackets$ Microwave Flight and Landing Systems $right brackets$
Anon
NTZ Nachr I NTZ Commun J v 29 n 4 Apr 1976 p 305-306 CODEN: NNTZIA
The microwave landing system DLS is described. It is designed to replace the present standard ILS in 1985. The idea and advantages of the DLS concept are presented. 1 ref.
In German
DESCRIPTORS: (+AIRCRAFT; +Landing),
CARD ALERT: 652
A brief overview of the U.S. candidate of the microwave landing system (MLS) is presented. Practical implementation of two types of ground antenna designs are presented, including improved performance. Lens array designs have proven to be acceptable solution for limited-scan medium-performance requirements.

DESCRIPTORS: (+AIRCRAFT, +Landing), (AIRCRAFT INSTRUMENTS, Microwaves), (AIRCRAFT INSTRUMENTS, Microwaves), (AIRPORTS, Instruments), (AIRCRAFT INSTRUMENTS, Microwaves), (IDENTIFIERS, Instrument Landing Systems)

CARD ALERT: 652, 431

Aeromagnetic Surveying

Aeromagnetic Surveying

Aeromagnetic Surveying
The operational/functional requirements for the new microwave landing system (MLS) are examined for STOL operations. The study utilizes a nonlinear six-degree-of-freedom simulation of a de Havilland Buffalo C-RA aircraft and automatic flight control system to assess the MLS/STOL accuracy and coverage requirements for the azimuth, DME, primary elevation, and flare elevation functions. The aircraft performance is statistically determined for representative curved flight paths through touchdown. A range of MLS errors and coverages, environmental disturbances, and navigation filtering are investigated. The filter configuration is shown to have a significant effect on the ability of all controlled aircraft to cope with the MLS navigation errors. The study indicates that the STOL MLS requirements are included within the range of proposed MLS configurations. 14 refs.

DESCRIPTORS: (+AIRCRAFT, VTOL/STOL. +Landing), MICROWAVE DEVICES.

CARD ALERT: 657, 714, 715
SOME SYSTEM CONSIDERATIONS FOR MLS AIRBORNE PROCESSORS.

Beneke, J.; Wightman, C.
Calspan Corp., Buffalo, NY

Navigation v 22 n 1 Spring 1975 p 35-46

The microwave landing system (MLS) is under development by the Federal Aviation Administration (FAA) as a replacement for the VHF/ULF ILS. The following are some of the features that the microwave landing aid will provide: accurate guidance signals that will be relatively insensitive to weather, terrain, airport structures, and other aircraft; flexible flight paths as an aid to noise abatement and increased airport capacity; accurate guidance signals that permit less separation of parallel runways; low cost versions appropriate for smaller airfields; and a common civil/military system having compatible tactical military versions. Currently the two competing techniques, scanning beam and Doppler scan, are under evaluation for selection as the United States Microwave Landing System. The selected system technique will be a candidate for submission to the International Civil Aviation Organization (ICAO) evaluation of new landing systems. A common international MLS is the ultimate goal of the FAA developmental program. The discussions presented here are based upon some results of a techniques analysis program sponsored by the FAA. Some of the system requirements will be considered with respect to their effect upon design parameters in the airborne processors for angle guidance data. Performance in typical multipath environments will be analyzed with the differences noted between the scanning beam and Doppler scan techniques. Techniques for rejecting multipath interference from other aircraft and airport structures will be discussed since they are essential in the MLS to provide precision guidance in a severe multipath environment. 4 refs.

DOPPLER MLS DEVELOPMENT

Blair, P. K.; Sandbank, C. P.
Stand Telecommun Lab., Harlow, Eng.

Electr Commun v 20 n 4 1975 p 298-304

The development of a Doppler microwave landing system from its initial proposal through experimental and prototype phases is outlined. It is being submitted to ICAO by the United Kingdom government as a possible successor to the standard ILS approach and landing system. The need for a new system is due to changes in aviation and the predicted patterns of airport operations, as well as the desire to overcome the shortcomings of existing ILS. A comprehensive Doppler MLS system was designed including forward and back azimuth systems, an elevation system of 90 $\lambda$ aperture, field and integral monitoring units, and a range of airborne receivers. Stringent system evaluation, including field and flight tests, is being undertaken in Britain. System performance so far has been excellent.

DESCRIPTORS: AIRCRAFT, (landing), AIR NAVIGATION.
IDENTIFIERS: AIRCRAFT LANDING SYSTEMS
CARD ALERT 652, 431
621652 ID NO. - E1760421652
PHASE CODED PRECISION DME FOR MLS.
Doddington, S. H.; Lang, A.; Lagrand, J.
IT&T Headquarters, New York, NY
Electronic Commun v 50 n 4 1975 p 287-291 CODEN: ELCMAB
L-band DME systems can be made to have the same accuracy as
microwave landing system (MLS). C-band DME systems by using
phase coding techniques. The phase coded MLS/DME sets avoid
interference, use common hardware, and are compatible with
existing DME installations.
DESCRIPTORS: (+AIRCRAFT, +Landing), AIR NAVIGATION,
IDENTIFIERS: AIRCRAFT LANDING SYSTEMS
CARD ALERT: 652, 431

621598 ID NO. - E1760421598
SOLID STATE AMPLIFIERS FOR DME BEACONS.
Grattan, O.;
FACE-Staff, Milan, Italy
Electronic Commun v 50 n 4 1975 p 273-277 CODEN: ELCMAX
Two new solid state amplifiers have been developed for DME
applications. The F50-30 beacon amplifier provides an output
power of 200 w and is suitable for ground DME beacons
collocated with an ILS or MLS. This amplifier also drives a
new 4 kW amplifier used in F50-5 DME beacons for en route
navigation.
DESCRIPTORS: (+AIR NAVIGATION, AMPLIFIERS, ULTRAHIGH
FREQUENCY.
IDENTIFIERS: RADIO BEACONS
CARD ALERT: 713, 431

616439 ID NO. - E1760316439
COMPATIBILITY AND THE FREQUENCY SELECTION PROBLEM.
Frazier, Robert A.
III Inst of Techol, Res Inst, Annapolis, Md
IEEE Trans Electromagn Compat v EMC-17 n 4 Nov 1975 p
248-254 CODEN: IEWMAT
An automated model that calculates the frequency separation
requirements for interference-free operation of electronic
systems located in a given environment is described. Using
these frequency separation requirements, the model assigns a
channel to each system in the environment based on the
frequencies available to each. The model calculates inter-
system, antenna coupled interference levels only. It uses an
iterative but nonexhaustive, process which attempts to
develop a compatible assignment. Preassignment checks are
performed to determine if a complete assignment is impossible
based on the number of frequencies available to each system
and the separations between these frequencies. If an
assignment is impossible, a partial assignment with the least
number of deletions results. Using the preassignment checks,
the model can be used to determine a channel scheme for a new
system that will conserve spectrum space and allow compatible
operation in any given environment. The results of a recent
application of the model to an environment of microwave
landing guidance systems including the proposed MLS is given.
DESCRIPTORS: ELECTROMAGNETIC COMPATIBILITY, (+RADIO,
Frequency Allocation), (+AIRCRAFT, Landing).
IDENTIFIERS: AIRCRAFT LANDING SYSTEMS
CARD ALERT: 717, 716, 652

607369 ID NO. - E1760207369
OVERVIEW OF THE UPGRADED THIRD GENERATION AIR TRAFFIC
CONTROL SYSTEM.
Isreal, David R.
Fed Aviat Adm, Washington, DC
IEEE Electron and Aerosp Syst Conv (IESCON '74), Rec
Washington, DC, Oct 7-9 1974 p 244-249. Publ by IEEE (IEEE
Publ 74CH0883-1 AES), New York, NY, 1974
The traffic control system planned for use in the 1980's
and beyond is now known as the Upgraded Third Generation
System (UGC3D). It is designed to meet the FAA's goals of: (a)
maintaining or improving safety, (b) constraining or reducing
costs, and (c) increasing or improving performance. The
system will be characterized by nine major features: $EM$ DASHS
Disembodied Positive Control (IPC), the Discrete Address
Beacon System (DABS), Area Navigation (RNAV), Microwave
Landing System (MLS), increased automation, Airport Perimeter
Traffic Control (ASTC), a Wake Vortex Avoidance System (WVAS),
Flight Service Stations (FSS), and Aeronautical Satellites
(AERSAT).
DESCRIPTORS: (+AIR TRANSPORTATION, +Traffic Control),
CARD ALERT: 431
Pilot performance in flying horizontally curved instrument approaches was analyzed by having nine test subjects fly curved approaches in a fixed-base simulator. Approaches were flown without an autopilot and without a flight director. Evaluations were based on deviation measurements made at a number of points along the curved approach path and on subject questionnaires. Results indicate that pilots can fly curved approaches, though less accurately than straight-in approaches, that a moderate wind does not seriously affect curve flying performance, and that there is no major performance difference between 60° degree and 90° degree turns.

DESCRIPTORS: (-AVIATORS, -Ability Testing, (+AIRCRAFT, Landing)

IDENTIFIERS: MICROWAVE LANDING SYSTEMS
CARD ALERT: 431. 912. 652

This paper describes the decision making structure being used to define the U.S. microwave landing system (MLS) design that will be offered to the International Civil Aviation Organization for consideration as the new standard replacing the existing instrument landing system (ILS). Essential prerequisites of such an offering include thoroughness in the underlying technical work and agreement by the user community that the new system is responsive to its diverse requirements in a cost-effective manner. 5 refs.

DESCRIPTORS: (+AIRCRAFT, -Landing), (+AIR NAVIGATION, Research), (+RADAR, Measurement Application)

IDENTIFIERS: MICROWAVE LANDING SYSTEMS
CARD ALERT: 652. 431. 716
INTERNATIONAL AND U. S. DESIGN PROPOSALS FOR A MICROWAVE LANDING SYSTEM.

Weer, S. Ahmed, Jones, Stanley R.
WITRE Corp, McLean, Va.
Int Conf on Syst, Man and Cybern, Proc. Dallas, Tex. Oct 2-4
1974 p. 150-160. Publ by IEEE (74 CH 908-4 SMC). New York,
NY, 1974

This paper describes the preliminary designs being proposed
for the International Civil Aviation Organization (ICAO) SEM
DASHS by the five countries having development programs on a
new precision approach and landing system. The Australian, U.
K. and U.S. Systems are all 'air-derived' and use the C-Band
for the main functions of azimuth and elevation. Differences
in these designs exist both in the use of Doppler or Scanning
Beam concepts and in the use of time or frequency multipleing
of the azimuth and elevation signals. The French and German
designs derive the angle information on the ground and
transmit it to the aircraft via a data link. The French are
proposing either an interferometric or a Doppler-effect
reception technique while the German approach is to employ
the L-Band DME. The signal formats, ground systems, and
avionics features of each design are described. Design
parameters that influence system performance in terms of
accuracy, integrity and implementability are identified. 8
refs.

DESCRIPTORS: (+AIRCRAFT, +Landing), (AIR NAVIGATION.
Research), (RADAR, Measurement Application), TELECOMMUN-
ICATION LINKS, MICROWAVE.
IDENTIFIERS: MICROWAVE LANDING SYSTEMS
CARD ALERT: 652, 731

APPLICATION OF MODERN CONTROL THEORY TO THE ANALYSIS OF
AIRCRAFT AUTOLAND PERFORMANCE USING A SCANNING BEAM GUIDANCE
SYSTEM.

Huber, Robert R.
AF Flight Dyn Lab, Wright-Patterson AFB, Ohio
Jt Autom Control Conf, 15th, Proc. Univ of Tex. Austin, Jun

A flexible digital computer analysis technique was developed
to predict aircraft longitudinal landing performance from the
FAA Category II window to touchdown. A Microwave Landing
System (MLS) provided sampled data elevation angle guidance
and continuous DME (Distance Measuring Equipment) guidance.
Atmospheric disturbances including deterministic winds and
random gusts as well as the MLS noise were modeled. The
automatic flight control system was modeled as a linear
optimal servo. A covariance propagation technique was used to
predict the system statistical performance along the landing
trajectory and at touchdown. Results are presented for a DC-8
aircraft for variations in atmospheric turbulence intensity
levels and variations in landing guidance system data rate. 8
refs.
AUTOMATIC CARRIER LANDING SYSTEMS.

Bell Aerosp Co, Buffalo, NY


A number of automatic carrier landing systems have been designed and proposed. These systems are all digital and navigation computing systems, and enable all double quotes hands off right double quotes all automatic, all well landings of properly equipped aircraft on to an aircraft carrier deck (or suitably equipped land based installations). Another design which is postulated for the near future is designated MLS EM DASH the microwave landing system. This system offers greater potential in that it is capable of controlling: (a) a larger airspace, i.e. more than one, has more potential: (b) more suitably equipped aircraft (at any given time), i.e. more capacity, and (c) is also compatible with conventional landing fields, including civilian and other tactical air fields.

DESCRIPTORS: (+AIRCRAFT, MILITARY, +Deck Landing), (AIRCRAFT CARRIERS, Radio Equipment).

CARD ALERT: 404, 652, 672, 716

COMPUTED DOPPLER MICROWAVE LANDING SYSTEM FOR AIRCRAFT.

Barratt, R W Plessey Radar Res Cent, Havant, Eng

Syst Technol n 21 Jun 1974 p 15-21 CODEN: SYTEAX

A new Microwave Landing System (MLS) for aircraft, which will eventually replace the current Instrument Landing System (ILS) is reported. The article outlines the background to the work and presents the basic principles.

DESCRIPTORS: (+AIRCRAFT, Landing), (AIRCRAFT CARRIERS, Radio Equipment).

CARD ALERT: 652, 716

AIR TRAFFIC CONTROL: UPGRADING THE THIRD GENERATION.

Israel, David B


The Air Traffic Control Advisory Committee has recommended evolution and improvement of the present ground-based and beacon-based system, with priority given to the greater use of automation and the introduction of a new concept of intersegmental positive control. The Committee’s recommendations are now referred to as the "left double quotes Updated Third-Generation System right double quotes", building on NAS Stage A and ARTS III, which constitute the "left double quotes third generation right double quotes system. Since the decision to proceed on its engineering and development, the Upgraded Third Generation System has been transformed into a broad system design which is highlighted by (but not restricted to) nine key features. Hardware and software development programs associated with these features have been initiated, with most test and evaluation activity scheduled for the 1976-1977 period. At that time, final system design choices and implementation decisions will be made, leading to initial operational capabilities in the early 1980s. In addition to intermittent positive control, the other key features are a discrete-address beacon system, area navigation, a microwave landing system, automation beyond that of NAS Stage A and ARTS III, airport surface traffic control, a wake-vortex avoidance system, automated flight service stations, and aeronautical satellites for trans-ocean flights.

DESCRIPTORS: (+AIR TRANSPORTATION, +Traffic Control), (AIR NAVIGATION).

CARD ALERT: 431

WHETHER ALL WEATHER: THE AIRLINES’ POINT OF VIEW OR A REVIEW OF ALL WEATHER ACRONYMITY.

Poritzky, Siegbert B

Air Transp Assoc of Am, Washington, DC SAE Prepr n 750602 for Meet May 6-8 1975, p 9 CODEN: SEPPAR

A brief review of the airline industry’s viewpoint on the all-weather operations program. The paper describes airline policy views on landing DASH requirements, on implementation of ground and airborne all-weather facilities, and on the relationship of the Microwave Landing System to all-weather operations. The paper discusses some necessary characteristics of flight control systems and new cockpit displays for the achievement of more complex and more efficient approaches to runways. The paper expresses an airline man’s views with respect to Independent Landing Monitors, visibility enhancement devices, and Air Traffic Situation Displays.

DESCRIPTORS: (+AVIATION, +Meteorology).

CARD ALERT: 431, 443
MICROWAVE LANDING SYSTEM.
Farris, David W.
Lockheed-Georgia Co., Marietta
This paper describes a flight test program to demonstrate the feasibility of a Bendix/Bell Scanning Beam Microwave Landing System. conceived, designed, and developed under a contract with the Federal Aviation Administration. The reasons for a new landing system, the requirements, the technical concepts, and descriptions of the feasibility hardware are discussed together with the flight test program, preliminary results, and conclusions.
DESCRIPTORS: (+AIRCRAFT, +Landing), CARD ALERT: 652

GROUND BASED SYSTEMS.
Anon.
Avionics Eng. v 47 n 2 Feb 1975 p 4-7, 11 CODEN AIENAF
A description is given of new air traffic control facilities being developed in Great Britain. These include an air traffic control center, which will have responsibility for supersonic operations over the Atlantic, as well as local operations in Britain. The distributed data processing system, contains an automatic three-dimensional radar, which can provide slant range, bearing, and height simultaneously; new Doppler VOR navigational aids; a microwave landing system; automatic test equipment for various frequency ranges; and a new computer-controlled radar simulator.
DESCRIPTORS: (+AIR TRANSPORTATION, +Traffic Control), AIR NAVIGATION, (DATA PROCESSING, Data Handling), CARD ALERT: 431, 723
DIALOG FILE: COMPEDEX - 70-80/Dec (Copr. Engineering Index Inc.) (Item 100 of 140) User 3007 SJ-481

528471  ID NO.: E1750528471
RADAR AIDS FOR AIRCRAFT LANDING, SHORT-RANGE NAVIGATION, AND SECONDARY RADAR SYSTEMS.
Palchikov, Georgy A.
All-Union Radio Res Inst of Sci Work, USSR
Astronaut Aeronaut v 13 n 2 Feb 1975 p 36-43 CODEN: ASAEA4
Basic facilities used by the Soviet civil aviation for ATC, air navigation, and aircraft landing are reviewed. The Soviet SP-50-M aircraft landing system differs from the ILS system with respect to the principle of operation of the course and the glide beacon as well as with respect to circuit arrangements and technological solutions employed in the equipment. In the Soviet Union, the problem of mutual employment of both Soviet and ICAO systems has been solved by employing a composite radio receiver type $\text{KURS-MP}$ operating in SP-50, ILS, and VOR modes. A high-precision radio system is used in the Soviet Union for short-range navigation. However, azimuth is determined somewhat differently from methods used in VOR and TACAN systems. The secondary radar system of the Soviet Union differs from the corresponding international system mainly with respect to the frequency band used, structure of the interrogation and reply signals, and composition and volume of information transmitted from on-board the plane.

CARD ALERT: 431, 652, 716

506171  ID NO.: E175010471
REQUIRED RADIO NAVIGATION AN AIR FORCE NAVIGATOR'S POINT OF VIEW
Lee, Leonard C.
Five areas of military aviation are reviewed in which radio navigation systems play an important role: arrival/departure, over land, over water, navigation, command and control, weapon delivery, reconnaissance and rescue. An available system for each area are discussed, and their advantages and disadvantages outlined. The paper concludes that future military air navigation configurations should include Omega, Loran C, linen D and ILS/ILS microwave landing systems.

Additionally, until the full development of area navigation systems such as VOR and TACAN will be required to be compatible with the present airway structures. This configuration could be used by all types of mission aircraft to some degree until the systems are denied by the enemy. Not to use them would seem a waste of capability.

DESCRIPTORS: (RADAR NAVIGATION, *Military Application). AIR NAVIGATION, AVIATION, MILITARY.
HYPERBOLIC NAVIGATION SYSTEMS. ILS.
CARD ALERT 716, 404, 431

514265  ID NO.: E1750314265
MLS PROGRAM: PHASE II.
Edwards, Jack W.
Fed Aviat Adm, Washington, DC.
IEEE Wescos Tech Pap v 17, for Meet, San Francisco, Calif.
Sep 11-14 1973 Pap 24/1, 9 p. CODEN WETPA4
The National Plan for Development of the Microwave Landing System (MLS) for aircraft is reviewed and the current status discussed. Phase II, Feasibility Demonstration, is now underway and culminates with the major decision of a five year program, namely, the selection of the best technique for continued development. Phase II is described in terms of objectives, issues, planning considerations and content. 2 refs.

DESCRIPTORS: (AIRCRAFT, *Landing). MICROWAVE DEVICES.
CARD ALERT: 652, 714
446006  ID NO. - E1740846006
NATIONAL MICROWAVE LANDING SYSTEM (MLS).
Edwards, Jack W.
Fed Aviat Adm. Washington, DC
SAE Prepr n 740345 for Meet Apr 2-5 1974. 8 p CODEN SEPPAB
The microwave landing system (MLS) is being developed as the next generation approach and landing system to replace the present worldwide instrument landing system (ILS). In order to satisfy diverse users such as civil and military aviation and conventional and V/STOL aircraft, the MLS employs compatible modular configurations. The five year National MLS Development Program, half over, has just completed a hardware feasibility demonstration phase, is about to choose the best technique, either scanning beam or Doppler scan, and in the next phase will select a single national system from among competing contractors. Meanwhile, the International Civil Aviation Organization has initiated a program directed toward the selection of a new MLS double quote non-visual approach and landing system (V/STOL). The United States is one of five member countries proposing candidates for international standardization. Operational advantages provided by the MLS include greater flying precision and flexibility, including curved or segmented approaches in three dimensions, and flare guidance for all-weather, automatic landing capability, resulting in greater safety while increasing airport capacities. At the same time, on a compatible basis, the economic and performance needs of general aviation are being satisfied.
DESCRIPTORS: *AIRCRAFT, AIRCRAFT INSTRUMENTS.
IDENTIFIERS: MICROWAVE LANDING SYSTEMS
CARD ALERT: 652

446003  ID NO. - E1740846003
NEW DESIGN AND OPERATING TECHNIQUES FOR IMPROVED TERMINAL AREA COMPATIBILITY.
Reeder, John P.; Taylor, Robert F.; Walsh, Thomas M.
NASA Langley Res. Cent., Hampton, Va
SAE Prepr n 740454 for Meet Apr 30-May 2 1974. 67 p
CODEN: SEPPAB
Current aircraft operating problems that must be alleviated for future high-density terminal areas are safety, dependence on weather, congestion, energy conservation, noise, and atmospheric pollution. The MLS under development by FAA provides increased capabilities over the current ILS. It is, however, necessary and urgent to develop the airborne system's capability to take maximum advantage of the MLS capabilities in order to solve the terminal area problems previously mentioned. A major limiting factor in longitudinal spacing for capacity increase is the trailing vortex hazard. Promising methods for avoiding early disspitation of the vortices are being explored. Also, flight procedures for avoiding the hazard will be explored.
NONLINEAR TRAJECTORY-FOLLOWING AND CONTROL TECHNIQUES IN THE TERMINAL AREA USING MLS NAVIGATION SENSOR.

Madden, P.; Dessi, R.
Mass Inst of Technol, Cambridge

Guidance and control techniques have been developed to permit accurate nonlinear path-following in the terminal area using an MLS & DME data base. The elements of the system include trajectory generation, mean-wind estimation, feedforward and perturbation control are described and the performance of the integrated system delineated. The investigation was made with the aid of a simulation and digital simulation, including modeling of the sensor and environmental effects. A conventional jet transport was the subject aircraft. A conclusion of the investigation was that the integrated guidance and control system was adequate to the task of path tracking with errors within the resolution of ATC radar. A corollary is that a degraded MLS operating at low-scan rates provides navigational data of sufficient accuracy to perform the curved approach task. 3 refs.

DESCRIPTORS: (AIR TRANSPORTATION, Traffic Control).
CARD ALERT: 431

MLS SCANNING-BEAM ANTENNA IMPLEMENTATION.

Sebring, J. O.; Ruth, J. W.
Bendix Commun Div, Towson, Md
Microwave J v 17 n 1 Jan 1974 p 41-44, 46 CODEN MCWJDA
A description is given of the Bendix/Bell MLS Scanning Beam System, an air-derived data system operating primarily in C-band. Angular position of the aircraft is measured with respect to ground generated fan beams that are electronically scanned in their narrow direction across the coverage sectors. An airborne receiver/processor extracts from the scanning beam the modulated angle data, corresponding to the line-of-sight angle to the ground antenna to the aircraft. 3 refs.

DESCRIPTORS: (AIRCRAFT, Electronic Equipment).
IDENTIFIERS: MICROWAVE LANDING SYSTEM
CARD ALERT: 652, 715

MLS SER DASH NAVIGATION, GUIDANCE, AND CONTROL.

Neal, G. L.
Collins Radio Co, Cedar Rapids, Iowa
Navigation v 20 n 3 Fall 1973 p 230-244 CODEN NAV1B3
The general problem in the application of the microwave landing (MLS) as a terminal area navigation tool is discussed and as an aid to vehicle guidance, and as a position control feedback element ground-based aid is discussed from a flight control engineer's viewpoint emphasizing subtleties of the system characteristics.

DESCRIPTORS: (AIR NAVIGATION, Aircraft, Landing).
CARD ALERT: 431, 652, 716
AIR TRAFFIC CONTROL SYSTEMS


AGARD Conf Proc n. 105, 1973, Var PAGES

This paper is intended to present a summary of the status of the progress toward a third-generation instrument landing system. Section II is a brief outline of the background of ILS system together with some of the efforts to develop a new ILS system. The limitations of ILS and the goals of MLS are summarized. The system definition issues discussed in the ICAO ARE presented in Section III. The competing technologies of Doppler and scanning beam are described in Section IV and the major issues associated with the choice between these are presented in Section V. Section VI summarizes the conclusions drawn from the history and expected future of M.S. 635 and 639.

DESCRIPTORS: (AIRCRAFT, (LANDING), AIR NAVIGATION, TELECOMMUNICATION LINKS, AEROSPACE VEHICLE TRACKING.

CARD ALERT 431, 716


IEEE Int Conv Dig IEEE (72 CH0581-9), New York, 1972. 559 p.


DESCRIPTORS: TELECOMMUNICATION. AIR TRANSPORTATION. INTEGRATED CIRCUITS. HYBRID. MICROWAVE DEVICES. INTEGRATED CIRCUIT MANUFACTURE.

IDENTIFIERS: COMMUNICATION SYSTEMS. CIRCUIT MANUFACTURE.

CARD ALERT: 431, 713, 745, 714.

248164 ID NO: E172X048165


The operational experience and recent evaluation data pertaining to the performance of TALAR, a step scanned microwave landing system is reviewed. The data reviewed covers a period of approximately 10 yr. The basic functional operation of a step scan system is described. TALAR, a family of landing systems is then derived via modular interchange with the base line unit. Operational configurations such as short takeoff and landing, asynchronous split site, multiple and multi-channel are described.

DESCRIPTORS: AIRCRAFT. SCANNING. ELECTROMAGNETIC WAVES.

IDENTIFIERS: TALAR. SCANNING BEAM SYSTEMS.

CARD ALERT: 652. 711.

248165 ID NO: E172X048165


Presents an analysis of the impact of conical coordinates on various airport equipment configurations and aircraft avionics installations. It is concluded that a signal format with provision for either planar or conical beams can minimize the risk of the technical uncertainties in the format. The impact on airborne equipment complexity is relatively small except for a limited class of VSI10 aircraft.

DESCRIPTORS: AIRCRAFT. SCANNING. ELECTROMAGNETIC WAVES.

IDENTIFIERS: MICROWAVE LANDING GUIDANCE SYSTEMS.

CARD ALERT: 652. 711.
C. INSPEC Database.
MLS USER COMMITMENT IS NEEDED NOW
WHITNEY, M.F.
INTERAVIA (ENGL. ED.) (SWITZERLAND) VOL 35, NO 7 587-90
JULY 1980 Coden: INTRA L
Treatment: GENERAL REVIEW
JOURNAL PAPER-
THE BATTLE TO DECIDE ON THE BASIC TECHNIQUE FOR A NEW
LANDING GUIDANCE AID, THE MICROWAVE LANDING SYSTEM (MLS), IS
NOW HISTORY, AND HAS BEEN FULLY DOCUMENTED OVER RECENT YEARS
WITH THE DECISION FINALLY MADE IN FAVOUR OF THE TIME REFERENCE
SCANNING BEAM APPROACH. MLS NOW FACES ANOTHER TEST TO BECOME
FULLY IMPLEMENTED IN A REALISTIC TIME-FRAME AND ACCEPTED AS A
REPLACEMENT FOR THE EXISTING INSTRUMENT LANDING SYSTEM (ILS).
THIS PAPER DISCUSSES THE ORIGINS OF MLS, THE LIMITATIONS OF
ILS, THE BENEFITS AND MEANS OF INTRODUCTION OF MLS, SOME
POSSIBLE PROBLEMS CAUSED BY THE DIFFERENCES IN TECHNIQUE

BETWEEN MLS AND ILS ARE ALSO DISCUSSED
Descriptors: AIR TRAFFIC CONTROL
Identifiers: MICROWAVE LANDING SYSTEM: MLS: TIME REFERENCE
SCANNING BEAM: INSTRUMENT LANDING SYSTEM: ILS
Section Class Codes: B7650C, C3360L

MADDE' MOBILE MULTIPURPOSE MLS
GEISENHEYNER, S.
DEF. ELECTRON (USA) VOL 12, NO 5 50, 52, 54, 58-9 MAY
1980 Coden: DEELGM
Treatment: GENERAL REVIEW
JOURNAL PAPER-
NATIONS PORTABLE MICROWAVE LANDING SYSTEM CAN BE USED FOR
MORE THAN MARGINAL WEATHER LANDING ASSISTANCE, THE
JAM-RESISTANT SYSTEM IS ALSO ENVISIONED TO INCREASE PRECISION
IN CLOSE AIR SUPPORT OPERATIONS FOR NAVIGATION AND ATTACK
PURPOSES
Descriptors: MILITARY EQUIPMENT: AIR TRAFFIC CONTROL:
AIRCRAFT
Identifiers: MADDE: MOBILE MULTIPURPOSE MLS: PORTABLE
MICROWAVE LANDING SYSTEM
Section Class Codes: B7650, B6320
453943  B80046416, C80030566
AN MLS SIMULATION FACILITY
BENEKE, J.; WIGHTMAN, C.W.
CALSPAN ADVANCED TECHNOLOGY CENTER, BUFFALO, NY, USA
SCHWAB, L.M.; DOUGLAS, J.M. (Editors)
IEEE TECHNOLOGY GROWTH FOR THE 80S. 1980 IEEE MTT-S INTERNATIONAL
MICROWAVE SYMPOSIUM DIGEST 401-3 1980
28-30 MAY 1980 WASHINGTON, DC, USA
Publ: IEEE NEW YORK, USA
xx+x
Treatment: THEORETICAL-EXPERIMENTAL-
REPORT SECTION
A MICROWAVE LANDING SYSTEM (MLS) SIMULATION FACILITY IS
DESCRIBED THAT GENERATES DIRECT AND MULTIPATH C-BAND SIGNALS
SUITE FOR EVALUATING AN AIRBORNE RECEIVER. TEST SCENARIOS
AND DATA REDUCTION ARE ACCOMPLISHED BY A PDP 11/10 COMPUTER.
TYPICAL TEST RESULTS ARE PRESENTED. SOME FUTURE APPLICATIONS
ARE CONSIDERED. (4 Refs)
Descriptors: AEROSPACE SIMULATION
Identifiers: C-BAND SIGNALS; AIRBORNE RECEIVER; DATA
REDUCTION; PDP 11/10 COMPUTER; MICROWAVE LANDING SYSTEM
SIMULATION; TEST SCENARIOS
Section Class Codes: B7620, C7450

453433  B80046431, C80028882
THE ADVANCED FLIGHT DECK
WILSON, J.W.; MILLMAN, R.E.
BRITISH AEROSPACE, HATFIELD, ENGLAND
AERONAUT. J. (GB) VOL. 84, NO. 8/1 93-100 MARCH-APRIL
1980 Coden: AENJAK
Treatment: APPLIC-PRACTICAL APPLIC-
JOURNAL PAPER
NEW DIGITAL EQUIPMENT FOR AUTOMATIC FLIGHT MANAGEMENT.
THRUST CONTROL, FREQUENCY SELECTION AND ELECTRONIC COLOUR
DISPLAYS HAS BEEN ORDERED AND IS BEING BUILT. THE NECESSARY
TECHNOLOGY IS CLEARLY AVAILABLE TO IMPLEMENT DATA LINK,
COLLISION AVOIDANCE, MLS, NAVSTAR AND SATCOM SYSTEMS. THE
MAJOR CONSTRAINT IN THE TEXT IN THE NEXT TWO DECADES WILL NOT
BE TECHNOLOGICAL BUT THE TIME AND COST INVOLVED IN ORGANISING
THE INTEGRATION OF AIRCRAFT SYSTEMS AND THE PROVISION OF
EXTERNAL AIDS
Descriptors: AEROSPACE CONTROL; AIRCRAFT INSTRUMENTATION
Identifiers: ADVANCED FLIGHT DECK; DIGITAL EQUIPMENT;
AUTOMATIC FLIGHT MANAGEMENT; THRUST CONTROL; FREQUENCY
SELECTION; ELECTRONIC COLOUR DISPLAYS; COLLISION AVOIDANCE;
MLS; NAVSTAR; SATCOM; AIRCRAFT SYSTEMS
Section Class Codes: B7630, C3360L
A 28 WATT, 5 GHZ GAAS FET AMPLIFIER FOR MLS

TAKAYAMA, Y.; HOKJO, K.
CENTRAL RES. LAB., NIPPON ELECTRIC CO LTD., KAWASAKI, JAPAN

SCHMIDT, L. M.; DOUGLAS, J. H. (Editors)
IEEE TECHNOLOGY GROWTH FOR THE 80S. 1980 IEEE MIT-S INTERNATIONAL
MICROWAVE SYMPOSIUM DIGEST 496-8 1980
28-30 MAY 1980 WASHINGTON, DC, USA

A 25-WATT, 29-DB GAIN, 5-GHZ FET AMPLIFIER FOR THE
TRANSMITTER IN THE MICROWAVE LANDING SYSTEM HAS BEEN DEVELOPED
USING PRACTICAL GAAS FETS ASSEMBLED IN CERAMIC PACKAGES WITH
INTERNAL MATCHING NETWORKS. THIS FOUR-STAGE AMPLIFIER PROVIDES
30-WATT POWER OUTPUT WITH 18.5 PERCENT POWER EFFICIENCY AT 17
DBM POWER INPUT LEVEL (6 Refs)

Descriptors: SOLID-STATE MICROWAVE CIRCUITS; MICROWAVE
AMPLIFIERS; FIELD EFFECT TRANSISTOR CIRCUITS; III-V
SEMICONDUCTORS; POWER AMPLIFIERS; GALLIUM ARSENIDE
Identifiers: 5 GHZ GAAS FET AMPLIFIER; MLS; TRANSMITTER;
MICROWAVE LANDING SYSTEM; CERAMIC PACKAGES; INTERNAL MATCHING
NETWORKS

Section Class Codes: 81220, 81350F
A NEW DESIGN FOR A DOUBLE SIDEBAND COMMUTATED DOPPLER SYSTEM FOR LANDING AIRCRAFT IS PROPOSED. IT IS CAPABLE OF PROVIDING ANGULAR INFORMATION IN ELEVATION AND AZIMUTH BY THE MEASUREMENT OF A DOPPLER FREQUENCY. FURTHERMORE, IT OFFERS THE POSSIBILITY OF DETECTING AND CORRECTING ANY MULTIPATH ERROR PRESENT IN THE DOPPLER SIGNAL (2 Refs).

Descriptors: DOPPLER EFFECT; MICROWAVE ANTENNAS; ANTENNA ARRAYS; AIR-TRAFFIC CONTROL

Identifiers: MICROWAVE LANDING SYSTEM; DOUBLE SIDEBAND COMMUTATED DOPPLER SYSTEM; DOPPLER FREQUENCY; DOPPLER SIGNAL; MULTIPATH ERROR DETECTION

Section Class Codes: B7650C; 85270F
PRECISION DME USING PULSE-COMPRESSION

SCHILLIGER, M.

THOMSON CSF, PARIS, FRANCE

NAVIGATION (FRANCE) VOL 27, NO 108 387-401 OCT 1979

Coden: NVGNAL

Treatment: PRACTICAL APPLIC.

Journal Paper:

Language: FRENCH

The DME (DISTANCE MEASURING EQUIPMENT), HERE DESCRIBED CAN.

IT IS CLAIMED PRODUCE THE NECESSARY DEGREE OF ACCURACY (±OR-

20 FT) NECESSARY FOR A MICROWAVE LANDING SYSTEM, AT THE SAME

TIME YIELDING THE 200 INDEPENDENT CHANNELS CONSIDERED

ESSENTIAL DOPPLER HAVING BEEN REJECTED. THE CHOICE IS BETWEEN

SHORT RISE TIME PULSE AND PULSE-COMPRESSION SYSTEMS USING THE

LATTER, THE REQUIRED NUMBER OF CHANNELS, WITH ADEQUATE

SEPARATION, CAN BE OBTAINED WITH NO AUGMENTATION OF PEAK

POWER. BY APPLYING MODERN SIGNAL PROCESSING TECHNOLOGY THE

SOMewhat COMPLEX PROCEDURES ARE FULLY DESCRIBED (2 Refs).

Descriptor: DISTANCE MEASUREMENT; AIRCRAFT INSTRUMENTATION;

RADIO_NAVIGATION

Identifiers: DME; DISTANCE MEASURING EQUIPMENT; MICROWAVE

LANDING SYSTEM

Section Class Codes: B7320C, B7630, B6330
SECTION CIV - CARS - B7690, B82730

PROOF AND REVISION

MICROFACIAL LANDING SYSTEM: MULTIPATH

INSTRUCTION

DECISION:

AIR TRAFFIC CONTROL: AIRPORTS

MICROFACIAL LANDING SYSTEM: A SOLUTION TO MULTIPATH PROBLEMS

DISCUSSIONS ON THE APPLICATION OF TIME DELAY UNIFICATION TO A

SECTION CIV - CARS - B7690, B82730

PROOF AND REVISION

MICROFACIAL LANDING SYSTEM: MULTIPATH

INSTRUCTION

DECISION:

AIR TRAFFIC CONTROL: AIRPORTS

MICROFACIAL LANDING SYSTEM: A SOLUTION TO MULTIPATH PROBLEMS

DISCUSSIONS ON THE APPLICATION OF TIME DELAY UNIFICATION TO A
339636 BBO010638, CBO006586
ANGLE RESOLUTION OF A MLS PHASED ARRAY (AIR TRAFFIC CONTROL)
MCD, J. K.; SHELTON, J. P.
NAVAL RES. LAB., WASHINGTON, D.C., USA
IEEE 1979 INTERNATIONAL SYMPOSIUM DIGEST ANTENNAS AND
PROPAGATION 825-8 197 SY
P11 18-22 JUNE 1979 SEATTLE, WA, USA
Publ: IEEE NEW YORK, USA
27+455
Treatment: APPLIC-EXPERIMENTAL
REPORT SECTION-
DEScribes A COMPUTER SIMULATION TECHNIQUE FOR TESTING THE
ANGULAR RESOLUTION OF A CONVENTIONAL LINEAR ARRAY AND A
COMPACT ARRAY. LINEAR PHASED ARRAYS ARE USEd FOR MICROWAVE
TRANSMISSIONS FOR THE TIME REFERENCE SCANNING BEAM SYSTEM IN
THE MICROWAVE LANDING SYSTEM MLS (2 Refs)
Descriptors: AIR TRAFFIC CONTROL; DIGITAL SIMULATION;
ANTENNA PHASED ARRAYS; RADIONAVIGATION; MICROWAVE ANTENNAS
Identifiers: MLS PHASED ARRAY: COMPUTER SIMULATION; ANGULAR
RESOLUTION: COMPACT; MICROWAVE: TIME REFERENCE SCANNING BEAM
SYSTEM: LANDING SYSTEM: AIR TRAFFIC CONTROL: ANTENNAS
Section Class Codes: B5270D, B7650C, CT410F

332773 BBO004724, CBO005298

313573 BBO002424, CBO001171
GCU, THE GUIDANCE AND CONTROL UNIT FOR ALL WEATHER APPROACH
BODENSEEWERK GERATETECHNIK GMBH, UBERLINGEN, GERMANY
AGARD AGARD CONFERENCE PROCEEDINGS NO 258, GUIDANCE AND CONTROL OF
HELICOPTERS AND V/STOL AIRCRAFT AT NIGHT AND IN POOR
VISIBILITY 20/11 1979
9-12 OCT 1978 THE HAGUE, NETHERLANDS
Publ: AGARD NEUILLY-SUR-SEINE, FRANCE
V1 + 238
Treatment: PRACTICAL APPLIC-
REPORT SECTION-
UTILIZING THE SETAC-MLS. THE GUIDANCE AND CONTROL UNIT GCU
DEVELOPED BY BODENSEEWERK DEMONSTRATED IN FLIGHT TEST THE
IMPROVEMENTS OF FUTURE LANDING PROCEDURES. THE SHORT-CAPTURED
STEEP APPROACH PATHS GENERATED BY THE GCU CAN BE FLOWN
MANUALLY WITH THE FLIGHT DIRECTOR INSTRUMENT DUE TO THE HIGH
ACCURACY OF SIGNAL PROCESSING BY MEANS OF KALMAN FILTER
TECHNIQUES. THE PAPER PRESENTS THE TECHNICAL EQUIPMENT AND
DISCUSS THE FLIGHT TEST RESULTS (5 Refs)
Descriptors: AIRCRAFT INSTRUMENTATION
Identifiers: GUIDANCE AND CONTROL UNIT; ALL WEATHER APPROACH
; SETAC-MLS; BODENSEEWERK; KALMAN FILTER TECHNIQUES; FLIGHT
TEST RESULTS
Section Class Codes: B7630, C3360I, C3210
THE INTERIM STANDARD MICROWAVE LANDING SYSTEM

TOMAN, D. J.
FULL AVIATION CORP., ARMONK, NY, USA
NAVIGATION (USA) VOL. 25, NO. 3 JAN. 1978

CODEN: NAV18J
TREATMENT: PRACTICAL APPLICATION
JOURNAL PAPER
CONCEIVED AS A BRIDGE BETWEEN THE VHF/UHF ILS AND THE FUTURE INTERNATIONAL STANDARD MICROWAVE LANDING SYSTEM. IMLS PROVIDES ALL THE OPERATIONAL BENEFITS OF CONVENTIONAL ILS WITH FEW OF THE TECHNICAL HEADACHES. SEVERAL IMLS INSTALLATIONS ARE PRESENTLY COMMISSIONED FOR PUBLIC USE SERVING IN SOME CASES AT SITES WHERE SITE PREPARATION COSTS FOR CONVENTIONAL ILS WOULD HAVE EXCEEDED BY FAR THE TOTAL COST OF THE REST OF THE IMLS INSTALLATIONS IN COMMISSION. THESE FACILITIES ARE THE WORLD'S FIRST PUBLIC-USE MICROWAVE LANDING SYSTEMS. THE PAPER DESCRIBES THE IMLS, ITS SIGNAL FORMAT, HOW IT COPIES WITH DIFFICULT SITING PROBLEMS AND HOW IT MANAGES TO BRIDGE THE GAP BETWEEN THE EXISTING VHF/UHF SYSTEM AND THE FUTURE WORLDWIDE SYSTEM, SERVING THE IMMEDIATE NEEDS OF THE AVIATION COMMUNITY.

DESCRIPTORS: RADIO NAVIGATION; AIRCRAFT; AIR TRAFFIC CONTROL.
IDENTIFIERS: INTERIM STANDARD MICROWAVE LANDING SYSTEM;
SIGNAL FORMAT; VHF/UHF SYSTEM
SECTION CLASS CODES: 86330, 87650C, C3360L

NEW INSTRUMENT LANDING SYSTEM—PROBABLY LONG TRANSITION PERIOD BEFORE MLS TAKES OVER

FORSSELL, B.
ELEKTRON, (NORWAY) VOL. 92, NO. 9 6-10 MAY 1979 CODEN
EERDAV
TREATMENT: GENERAL REVIEW
JOURNAL PAPER
LANGUAGES: NORWEGIAN
THE METHOD OF OPERATION OF THE CURRENT INSTRUMENT LANDING SYSTEM (ILS). ITS WEAKNESSES AND WHY IT NEEDS A REPLACEMENT ARE DISCUSSED. THE FRSB AND DMLS SCHEMES PROPOSED ARE DESCRIBED.
DESCRIPTORS: AIRCRAFT INSTRUMENTATION; RADIO DIRECTION-FINDING
IDENTIFIERS: INSTRUMENT LANDING SYSTEM
SECTION CLASS CODES: 86330, 87650C
GUIDANCE ACCURACY CONSIDERATIONS FOR THE MICROWAVE LANDING SYSTEM L-BAND PRECISION DME

KELLY, R. J.; LARREGE, E. F.
COMMUNICATIONS DIV., BENDIX CORP., BALTIMORE, MD, USA

PROCEEDINGS OF THE IEEE 1979 NATIONAL AEROSPACE AND ELECTRONICS CONFERENCE NAECON 1979 1130-41 1979

PUBL. IEEE NEW YORK, USA

500

Treatment: PRACTICAL APPLICATION

REPORT SECTION - THE MICROWAVE LANDING SYSTEM (MLS), DEVELOPED BY THE FAA UNDER A JOINT DOT/FAA, OOD, AND NASA PROGRAM IS DESIGNED FOR EXTENDED REQUIREMENTS IN VOLUMETRIC COVERAGE. GUIDANCE ACCURACY, AND INTEGRITY TO MEET THE INCREASING NEEDS OF AVIATION. IT IS TO BE A COMMON CIVIL-MILITARY SYSTEM AND PROVIDE A LEVEL OF OPERATIONS AND EQUIPMENTS SUITABLE FOR ALL CLASSES OF USERS. INTEGRAL TO THE MICROWAVE LANDING SYSTEM CONCEPT IS THE DISTANCE MEASURING EQUIPMENT (DME) WHICH MEASURES RANGE TO TOUCHDOWN. IT MUST SATISFY TO THE MAXIMUM EXTENT POSSIBLE, APPROACH AND LANDING OPERATIONAL REQUIREMENTS FOR ALL USER AIRCRAFT (CTOL, STOL, AND VTOL). THESE REQUIREMENTS DICTATE AIRCRAFT RANGE AND RANGE RATE MEASUREMENTS WITH AN ACCURACY AT LEAST AN ORDER OF MAGNITUDE MORE PRECISE THAN THOSE NEEDED FOR THE CONVENTIONAL TERMINAL DME APPLICATION. THIS PAPER PRESENTS A CONSISTENT ACCURACY SPECIFICATION SUITABLE FOR MLS OPERATIONAL REQUIREMENTS AND A PRECISION DME (POMC) IMPLEMENTATION COMMON FOR CTOL, STOL, AND VTOL. (26 Refs)

Descriptors: DISTANCE MEASUREMENT: GROUND SUPPORT SYSTEMS
Identifiers: MICROWAVE LANDING SYSTEM; L-BAND: AVIATION;
DISTANCE MEASURING EQUIPMENT: ACCURACY SPECIFICATION: RANGE TO TOUCHDOWN MEASUREMENT

Section Class Codes: B7650, B7320C
A STILLBORN SYSTEM? COMMENTS ON AN ICAO INSTRUMENT LANDING SYSTEM

BAIER, W.
RADIO-ELECTRON. (SWITZERLAND) VOL. 38, NO 8 38 AUG.
1978

Treatment: PRACTICAL APPLIC-
JOURNAL PAPER-
Languages: GERMAN

CRITICAL COMMENTS ARE MADE ABOUT THE TRSB (TIME REFERENCED SCANNING BEAM) INSTRUMENT LANDING SYSTEM TO BE MADE MANDATORY BY 1986. THE PROBLEMS OF AERIAL ARRAYS WITH PHASE CONTROL ARE MENTIONED, THE NEED FOR MONITORING RECEIVERS IS STATED AND THE PROBLEMS OF REFLECTIONS AND GHOSTS ARE REFERRED TO.

Descriptors: RADIONAVIGATION; AIRCRAFT; AIR TRAFFIC CONTROL; IDENTIFIERS: ICAO INSTRUMENT LANDING SYSTEM; TRSB; CRITICAL REVIEW

Section Class Codes: B7630, B7650C, RA330, C3360L

THE CHOICE OF MLS TECHNIQUE BY THE O.A.C.I

FONBONNE, P.
NAVIGATION (FRANCE) VOL. 26, NO. 104 383-98 OCT. 1978

Treatment: GENERAL REVIEW-
JOURNAL PAPER-
Languages: FRENCH

THE ALL WEATHER OPERATIONS PANEL OF THE INTERNATIONAL CIVIL AVIATION ORGANISATION (O.A.C.I.) HAS SELECTED THE TIME REFERENCE SCANNING BEAM MICROWAVE LANDING SYSTEM (TRSBML) AS A SUCCESSION TO THE INSTRUMENT LANDING SYSTEM. THE MAJOR STAGES IN THE DEVELOPMENT OF THIS CHOICE ARE REVIEWED HISTORICALLY, AND THE PRINCIPLES OF THE FORMER AND PRESENT SYSTEMS ARE EXAMINED.

Descriptors: RADIONAVIGATION; AIRCRAFT; AIR TRAFFIC CONTROL; IDENTIFIERS: MLS TECHNIQUE; TIME REFERENCE SCANNING BEAM MICROWAVE LANDING SYSTEM

Section Class Codes: B6330, B7650C, C3360L
177456 B79010516. C79003690
THE CHOICE OF A NEW INTERNATIONAL LANDING SYSTEM BY THE ICAO.
FOMDONNE, M.P.
THOMSON-CSF, PARIS, FRANCE
CODER ELECTR. (FRANCE) VOL. 5B. NO. 11 71-82 NOV. 1978
Codex: IIEEMS
Treatmen: GENERAL, REVIEW-PRACTICAL APPLIC-
JOURNAL PAPERS
Language: FRENCH
THE INTERNATIONAL ILS (INSTRUMENT LANDING SYSTEM) WHICH WAS
STANDARDIZED IN 1947, IS PLAGUED WITH CONSTITUTIONAL
DEFICIENCIES THAT A MORE MODERN SYSTEM MIGHT NOT PRESENT
SINCE 1969, VARIOUS SOLUTIONS PROPOSED BY SEVERAL NATIONS,
INCLUDING FRANCE, HAVE BEEN COMPARING AND EVALUATING
THIS INTENSE TECHNICAL EFFORT CAPTURED IN APRIL 1978 WHEN ICAO
INTERNATIONAL CIVIL AVIATION ORGANIZATION) SELECTED THE TIME-
REFERENCE SCANNING BEAMS SYSTEM PROPOSED BY THE UNITED STATES
AND AUSTRALIA AS SUCCESSOR OF ILS. THIS SYSTEM, WHICH OPERATES
AT 5 GHZ, INDICATES THE AIRCRAFT AZIMUTH AND ELEVATION INSIDE
A WIDE VOLUME AND SHOULD BE LESS SENSITIVE THAN ILS TO SITE
EFFECTS.
Descriptors: AIR-TRAFFIC CONTROL; GROUND SUPPORT SYSTEMS;
RADIONAVIGATION
Identifiers: INTERNATIONAL LANDING SYSTEM: INTERNATIONAL
CIVIL AVIATION ORGANIZATION: TIME REFERENCE SCANNING BEAMS
SYSTEM: AIRCRAFT LANDING SYSTEM; 5 GHZ OPERATION
Section Class Codes: B7650C, B6330, C3360L

166658 B79001603
SIMULATION OF AUTOMATIC LANDING APPROACHES FOR PASSENGER
PLANES FOR THE EXAMPLE OF A BOEING 707
DFHN, C
INST. FUR REGELUNGSTECH.
BRAUNSCHWEIG, GERMANY
REGELUNGSTECHNIK (GERMANY) VOL. 26 NO. 10 AUG
Codex: IIEEMS
Treatmen: THEORETICAL
JOURNAL PAPERS
Language: GERMAN
QUESTIONS OF SAFETY AND OF BETTER CAPACITY UTILIZATION ARE
CONSIDERED. THE PROBLEMS CAN BE SOLVED BY APPLYING NEW
MICROWAVE LANDING SYSTEMS AND BY BETTER COOPERATION OF THE
PILOT WITH THE FLIGHT CONTROLLER. SIMULATIONS, THE LIMIT CASE OF THE
COMPLETE AUTOMATIC APPROACH, ACCORDING TO NOISE PRODUCING AND CAPACITY AUGMENTING
STEEP LANDING PROCEDURES ARE INVESTIGATED. THE RESULTS CAN BE
USED AS A REFERENCE BASIS FOR MANUALLY CONTROLLED APPROACHES
12 Refs)
Descriptors: AEROSPACE CONTROL; AIRCRAFT: AEROSPACE
SIMULATION
Identifiers: AUTOMATIC LANDING: PASSENGER PLANES: BOEING 707:
SAFETY; MICROWAVE LANDING SYSTEMS: PILOT: FLIGHT CONTROLLER;
COMPUTER SIMULATION: STEEP LANDING PROCEDURES
Section Class Codes: C3360L, C460L

164828 B79006268
LANDING AIRCRAFT UNDER POOR CONDITIONS
KELLY, R.J.; REDLIER, H.W.: SHAGENA, J.L.
BENDIX CORP., CINCINNATI, OH: USA ELECTRICAL & ELECTRONICS CORP.
IEEE CIRCUITORY (USA) VOL. 15. NO. 9 52-57 SEPTEMBER
Codex: IIEEMS
Treatmen: PRACTICAL APPLIC.-
JOURNAL PAPERS
DESCRIPTION.
THE PRINCIPLE OF THE TIME-REFERENCE SCANNING-BEAM
MICROWAVE LANDING SYSTEM (I55B MLS) WHICH IS A SYSTEM APPROACH
TO THE LANDING-GUIDANCE PROBLEM, IT CAN MEET A WIDE VARIETY OF
DIFFERENT USES FOR ECONOMIC, SAFETY REQUIREMENTS AND
SUPPLY A UNIVERSAL AIRBORNE RECEIVER-PROCESSOR ABLE TO
OPERATE WITH ALL AIRCRAFT SYSTEMS. MLS CAN ACHIEVE THESE
OBJECTIVES BECAUSE OF TWO MAJOR FACTORS: THE CHOICE OF AN
OPERATING FREQUENCY IN THE MICROWAVE C BAND (5 GHZ), AND THE
DESIGN OF ITS SIGNAL FORMAT.
Descriptors: AIRCRAFT: GROUND SUPPORT SYSTEMS: MICROWAVE
LINKS: AIR-TRAFFIC CONTROL: RADIONAVIGATION
Identifiers: MICROWAVE LANDING SYSTEM: C BAND: 5 GHZ: TIME
REFERENCE SCANNING BEAMS SYSTEM: AIRCRAFT LANDING SYSTEM:
GUIDANCE: AIRCRAFT COMMUNICATION: GROUND SUPPORT SYSTEM:
AIR TRAFFIC CONTROL
Section Class Codes: B7650C, B6330

DIALOG File: INSPEC - 78-80/iss24 (Copr. IEEE) See file 124(9) 77 (Item 170 of 160) for full text
SYSTEM REQUIREMENTS FOR TRANSITION FROM ENROUTE TO APPROACH GUIDANCE

Meyer, D. H., Collins Radio Group, Rockwell Internat., Cedar Rapids, IA, USA

NAVIGATION (USA), Vol. 24, No. 4, 312-28, Winter 1978
CODEN NAVW3

TREATMENT: APPLICATION JOURNAL PAPER

The airborne system operational/functional requirements are examined for the transitional phase of an aircraft flight. The automated navigation system (based nominally on enroute aids) and the ILS/MLS system capabilities are described. And the complementary nature of each is treated. To achieve the full potential benefits of proposed landing system operations, it is suggested that on-board enroute navigation systems will be an important aid to exploit fully the resulting operational capabilities. Proposed microwave landing system capabilities suggest new operational procedures for predefined maneuvers in the terminal area such as close-in captures and complex approach paths. Equipment configurations are presented to demonstrate the system requirements (12 Refs).

DESIGNERS: AIR TRAFFIC CONTROL; RADIONAVIGATION

FUNCTIONAL REQUIREMENTS: AIRCRAFT FLIGHT; AUTOMATED NAVIGATION SYSTEM; ILS/MLS SYSTEM; OPERATIONAL PROCEDURES

Section Class Codes: B7650C, B6330, C3360L, C3370W

USE OF THE US INTERIM STANDARD MICROWAVE LANDING SYSTEM IN CANADA

CODEN: CSPWAE

TREATMENT: APPLICATION PRACTICAL APPLICATION JOURNAL PAPER

Discusses the full aviation corp. microwave landing system and its application as an interim standard landing system in Canada. Designers: AIR TRAFFIC CONTROL; RADIONAVIGATION

Identifiers: US INTERIM STANDARD: MICROWAVE LANDING SYSTEM

CANADA: TULL AVIATION CORP

Section Class Codes: B7650C, B6330, C3360L
 Title: Propagation Integrity for Microwave Instrument Landing Systems

Authors: Demko, P.S., US Army Avionics Res. and Dev. Activity, Fort Monmouth, NJ, USA

Agard Conference Proceedings, No. 240, Guidance and Control Design Considerations for Low-Altitude and Terminal-Area Flight 21/1-8 1978

Publication Details: AGARD NEUILLY-SUR-SINE, FRANCE

Abstract: The existence of a multipath problem that must be reckoned with if the next generation microwave landing system is ever to be used in operational utility and safety is indicated. There is strong evidence to support the contention that the choice of the correct polarisation is fundamentally the surest way to relieve the next generation precision approach and landing systems from the burden of unnecessary multipath signals. The data weigh heavily in favor of circular polarisation (13 Refs).

Descriptors: Aircraft Instrumentation; Microwave Systems; Guidance; Landing Systems; Multipath Problem; Circular Polarisation; Propagation Integrity

Section Class Codes: B7650C. B6330. C3360L

Title: Automatic Flight Performance of a Transport Airplane on Complex Microwave Landing System Paths

Authors: Walsh, T.M.; Weener, E.F., NASA Langley Res. Center, Hampton, VA, USA

Agard Conference Proceedings, No. 240, Guidance and Control Design Considerations for Low-Altitude and Terminal-Area Flight 19/1-12 1978

Publication Details: AGARD NEUILLY-SUR-SINE, FRANCE

Abstract: A practical approach to the practical application section briefly describes the US microwave landing system (MLS) and the TCV B-737 airplane used in the demonstration flights. Followed by a description of the demonstration scenario and approach paths, the tracking performance achieved on these paths under MLS guidance is examined in some detail. Finally, the wind environment, within which these flights were conducted, is quantified (4 Refs).

Descriptors: Aircraft; Automatic Flight; Microwave Systems; Guidance; Operations; Twin Turboprop BAC 1-11; Twin Turboprop HS 748.
A SCANNING-BEAM MICROWAVE LANDING SYSTEM INCORPORATING DOPPLER CODING

GLASGOW, U.A.

GEC J. SCI. AND TECHNOLOGY, (GB) VOL. 44, NO. 2 87-92 1978

CODEN: GUSTA

TREATMENT: APPLIC-

JOURNAL PAPER-

A NEW LANDING GUIDANCE SYSTEM FOR AIRCRAFT IS REQUIRED TO REPLACE THE PRESENT-DAY INSTRUMENT LANDING SYSTEM, WHICH PROVIDES GUIDANCE FOR ONLY A SINGLE LINE OF APPROACH TO THE RUNWAY. WITH THE NEW MICROWAVE LANDING SYSTEM (MLS), THE APPROACH PATH CAN BE SUITABLE BOTH TO PARTICULAR AIRCRAFT AND TO THE CURRENT TRAFFIC. A NUMBER OF ALTERNATIVE TECHNIQUES HAVE BEEN PROPOSED, THE TWO MAIN CONTENDERS BEING THE TIME-REFERENCE SCANNING BEAM (TRSB) AND THE DOPPLER SYSTEM. THIS PAPER DESCRIBES A TECHNIQUE FOR FORMING A TRSB SYSTEM THAT HAS EXCEPTIONAL PRECISION WITH REGARD TO POSITION AND TIME, WHILE ACCURATE FREQUENCY CODING MAY BE APPLIED TO IT AS A MODULATION, SO THAT IT MAY BE INTERPRETED BY A FORM OF DOPPLER PROCESSOR (4 Refs)

Descriptors: GROUND SUPPORT SYSTEMS; AIR TRAFFIC CONTROL; DOPPLER EFFECT; ENCODING; RADIO DIRECTION-FINDING

Identifiers: LANDING GUIDANCE SYSTEM; MICROWAVE LANDING SYSTEM; PRECISION; FREQUENCY CODING; DOPPLER PROCESSOR; TIME-REFERENCE SCANNING BEAM

Section Class Codes: B7650C, B6330

COMPARISON STUDY OF MLS AIRBORNE SIGNAL PROCESSING TECHNIQUES

KELLY, R. J. E. (F. E. F.) COMMUNICATIONS DIV. BENZEL CORP., BALTIMORE, MD, USA

IEEE, AMERICAN INST. AERONAUTICS AND ASTRONAUTICS


15-16 MAY 1978 DAYTON, OH, USA

PUBL. IEEE NEW YORK, USA

XIV, 510

TREATMENT: THEORETICAL-REPORT SECTION-

EARLY IN THE PROTOTYPE HARDWARE PHASE OF THE PROGRAM FOR TIME REFERENCE SCANNING BEAM (TRSB) MICROWAVE LANDING SYSTEM (MLS), THE DWELL GATE PROCESSOR WHICH OPERATES ON THE RECEIVED BEAM ENVELOPE WAS SELECTED BECAUSE OF ITS SIMPLICITY. THE STUDY DISCUSSED IN THIS PAPER WAS UNDERTAKEN TO REVIEW THIS DECISION IN THE LIGHT OF WORK THAT HAS BEEN DONE ON OTHER PROCESSOR MECHANIZATIONS IN THE INTERIM. IN COMMON WITH THE DWELL GATE PROCESSOR, THESE PROCESSORS ALSO OPERATE ON THE BEAM ENVELOPE AND IGNORE PHASE INFORMATION. THEREFORE, THE STUDY INCLUDED THE DEFINITION OF AN 'OPTIMUM PHASE AND AMPLITUDE PROCESSOR AGAINST WHICH ALL OF THE TECHNIQUES WERE COMPARED SO THAT THE SIMPLIFYING TRADEOFFS FOR AMPLITUDE ONLY PROCESSING COULD BE PLACED IN AN OPERATIONAL CONTEXT (9 Refs)

Descriptors: SIGNAL PROCESSING; AIRCRAFT INSTRUMENTATION

Identifiers: AIRBORNE SIGNAL PROCESSING TECHNIQUES

MICROWAVE LANDING SYSTEM; TIME REFERENCE SCANNING BEAM; DWELL GATE PROCESSOR

Section Class Codes: B7630, C3360L
THE NEED TO PROVIDE PRECISION APPROACH GUIDANCE OVER WIDER ANGULAR COVERAGE THAN IS POSSIBLE WITH THE PRESENT INSTRUMENT LANDING SYSTEM (ILS) AND THE WISH TO AVOID SITTING PROBLEMS SOMETIMES ENCOUNTERED WITH THE CURRENT EQUIPMENT HAS PROMPTED WORK ON NEW SYSTEMS IN VARIOUS COUNTRIES. IN THE DOPPLER MICROWAVE LANDING SYSTEM, A SOURCE OF RADIATION IS MOVED AT A CONSTANT VELOCITY ALONG THE GROUND AND COMPARED WITH A STATIONARY FREQUENCY IN AN AIRBORNE RECEIVER. THE FREQUENCY DIFFERENCE REPRESENTS A DIRECT MEASURE OF THE ANGLE OF THE RECEIVER FROM THE ARRAY BORESIGHT.

Descriptors: RADIONAVIGATION; AIRCRAFT INSTRUMENTATION; AIR-TRAFFIC CONTROL

Identifiers: DOPPLER MLS; AIR TRAFFIC CONTROL; AIRCRAFT; RADIONAVIGATION

Section Class Codes: B7650C, B6330, C3360L

A NEW L-BAND MLS/DME WITH HIGH ACCURACY

KIRKER, E.O., AVIONICS DIV., BENDIX CORP., LAUDERDALE, FL, USA

IEEE PROCEEDINGS OF SOUTHEASTCON '78 REGION 3 CONFERENCE 121-3 1978

10-12 APRIL 1978 ATLANTA, GA, USA

Publ: IEEE NEW YORK, USA XVII-356

Treatment: PRACTICAL APPLIC- REPORT SECTION-

DEScribes THE SOLId STATE AIRBORNE AND GROUND DISTANCE MEASURING EQUIPMENT (DME) DESIGNED FOR HIGH ACCURACY. MICROWAVE LANDING SYSTEM (MLS) REQUIREMENTS. MODERN LSI TECHNOLOGY AND MICROPROCESSORS ARE USED FOR FILTERING AND PROCESSING THE DIGITAL DATA. IN ADDITION TO RANGE AND RANGE RATE, TERRAIN INDEPENDENT HEIGHT ABOVE THE RUNWAY IS COMPUTED FROM DISTANCE AND MLS ELEVATION AND DISPLAYED IN THE COCKPIT (3 Refs)

Descriptors: DISTANCE MEASUREMENT; AIRCRAFT INSTRUMENTATION; MICROWAVE LINKS; RADIONAVIGATION; AIR-TRAFFIC CONTROL

Identifiers: LSI TECHNOLOGY; MICROPROCESSORS; FILTERING; DIGITAL DATA; RANGE RATE; TERRAIN INDEPENDENT HEIGHT; MICROWAVE LANDING SYSTEM; L-BAND DISTANCE MEASURING EQUIPMENT

Section Class Codes: B6330, B7320C, B7630, B7650C, C3360L
A HYBRID GUIDANCE SYSTEM FOR ALL-WEATHER APPROACH AND LANDING

HURASS, K.
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUR LUFT- UND RAUMANFAHRT E.V., INST. FUR FLUGFUHRUNG, BRAUNSCHWEIG, GERMANY

AGARD
AGARD CONFERENCE PROCEEDINGS NO. 220 ON APPLICATIONS OF ADVANCES IN NAVIGATION TO GUIDANCE AND CONTROL 21-1/15 1978
STUTTGART, GERMANY
Publ: AGARD NEUILLY-SUR-SEINE, FRANCE

V2288

Report Section:
THE AUTHOR REPORTS TESTS ON THE MICROWAVE LANDING SYSTEM MLS TO FIND OUT TO WHAT DEGREE ITS ACCURACY COULD BE IMPROVED BY INTEGRATING AN INERTIAL NAVIGATION SYSTEM. BOTH SYSTEMS WERE COMBINED BY MEANS OF A KALMAN FILTER. IN THIS STUDY, THE OPERATION OF THE FILTER DURING AN APPROACH IS DESCRIBED. THE ERRORS OF THE TRIAL SYSTEM SET UP AT BRAUNSCHWEIG AIRPORT COULD BE REDUCED TO ABOUT 2 PERCENT (5 Refs)

Descriptors: INERTIAL NAVIGATION, KALMAN FILTER, ACCURACY, INERTIAL NAVIGATION SYSTEM, KALMAN FILTER ENS, AIRPORT, ALL WEATHER APPROACH, MICROWAVE LANDING SYSTEM

Section Class Codes: B7650, B6320, B6140, C3360L, C3370H, C1260

MICROWAVE LANDING SYSTEMS; ICAO ACCURACY REQUIREMENTS, COVERAGE, FLARE GUIDANCE, GROWTH POTENTIAL, PERFORMANCE IMPROVEMENTS.

Section Class Codes: B7650, B7310N, B7320C, C3360L, C3370H, C3120C

FLIGHT TEST EVALUATION OF MICROWAVE LANDING SYSTEM AIRBORNE ANTENNAS

GILREATH, M.C.; WHITE, W.F.
LANGLY RAP CENTER, NASA, HAMPTON, VA, USA

IEEE
1978 INTERNATIONAL SYMPOSIUM DIGEST. ANTENNAS AND PROPAGATION 400-1 1978
WASHINGTON, DC, USA
Publ: IEEE NEW YORK, USA

XVI+457

Treatment: GENERAL, REVIEW, EXPERIMENTAL

Report Section:
PRESENTS THE DATA OBTAINED DURING THE FLIGHT EXPERIMENT WHICH INDICATES THE ACCURACY OF THE SCALE MODEL MEASUREMENTS AND NUMERICAL RESULTS (6 Refs)

Descriptors: AIRCRAFT INSTRUMENTATION, MICROWAVE ANTENNAS, TESTING.

Identifiers: MICROWAVE LANDING SYSTEMS, AIRBORNE ANTENNAS, MICROWAVE ANTENNA, FLIGHT TEST DATA

Section Class Codes: B5270R, R7630

095834 B78035871
MICROWAVE LANDING SYSTEMS
POGUST, F.
IEEE SPECTRUM (USA) V01. 15. NO. 3 30-6 MARCH 1978

Codex: IESAM

Treatment: GENERAL, REVIEW, JOURNAL PAPER

The Author Discusses Various Aircraft Landing Systems Including the Time Reference Scanning Beam (TRS) and the Doppler MLS

Descriptors: AIRCRAFT INSTRUMENTATION, AIR TRAFFIC CONTROL, KALMAN FILTER ENS, AIRBORNE LANDING SYSTEMS, TIME REFERENCE SCANNING BEAM SYSTEM, CURVED PATHS, DOPPLER SYSTEM

Section Class Codes: B7630, B7650C, B6330

098570 B78040408, C78019840
STOP CHANGES ON NEW MICROWAVE LANDING SYSTEMS (MLS) FROM AN OPERATIONAL POINT OF VIEW

BECKER, A.
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUR LUFT- UND RAUMANFAHRT E.V., INST. FUR FLUGFUHRUNG, BRAUNSCHWEIG, GERMANY

AGARD
AGARD CONFERENCE PROCEEDINGS NO. 220 ON APPLICATIONS OF ADVANCES IN NAVIGATION TO GUIDANCE AND CONTROL 21-1/15 1978
STUTTGART, GERMANY
Publ: AGARD NEUILLY-SUR-SEINE, FRANCE

V2288

Report Section:
THE ACCURACY CONSIDERATIONS ON THE NEW MLS IS FOLLOWED BY A BRIEF DESCRIPTION OF THE COMPETING SYSTEMS. THE ACCURACY AND THE COVERAGE ARE DISCUSSED IN THE NEXT Chapter. FOLLOWED BY A BRIEF DISCUSSION OF THE FLARE GUIDANCE PROBLEM SOME PROSPECTIVE CONSIDERATIONS ON GROWTH POTENTIAL GIVE AN INDICATION OF POSSIBLE FUTURE PERFORMANCE IMPROVEMENTS (5 Refs)

Descriptors: AIRPORTS, GROUND SUPPORT SYSTEMS, MICROWAVE MEASUREMENT, DISTANCE MEASUREMENT

Section Class Codes: B7650, B6320, B6140, C3360L, C3370H, C1260
083146 B78031108, C78014160
RELIABILITY CONSIDERATIONS IN NEW MICROWAVE LANDING SYSTEMS
LESLIE, M. E. B. RELCHER, W. P.
AWA TECH REV. (AUSTRALIA) VOL 16, NO 2 59-67 SEPT 1977
CODEN AWATR3
TREATMENT: APPLIC-PRACICAL APPLC.
JOURNAL PAPER:
The interscan system developed around the time reference scanning beam (trsb) concept, is proposed by australia for international adoption. the reliability parameters are summarised also operational considerations and design factors influencing the definition of an engineering solution to the new requirements. some of the inevitable design conflicts which require resolution are noted. particular attention is paid to those aspects which distinguish the system from others in which reliability has fundamental significance. clearly, this viewpoint does not provide the sole basis for examining the system reliability. the emphasis reflects the authors association with equipment design and manufacture consequently, the personal views expressed on issues still requiring international consensus should not be identified with the assessment of individual operating authorities in australia or overseas (11 refs)
Descriptors: AIR TRAFFIC CONTROL; RADIO DIRECTION FINDING; RELIABILITY
Identifiers: MICROWAVE LANDING SYSTEMS; INTERSCAN SYSTEM RELIABILITY; AIR TRAFFIC CONTROL; RADIO DIRECTION FINDING
Section Class Codes: B7630C, B7630, C7801, C7809C

083147 B78031109
FUTURE AIRCRAFT LANDING SYSTEMS TRSB, DMLS OR DLS?
NACHR. ELEKTRON. (GERMANY) VOL 32, NO 3 96 MARCH 1978
CODEN: NAELDV
TREATMENT: GENERAL REVIEW JOURNAL PAPER
Languages: GERMAN
For some time the international civil aviation organisation has been in the process of selecting a microwave landing system which will replace the present instrument landing system. the new system will allow a more flexible final approach for landing aircraft. three systems have been developed: time reference scanning beam, doppler microwave landing system and dme-controlled landing system. the last one, developed by sel, has the great advantage that the present airborne equipment may be used for the new function with an add-on-module, and no additional set of electronics will be necessary.
Descriptors: AIRCRAFT INSTRUMENTATION; RADIONAVIGATION; AIR TRAFFIC CONTROL
Identifiers: TIME REFERENCE SCANNING BEAM; DOPPLER MICROWAVE LANDING SYSTEM; DME-CONTROLLED LANDING SYSTEM; MICROWAVE LANDING SYSTEMS; LANDING SYSTEM SELECTION; OPERATION
Section Class Codes: B7630C, B7630...
OT1463 B78026249 C78014181
GUIDANCE ACCURACY CONSIDERATION FOR THE MICROWAVE LANDING SYSTEM
KELLY, R.J.
NAVIGATION (USA) VOL. 24, NO. 3 \ 189-205 FALL 1977
CODEN: NAV183
TREATMENT: PRACTICAL APPLIC-
JOURNAL PAPER-
AN MLS (MICROWAVE LANDING SYSTEM) SPECIFICATION IS PROPOSED
WHICH INVOLVES ONLY TWO DEFINITIONS: THE 'PATH FOLLOWING ERROR'
AND THE 'CONTROL MOTION NOISE'. THE SPECIFICATION IS SIMPLE
AND ECONOMICAL BECAUSE THE TRADITIONAL BIAS COMPONENT DOES NOT
REQUIRE A SEPARATE MEASUREMENT. ADDITIONAL STUDIES ARE
REQUIRED TO ENSURE THAT THE CONCEPT IS CONSISTENT WITH
ACCEPTABLE AIRCRAFT ATTITUDE LIMITS. IT IS RECOMMENDED THAT
MLS GROUND EQUIPMENT BE SPECIFIED SO AS TO GENERATE AN MLS
SIGNAL-IN-SPACE HAVING CATEGORY III ACCURACY PERFORMANCE AT
ALL GOVERNMENT MAINTAINED RUNWAYS (19 Refs)
Descriptors: GROUND SUPPORT SYSTEMS: AIR-TRAFFIC CONTROL;
MICROWAVE LINKS: AIRCRAFT COMMUNICATION
Identifiers: MICROWAVE LANDING SYSTEM: PATH FOLLOWING ERROR;
CONTROL MOTION NOISE: AIRCRAFT ATTITUDE LIMITS: GUIDANCE
ACCURACY: STANDARDS: GROUND SUPPORT SYSTEM
Section Class Codes: B7650C, B7320C, C3360L

OS6240 B78021695
PRECISION DME FOR NEW LANDING SYSTEM: FAST OR SLOW PULSE?
GRAZIANI, D
FACE-STANDARD, MILAN, ITALY
ELECTR. COMMUN (GB) VOL. 52, NO. 4 \ 289-92 1977 CODEN
ELCMAX
TREATMENT: PRACTICAL APPLIC-
JOURNAL PAPER-
SOME PROPOSALS HAVE Recently BEEN MADE FOR THE NEW PRECISION
DISTANCE MEASURING EQUIPMENT (P-DME) WITH THE OBJECTIVE OF
DEVELOPING A SYSTEM THAT IS BOTH COMPATIBLE AS FAR AS IS
POSSIBLE, WITH THE EXISTING DME EQUIPMENT AND SUITABLE FOR
COLLOCATION WITH THE PROPOSED NEW MICROWAVE LANDING SYSTEM
(MLS). THESE PROPOSALS ARE BASED ON TWO DISTINCT TECHNIQUES:
FIRST, ADOPTION OF A NEW PULSE THAT IS COMPATIBLE WITH THE
EXISTING ONE BUT WITH A SHORTER RISE TIME, THE SO-CALLED FAST
PULSE; SECOND, ADOPTION OF THE EXISTING (SLOW) PULSE BUT WITH
IMPROVEMENTS IN THE ASSOCIATED CIRCUITS AND NEW TECHNIQUES
THAT WILL NOT REQUIRE INTERNATIONAL CIVIL AVIATION
ORGANIZATION (ICAO) SPECIFICATIONS, THE MOST CRITICAL POINTS
IN COMPARING THESE TECHNIQUES ARE CONSIDERED (6 Refs)
Descriptors: DISTANCE MEASUREMENT: MICROWAVE LINKS;
RADIONAVIGATION
Identifiers: SLOW PULSE; PRECISION DISTANCE MEASURING
EQUIPMENT: MICROWAVE LANDING SYSTEM: FAST PULSE
Section Class Codes: B7630, B7320C, B6330
AIRBORNE NAVIGATION SYSTEM PERFORMANCE DURING RNAV/MLS TRANSITION

HEINE, W.
SYSTEMS CONTROL INC., PALO ALTO, CA, USA
IEEE, ET AL.

PROCEEDINGS OF THE IEEE 1977 NATIONAL AEROSPACE AND ELECTRONICS CONFERENCE, NAECON '77 705-12 1977
17-19 MAY 1977 DAYTON, OHIO, USA
Publ: IEEE NEW YORK, USA
XXXI+3969
Treatment: EXPERIMENTAL-

AIRCRAFT POSITION ERROR SENSITIVITY TO SENSOR ERRORS AND FLIGHT PATH GEOMETRY IS ANALYZED DURING RNAV/MLS TRANSITION USING A DIGITAL COMPUTER SIMULATION. THE AVIONICS SENSITIVITY DATA PROVIDES INFORMATION NECESSARY TO ESTABLISH REQUIREMENTS FOR ADDITIONAL GUIDANCE LAW DESIGN AND TO ESTABLISH AIRSPACE REQUIREMENTS FOR MANEUVERING TO NULL ANY RESIDUAL RNAV (AREA OF NAVIGATION) ERRORS UPON MLS (MICROWAVE LANDING SYSTEM) TRANSITION. THE DATA BASE IS ALSO BENEFICIAL AS PLANNING INFORMATION FOR SUBSEQUENT FLIGHT TESTING. THE PARAMETERS VARIED DURING THE GENERATION OF THE DATA BASE INCLUDE FLIGHT PROFILE, ERROR SOURCE CONTENT AND MAGNITUDE, GROUND FACILITY LOCATION, RUNWAY/FLIGHT PATH ORIENTATION AND NAVIGATION MODE (10 Refs)

Descriptors: AIRCRAFT INSTRUMENTATION; RADIONAVIGATION
Identifiers: AVIONICS SENSITIVITY DATA: AIRBORNE NAVIGATION SYSTEM; MICROWAVE LANDING SYSTEM AIRCRAFT

Section Class Codes: B7630, B6330
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END
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