

PRELIMINARY

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TRANSPORTATION TECHNOLOGY AND SYSTEMS DEVELOPMENT REPORTS

A QUARTERLY ANNOUNCEMENT JOURNAL



JUNE 1971
VOLUME 1 • NUMBER 1

U. S. DEPARTMENT OF TRANSPORTATION

**TECHNICAL CONFERENCE
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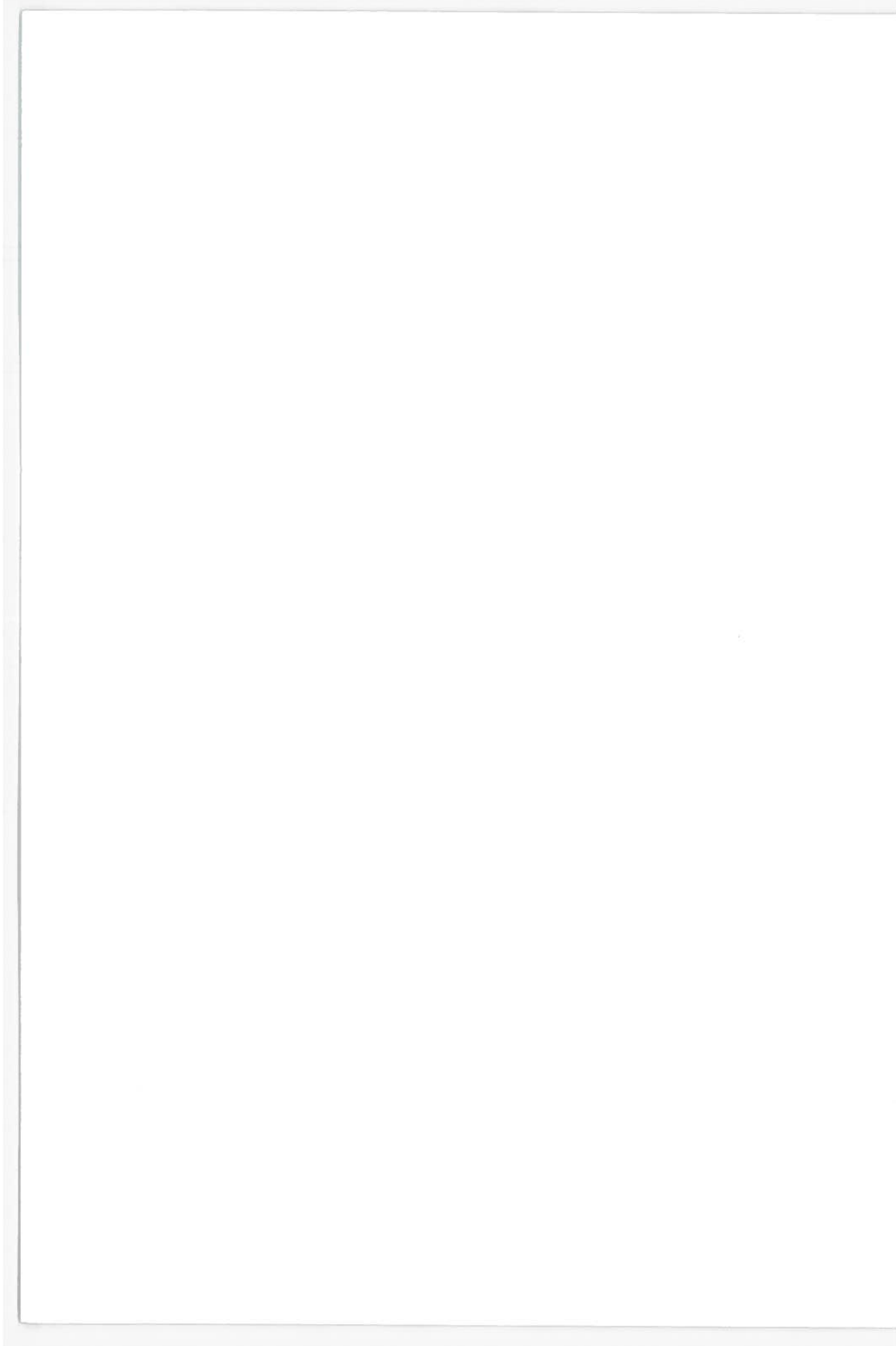
**TRANSPORTATION SYSTEMS CENTER
55 BROADWAY, CAMBRIDGE, MASSACHUSETTS 02142**

**TRANSPORTATION TECHNOLOGY
& SYSTEMS DEVELOPMENT
REPORTS**

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U.S. DEPARTMENT OF TRANSPORTATION
TRANSPORTATION SYSTEMS CENTER
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**U.S. DEPARTMENT OF TRANSPORTATION
TRANSPORTATION TECHNOLOGY &
SYSTEMS DEVELOPMENT REPORTS**

Vol. 1, No. 1 June 1971

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**TRANSPORTATION SYSTEMS CENTER (TSC)
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INTRODUCTION

TRANSPORTATION TECHNOLOGY AND SYSTEMS DEVELOPMENT REPORTS (TTSDR) includes business and economic as well as scientific and technical report literature. It is published by the Transportation Systems Center, Technical Conference Publication Branch (TSCTCPB) to simplify and improve access to Federal publications and data files.

TTSDR announces information released through TSCTCPB by technical directorates departments and branches within T. Announcements are arranged in 22 subject fields of the COSATI Subject Category list (AD-612-200). Reports covering more than one subject are announced in the primary field and cross-referenced in other fields.

An "Edge Index" on the back cover of this journal provides easy access to the subject fields within this journal.

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Publications available from NTIS on subscription or standing order are identified by an asterisk and foot note at the bottom of each page.

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LIMITED DISTRIBUTION

In this preliminary publication, documents and publications not identified with an asterisk are initially limited to distribution within the Department of Transportation.

TYPICAL JOURNAL ENTRIES

subject field → **8. EARTH SCIENCES AND OCEANOGRAPHY**

Includes the following Groups: Biological Oceanography; Cartography; Dynamic Oceanography; Geochemistry; Geodesy; Geography; Geology and Mineralogy; Hydrology and Limnology; Mining Engineering; Physical Oceanography; Seismology; Snow, Ice, and Permafrost; Soil Mechanics; Terrestrial Magnetism.

sponsoring agency name and address → **NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C. 20590**

performing organization report no. → **DOT-TSC-NASA-70-1** Transportation Systems Center ← performing organization name

EARTH SURVEY BIBLIOGRAPHY: A KWIC INDEX OF REMOTE SENSING INFORMATION *

I. Thompson, III, Technical Report, February 1971, 265 pp. Earth Resources, Infrared, Radar, Visible, and Microwaves. ← key words

abstract → This bibliography represents a collection of 1650 bibliographic citations on remote sensing of the physical characteristics of the Earth. This bibliography is intended to be used as a source document leading to additional information.

title and subtitle → **DOT-TSC-NASA-71-6** Transportation Systems Center
ATMOSPHERIC TRANSMISSION HANDBOOK: A SURVEY OF ELECTROMAGNETIC WAVE TRANSMISSION IN THE EARTH'S ATMOSPHERE OVER THE FREQUENCY (WAVELENGTH) RANGE 3 kHz (100 km) - 3,000 THz (0.1 μm) *

author(s) → I. Thompson, III, Technical Report, February 1971, 300 pp. ← type and date of report and No. of pages
Earth-to-Space Paths, Transmission Fundamentals, Transmission Properties, Transmission Information, Propagation, Infrared, Visible, Radio, Microwave, and Ultraviolet.
For primary bibliographic entry, see Field 17.

DOC. NO. 1693A Transportation Systems Center
HANDBOOKS, MICROWAVE RADIOMETERS, BUZZARDS BAY MEASUREMENT INSTRUMENT FOR OCEANOGRAPHIC RESEARCH
P. Gatti, Ewen Knight Corp., Wellesley, Mass., NA01, ← contractor organization and address and work unit no.
Technical Report.

DOC. NO. 1724 Transportation Systems Center
DESIGN AND TEST PLAN, BUZZARDS BAY MEASUREMENT INSTRUMENT FOR OCEANOGRAPHIC RESEARCH
H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report.

DOC. NO. 1732 Transportation Systems Center
SYSTEM CALIBRATION PROCEDURES AND RESULTS, BUZZARDS BAY MEASUREMENT INSTRUMENT FOR OCEANOGRAPHIC RESEARCH
J. A. Campbell, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report.

* Document is available to the public through the National Technical Information Service

SUBJECT FIELD STRUCTURE

(Use Edge Index on back cover to locate subject field in the journal)

FIELD 1. AERONAUTICS. Includes the following Groups: Aerodynamics; Aeronautics; Aircraft; Aircraft Flight Control and Instrumentation; Air Facilities.

FIELD 2. AGRICULTURE. Includes the following Groups: Agricultural Chemistry; Agricultural Economics; Agricultural Engineering, Agronomy and Horticulture; Animal Husbandry; Forestry.

FIELD 3. ASTRONOMY AND ASTROPHYSICS. Includes the following Groups: Astronomy; Astrophysics; Celestial Mechanics.

FIELD 4. ATMOSPHERIC SCIENCES. Includes the following Groups: Atmospheric Physics; Meteorology.

FIELD 5. BEHAVIORAL AND SOCIAL SCIENCES. Includes the following Groups: Administration and Management; Documentation and Information Technology; Economics; History, Law, and Political Science; Human Factors Engineering; Humanities; Linguistics; Man-machine Relations; Personnel Selection, Training, and Evaluation; Psychology (Individual and Group Behavior); Sociology.

FIELD 6. BIOLOGICAL AND MEDICAL SCIENCES. Includes the following Groups: Biochemistry; Bioengineering; Biology; Bionics; Clinical Medicine; Environmental Biology; Escape, Rescue, and Survival; Food, Hygiene and Sanitation; Industrial (Occupational) Medicine; Life Support; Medical and Hospital Equipment; Microbiology; Personnel Selection and Maintenance (Medical); Pharmacology; Physiology; Protective Equipment; Radiobiology; Stress Physiology; Toxicology; Weapon Effects.

FIELD 7. CHEMISTRY. Includes the following Groups: Chemical Engineering, Inorganic Chemistry; Organic Chemistry; Physical Chemistry, Radio and Radiation Chemistry.

FIELD 8. EARTH SCIENCES AND OCEANOGRAPHY. Includes the following Groups: Biological Oceanography; Cartography; Dynamic Oceanography; Geochemistry; Geodesy; Geography; Geology and Mineralogy; Hydrology and Limnology; Mining Engineering; Physical Oceanography; Seismology; Snow, Ice, and Permafrost; Soil Mechanics; Terrestrial Magnetism.

FIELD 9. ELECTRONICS AND ELECTRICAL ENGINEERING. Includes the following Groups: Components; Computer Electronic and Electrical Engineering; Information Theory; Subsystems; and Telemetry.

FIELD 10. ENERGY CONVERSION (Non-propulsive). Includes the following Groups: Conversion Techniques; Power Source Energy Storage.

FIELD 11. MATERIALS. Includes the following groups: Adhesives and Seals; Ceramics, Refractories, and Glasses; Coating Colorants, and Finishes; Composite Materials; Fibers and Textiles; Metallurgy and Metallography; Miscellaneous Materials; Oil Lubricants, and Hydraulic Fluids; Plastics; Rubbers; Solvents, Cleaners, and Abrasives; Wood and Paper Products.

FIELD 12. MATHEMATICAL SCIENCES. Includes the following Groups: Mathematics and Statistics; Operations Research.

FIELD 13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING. Includes the following Groups: Air Conditioning, Heating, Lighting, and Ventilating; Civil Engineering; Construction Equipment, Materials, and Supplies; Containers and Packaging; Couplings, Fittings, Fasteners, and Joints; Ground Transportation Equipment; Hydraulic and Pneumatic Equipment; Industrial Processes; Machinery and Tools; Marine Engineering; Pumps, Filters, Pipes, Fittings, Tubing, and Valves; Safety Engineering; Structural Engineering.

FIELD 14. METHODS AND EQUIPMENT. Includes the following Groups: Cost Effectiveness; Laboratories, Test Facilities, and Test Equipment; Recording Devices; Reliability; Reprography.

FIELD 15. MILITARY SCIENCES. Includes the following Groups: Antisubmarine Warfare; Chemical, Biological, and Radiological Warfare; Defense; Intelligence; Logistics; Nuclear Warfare; Operations, Strategy, and Tactics.

FIELD 16. MISSILE TECHNOLOGY. Includes the following Groups: Missile Launching and Ground Support; Missile Trajectories; Missile Warheads and Fuses; Missiles.

FIELD 17. NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES. Includes the following Groups: Acoustic Detection; Communications; Direction Finding; Electromagnetic and Acoustic Countermeasures; Infrared and Ultraviolet Detection; Magnetic Detection; Navigation and Guidance; Optical Detection; Radar Detection; Seismic Detection.

SUBJECT FIELD STRUCTURE (Continued)

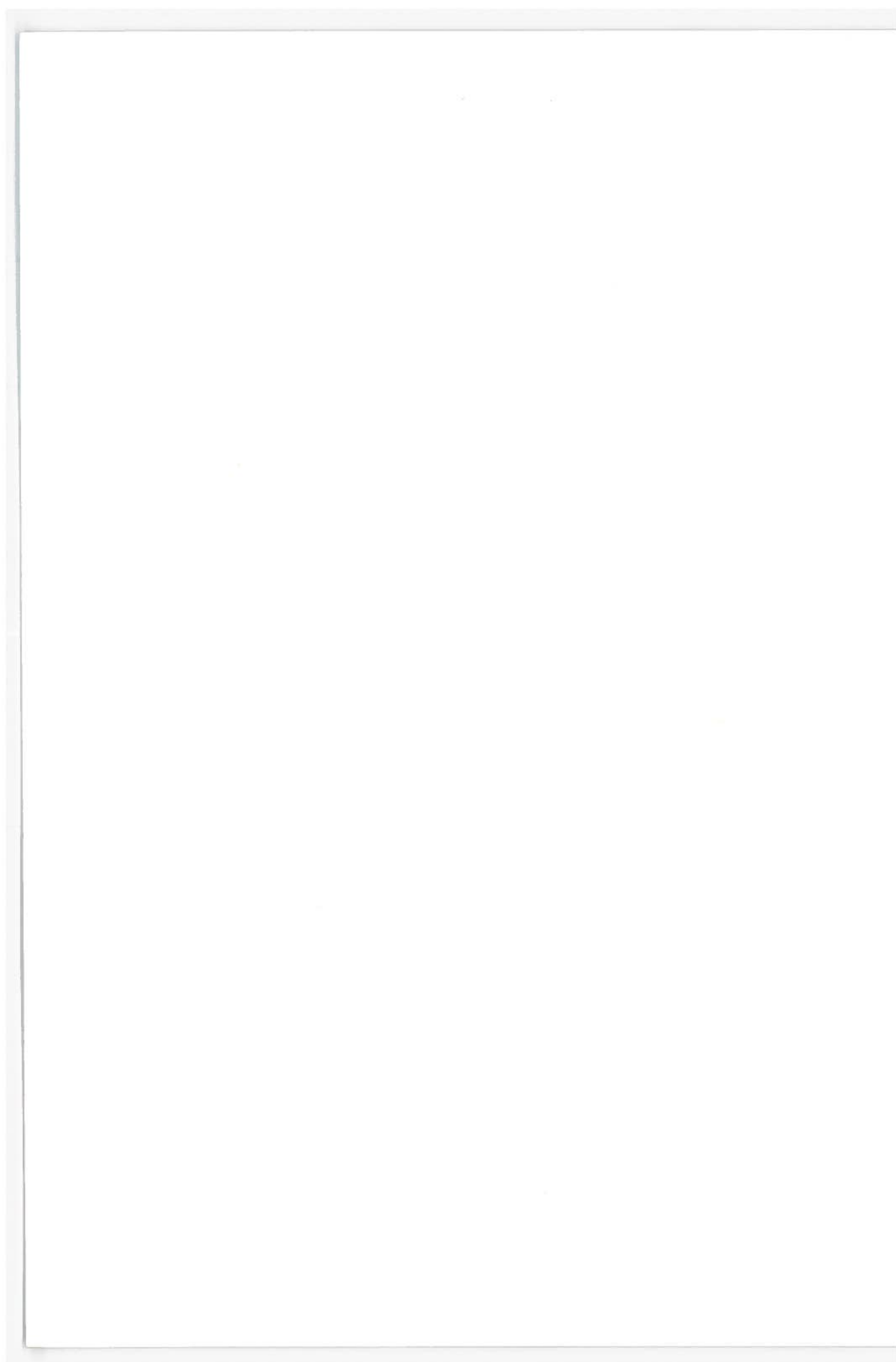
FIELD 18. NUCLEAR SCIENCE AND TECHNOLOGY. Includes the following Groups: Fusion Devices (Thermonuclear); isotopes; Nuclear Explosions; Nuclear Instrumentation; Nuclear Power Plants; Radiation Shielding and Protection; Radioactive Wastes and Fission Products; Radioactivity; Reactor Engineering and Operation; Reactor Materials; Reactor Physics; Reactors (Power); Reactors (Non-power); SNAP Technology.

FIELD 19. ORDNANCE. Includes the following groups: Ammunition, Explosives, and Pyrotechnics; Bombs; Combat Vehicles, Explosions, Ballistics, and Armor; Fire Control and Bombing Systems; Guns; Rockets; Underwater Ordnance.

FIELD 20. PHYSICS. Includes the following Groups: Acoustics, Crystallography; Electricity and Magnetism; Fluid Mechanics; Masers and Lasers; Optics; Particle Accelerators; Particle Physics; Plasma Physics; Quantum Theory, Solid Mechanics, Solid-state Physics; Thermodynamics; Wave Propagation.

FIELD 21. PROPULSION AND FUELS. Includes the following Groups: Air-breathing Engines; Combustion and Ignition; Electric Propulsion; Fuels; Jet and Gas Turbine Engines; Nuclear Propulsion; Reciprocating Engines; Rocket Motors and Engines; Rocket Propellants.

FIELD 22. SPACE TECHNOLOGY. Includes the following Groups: Astronautics; Spacecraft; Spacecraft Trajectories and Reentry; Spacecraft Launch Vehicles and Ground Support.





VOLUME 1 NUMBER 1/JUNE 1971

Transportation Technology and Systems Development Reports

A Quarterly Announcement Journal of the U. S. Department of Transportation

1. AERONAUTICS

Includes the following Groups: Aerodynamics; Aeronautics, Aircraft; Aircraft Flight Control and Instrumentation. Air Facilities.

FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20590

DOT-TSC-FAA-71-1 Transportation Systems Center
EN ROUTE TRAFFIC FLOW SIMULATION *
M. F. Medeiros, Jr., Technical Report, January 1971
For primary bibliographic entry, see Field 9.

DOT/TSC-FAA-71-2 Transportation Systems Center
**HUMAN FACTORS IN COCKPIT INPUT AND DISPLAY
FOR DATA LINK ***
Edwin H. Hilborn, FA16-0, Technical Memo. July 1970-
January 1971, 17 pp.
Data Link, Air-Ground-Air Messages, ARINC Proposal, Vocabulary Messages, and Display Problems.

Problems associated with the entry of air-ground-air messages via keyboard for transmission by Data Link are discussed. The ARINC proposal for a keyboard is presented, and an alternative method for coding keys is proposed for comparative evaluation. A sizable vocabulary of messages requiring a minimum of keying is developed and justified. An alternative layout for a keyboard is proposed and its rationale explained. Some display problems are noted. Plans for experimental evaluation of several keyboard codes and layouts are noted.

DOT-TSC-FAA-71-3 Transportation Systems Center.
CONCEPTUAL NETWORK MODEL OF THE AIR TRANSPORTATION SYSTEM. THE BASIC, LEVEL 1 MODEL *
N. de Holland, S. Priver, FA06, Technical Report, April 1971, 44 pp.
Conceptual Transportation Systems Model, Flight Simulation, Input Package and Output Package.
For primary bibliographic entry, see Field 9.

DOT-TSC-FAA-71-4 Transportations Systems Center.
A FUNCTIONAL DESCRIPTION OF AIR TRAFFIC CONTROL *
J. R. Coonan and P. Mpontsikaris, FA06, Technical Note,

March 1971, 81 pp.
ATC Event Sequence and ATC Functions.
For primary bibliographic entry, see Field 17.

DOT-TSC-FAA-71-5 Transportation Systems Center
THE IMPACT OF INERTIAL NAVIGATION ON AIR SAFETY *
R. M. Hershkowitz, D. O'Mathuna and K. R. Britting, FA04, Technical Report, May 1971, 25pp.
Inertial navigation, Collision risk model, En route navigation statistics and Blunders.
For primary bibliographic entry, see Field 17.

DOT-TSC-FAA-71-6 Transportation Systems Center
COLLISION RISK MODEL FOR NAT REGION *
Ronald Hershkowitz, FA04, Technical Report, May 1971, 55 pp.
Collision Risk Model, Composite Problem, Vertical Separation and Lateral Separation.
For primary bibliographic entry, see Field 17.

DOT-TSC-FAA-71-7 Transportation Systems Center
EVALUATION OF AIR TRAFFIC CONTROL MODELS AND SIMULATIONS *
L. O. Higgins and P. Mpontsikaris, Service Technology Corporation, Cambridge, FA06, Technical Report, June 1971.
Air Traffic Control (ATC), Modeling and Simulation of ATC and Evaluation of ATC Models.

Approximately two hundred reports were identified as describing Air Traffic Control (ATC) modeling and simulation efforts. Of these, about ninety analytical and simulation models dealing with virtually all aspects of ATC were formally evaluated. The bibliography lists all the reports identified. There is an introduction to, and a summary of the evaluation efforts as of this publication. The summary also contains a preliminary indication of which models may be of value for ATC concept evaluation; specifically traffic flow, safety and system loading aspects of proposed concepts. The remainder of the document is a catalog of the written evaluation of the ATC models. The models are divided into seven categories: (A) Airport Surface Traffic, (B) Runway, Departure/Arrivals, (C) Terminal Area, (D) Enroute, (E) ATC Systems (and miscellaneous), (F) Cost-Effectiveness Models, and (G) Safety Related Models. The catalog will be updated periodically.

* Document is available to the public through the National Technical Information Service.

1. AERONAUTICS

DOT-TSC-FAA-71-8 Transportation Systems Center LINEARIZED MATHEMATICAL MODELS FOR DEHAVILLAND CANADA "BUFFALO & TWIN OTTER" STOL TRANSPORTS *

R. A. MacDonald, Mel Garelick and J. O'Grady, FA18, Technical Note.

Aircraft Math Models and STOL Aircraft Stability & Control.

Linearized six degree of freedom rigid body aircraft equations of motion are presented in a stability axes system. Values of stability derivatives are estimated for two representative STOL aircraft — the DeHavilland of Canada "Buffalo" and "Twin Otter." These estimates are based on analytical expressions included in the report. The combination of the equations of motion and the estimated stability derivatives provides an aircraft model which is useful for Navigation, Guidance and ATC Studies. Resulting transient responses to control inputs are presented.

DOT-TSC-FAA-71-10 Transportation System Center PRELIMINARY SURVEY OF POTENTIAL STOL TERMINAL AREA OPERATIONAL REQUIREMENTS

Lloyd E. Stevens, Technical Memorandum.

STOL and Terminal Area Operations

A preliminary survey of potential operational requirements for STOL in the terminal area has been made. The presentation of this survey is in three sections. The first section presents the motivation for the survey, which can be summarized as the necessity for the federal government to have a knowledge of the potential operational requirements of STOL. The second section discusses the markets in which STOL may be found viable. This discussion is limited to those aspects which are necessary to determine the effects of these markets on shaping future STOL operations. The final section consists of a description of terminal area operations as they currently exist, of possible operational changes that may occur exclusive of the introduction of STOL, and then of potential operational requirements of STOL in the terminal area.

DOT-TSC-FAA-71-11 Transportation Systems Center SIMULATION MODEL FOR THE PIPER PA-30 LIGHT MANEUVERABLE AIRCRAFT IN THE FINAL APPROACH *

Joseph S. Koziol, Jr., Technical Memorandum, June, 1971, 21 pp.

Light Maneuverable aircraft, autopilot model, final approach and simulation studies.

This report describes the Piper PA-30 "Twin Comanche" aircraft and a representative autopilot during the final approach configuration for simulation purposes. The aircraft is modeled by linearized six-degree-of-freedom perturbation equations referenced to the aircraft stability axis. Other equations are presented which derive the body axis rates, velocities and accelerations, and ground referenced velocities (translation equations). The autopilot is a representative system for automatic ILS approaches from initial localizer track down to decision height. The glideslope system is engaged by approaching the glidepath at constant altitude (usually in the altitude hold mode) on the localizer beam. The pilot must take over manually at the decision height since light aircraft are not normally equipped with automatic

* Document is available to the public through the National Technical Information Service.

flare capability. The aircraft autopilot model described herein has been used extensively in simulation studies at TSC and exhibits the expected behavior.

DOT-TSC-FAA-71-13 Transportation Systems Center FINAL REPORT: OCEANIC SURVEILLANCE AND NAVIGATION ANALYSIS, FY 71 *

Ronald M. Hershkowitz, FA04, Technical Report, June 1971.

Air Traffic Control, Collision Risk Model, Inertial Navigation and Separation Standards Surveillance.

For primary bibliographic entry, see Field 17.

DOT-TSC-FAA-71-14 Transportation Systems Center REAL-TIME SIMULATION PROGRAM FOR DE HAVILLAND (CANADA) "BUFFALO" AND "TWIN OTTER" STOL TRANSPORTS *

R. A. MacDonald, Mel Garelick and J. Haas, FA18, Technical Note, June 1971.

Aircraft Math Models, STOL Aircraft Stability and Control, and Aircraft Simulation.

Simulation models of two representative STOL aircraft — the DeHavilland (Canada) "Buffalo" and "Twin Otter" transports — have been generated. The aircraft are described by means of non-linear equations that will accommodate gross changes in angle of attack, pitch angle, flight path angle, velocity, and power setting. Aircraft motions in response to control inputs and external disturbances are related to Earth-fixed coordinates. The equations are programmed to run in "real time" so that they can be used in conjunction with a manned cockpit simulator. Provisions are made for pilot control inputs to the simulation, and conventional panel display parameters are generated. The report includes representative simulation results which demonstrate that the simulation is an adequate representation of the two STOL aircraft being modeled.

DOT-TSC-FAA-71-15 Transportation Systems Center LARGE SCALE SYSTEMS — A STUDY OF COMPUTER ORGANIZATIONS FOR AIR TRAFFIC CONTROL APPLICATIONS *

John Dumanian and David Clapp, FA03, Technical Report, June 1971, 152pp.

Computers, NAS Stage A Data Processing and ARTS III Data Processing.

For primary bibliographic entry, see Field 9.

DOT-TSC-FAA-71-16 Transportation Systems Center SYSTEM RELIABILITY AND RECOVERY *

Charles A. Dancy, III, FA03, Technical Report, June 1971, 61 pp.

Reliability, recovery, reconfiguration, multiprocessor and failsafe/soft.

For primary bibliographic entry, see Field 9.

DOT-TSC-FAA-71-17 Transportation Systems Center TIME/FREQUENCY SYSTEMS *

E. H. Farr, L. A. Frasco, H. D. Goldfein and R. M. Snow, Technical Report, June 1971, 82 pp.

Time/Frequency, Multipath, ATC Systems and Coding.

For primary bibliographic entry, see Field 17.

1. AERONAUTICS

DOT-TSC-FAA-71-18 Transportation Systems Center
PROPOSED CONTROL TOWER AND COCKPIT VISIBILITY READOUTS BASED ON AN AIRPORT - AIRCRAFT SYSTEM INFORMATION FLOW *

Hector C. Ingrao and J. R. Lifnitz, PPA FA15, Technical Report, July 1971.

Visibility, Air Traffic Control and Cockpit Display.

The problem of displaying visibility information to both controller and pilot is discussed in the context of visibility information flow in the airport - aircraft system. The optimum amount of visibility information, as well as its rate of flow and display, depends both on the needs of the pilot during landing and on the air traffic control philosophy (tactical or strategic) chosen. A rationale is provided to assist in the selection of flow rates and readouts. The relationship of visibility information to the magnitude of terminal information handled by the pilot is discussed. Several display formats are proposed, including one for the traffic controller and three different options for the pilot.

DOT-TSC-FAA-71-19 Transportation Systems Center
CLEAR AIR TURBULENCE RADIOMETRIC DETECTION PROGRAM *

George W. Wagner, G. G. Heroules and W. E. Brown, FA20, Annual Report FY71 July 1, 1970 - June 30, 1971, 47 pp. Radiometer.

For primary bibliographic entry, see Field 17.

DOT-TSC-FAA-71-23 Transportation Systems Center
COMPUTER SYSTEMS PERFORMANCE MEASUREMENT TECHNIQUES *

Judith Gertler, Herbert Glynn, Vivian Hobbs and Frederick Woolfall, FA03, Technical Report, June 1971, 71 pp. Computer Measurements, ARTS III Data Processing, Executive Systems and Simulation.

For primary bibliographic entry, see Field 9.

THE CALCULATION OF AIRCRAFT COLLISION PROBABILITIES

J. F. Bellatoni, Transportation Systems Center, FA17, Internal Report, June 1971.

The basic limitation on air traffic compression, from the safety point of view, is the increased risk of collision due to reduced separations. In order to evolve new procedures, and eventually a fully automatic system, it is desirable to have a means of calculating the collision probability for any prescribed flight paths. This paper extends the statistical-probabilistic method of collision probability calculation, which has been limited to parallel, straight line flight paths, to arbitrary flight paths and vehicle shapes. The general formula is specialized to the cases of large relative velocity, non-zero relative velocity, zero relative velocity, and spherical collision surface. The formulas are applied to independent curved landing approaches to parallel runways.

AIAA NO. 71-77 Transportation Systems Center
4-D GUIDANCE OF STOL AIRCRAFT

R. H. Hynes, L. E. Stevenson and E. B. Capen, AIAA Paper, July 1971.

For primary bibliographic entry, see Field 17.

TSC/PS-0029-RN Transportation Systems Center
REQUEST FOR PROPOSAL

R. M. Hershkowitz and R. N. Nelson, FA04, April 1971.

TSC/PA-0029 Transportation Systems Center
TECHNICAL EVALUATION OF PROPOSALS

R. M. Hershkowitz and D. L. Brandel, FA04, Technical Report, June 1971.

DEVELOPMENT OF METHODOLOGY FOR OCEANIC AIR TRAFFIC CONTROL SURVEILLANCE SYSTEM

J. S. Tyler and D. E. Stegner, Systems Control, Inc., Cambridge, FA04, Technical Report, April 1971.

RPT-553 Transportation Systems Center
PHASE II LATERAL CONTROL SYSTEM

Service Technology Corporation, Cambridge, FA07, Technical Report, October 1970.

For primary bibliographic entry, see Field 12.

RPT-566 Transportation Systems Center
COMPARISON OF THE COMPUTERS AVAILABLE FOR SIMULATION

Service Technology Corporation, Cambridge, FA12, Technical Report, September 1970.

RPT-580 Transportation Systems Center
COMPLEMENTARY FILTER SCHEME FOR PREMIXING INS AND ILS INFORMATION

Service Technology Corporation, Cambridge, FA07, Technical Report, October 1970.

For primary bibliographic entry, see Field 17.

RPT-590 Transportation Systems Center
CTOL SUBROUTINE TO SIMULATE ACTUAL ILS BEAM NOISE

Service Technology Corporation, Cambridge, FA07, Technical Report, December 1970.

For primary bibliographic entry, see Field 9.

RPT-594 Transportation Systems Center
IALS TIME REDUCTION STUDY

Service Technology Corporation, Cambridge, FA12, Technical Report, December 1970.

RPT-597 Transportation Systems Center
ADDENDUM TO CTOL SUBROUTINE TO SIMULATE ACTUAL ILS BEAM NOISE

Service Technology Corporation, Cambridge, FA07, Technical Report, January 1971.

For primary bibliographic entry, see Field 9.

RPT-608 Transportation Systems Center
PERFORMANCE EVALUATION OF THE LATERAL AXIS OF A CONVENTIONAL AND AN INERTIALLY AUGMENTED AUTOMATIC LANDING SYSTEM

Service Technology Corporation, Cambridge, FA07, Technical Report, January 1971.

* Document is available to the public through the National Technical Information Service.

1. AERONAUTICS

RPT-626 Transportation Systems Center
REVISED ERROR MODEL FOR THE INERTIAL NAVIGATION SYSTEM

Service Technology Corporation, Cambridge, FA07, Technical Report, March 1971.

For primary bibliographic entry, see Field 17.

RPT-629 Transportation Systems Center
ILS BEAM NOISE OPTIONS FOR CTOL SUBROUTINE BNOS

Service Technology Corporation, Cambridge, FA07, Technical Report, March 1971.

For primary bibliographic entry, see Field 9.

RPT-685 Transportation Systems Center
IALS LATERAL CONTROL SYSTEMS OPTIONS

Service Technology Corporation, Cambridge, FA07, Technical Report, March 1971.

For primary bibliographic entry, see Field 9.

RPT-697, Transportation Systems Center
REVISED SUBROUTINE CSYS

Service Technology Corporation, Cambridge, FA07, Technical Report, March 1971.

For primary bibliographic entry, see Field 9.

RPT-701 Transportation Systems Center
IALS LONGITUDINAL CONTROL SYSTEM OPTIONS

Service Technology Corporation, Cambridge, FA07, Technical Report, March 1971.

For primary bibliographic entry see Field 9.

RPT-745 Transportation Systems Center
SYNCHRONIZATION CONTROL IALS DIGITAL PROGRAM SOLUTION TIME-STRIP CHART RECORDER PAPER SPEED

Service Technology Corporation, Cambridge, FA12, Technical Report, April 1971.

STC-DOT-TSC-43-71-755, Transportation Systems Center

SECOND ORDER COMPLEMENTARY FILTER FOR PREMIXING ILS AND ILS INFORMATION

Service Technology Corporation, Cambridge, FA07, Technical Report, May 1971, 37 pp.
Instrument Landing System, Automatic Landing System, Complementary Filter, and Inertial Navigation System

Methods of filtering ILS localizer information utilizing inertial navigation system measured velocity information employing complementary filtering techniques are discussed. A second order complementary filter is compared with a first order filter design that was discussed in an earlier report. Analysis and simulation results are presented that show the performance of an automatic landing system when these filter designs are implemented as premix filters.

STC-DOT-TSC-43-71-823 Transportation Systems Center

FEASIBILITY STUDY OF CATEGORY II LANDINGS USING A CATEGORY I LOCALIZER BEAM

Service Technology Corporation, Cambridge, FA07, Technical Report, June 1971, 17 pp.

* Document is available to the public through the National Technical Information Service.

Category II landings, localizer beam specifications, inertially aided ILS (Instrument Landing System).

For primary bibliographic entry, see Field 17.

STC-DOT-TSC-43-71-838 Transportation System Center

DESIGN REQUIREMENTS OF A DIGITAL CONTROLLER FOR THE IALS PROGRAM

Service Technology Corporation, Cambridge, FA07, Technical Report, June 1971.

Digital controller, control system, computer core size, and computer iteration rate.

For primary bibliographic entry, see Field 9.

ADR-754 Transportation Systems Center
DESIGN, DEVELOPMENT AND FLIGHT EVALUATION OF INERTIALLY AUGMENTED LANDING SYSTEMS

R. Gadbois, G. Soderland and S. Davis, (Lear Siegler, Inc Waltham, Mass.), FA07, Technical Report, March 1971.

Santa Monica, Ca., FA07, Technical Report, March 1971.

For primary bibliographic entry, see Field 17.

R-666 Transportation Systems Center
OPTIMAL AND SUBOPTIMAL FLIGHT PATH CONTROL IN THE TERMINAL AREA USING RADIO-INERTIAL MEASUREMENTS

M. Desai, D. MacKinnon and P. Madden, (M.I.T. Charles Stark Draper Laboratory, Cambridge), FA07, Lab Report July 1970.

For primary bibliographic entry, see Field 17.

AIAA Paper Transportation Systems Center
INERTIALLY AUGMENTED APPROACH AND LANDING SYSTEMS

R. Pawlak, FA07, AIAA Paper, July 1971.

AN INVESTIGATION OF MICROWAVE LANDING GUIDANCE SYSTEM SIGNAL REQUIREMENTS FOR CONVENTIONALLY EQUIPPED CIVILIAN AIRCRAFT

Transportation Systems Center, FA08, Technical Report September 1971.

SIMULATION MODEL FOR THE CORVAIR CV-880 AND BOEING 720B AIRCRAFT-AUTOPILOT SYSTEMS II THE APPROACH CONFIGURATION

Transportation Systems Center, FA12, Preliminary Memorandum.

SIMULATION MODEL FOR THE PIPER PA-30 LIGHT MANEUVERABLE AIRCRAFT IN THE FINAL APPROACH

Transportation Systems Center, FA12, Preliminary Memorandum.

SIMULATION MODEL FOR THE DC-10 AIRCRAFT DURING APPROACH

Transportations System Center, FA12, Preliminary Memorandum.

1. AERONAUTICS

A SIMULATION MODEL OF THE BOEING-720B AIRCRAFT FLIGHT CONTROL SYSTEM IN CONTINUOUS FLIGHT

Transportation Systems Center, FA12, Preliminary Memorandum.

MANEUVERABILITY OF CONVENTIONAL FIXED WING AIRCRAFT IN THE LANDING APPROACH

J. Koziol, Transportation Systems Center, FA12, Memorandum.

SELECTION OF A REPRESENTATIVE LIGHT MANEUVERABLE AIRCRAFT FOR INSTRUMENTED APPROACH AND LANDING STUDIES

J. Koziol, Transportation Systems Center, FA12, Memorandum.

A COMPARISON BETWEEN THE CESSNA-310 AND THE PIPER PA-30 TWIN COMANCHE

J. Koziol, Transportation Systems Center, FA12, Memorandum.

HUMAN FACTORS FOR MAN-MACHINE INTERFACE

Transportation Systems Center, FA13, Technical Report, May 1971.

SUMMARY REPORT ON IMPLICATIONS OF AUTOMATION FOR ATC CONTROLLERS

Transportation Systems Center, FA13, Technical Report, July 1971.

PSD-PWI-1.0 Transportation Systems Center OPTICAL IR PILOT WARNING INDICATOR EVALUATION

FA14, Technical Program Plan

STATIC FIELD TEST PLAN OPTICAL IR PILOT WARNING INDICATOR EVALUATION

Transportation Systems Center, FA14, Test Plan

FAA/NAFEC TEST PLANT TEST AND EVALUATION OF COLLISION PREVENTION PILOT WARNING INSTRUMENTS

Transportation Systems Center, FA14, Technical Report.

STAN ROSS AND COMPANY PROGRESS REPORTS AND WORKING PAPERS

Transportation Systems Center, FA14, Progress Reports, December 1970-June 1970.

FTG/71-95 Transportation Systems Center OPTICAL MEASUREMENT REPORT

Flash Technology Corporation of America, FA14, Technical Report, April 1971.

SUMMARY REPORT OF STUDIES OF HUMAN FACTORS IN COCKPIT I/O DEVICES

Transportation Systems Center, FA16, Technical Report, July 1971.

REPORT ON SELECTION OF WORK AREAS FOR FA17

Transportation Systems Center, FA17, TSC Internal Report, November 1970.

M71-84 Transportation Systems Center THE USE OF MONOPULSE TECHNIQUES IN THE RADAR BEACON SYSTEM

MITRE Corporation, Bedford, Mass., FA19, Technical Report, April 1971.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION WASHINGTON, D.C. 20590

DOT-TSC-NA-71-5 Transportation Systems Center LABORATORY EVALUATION OF FECKER AND LORAL OPTICAL IR PWI SYSTEMS *

Mark Gorstein, James N. Hallock, Maurice Houten and Igan G. McWilliams, Technical Report, February 1971, 81 pp. Electro-Optical PWI, Flashing Xenon Strobe, Fault Correction, Calibrate in Azimuth and Elevation and Range.

For primary bibliographic entry, see Field 17.

DOT-TSC-50 Transportation Systems Center NORTH ATLANTIC SATELLITE ATC CENTER STUDY

IBM Corp., NA02, Technical Report, April 1971, 297 pp. North Atlantic, ocean control center, satellite system, and air traffic control.

For primary bibliographic entry, see Field 17.

TSC-71-6004 Transportation Systems Center A SATELLITE OCEANIC ATC CENTER

C. E. Bading, IBM Corp., NA02, Technical Report, April 1971

TEST PLAN FOR L-BAND/VHF ATC COMMUNICATIONS EXPERIMENT

Transportation Systems Center, NA05, Technical Report, March 1971

PGS-NA11-1.0 Transportation Systems Center STOL NAVIGATION AND GUIDANCE DEVELOPMENT PLAN

NA11, Technical Report, November 1970

Much has been said and written concerning the advantages to be realized through the introduction of STOL aircraft into the commercial passenger fleet. A great deal of attention has also been devoted to the problems associated with the operational employment of STOL aircraft as a commercial passenger carrier. A discussion of some of these considerations is presented below. Before proceeding with this section it should be recognized that it is not the function of the Transportation Systems Center (TSC) to define or develop procedures for STOL aircraft operations. Nor does this organization presume to define system operational or STOL ATC requirements, since these areas are properly the function of the FAA. Nevertheless, it is essential that we set down our understanding of these areas and what the problems are before describing the program which has been formulated in response to these problems.

* Document is available to the public through the National Technical Information Service.

1. AERONAUTICS

**PGS-NA11-2.0 Transportation Systems Center
SYSTEM SPECIFICATION, PHASE I STOL NAVIGATION
AND GUIDANCE SYSTEM**

NA11, Technical Report, December 1970

For primary bibliographic entry, see Field 17.

STC-DOT-TSC-43-71-724 Transportation Systems Center

STOLNAV PALLET EMI PLAN

Service Technology Corp., Cambridge, NA11, Technical Report, April 1971

This document defines the interconnection, cabling, shielding, and grounding procedures to be followed during the design and construction of the STOLNAV PALLET to minimize EMT among the various stolnav black boxes and between the STOLNAV and other aircraft electronic circuits. Requirements for chassis bonding are described. A method of classifying each signal according to its frequency, impedance, and voltage level is established. Bundling and routing procedures, based upon the signal classification, are defined, as well as twisting and shielding requirements.

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OF TRANSPORTATION
WASHINGTON, D. C. 20590**

**DOT-TSC-OST-71-4 Transportation Systems Center
A THEORY OF AIRCRAFT COLLISION AVOIDANCE
SYSTEM DESIGN AND EVALUATION ***

Edmund J. Koenke, Technical Report, March, 1971, 184pp. Anti-collision system, Collision avoidance, Air traffic models, Collision detection and avoidance, and Traffic model formulations (air).

For primary bibliographic entry, see Field 17.

**DOT-TSC-OST-71-5 Transportation Systems Center
AIRCRAFT EMISSIONS SURVEY ***

A. J. Broderick, W. F. Harriott, and R. A. Walter, OS10, Technical Memorandum, July 1, 1970 - March 31, 1971, Air Pollution, Gas Turbines, Emissions, Jet Engines, and Instrumentation.

This technical memorandum presents the preliminary results of a survey of transportation systems emissions monitoring requirements. Emissions of carbon monoxide, hydrocarbons, oxides of nitrogen and particulates from aircraft power plants, with emphasis on gas turbine engines, are considered. Measurement rationale for various types of aircraft is summarized. Instrumentation available for measuring these emissions is reviewed and a tabulation made of those techniques in current use. Instrumentation requiring further engineering development is briefly discussed.

**DOT-TSC-OST-71-8 Transportation Systems Center
A REVIEW OF AVAILABLE L-BAND AND VHF AIRCRAFT
ANTENNAS FOR AN AIRCRAFT-SATELLITE
COMMUNICATIONS LINK ***

Telecommunications Division, OS08, Technical Report, May 1971, 93 pp.

L-Band Antenna, VHF Antenna, Slot-Dipole Antenna, and Boeing

For primary bibliographic entry, see Field 17.

* Document is available to the public through the National Technical Information Service.

**DOT-TSC-OST-71-12 Transportation Systems Center
AN AIRPORT AIRSIDE SYSTEM MODEL ***

Irwin Englander, OS04, Technical Report, June 1971

For primary bibliographic entry, see Field 9.

**ANALYTICAL REQUIREMENTS FOR ANALYSIS AND
SIMULATION FOR ATC SYSTEMS**

Transportation Systems Center, OS03, Technical Report, July 1971

ATC REAL TIME EXPERIMENTAL RESULTS

Transportation Systems Center, OS03, Internal Report, July 1971

**D6-24898 Transportation Systems Center
PHASE I REPORT - STUDY AND CONCEPT FORMULATION
OF A FOURTH GENERATION AIR TRAFFIC
CONTROL SYSTEM**

Boeing, OS04, Technical Report, April 1971

This is a report of the work accomplished during phase I of the Study and Concept Formulation of a Fourth-Generation Air Traffic Control System. The objective of phase I was to define two candidate system concepts to be compared to the Up-Graded Third-Generation System in phase II. The description of the two candidate system concepts which were selected is presented in this section. The operational-concept analysis, technology alternatives, trade-off studies and the system selection process are described in sections 2.0 through 5.0 respectively.

The material is presented in an unprocessed form in that no concerted effort has been made to edit the various sections for conciseness, pertinence of content or complete correlation between sections. This report is considered an interim product. Pertinent material will be included in a finished form in the final study report, whereas tutorial, redundant and unsubstantiated information will be deleted.

**C71-61.5/301 Transportation Systems Center
STUDY AND CONCEPT FORMULATION FOR A FOURTH
GENERATION AIR TRAFFIC CONTROL SYSTEM**

Autonetics, OS04, Interim Report, April 1971

**DOT-TSC-140 Transportation Systems Center
CONCEPT FORMULATION STUDIES OF THE CONTROL
ASPECTS OF THE FOURTH GENERATION AIR TRAFFIC
CONTROL SYSTEM**

MIT/Lincoln Laboratory, Cambridge, OS04, Interim Report, April 1971

**FOURTH GENERATION AIR TRAFFIC CONTROL
SYSTEM PROGRAM PLAN**

Transportation Systems Center, OS04, Technical Report, February 1971

PRELIMINARY EVALUATION OF FLUXGATE MAGNETOMETERS AND ACTIVE METAL DETECTORS

Transportation Systems Center, OS13, Conference Paper, January 1971

**PRELIMINARY EVALUATION OF METAL DETECTORS
FOR USE IN AIRPORT SCREENING SYSTEMS**

Transportation Systems Center, OS13, Technical Report, February 1971.

5. BEHAVIORAL AND SOCIAL SCIENCES

TECHNICAL EVALUATION OF METAL DETECTORS FOR CONCEALED WEAPONS

Transportation Systems Center, OS13, Technical Report, June 1971

2. AGRICULTURE

No reports.

3. ASTRONOMY AND ASTROPHYSICS

Includes the following Groups: Astronomy; Astrophysics; Celestial Mechanics.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C. 20590

DOT-TSC-NASA-71-10 Transportation Systems Center MEASUREMENTS OF TRANS-ATMOSPHERIC ATTENUATION STATISTICS AT THE MICROWAVE FREQUENCIES: 15, 19, AND 34 GHz *

G. G. Haroules, W. E. Brown, III, G. J. Bishop, Technical Report, June 1971

Earth-to-space paths, Electromagnetic Wave Propagation, and Atmospheric Attenuation.

Attenuation statistics resulting from a twelve month observation program are presented. The sun is used as a source of microwave radiation. The dynamic range of atmospheric attenuation measurement capability is in excess of 30 dB. Solar radiation characteristics with amplitude variations of a few percent are easily measured while at the same time provision is made to accommodate a 10 dB range above the quiet sun level if major solar flare activity occurs. The solar phenomenon was extracted from the data since it is not an objective of the measurement program. A discussion and analysis of the measurement technique is presented in support of the experimental data.

4. ATMOSPHERIC SCIENCES

Includes the following Groups: Atmospheric Physics; Meteorology.

UNITED STATES COAST GUARD WASHINGTON, D.C. 20591

DOT-TSC-CG-71-1 Transportation Systems Center SURVEY OF METEOROLOGICAL REMOTE SENSORS *

A. E. Barrington, CG04, Technical Memorandum, July 1, 1970 - May 15, 1971.

Meteorology, Remote Sensing, Data Buoy, and Instrumentation.

For primary bibliographic entry, see Field 17.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C. 20590

* Document is available to the public through the National Technical Information Service.

DOT-TSC-NASA-71-6 Transportation Systems Center ATMOSPHERIC TRANSMISSION HANDBOOK: A SURVEY OF ELECTROMAGNETIC WAVE TRANSMISSION IN THE EARTH'S ATMOSPHERE OVER THE FREQUENCY (WAVELENGTH) RANGE 3 kHz (100 km) - 3,000 THz (0.1 μ m). *

W. I. Thompson, III, Technical Report, February 1971, 300 pp.

Earth-to-Space Paths, Transmission Fundamentals, Transmission Properties, Transmission Information, Propagation, Infrared, Visible, Radio Microwave, and Ultraviolet.

For primary bibliographic entry, see Field 17.

DOT-TSC-NASA-71-10 Transportation Systems Center MEASUREMENTS OF TRANSATMOSPHERIC ATTENUATION STATISTICS AT THE MICROWAVE FREQUENCIES: 15, 19 and 34 GHz *

G. G. Haroules, W. E. Brown, III, G. J. Bishop, Technical Report, June 1971.

Earth-to-space paths, Electromagnetic Wave Propagation, and Atmospheric Attenuation

For primary bibliographic entry, see Field 3.

OFFICE OF THE SECRETARY OF TRANSPORTATION WASHINGTON, D.C. 20590

LOW-POLLUTION PROPULSION TECHNOLOGY BUILD-UP PLAN

Transportation Systems Center, OS14, Technical Report

5. BEHAVIORAL AND SOCIAL SCIENCES

Includes the following Groups: Administration and Management, Documentation and Information Technology; Economics; History, Law, and Political Science; Human Factors Engineering; Humanities; Linguistics; Man-machine Relations; Personnel Selection, Training, and Evaluation; Psychology (Individual and Group Behavior); Sociology.

FEDERAL AVIATION ADMINISTRATION WASHINGTON, D.C. 20590

DOT-TSC-FAA-71-2 Transportation Systems Center HUMAN FACTORS IN COCKPIT INPUT AND DISPLAY FOR DATA LINK *

Edwin H. Hilborn, FA16, Technical Memo, July 1970 - January 1971, 18 pp.

Data Link, Air-Ground-Air Messages, ARINC Proposal, Vocabulary Messages, and Display Problems.

For primary bibliographic entry, see Field 1.

HUMAN FACTORS FOR MAN-MACHINE INTERFACE

Transportation Systems Center, Technical Report, FA13, May 1971.

5. BEHAVIORAL AND SOCIAL SCIENCES

SUMMARY REPORT ON IMPLICATIONS OF AUTOMATION FOR ATC CONTROLLERS

Transportation Systems Center, FA13, Technical Report, July 1971.

SUMMARY REPORT OF STUDIES OF HUMAN FACTORS IN COCKPIT I/O DEVICES

Transportation Systems Center, FA16, Technical Report, July 1971.

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, WASHINGTON, D.C. 20591

DOT-TSC-NHTSA-71-2 Transportation Systems Center SUMMARY AND EVALUATION OF RESPONSES RECEIVED ON THE ALCOHOL SAFETY INTERLOCK SYSTEM *

E. Donald Sussman, Technical Memorandum, HS02, May 1971, 25 pp.

Alcohol Intoxication Interlock Driving Psychomotor-performance.

For primary bibliographic entry, see Field 13.

OFFICE OF THE SECRETARY OF TRANSPORTATION, WASHINGTON, D. C. 20590

DOT-TSC-71-7 Transportation Systems Center VEHICULAR TRAFFIC FLOW THEORY AND TUNNEL TRAFFIC FLOW MEASUREMENTS *

G. Chin, L. Jordan, D. Kahn, S. Morin, and P. Yoh, OS12, Technical Report, June 1971, 221 pp.

Traffic Flow, Tunnel Traffic, Congestion, and Airport Access.

For primary bibliographic entry, see Field 13.

DOT-TSC-OST-71-9 Transportation Systems Center MODELING TRANSPORTATION SYSTEMS: AN OVERVIEW *

George Kovatch and George Zames, Service Technology Corp., Cambridge, OS12, Technical Report, June 1971.

Transportation Modeling and Transportation Planning

The purpose of this report is to outline the role of systems analysis and mathematical modeling in the planning of transportation systems. The planning process is divided into three sectors (demand, supply, and policy) reflecting the demand for transportation services by the public, the ability of the system to deliver these services, and the effects of management policies on the equilibration between supply and demand. The composition of each sector is examined and illustrated by samples from recent major transportation studies and the modeling literature. Emphasis is placed on structure, dynamics, and feedback effects.

* Document is available to the public through the National Technical Information Service.

DOT-TSC-OST-71-11 Transportation Systems Center PERSONALIZED RAPID TRANSIT SYSTEMS: A FIRST ANALYSIS *

George Kovatch and George Zames, Service Technology Corporation, Cambridge, OP01, Final Report: October 1970 - August 1971.

Transportation Systems Analysis, PRT Systems, and Urban Transportation.

In this report a preliminary systems analysis of the Personalized Rapid Transit System concept is given. It includes presentation of the significant advantages and disadvantages of the concept. Questions of system capacity, station capacity, urban grid design, and headway requirements are addressed. A review of current manufacturers' concepts is given with a functional classification of their major characteristics. Major component and system needs, which require further research and analysis, are described. A brief discussion of cost factors is also given.

DESIGN AND CONSTRUCTION OF A PORTABLE OCULOMETER FOR USE IN TRANSPORTATION ORIENTED HUMAN FACTOR STUDIES

P. W. Davis, J. S. Lutz, A. Warner, and A. Iannini, OS11, Technical Report, July 1971.

NON-ENCUMBERING VISUAL PERFORMANCE MEASUREMENTS

Transportation Systems Center, P. W. Davis, J. S. Lutz, OS11, Conference Paper, January 1971.

MARKET AREA DEFINITION

Transportation Systems Center, R. Casey, OP01, Technical Memorandum, March 1971.

SYSTEM PERFORMANCE CHARACTERIZATION

Transportation Systems Center, R. Casey, OP01, Technical Memorandum, March 1971.

GLOSSARY OF INTERMODAL TRANSPORTATION TERMS

Transportation Systems Center, G. Kovatch, OP01, Technical Memorandum, March 1971.

TRANSPORTATION CONCEPT DESCRIPTION

Transportation Systems Center, G. Kovatch and R. Casey, OP01, Technical Memorandum, April 1971.

DEMAND RESPONSIVE SYSTEMS

Transportation Systems Center, C. Toye, OP01, Technical Memorandum, April 1971.

8. EARTH SCIENCES AND OCEANOGRAPHY

6. BIOLOGICAL AND MEDICAL SCIENCES

Includes the following Groups: Biochemistry; Bioengineering; Biology; Bionics; Clinical Medicine; Environmental Biology; Escape, Rescue, and Survival; Food, Hygiene and Sanitation; Industrial (Occupational) Medicine; Life Support; Medical and Hospital Equipment; Microbiology; Personnel Selection and Maintenance (Medical); Pharmacology; Physiology; Protective Equipment; Radiobiology; Stress Physiology; Toxicology; Weapon Effects.

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, WASHINGTON, D.C. 20591

SOME CONSIDERATIONS RELATED TO THE DEVELOPMENT OF AN ALCOHOL SAFETY INTERLOCK SYSTEM (ASIS)

Transportation Systems Center, HS02, Technical Report, October 1970.

FEASIBILITY STUDY OF ROADSIDE ANALYZER FOR ALCOHOL AND DRUGS

Transportation Systems Center, M. Salomon and A. E. Barrington, HS02, Technical Report, August 1970.

OFFICE OF THE SECRETARY OF TRANSPORTATION WASHINGTON, D.C. 20590

DOT-TSC-OST-71-5 Transportation Systems Center AIRCRAFT EMISSIONS SURVEY *

A. J. Broderick, W. F. Harriott, and R. A. Walter, OS10, Technical Memorandum, July 1, 1970 - March 31, 1971. Air Pollution, Gas Turbines, Emissions, Jet Engines, and Instrumentation.

For primary bibliographic entry, see Field 1.

DESIGN AND CONSTRUCTION OF A PORTABLE OCULOMETER FOR USE IN TRANSPORTATION ORIENTED HUMAN FACTORS STUDIES

Transportation Systems Center, P. W. Davis, J. S. Lutz, A. Warner, and A. Iannini, OS11, Technical Report, July 1971.

NON-ENCUMBERING VISUAL PERFORMANCE MEASUREMENTS

Transportation Systems Center, P. W. Davis and J. S. Lutz, OS11, Conference Paper, January 1972.

PASSENGER CAR NOISE LEVELS

Transportation Systems Center, G. Larson, OS14, Technical Report.

* Document is available to the public through the National Technical Information Service.

LOW-POLLUTION PROPULSION TECHNOLOGY BUILD-UP PLAN

Transportation Systems Center, OS14, Technical Report.

POLLUTION FREE VEHICLES

Transportation Systems Center, D. Sheldon, OP01, Technical Report, April 1971.

URBAN MASS TRANSPORTATION ADMINISTRATION, WASHINGTON, D.C. 20590

TACV NOISE POLLUTION

Transportation Systems Center, G. Economou, UM01, Preliminary Report, December 1970.

7. CHEMISTRY

Includes the following Groups: Chemical Engineering, Inorganic Chemistry; Organic Chemistry; Physical Chemistry, Radio and Radiation Chemistry

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C. 20590

DOT-TSC-NASA-71-6 Transportation Systems Center ATMOSPHERIC TRANSMISSION HANDBOOK: A SURVEY OF ELECTROMAGNETIC WAVE TRANSMISSION IN THE EARTH'S ATMOSPHERE OVER THE FREQUENCY (WAVELENGTH) RANGE 3 kHz (100 km) - 3,000 THz (0.1 μ m) *

W. I. Thompson, III, Technical Report, February 1971, 300 pp.

Earth-to-Space Paths, Transmission Fundamentals, Transmission Properties, Transmission Information, Propagation, Infrared, Visible, Radio, Microwave, and Ultraviolet.

For primary bibliographic entry, see Field 17.

DOT-TSC-NASA-71-9 Transportation Systems Center METALLIZATION FAILURES *

Rosemary Beatty, R1130, Technical Report, May 1971, 116 pp.

Metallization Failures, Integrated Circuit Failures, Metallization Material, Multilevel Metallization, Integrated Circuit Design, and Beam Lead Technology.

For primary bibliographic entry, see Field 9.

8. EARTH SCIENCES AND OCEANOGRAPHY

Includes the following Groups: Biological Oceanography; Cartography; Dynamic Oceanography; Geochemistry; Geodesy; Geography; Geology and Mineralogy; Hydrology and Limnology; Mining Engineering; Physical Oceanography; Seismology; Snow, Ice, and Permafrost; Soil Mechanics; Terrestrial Magnetism.

**9. ELECTRONICS AND ELECTRICAL
ENGINEERING**

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SPACE ADMINISTRATION,
WASHINGTON, D.C. 20590**

**DOT-TSC-NASA-70-1 Transportation Systems Center
EARTH SURVEY BIBLIOGRAPHY: A KWIC INDEX OF
REMOTE SENSING INFORMATION ***

W. I. Thompson, III, Technical Report, February 1971, 265 pp.
Earth Resources, Infrared, Radar, Visible, and Microwaves.

This bibliography represents a collection of 1650 bibliographic citations on remote sensing of the physical characteristics of the Earth. This bibliography is intended to be used as a source document leading to additional information.

**DOT-TSC-NASA-71-6 Transportation Systems Center
ATMOSPHERIC TRANSMISSION HANDBOOK: A SURVEY OF
ELECTROMAGNETIC WAVE TRANSMISSION IN
THE EARTH'S ATMOSPHERE OVER THE FREQUENCY
(WAVELENGTH) RANGE 3 kHz (100 km) - 3,000 THz
(0.1 μ m) ***

W. I. Thompson, III, Technical Report, February 1971, 300 pp.
Earth-to-Space Paths, Transmission Fundamentals, Transmission Properties, Transmission Information, Propagation, Infrared, Visible, Radio, Microwave, and Ultraviolet.

For primary bibliographic entry, see Field 17.

**DOC. NO. 1693A Transportation Systems Center
HANDBOOKS, MICROWAVE RADIOMETERS,
BUZZARDS BAY MEASUREMENT INSTRUMENT FOR
OCEANOGRAPHIC RESEARCH**

P. Gatti, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report.

**DOC. NO. 1724 Transportation Systems Center
DESIGN AND TEST PLAN, BUZZARDS BAY MEASUREMENT
INSTRUMENT FOR OCEANOGRAPHIC RESEARCH**

H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report.

**DOC. NO. 1732 Transportation Systems Center
SYSTEM CALIBRATION PROCEDURES AND RESULTS,
BUZZARDS BAY MEASUREMENT INSTRUMENT FOR
OCEANOGRAPHIC RESEARCH**

J. A. Campbell, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report.

**DOC. NO. 1735 Transportation Systems Center
OPERATORS INSTRUCTION MANUAL, BUZZARDS BAY
MEASUREMENT INSTRUMENT FOR OCEANOGRAPHIC
RESEARCH**

H. P. Taylor, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report.

**DOC. NO. 1737 Transportation Systems Center
FINAL REPORT, CONTRACT DOT-TSC-14**

H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report.

* Document is available to the public through the National Technical Information Service.

**DOC. NO. 1740 Transportation Systems Center
PRELIMINARY RESULTS, APRIL 5 - JUNE 15, 1971
BUZZARDS BAY MEASUREMENT INSTRUMENT FOR
OCEANOGRAPHIC RESEARCH**

H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report, June 1971.

**STC-DOT-TSC-43-71-782 Transportation Systems Center
DISTORTIONS IN DISTANCE FROM ORIGIN IN PLANAR
MAPPING OF EARTH SURFACE**

Service Technology Corp., Cambridge, NA11, Technical Report, May 1971.

**STC-DOT-TSC-43-71-787 Transportation Systems Center
COMPARISON OF ERRORS AND COMPUTATION LOAD-
ING FOR VOR/DME AND DME/DME NAVIGATION
MODES IN PLANAR AND SPHERICAL EARTH**

Service Technology Corp., Cambridge, NA11, Technical Report, May 1971.

**STS-DOT-TSC-43-71-794 Transportation Systems Center
ERRORS DUE TO USE OF ALTITUDE MEASUREMENT
IN PLANAR REPRESENTATION OF EARTH SURFACE**

Service Technology Corp., Cambridge, NA11, Technical Report, May 1971.

**9. ELECTRONICS AND ELECTRICAL
ENGINEERING**

Includes the following Groups; Components; Computers; Electronic and Electrical Engineering; Information Theory; Subsystems; and Telemetry.

**UNITED STATES COAST GUARD
WASHINGTON, D. C. 20591**

**STC-DOT-43-71-808 Transportation Systems Center
USER'S MANUAL FOR MODIFIED HARBOR MODEL**
Service Technology Corp., Cambridge, CG01, Technical Report

**A TECHNIQUE FOR MEASURING THE BEHAVIOR OF A
NAVIGATIONAL BUOY**

Transportation Systems Center, L. V. Babb, R. W. Wilmarth, Cdr. G. J. Budridge (USCG), CG03 No. 3, International Telemetry Conference Paper, September 1971.

**FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D. C. 20590**

**DOT-TSC-FAA-71-1 Transportation Systems Center
EN ROUTE AIR TRAFFIC FLOW SIMULATION ***
M. F. Medeiros, Jr., Technical Report, January 1971.

This report covers the conception, design, development, and initial implementation of an advanced simulation tech-

9. ELECTRONICS AND ELECTRICAL ENGINEERING

nique applied to a study of national air traffic flow and its control by En Route Air Route Traffic Control Centers (ARTCC). The program was constructed at TSC under PPA FA17 (FY 70), and had also been submitted as a term project by the author. It is intended to be the first step in gaining an insight into the nature of the national flow control problem and into the utility and limitations of digital simulation for that end. A flexible digital computer implemented simulation has been developed which provides a family of model configurations and simulated environments for the U.S. air traffic system, restricted to positive controlled high altitude airspace. Exploitation, validation, and verification of this simulation model are just beginning. This report describes the purpose, design, development, and initial implementation of the simulation and presents future plans. Detailed information on the design and program structure is presented in the Appendices.

DOT-TSC-FAA-71-2 Transportation Systems Center HUMAN FACTORS IN COCKPIT INPUT AND DISPLAY FOR DATA LINK *

Edwin H. Hilborn, FA16, Technical Memo, July 1970 - January 1971, 18 pp.

Data Link, Air-Ground-Air Messages, ARINC Proposal, Vocabulary Messages, and Display Problems.

For primary bibliographic entry, see Field 1.

DOT-TSC-FAA-71-3 Transportation System Center CONCEPTUAL NETWORK MODEL OF THE AIR TRANSPORTATION SYSTEM. THE BASIC, LEVEL 1 MODEL *

A. N. de Hollan and A. S. Priver, FA06, Technical Report, April 1971, 44 pp.

Conceptual Transportation Systems Model, Flight Simulation, Input Package, and Output Package.

A basic conceptual model of the entire Air Transportation System is being developed to serve as an analytical tool for studying the interactions among the System elements. The model is being designed to function in an interactive computer graphics environment which permits rapid alteration of rules and parameters, as well as continuous real-time graphical monitoring of system operations. The model described here is the first member in an evolving hierarchy of increasingly complex models, progressing in the direction of closer approximation to the real-world Air Transportation System.

DOT-TSC-FAA-71-14 Transportation Systems Center REAL-TIME SIMULATION PROGRAM FOR DE HAVILLAND (CANADA) "BUFFALO" AND "TWIN OTTER" STOL TRANSPORTS *

R. A. MacDonald, Mel Garelick, and J. Haas, FA18, Technical Note, June 1971.

Aircraft Math Models, STOL Aircraft Stability and Control, and Aircraft Simulation.

For primary bibliographic entry, see Field 1.

DOT-TSC-FAA-71-15 Transportation Systems Center LARGE SCALE SYSTEMS - A STUDY OF COMPUTER ORGANIZATIONS FOR AIR TRAFFIC CONTROL APPLICATIONS *

* Document is available to the public through the National Technical Information Service.

J. Dumanian and D. Clapp, FA03, Technical Report, June 1971, 152 pp.

Computers, NAS Stage A Data Processing, and ARTS III Data Processing.

Based on current sizing estimates and tracking algorithms, some computer organizations applicable to future air traffic control computing systems are described and assessed. Hardware and software problem areas are defined and solutions are outlined. System evaluation criteria are presented.

Section 1: delineates the objectives and approach, and furnishes definitions of computer hardware and software;

Section 2: presents the ATC data processing requirements: the anticipated traffic, the computer processing rates, and the methods for analyzing computer performance;

Section 3: describes current computing systems with capabilities for usage in near future ATC applications;

Section 4: denotes the algorithms which are to be used in the projected ATC programs;

Section 5: sums up the future prospects in ATC data processing, assesses the risks and points out some future work efforts.

DOT-TSC-FAA-71-16 Transportation Systems Center SYSTEM RELIABILITY AND RECOVERY *

C. A. Dancy, III, FA03, Technical Report, June 15, 1971, 61 pp.

Reliability, recovery, reconfiguration, multiprocessor, and failsafe/soft.

This study exhibits a variety of reliability techniques applicable to future ATC data processing systems. Presently envisioned schemes for error detection, error interrupt and error analysis are considered, along with methods of retry, reconfiguration, task rescheduling and system restart. Reliability data are accumulated on present and planned ATC data processing systems and on certain commercial, military, and experimental computers having features applicable to future ATC tasks. Included as well are discussions of reliability concepts, methods of reliability determination and criteria for judging system reliability and capability for recovery. This work is connected with FA03-1, Large Scale Systems.

DOT-TSC-FAA-71-23 Transportation Systems Center COMPUTER SYSTEMS PERFORMANCE MEASUREMENT TECHNIQUES *

J. Gertler, H. Glynn, V. Hobbs, and F. Woolfall, FA03, Technical Report, June 1971, 71 pp.

Computer Measurements, ARTS III Data Processing, Executive Systems, and Simulation.

Computer system performance measurement techniques, tools, and approaches are presented as a foundation for future recommendations regarding the instrumentation of the ARTS ATC data processing subsystem for purposes of measurement and evaluation.

Section 1: Introduces the subject of computer system performance measurement and states objectives.

9. ELECTRONICS AND ELECTRICAL ENGINEERING

Section 2: Defines several computer system measurement approaches, describes the event-monitoring and statistical sampling software techniques, and discusses the various phases of a measurement process.

Appendix A: Defines the role of an Executive System in diverse computing environments and its effect on the design of a measurement package, discusses fundamental operational concepts of Executive Systems, and reviews ARTS III in terms of those concepts.

Appendix B: Surveys the state-of-the-art of available simulation languages and packages, summarizes their salient characteristics and provides guidelines for evaluation and selection of a simulation capability.

RPT-566 Transportation Systems Center COMPARISON OF THE COMPUTERS AVAILABLE FOR SIMULATION

Service Technology Corporation, Cambridge, FA12, Technical Report, September 1970.

RPT-590 Transportation Systems Center CTOL SUBROUTINE TO SIMULATE ACTUAL ILS BEAM NOISE

Service Technology Corporation, Cambridge, FA07, Technical Report, December 1970.

The subroutine BNOS in the CTOL simulation program has been revised. It is now capable of reading and storing actual airport beam noise — up to 1600 data points. The original subroutine BNOS uses random number generation techniques to produce a noise signal. The revised subroutine BNOS supplies actual beam noise signals during a CTOL simulation run. The actual beam noise data is obtained from Lear-Siegler and is from three sources — Miami glidescope, Burbank localizer, and Washington localizer.

RPT-594 Transportation Systems Center IALS TIME REDUCTION STUDY

Service Technology Corporation, Cambridge, FA12, Technical Report, December 1970

RPT-597 Transportation Systems Center ADDENDUM TO CTOL SUBROUTINE TO SIMULATE ACTUAL ILS BEAM NOISE

Service Technology Corporation, Cambridge, FA07, Technical Report, January 1971

The revised subroutine BNOS, a subroutine which provides actual beam noise during a CTOL simulation run, has been further changed. It can now accept other noise data, particularly overflight beam noise.

RPT-608 Transportation Systems Center PERFORMANCE EVALUATION OF THE LATERAL AXIS OF A CONVENTIONAL AND AN INERTIALLY AUGMENTED AUTOMATIC LANDING SYSTEM

Service Technology Corporation, Cambridge, FA07, Technical Report, January 1971

RPT-626 Transportations Systems Center REVISED ERROR MODEL FOR THE INERTIAL NAVIGATION SYSTEM

Service Technology Corporation, Cambridge, FA07, Technical Report, March 1971

For primary bibliographic entry, see Field 17.

RPT-629 Transportation Systems Center ILS BEAM NOISE OPTIONS FOR CTOL SUBROUTINE BNOS

Service Technology Corporation, Cambridge, FA07, Technical Report, March 1971

The subroutine BNOS in the CTOL simulation program has been enlarged. Actual ILS beam noise or random ILS beam noise can be called for during a CTOL simulation run. Subroutine BNOS has several ILS beam noise options to choose from which can be used connection with random beam noise. These options provide for gain variation, beam bend, and sine wave.

RPT-685 Transportation Systems Center IALS LATERAL CONTROL SYSTEM OPTIONS

Service Technology Corporation, Cambridge, FA07, Technical Report, March 1971

The lateral control system subroutine LCSYS of the IALS digital simulation has been modified to contain the inertial system options, ideal and augmented, in addition to the autoland system. This report contains the revised subroutine.

RPT-697 Transportation Systems Center REVISED SUBROUTINE CSYS

Service Technology Corporation, Cambridge, FA07, Technical Report, March 1971

Subroutine CSYS has been revised to include the new INS Error Model described in STC RPT-685. Facility has also been included for providing sampled inputs to the ILS receivers. The method for calculating acceleration measurements from the INS has also been revised.

RPT-701 Transportation Systems Center IALS LONGITUDINAL CONTROL SYSTEM OPTIONS

Service Technology Corporation, Cambridge, FA07, Technical Report, March 1971

This report documents a new longitudinal control system subroutine, ZCSYS (0), which contains the inertial (ideal and augmented) and the autoland system options for use in the IALS Digital Simulation Program.

STC-DOT-TSC-43-71-745 Transportation Systems Center

SYNCHRONIZATION CONTROL IALS DIGITAL PROGRAM SOLUTION TIME — STRIP CHART RECORDER PAPER SPEED

Service Technology Corporation, Cambridge, FA12, Technical Report, April 1971

STC-DOT-TSC-43-71-755 Transportation Systems Center SECOND ORDER COMPLEMENTARY FILTER FOR PREMIXING ILS AND ILS INFORMATION

* Document is available to the public through the National Technical Information Service.

9. ELECTRONICS AND ELECTRICAL ENGINEERING

Instrument landing system, automatic landing system, complementary filter, inertial navigation system.

For primary bibliographic entry, see Field 1.

STC-DOT-TSC-43-71-823 Transportation Systems Center

FEASIBILITY STUDY OF CATEGORY II LANDINGS USING A CATEGORY I LOCALIZER BEAM

Service Technology Corporation, Cambridge, FA07, Technical Report, June 1971

Category II landings, localizer beam specifications, and inertially aided ILS (Instrument Landing System)

For primary bibliographic entry, see Field 17.

STC-DOT-TSC-43-73-838 Transportation Systems Center

DESIGN REQUIREMENTS OF A DIGITAL CONTROLLER FOR THE IALS PROGRAM

Service Technology Corporation, Cambridge, FA07, Technical Report, June 1971

Digital controller, control system, computer core size, computer iteration rate.

Iteration interval and core size requirements of the lateral and longitudinal control loops necessary to specify the design of a digital controller for the Inertially-Aided Landing System (IALS) Program using the inertially-augmented option are given in this report.

M71-84 Transportation Systems Center

THE USE OF MONOPULSE TECHNIQUES IN THE RADAR BEACON SYSTEM

MITRE Corporation, Bedford, Mass., FA19, Technical Report, April 1971

AN INVESTIGATION OF MICROWAVE LANDING GUIDANCE SYSTEM SIGNAL REQUIREMENTS FOR CONVENTIONALLY EQUIPPED CIVILIAN AIRCRAFT

Transportation Systems Center, FA08, Technical Report, September 1971

SIMULATION MODEL FOR THE CORVAIR CV-880 AND BOEING 720B AIRCRAFT-AUTOPILOT SYSTEMS IN THE APPROACH CONFIGURATION

Transportation Systems Center, FA12, Preliminary Memorandum

SIMULATION MODEL FOR THE PIPER PA30 LIGHT MANEUVERABLE AIRCRAFT IN THE FINAL APPROACH

Transportation Systems Center, FA12, Preliminary Memorandum

SIMULATION MODEL FOR THE DC-10 AIRCRAFT DURING APPROACH

Transportation Systems Center, FA12, Preliminary Memorandum

A SIMULATION MODEL OF THE BOEING 720B AIRCRAFT-FLIGHT CONTROL SYSTEM IN CONTINUOUS FLIGHT

Transportation Systems Center, FA12, Preliminary Memorandum

* Document is available to the public through the National Technical Information Service.

SUMMARY REPORT OF STUDIES OF HUMAN FACTORS IN COCKPIT I/O DEVICES

Transportation Systems Center, FA16, Technical Report, July 1971

FEDERAL HIGHWAY ADMINISTRATION WASHINGTON, D. C. 20590

DOT/FHWA 10 NODE PAS II DEMONSTRATION SYSTEM
Transportation Systems Center, HW01, Technical Report

AN INTRODUCTION TO PAS II I/O

Transportation Systems Center, G. Paul and P. Porier, HW01, Technical Report, September 1970

INTERIM REPORT ON PAS I/O

Transportation Systems Center, G. Paul and P. Porier, HW01, Technical Report, September 1970

REQUIREMENTS SURVEY OF HIGHWAY ROUTING SYSTEMS

Transportation Systems Center, HW02, Technical Report, November 1970

ENVIRONMENTAL RECOMMENDATIONS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

QUALITY ASSURANCE REQUIREMENTS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

RELIABILITY REQUIREMENTS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

REQUIREMENTS FOR MAINTAINABILITY OF HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

AUTOMATIC SCANNING OF AERIAL PHOTOGRAPHS OF HIGHWAY TRAFFIC - A STATE-OF-THE-ART REPORT

Transportation Systems Center, J. G. Raudseps, HW05, Technical Report, November 1970

AUTOMATIC DETECTION OF VEHICLES IN AERIAL PHOTOGRAPHS OF HIGHWAYS

Transportation Systems Center, J. G. Raudseps, HW05, Conference Paper, May 1971

FEDERAL RAILROAD ADMINISTRATION WASHINGTON, D. C. 20590

9. ELECTRONICS AND ELECTRICAL ENGINEERING

DOT-TSC-FRA-71-1 Transportation Systems Center POWER CONDITIONING FOR HIGH-SPEED TRACKED VEHICLES *

F. L. Raposa, RR05, Interim Technical Report, February 1971, 65 pp, Linear Induction Motor, Speed Control, Power Conditioner, On-Board Electric Power Sources, Wayside Electric Power Sources

For primary bibliographic entry, see Field 21.

DOT-TSC-FRA-71-1A Transportation Systems Center POWER CONDITIONING FOR HIGH-SPEED TRACKED VEHICLES *

F. L. Raposa, RR05, Interim Technical Report, February 1971, 65 pp,
Linear Induction Motor, Speed Control, Power Conditioner,
On-Board Electric Power Sources, Wayside Electric Power
Sources

For primary bibliographic entry, see Field 21.

DOT-TSC-FRA-71-2 Transportation Systems Center METROLINER AUXILIARY POWER ELECTRICAL SYSTEM RELIABILITY STUDY *

J. D. Abbas and C. W. Watt, Jr., Interim Report, June 1971,
135 pp

For primary bibliographic entry, see Field 21.

DOT-TSC-FRA-71-3 Transportation Systems Center TECHNOLOGICAL INNOVATION IN GRADE CROSSING PROTECTIVE SYSTEMS *

J. B. Hopkins and M. E. Hazel, RR02, Technical Report,
June 1971

Grade crossing protection, train detection, microwave tele-
metry, railroad signals

For primary bibliographic entry, see Field 13.

DOT-TSC-FRA-71-4 Transportation Systems Center MULTI-MODAL TRANSPORTATION SYSTEM SIMULA- TION *

R. C. Ricci and J. R. Roy, Technical Report, July 1971, 24
pp.

A laboratory with real-time simulation capability is being developed for simulating the command and control functions related to transportation systems. The initial effort in Advanced Air Traffic Control Techniques is defining and evaluating the most effective role of controllers in future ATC systems. The present laboratory status, the simulation models and structure, and programming techniques that are being used are discussed.

AUTOMATIC TRAIN CONTROL AND OPERA- TION - STATE-OF-THE-ART TECHNOLOGY

Transportation Systems Center, RR01, Interim Technical
Report

PROPOSED STUDIES ON THE METROLINER ELECTRI- CAL SYSTEMS RELIABILITY

Transportation Systems Center, C. W. Watt, RR06, Memorandum, August 1971.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C. 20590

DOT-TSC-NASA-71-8 Transportation Systems Center MULTI-SENSOR NAVIGATION SYSTEM DESIGN *

D. R. Downing, Technical Report, March 1971, 138 pp,
Multi-Sensor Navigation, Systems, Design Procedure, Design
Option, and System Evaluation.

This report treats the design of navigation systems that collect data from two or more on-board measurement subsystems and process this data in an on-board computer. Such systems are called Multi-Sensor Navigation Systems.

The design begins with the definition of the design requirements and a list of n sensors and c computers. A Design Procedure is then developed which automatically performs a systematic evaluation of the $(2^n - 1) \times c$ candidate systems that may be formed. This procedure makes use of a model of the navigation system that includes sensor measurement errors and geometry, sensor sampling limits, data processing constraints, relative computer loading, and environmental disturbances. The performance of the system is determined by its terminal navigation uncertainty and dollar cost. The Design Procedure consists of three design options, three levels of evaluation, and a set of auxiliary data. By choosing from among the design options and the auxiliary data, the designer can tailor the Design Procedure to his particular application.

A design option is developed to answer each of the three following questions (1) Which candidate system meets the system accuracy specification and has the lowest system cost? (2) For each sensor or computer chain, which is defined as the set of all systems containing that component, what is the system that satisfies the accuracy requirements and has the lowest cost? (3) Which systems satisfy the design accuracy requirements?

The system evaluation is accomplished using one optimal and two non-optimal techniques. The optimal performance evaluation uses the measurement schedule that minimizes the terminal uncertainty. A first-order optimization procedure is developed to determine this schedule. This uses optimal sampling logic derived by applying the Maximum Principle. One non-optimal capability analysis uses the idea that the addition of a sensor or the increase of the computer processing capability can not degrade the system's performance. The second non-optimal technique obtains approximate values of the system's accuracy by assuming measurement schedules that do not satisfy the processing constraint.

The Procedure is applicable to a large class of air or space missions for which a nominal trajectory can be defined. To illustrate how the Procedure would be used, the design of an aircraft navigation system for operation in the NE corridor is presented. This problem considers the configuration of a system starting with four candidate sensors and three candidate computers. The outputs from all three design options are presented and discussed.

* Document is available to the public through the National Technical Information Service.

9. ELECTRONICS AND ELECTRICAL ENGINEERING

DOT-TSC-NASA-71-9 Transportation Systems Center METALLIZATION FAILURES *

R. Beatty, Technical Report, May 1971, 116 pp.
Metallization Failures, Integrated Circuit Failures, Metallization Material, Multilevel Metallization, Integrated Circuit Design, and Beam Lead Technology.

Metallization-related failure mechanisms are a major cause of integrated circuit failures under accelerated stress and field operations. Industry's approach has been, (1) a better understanding of the aluminum system, now the most widely used material, and (2) evaluation of alternative metal systems. The newer and more complex multilevel metallization systems require low temperature deposition techniques and critical etching-through methods due to smaller geometry and closer spacing. Aluminum metallization offers many advantages, but also has limitations. Alternative materials are being considered for large scale integrated arrays. This survey defines the merits and restrictions of metallization systems in current usage and those under development. Although no specific recommendations are made references can be drawn from the data presented. The advanced state of beam lead technology is apparent.

DOT-TSC-NASA-71-10 Transportation Systems Center EVALUATION OF NONDESTRUCTIVE TENSILE TESTING *

J. J. Bowe and S. M. Polcari, NA08, Technical Report, May 1971

Semiconductor Devices, Nondestructive Testing, and Chip and Wire Bonding.

This report presents the results of a series of experiments performed in the evaluation of nondestructive tensile testing of chip and wire bonds. Semiconductor devices were subjected to time-temperature excursions, static-load life testing and multiple pre-stressing loads to determine the feasibility of a nondestructive tensile testing approach. The report emphasizes the importance of the breaking angle in determining the ultimate tensile strength of a wire bond, a factor not generally recognized nor implemented in such determinations.

DOT-TSC-50 Transportation Systems Center NORTH ATLANTIC SATELLITE ATC CENTER STUDY

I.B.M. Corp., NA02, Technical Report
North Atlantic, ocean control center, satellite system, air traffic control.

For primary bibliographic entry, see Field 17.

TSC-71-6004 Transportation Systems Center A SATELLITE OCEANIC ATC CENTER

C. E. Bading, I.B.M. Corp., NA02, Technical Report, April 1971

DEVELOPMENT OF HIGH POWER TRANSFERRED ELECTRON DEVICES FOR X- AND KU-B AND OSCILLATORS

Transportation Systems Center, S. Y. Narayan and A. R. Gobate, RCA Electronic Components, Princeton, N.J., NA04, Technical Report, October 1970

AVALANCE DIODE OSCILLATOR CIRCUIT WITH TUNING AT MULTIPLE FREQUENCIES

Transportation Systems Center, D. Parker, et al, of Stanford Research Institute, Menlo Park, Calif., NA04, Technical Report, February 1971

TRAPATT OSCILLATIONS IN A P-I-N AVALANCHE DIODE

TRAPATT OSCILLATIONS IN A P-I-N AVALANCHE DIODE

Transportation Systems Center, D. Parker of Stanford Research Institute, Menlo Park, Calif., NA04, IEEE Transactions article, Vol. ED-18, No. 5, May 1971

TRAPATT OSCILLATIONS WITH A HALF-WAVE RECTIFIED SINE WAVE CURRENT

Transportation Systems Center, D. Parker of Stanford Research Institute, Menlo Park, Calif., NA04, Letter in IEEE Proceedings, May 1971

AVIS STATEMENT OF WORK

Transportation Systems Center, NA09, Working Paper

MIDAS USERS MANUAL

Transportation Systems Center, Service Technology Corp., Cambridge, NA09, Technical Report, June 1971

MIDAS SAMPLE DATA

Transportation Systems Center, Service Technology Corp., Cambridge, NA09, Technical Report, June 1971

MIDAS PROGRAM DESCRIPTION

Transportation Systems Center, Service Technology Corp., Cambridge, NA09, Technical Report, June 1971

STC-DOT-TSC-43-71-599 Transportation Systems Center

MICROELECTRONIC DATA BANK

Service Technology Corp., Cambridge, NA09, Technical Report, January 1971

STC-DOT-TSC-43-71-601 Transportation Systems Center

MICROELECTRONIC DATA BANK PROPOSED DATA FIELDS

Service Technology Corp., Cambridge, NA09, Technical Report, January 1971

STC-DOT-TSC-43-71-625 Transportation Systems Center

MICROELECTRONIC DATA BANK TECHNICAL DISCUSSION

Service Technology Corp., Cambridge, NA09, Technical Report, February 1971

* Document is available to the public through the National Technical Information Service.

9. ELECTRONICS AND ELECTRICAL ENGINEERING

STC-DOT-TSC-43-71-787 Transportation Systems Center

COMPARISON OF ERRORS AND COMPUTATION LOADING FOR VOR/DME AND DME/DME NAVIGATION MODES IN PLANAR AND SPHERICAL EARTH REPRESENTATIONS

Service Technology Corp., Cambridge, MA11, Technical Report, May, 1971

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, WASHINGTON, D. C. 20591

DOT-TSC-NHTSA-71-1 Transportation Systems Center
OCCUPANT MOTION SENSORS *

J. L. Horner, PH.D., HS05, Technical Report, July 1970 - January 1971, 54 pp.

Fourier Spectrum, Bandwidth, Acceleration, Rotational Motion, Sensors, and Transducers.

For primary bibliographic entry, see Field 13.

DOT-TSC-NHTSA-71-4 Transportation Systems Center
OCCUPANT MOTION SENSORS: METHODS OF DETECTION AND ANALYSIS *

J. L. Horner, D. S. Ofsevit, G. R. Plank, and G. G. Lawrence, HS05, Technical Report, July 1971, 55 pp.

Bandwidth, Rotational Motion, Fourier Analysis, Sensor, Transducer, Acceleration, Angular Motion, and Digital Filtering.

For primary bibliographic entry, see Field 13.

OFFICE OF THE SECRETARY OF TRANSPORTATION, WASHINGTON, D. C. 20590

DOT-TSC-OST-71-1 Transportation Systems Center
GUIDE TO THE USE OF THE DYNAMIC DISPLAY SOFTWARE SYSTEM *

Wolf Research and Development Corp., OS03, Technical Report, January 1971

The Dynamic Display Software System (DISS) was designed and implemented to provide most scientifically oriented personnel with the ability, via a highly interactive and interpretive language, to create desired displays and specify dynamic parameters in order to simulate a particular environment. The command language and data structure necessary to accomplish this goal are embodied in DISS. This manual is intended to provide the user with an easy reference to the commands and use of DISS, and to act as a guide when designing and entering a display into the display system via DISS. This document is arranged with a summary of commands, their format, and their uses, as well as an alphabetical and functional quick reference list in the appendix. The user need not be a highly sophisticated programmer to create desired displays successfully. However, the aid of a more advanced programmer may be required to explain the interface of the display system to dynamic processes, e.g., a simulation. Once learned, however, the

* Document is available to the public through the National Technical Information Service.

procedure is straightforward and could be utilized by any technically oriented person.

DOT-TSC-OST-71-2 Transportation Systems Center
PROGRAMMER'S REFERENCE MANUAL FOR DYNAMIC DISPLAY SOFTWARE SYSTEM *

OS03, Technical Report, January 1971

In 1968, the display systems group of the Systems Laboratory of the NASA/Electronics Research Center undertook a research task in the area of computer controlled flight information systems for aerospace application. The display laboratory of the Transportation Systems Division of the Transportation Systems Center for the Department of Transportation is the direct descendant of the above display laboratory. The vehicle for conducting this research consists of a Honeywell DDP-516 computer interfaced with a Sanders Associates ADDS/900 graphical display generator that controls various CRT devices. Input devices for indicating user response, including light pen, tablet, track ball and others can be interfaced with the computer and monitored by a simulation program.

With the Dynamic Display Software System, the user can interactively create the geometric characteristics of the desired display and specify dynamic linkages with a program to simulate the display environment. After the desired set of indicators is specified, the system serves as a simple real-time simulator to evaluate the usefulness of the displays. In addition, the system may run on-line with PDP-10, which allows display of conditions in a more complicated simulation environment. The user has the capability of making changes to previously created indicators to provide an evolutionary means of developing environment indicator systems. The system is described in this manual.

DOT-TSC-OST-71-3 Transportation Systems Center
TRIP-THE TRANSPORTATION ROUTING AND INTERMODAL PLANNING SYSTEM: AN AID FOR TODAY'S TRAVELER *

George Kovatch and Jack Taub, Service Technology Corp., Cambridge, OS12, Technical Report, January 1971, 35 pp.
TRIP, Computer Display Technology, and Comparative Cost and Time Data.

The Transportation Routing and Intermodal Planning (TRIP) System was conceived as an aid to today's traveler. It assumes a traveler wishes to choose from all available modes of transportation generally air, automobile, rail, and bus. It is based on the utilization of current computer display technology. The TRIP System accepts information from the traveler in real time while the traveler sits at an input terminal. The information described the individual travel needs and desires. The computer produces actual travel plans with comparative cost and time data for each mode. Results of a demonstration on existing TSC computer equipment are reported. (In this report, the concept is described and possibilities for future development and potential application are given.)

DOT-TSC-OST-71-6 Transportation Systems Center
TRAFFIC CIRCLE MODEL *

I. Englander, OS12, Preliminary Memorandum, May 1971, 14 pp.

9. ELECTRONICS AND ELECTRICAL ENGINEERING

Dynamic Model, Traffic Circle, and CRT Display Terminal.

This report describes a dynamic model of a traffic circle which has been implemented on a CRT display terminal.

The model includes sufficient parameters to allow changes in the structure of the traffic circle, the frequency of traffic introduced to the circle by each entering road, the model of entering the circle (right of way), the frequency of traffic leaving the circle by each road, and vehicular spacing toward the circle.

DOT-TSC-OST-71-11 Transportation Systems Center PERSONALIZED RAPID TRANSIT SYSTEMS: A FIRST ANALYSIS *

George Kovatch and George Zames, Service Technology Corp., OP01, Final Report: October 1970 - August 71
Transportation Systems Analysis, PRT Systems, and Urban Transportation.

For primary bibliographic entry, see Field 5.

DOT-TSC-OST-71-12 Transportation Systems Center AN AIRPORT AIRSIDE SYSTEM MODEL *

I. Englander, OS04, Technical Report, June 1971

This model of an airport airside system simulates aircraft operations and controller functions in the terminal area, both in the air and on the ground. The model encompasses all operations between the terminal gate and the point of handoff between the enroute controller and the terminal controller.

SIMULATION SOFTWARE AND CONTROL SCHEDULER

Transportation Systems Center, Bolt, Beranek and Newman, Inc., Cambridge, OS03, Technical Report, July 1971

MULTI-MODE SIMULATION

Transportation Systems Center, OS03, Summer Simulation Conference Paper

ANALYTICAL REQUIREMENTS FOR ANALYSIS AND SIMULATION FOR ATC SYSTEMS

Transportation Systems Center, OS03, Technical Report, July 1971

SIMULATION SPECIFICATION

Transportation Systems Center, OS03, Technical Report, August 1971

MMAL USER MANUAL

Transportation Systems Center, OS03, Internal Technical Report, July 1971

PDP-10/516 INTERFACE MANUAL

Transportation Systems Center, OS03, Internal Technical Report, July 1971

FORTRAN SOFTWARE SIMULATION AND ATC EXPERI- MENTS

Transportation Systems Center, Raytheon Company, Lexington, Mass., OS03, Final Technical Report, September 1971

ATC REAL TIME EXPERIMENTAL RESULTS

Transportation Systems Center, OS03, Internal Report, July 1971

* Document is available to the public through the National Technical Information Service.

EXPERIMENTAL RESULTS OF INCREMENTAL CON- TROL SCHEDULE

Transportation Systems Center, OS03, Internal Technical Report, August 1971

D6-24898 Transportation Systems Center PHASE I REPORT - STUDY AND CONCEPT FORMULA- TION OF A FOURTH GENERATION AIR TRAFFIC CONTROL SYSTEM

Boeing, OS04, Technical Report, April 1971

For primary bibliographic entry, see Field 1.

C71-61-5/301 Transportation Systems Center STUDY AND CONCEPT FORMULATION FOR A FOURTH GENERATION AIR TRAFFIC CONTROL SYSTEM

Autonetics, OS04, Interim Report, April 1971

DOT-TSC-140 Transportation Systems Center CONCEPT FORMULATION STUDIES OF THE CONTROL ASPECTS OF THE FOURTH GENERATION AIR TRAF- FIC CONTROL SYSTEM

MIT/Lincoln Laboratory, Cambridge, OS04, Interim Report, April 1971

FOURTH GENERATION AIR TRAFFIC CONTROL SYSTEM PROGRAM PLAN

Transportation Systems Center, OS04, Technical Report, February 1971

BATTERIES FOR THE ELECTRIC AUTOMOBILE

Transportation Systems Center, M. Saloman, OS14, Techni- cal Report

INFORMATION AND CONTROL SYSTEMS

Transportation Systems Center, R. Favout, OP01, Technical Report, April 1971

DIAL-A-RIDE

Transportation Systems Center, C. Toye, OP01, Technical Memorandum, May 1971

URBAN MASS TRANSPORTATION ADMINISTRATION, WASHINGTON, D. C. 20590

LIM PRIMARY VOLTAGE PHASE CONTROL

Transportation Systems Center, A. Kusko, Inc., UM01, Technical Report, March 1971

REPORT ON THE TEST AND EVALUATION OF THE CITY II PROGRAM

Transportation Systems Center, UM02, Technical Report, May 1971

9. ELECTRONICS AND ELECTRICAL ENGINEERING

CITY II DECISION FORMAT GUIDE (APPENDIX C TO REPORT ON THE TEST AND EVALUATION OF THE CITY II PROGRAM)

Transportation Systems Center, UM02, Technical Report, May 1971

CITY II SUBPROGRAM CROSS REFERENCE TABLES (APPENDIX D TO REPORT ON THE TEST AND EVALUATION OF THE CITY II PROGRAM)

Transportation Systems Center, UM02, Technical Report, May 1971

OPERATING GUIDELINES FOR THE DIAL-A-RIDE BASIC AND ADVANCED PROGRAMS

Transportation Systems Center, UM02, Technical Report

PRT GOALS AND SIMPLIFIED COST MODEL

Transportation Systems Center, UM05, Working Paper

MORGANTOWN COMMAND AND CONTROL SYSTEM-OPERATIONS DESCRIPTION

Transportation Systems Center, UM05, Working Paper

GSP-001 Transportation Systems Center
UMTA REQUIREMENTS AND CONSTRAINTS FOR A PERSONAL RAPID TRANSIT SYSTEM
UM05, Working Paper

10. ENERGY CONVERSION (NON-PRO-PULSIVE)

No reports.

11. MATERIALS

Includes the following Groups: Adhesives and Seals; Ceramics, Refractories, and Glasses; Coatings, Colorants, and Finishes; Composite Materials; Fibers and Textiles; Metallurgy and Metallography; Miscellaneous Materials; Oils, Lubricants, and Hydraulic Fluid; Plastics; Rubbers; Solvents, Cleaners, and Abrasives; Wood and Paper Products.

UNITED STATES COAST GUARD WASHINGTON, D. C. 20591

TSC-USCG-71-7 Transportation Systems Center AN INVESTIGATION OF OIL FLUORESCENCE AS A TECHNIQUE FOR THE REMOTE SENSING OF OIL SPILLS *

J. F. Fantasia, T. M. Hard and H. C. Ingrao, CG03, Technical Progress Report - July 1, 1970 - June 30, 1971

Oil Spills, Oil, Remote Sensing, Oil Fluorescence, and Laser
For primary bibliographic entry, see Field 17.

* Document is available to the public through the National Technical Information Service.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C. 20590

DOT-TSC-NASA-71-9 Transportation Systems Center METALLIZATION FAILURES *

R. Beatty, Technical Report, May 1971

Metallization Failures, Integrated Circuit Failures, Metallization Material, Multilevel Metallization, Integrated Circuit Design, and Beam Lead Technology.

For primary bibliographic entry, see Field 9.

DOT-TSC-NASA-71-10 Transportation Systems Center EVALUATION OF NONDESTRUCTIVE TENSILE TESTING *

J. J. Bowe and S. M. Polcari, NA08, Technical Report, May 1971

Semiconductor Devices, Nondestructive Testing, and Chip and Wire Bonding.

For primary bibliographic entry, see Field 9.

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, WASHINGTON, D. C. 20591

SPECIAL REPORT OF THE TIRE TESTING TASK FORCE
Transportation Systems Center, HS03, Technical Report
October 1970

12. MATHEMATICAL SCIENCES

No reports.

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

Includes the following Groups: Air Conditioning, Heating, Lighting and Ventilating; Civil Engineering; Construction Equipment, Materials, and Supplies; Containers and Packaging; Couplings, Fittings, Fasteners, and Joints; Ground Transportation Equipment; Hydraulic and Pneumatic Equipment; Industrial Processes; Machinery and Tools; Marine Engineering; Pumps, Filters, Pipes, Fittings, Tubing, and Valves; Safety Engineering; Structural Engineering.

UNITED STATES COAST GUARD WASHINGTON, D. C. 20591

DOT-TSC-CG-71-1 Transportation Systems Center
SURVEY OF METEOROLOGICAL REMOTE SENSORS *
A. E. Barrington, CG04, Technical Memorandum, July 1, 1970 - May 15, 1971
Meteorology, Remote Sensing, Data Buoy, and Instrumentation.

For primary bibliographic entry, see Field 17.

DOT-TSC-CG-71-3 Transportation Systems Center
TWO CANDIDATE SYSTEMS FOR UNMANNED FOG BANK DETECTION *
J. R. Lifszitz and H. C. Ingrao, CG02, Technical Report, June 1971
Fog Bank Detection, LIDAR, Aid-to-Navigation, and Radiometer.

For primary bibliographic entry, see Field 17.

A TECHNIQUE FOR MEASURING THE BEHAVIOR OF A NAVIGATIONAL BUOY
Transportation Systems Center, L. V. Babb, R. W. Wilmarth, Cdr. G. J. Budridge (USCG), CG01 No. 3, International Telemetry Conference Paper, September 1971

FEDERAL HIGHWAY ADMINISTRATION, WASHINGTON, D. C. 20590

DOT/FHWA 10 NODE PAS II DEMONSTRATION SYSTEM
Transportation Systems Center, HW01, Technical Report

AN INTRODUCTION TO PAS II I/O
Transportation Systems Center, G. Paul and P. Porier, HW01, Technical Report, September 1970

INTERIM REPORT ON PAS II I/O
Transportation Systems Center, G. Paul and P. Porier, HW01, Technical Report, September 1970

PAS II TECHNICAL PROPOSAL FOR STAGE II INSTALLATION OF PAS
Transportation Systems Center, Raytheon Company, Lexington, Mass., HW01, Technical Report, November 1970

REQUIREMENTS SURVEY OF HIGHWAY ROUTING SYSTEMS

Transportation Systems Center, HW02, Technical Report, November 1970

SURVEY TRIP REPORTS

Transportation Systems Center, HW04, Working Paper

ENVIRONMENTAL RECOMMENDATIONS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

ANALYSIS AND USE SUGGESTIONS: SPECIFICATIONS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

QUALITY ASSURANCE REQUIREMENTS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

RELIABILITY REQUIREMENTS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

REQUIREMENTS FOR MAINTAINABILITY OF HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

AUTOMATIC SCANNING OF AERIAL PHOTOGRAPHS OF HIGHWAY TRAFFIC - A STATE-OF-THE-ART REPORT

Transportation Systems Center, J. G. Raudseps, HW05, Technical Report, November 1970

AUTOMATIC DETECTION OF VEHICLES IN AERIAL PHOTOGRAPHS OF HIGHWAYS

Transportation Systems Center, J. G. Raudseps, HW05, Conference Paper, May 1971

FEDERAL RAILROAD ADMINISTRATION WASHINGTON, D. C. 20590

DOT-TSC-FRA-71-1 Transportation Systems Center POWER CONDITIONING FOR HIGH-SPEED TRACKED VEHICLES *

F. L. Raposa, RR05, Interim Technical Report, February 1971, 65 pp.
Linear Induction Motor, Speed Control, Power Conditioner, On-Board Electric Power Sources, and Wayside Electric Power Sources.

For primary bibliographic entry, see Field 21.

DOT-TSC-FRA-71-1A Transportation Systems Center POWER CONDITIONING FOR HIGH-SPEED TRACKED VEHICLES *

F. L. Raposa, RR05, Interim Technical Report, February 1971, 65 pp.
Linear Induction Motor, Speed Control, Power Conditioner, On-Board Electric Power Sources, and Wayside Electric Power Sources.

For primary bibliographic entry, see Field 21.

* Document is available to the public through the National Technical Information Service.

**13. MECHANICAL, INDUSTRIAL, CIVIL, AND
MARINE ENGINEERING**

**DOT-TSC-FRA-71-2 Transportation Systems Center
METROLINER AUXILIARY POWER ELECTRICAL
SYSTEM RELIABILITY STUDY ***

J. D. Abbas and C. W. Watt, Jr., Interim Report, June 1971,
135 pp.

For primary bibliographic entry, see Field 21.

**DOT-TSC-FRA-71-3 Transportation Systems Center
TECHNOLOGICAL INNOVATION IN GRADE CROSSING
PROTECTIVE SYSTEMS ***

J. B. Hopkins and M. E. Hazel, RR02, Technical Report,
June 1971

Grade crossing protection, train detection, microwave telem-
etry, and railroad signals

The constraints on innovative grade crossing protective systems are delineated and guidelines for development indicated. Inventory data have been arranged to permit an estimate of the classes of systems needed, the allowable costs, and contribution of various types of crossings to accidents. Many crossings warrant very limited expense and account for very few deaths. A number of approaches are possible for the intermediate cost classes, based on use of conventional signals with low-cost activation systems. Use of similar elements, singly or in combination, can also improve effectiveness of more expensive systems. The very high cost locations may well benefit from interconnection of train and vehicle detectors and small computers.

Extensive analysis and laboratory investigation has been carried out relating to a microwave telemetry alternative to conventional track circuits and possible crossing-located radar and impedance train detection systems.

**AUTOMATIC TRAIN CONTROL AND OPERA-
TION - STATE-OF-THE-ART TECHNOLOGY**

Transportation Systems Center, RR01, Interim Technical
Report

ATO COST/BENEFIT

Transportation Systems Center, RR01, Interim Technical
Report

**PROPOSED STUDIES ON THE METROLINER ELECTRI-
CAL SYSTEMS RELIABILITY**

Transportation Systems Center, C. W. Watt, RR06, Memorandum, August 1971

VISIT TO PENN CENTRAL

Transportation Systems Center, C. W. Watt, F. Raposa, and
R. Ebacher, RR06, Working Paper, July 1970

**VISIT TO PENN CENTRAL N.E. CORRIDOR COORDINA-
TOR**

Transportation Systems Center, F. Seekell and S. Skeiber,
RR06, Working Paper, September 1970

**TRIP REPORT - LOUIS T. KLAUDER AND ASSOCI-
ATES**

Transportation Systems Center, C. W. Watt, RR06, Working
Paper, January 1970

TRIP REPORT - MARCHETTI, INC.

Transportation Systems Center, J. Abbas, RR06, Working
Paper, February 1971

TRIP REPORT - GENERAL ELECTRIC CO., ERIE, PA.

Transportation Systems Center, J. Abbas, RR06, Working
Paper, March 1971

**METROLINER AUXILIARY ELECTRICAL POWER
SYSTEM RELIABILITY STUDY**

Transportation Systems Center, J. Abbas, RR06, Technical
Report, June 1971

**NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION,
WASHINGTON, D. C. 20590**

**DOT-TSC-NASA-71-9 Transportation Systems Center
METALLIZATION FAILURES ***

R. Beatty, Technical Report, May 1971, 116 pp.

Metallization Failures, Integrated Circuit Failures, Metalliza-
tion Material, Multilevel Material, Integrated Circuit Design,
and Beam Lead Technology.

For primary bibliographic entry, see Field 9.

**DOC. NO. 1724 Transportation Systems Center
DESIGN AND TEST PLAN, BUZZARDS BAY MEASURE-
MENT INSTRUMENT FOR OCEANOGRAPHIC RE-
SEARCH**

H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley,
Mass., NA01, Technical Report

**DOC. NO. 1693A Transportation Systems Center
HANDBOOKS, MICROWAVE RADIOMETERS, BUZ-
ZARDS BAY MEASUREMENT INSTRUMENT FOR O-
CEANOGRAPHIC RESEARCH**

P. Gatti, Ewen Knight Corp., Wellesley, Mass., NA01,
Technical Report

**DOC. NO. 1732 Transportation Systems Center
SYSTEM CALIBRATION PROCEDURES AND RESULTS,
BUZZARDS BAY MEASUREMENT INSTRUMENT FOR
OCEANOGRAPHIC RESEARCH**

J. A. Campbell, Ewen Knight Corp., Wellesley, Mass., NA01,
Technical Report

**DOC. NO. 1735 Transportation Systems Center
OPERATORS INSTRUCTION MANUAL, BUZZARDS BAY
MEASUREMENT INSTRUMENT FOR OCEANOGRAPHIC
RESEARCH**

H. P. Taylor, Ewen Knight Corp., Wellesley, Mass., NA01,
Technical Report

**DOC. NO. 1737 Transportation Systems Center
FINAL REPORT, CONTRACT DOT-TSC-14**

H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley,
Mass., NA01, Technical Report

* Document is available to the public through the National Technical Information Service.

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

DOC. NO. 1740 Transportation Systems Center
**PRELIMINARY RESULTS, APRIL 5 – JUNE 15, 1971,
BUZZARDS BAY MEASUREMENT INSTRUMENT FOR
OCEANOGRAPHIC RESEARCH**

H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report, June 1971

**NATIONAL HIGHWAY TRAFFIC
SAFETY ADMINISTRATION,
WASHINGTON, D. C. 20591**

DOT–TSC–NHTSA–71–1 Transportation Systems Center
OCCUPANT MOTION SENSORS *

J. L. Horner, Ph.D., HS05, Technical Report July 1970 – January 1971, 54 pp.

Fourier Spectrum, Bandwidth, Acceleration, Rotational Motion, Sensors, and Transducers.

An analysis has been made of methods for measuring vehicle occupant motion during crash or impact conditions. The purpose of the measurements is to evaluate restraint system performance using human, anthropometric dummy, or animal occupants. A detailed Fourier frequency analysis is made of the sensor requirements. Potential candidate systems are evaluated, and five of these recommended for further development and field testing.

DOT–TSC–NHTSA–71–2 Transportation Systems Center
SUMMARY AND EVALUATION OF RESPONSES RECEIVED ON THE ALCOHOL SAFETY INTERLOCK SYSTEM *

E. D. Sussman, HS02, Technical Memorandum, May 1971, 25 pp.

Alcohol Intoxication Interlock Driving Psychomotor–performance.

This report summarizes and evaluates devices and suggestions provided by respondents to the DOT Prospectus entitled "Some Considerations Related to the Development of an Alcohol Safety Interlock System (ASIS)". The responses are categorized into: (1) ASIS based on measurement of human performance, (2) ASIS based on personal or vehicle identification, and (3) ASIS based on the detection of alcohol.

DOT–TSC–NHTSA–71–3 Transportation Systems Center
**DEVELOPMENT OF ANTICIPATORY AUTOMOBILE
CRASH SENSORS ***

Hopkins, Holmstrom, Appra, Hazel, White, and Newfell, HS04, Annual Report July 1, 1970 – June 30, 1971

Automobile Safety, Occupant Protection, Passive Restraint Activation, and Anticipatory Crash Sensing.

A comprehensive examination is carried out to determine the basic system constraints and required operational characteristics for anticipatory sensing of impending automobile crashes. This is followed by consideration of a wide variety of possible sensing techniques and selection of those deserving of further study. Two methods are chosen, microwave radar and ultrasonic sonar, and the advantages, weaknesses, and uncertain areas of both are delineated.

Realization of both sensors is described. The radar sensor, comprising standard microwave components and solid state circuitry, has been installed on a test vehicle for characterization. Results are promising, but preliminary; the complexity of the sensing task and the reliability demands on the system require extensive analysis and testing before a conclusion can be drawn as to overall viability.

The sonar approach is a translation of the radar sensor into acoustic form. Transducers have been the subject of particular study and modification. Preliminary results suggest that environmental considerations and adequate target discrimination will be the major problem areas.

DOT–TSC–NHTSA–71–4 Transportation Systems Center
OCCUPANT MOTION SENSORS: METHODS OF DETECTION AND ANALYSIS *

J. L. Horner, D. S. Ofsevit, G. R. Plank, and G. G. Lawrence, HS05, Technical Report, July 1971, 55 pp.

Bandwidth, Rotational Motion, Fourier Analysis, Sensor, Transducer, Acceleration, Angular Motion, and Digital Filtering.

A study has been made of methods for measuring occupant motion within a vehicle during crash or impact conditions. The purpose of the measurements is to evaluate restraint systems, using anthropometric dummy, animal, or human occupants. A list of general specifications for occupant motion sensors was drawn up. This was used to establish criteria for evaluation of proposed systems. From a study of various possible systems, five were selected for further development. These systems were built and prepared for field testing. In addition, computer methods for Fourier analysis of the data produced by these systems have been developed in theory and in programs for a digital computer.

DOT–TSC–NHTSA–71–5 Transportation Systems Center
**SURVEY OF NON–DESTRUCTIVE TIRE INSPECTION
TECHNIQUES ***

A. L. Lavery, I. Litant, R. P. Ryan, N. Knable, and H. L. Cecon, Preliminary Memorandum, July 1971

The purpose of the Nondestructive Tire Testing Program at TSC is to apply NDT technology to the detection of faults in tires that could lead to their abrupt failure, or at least to an inability to perform their function safely. The initial effort is being concentrated on quantitative characterization of tire anomalies as seen by several NDT methods, and investigation of the relationships between such anomalies and tire behavior. The development of reliable detection methods will have a significant impact on compliance testing of new tires, inspection of tires in service, and inspection of remanufactured tires (retreads). While NDT inspection is of great importance in each of these areas, the increasing costs and limited availability of facilities for compliance testing lend primary importance to application of NDT to prior screening of compliance test samples. The goal in this case is to develop suitable methods to single out those tires that are most likely to fail the compliance test. Since only 1–2 percent of the tested tires fail, an NDT method that could reliably predict which tires will fail could increase the sample size by a factor of 50 without appreciably increasing the cost of compliance testing, or conversely, could reduce the number of tires to be so tested. Either path presents sufficient reason for the performance of this work.

* Document is available to the public through the National Technical Information Service.

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

SOME CONSIDERATIONS RELATED TO THE DEVELOPMENT OF AN ALCOHOL SAFETY INTERLOCK SYSTEM (ASIS)

Transportation Systems Center, HS02, Technical Report, October 1970

FEASIBILITY STUDY OF ROADSIDE ANALYZER FOR ALCOHOL AND DRUGS

Transportation Systems Center, M. Salomon and A. E. Barrington, HS02, Technical Report, August 1970

SPECIAL REPORT OF THE TIRE TESTING TASK FORCE

Transportation Systems Center, HS03, Technical Report, October 1970

OFFICE OF THE SECRETARY OF TRANSPORTATION, WASHINGTON, D. C. 20590

DOT-TSC-OST-71-6 Transportation Systems Center TRAFFIC CIRCLE MODEL *

I. Englander, OS12, Preliminary Memorandum, May 1971, 14 pp.

Dynamic Model, Traffic Circle, and CRT Display Terminal.
For primary bibliographic entry, see Field 9.

DOT-TSC-71-7 Transportation Systems Center VEHICULAR TRAFFIC FLOW THEORY AND TUNNEL TRAFFIC FLOW MEASUREMENTS

G. Chin, L. Jordan, D. Kahn, S. Morin, and P. Yoh, OS12, Technical Report, June 1971, 221 pp.

Traffic Flow, Tunnel Traffic, Congestion, and Airport Access

Vehicular traffic flow has been investigated theoretically and experimentally in order that peak hour collective traffic flow dynamics be understood and that the peak hour flow through the Callahan Tunnel be improved by means of traffic flow control and modification. Two theoretical models are suggested, the finite reaction time model and the asymmetrical response model, as predictive of observed traffic density dynamics, wave growth and asymmetry. Experimentally, a traffic flow profile of capacities, vehicle speeds and traffic densities in the Callahan Tunnel has been obtained, and relationship between slowdown wave phenomena and traffic flow, determined. Based on these, it is suggested that traffic flow may be improved with traffic flow modification procedures.

DOT-TSC-OST-71-9 Transportation Systems Center MODELING TRANSPORTATION SYSTEMS: AN OVERVIEW *

George Kovatch and George Zames, Service Technology Corp., Cambridge, OS12, Technical Report, June 1971
Transportation Modeling and Transportation Planning.

For primary bibliographic entry, see Field 5.

DOT-TSC-OST-71-10 Transportations Systems Center TRANSPORTATION SYSTEMS TECHNOLOGY: A TWENTY-YEAR OUTLOOK *

Service Technology Corp., Cambridge, G. Kovatch, J. B. Barber, R. F. Casey, and G. Zames, OP01, Final Report: October 1970 - August 1971

* Document is available to the public through the National Technical Information Service.

Transportation Technology, Urban Transportation, and Interurban Transportation.

In this report an overall technology assessment of new and improved transportation systems is given. A broad survey has been made of new systems concepts for passenger and freight transportation in urban and interurban applications. Results of the findings are reported and projections of expected innovations and improvements are made along with discussion of some of the major limitations to wide scale applications over the next two decades. Recommendations for research and development emphasis in some of the most promising areas are given where possible although full analysis of cost factors and comparative analysis of competing systems were beyond the scope of this investigation.

DOT-TSC-OST-71-11 Transportation Systems Center PERSONALIZED RAPID TRANSIT SYSTEMS: A FIRST ANALYSIS *

George Kovatch and George Zames, Service Technology Corp., Cambridge, OP01, Final Report: October 1970 - August 71

Transportation Systems Analysis, PRT Systems, and Urban Transportation.

For primary bibliographic entry, see Field 5.

BATTERIES FOR THE ELECTRIC AUTOMOBILE

Transportation Systems Center, M. Saloman, OS14, Technical Report

PASSENGER CAR NOISE LEVELS

Transportation Systems Center, G. Larson, OS14, Technical Report

MOVING GUIDEWAY SYSTEMS

Transportation Systems Center, J. Taub and R. Casey, OP01, Technical Memorandum, April 1971

GAS TURBINE POWERED TRUCKS

Transportation Systems Center, D. Sheldon, OP01, Technical Memorandum, April 1971

PIPELINES

Transportation Systems Center, D. Sheldon, OP01, Technical Memorandum, April 1971

FAST TRANSIT LINK SYSTEMS

Transportation Systems Center, J. Barber, C. Watt, H. Zuckerburg, and D. Sheldon, OP01, Technical Memorandum, April 1971

HIGH SPEED RAIL SYSTEMS

Transportation Systems Center, C. Watt and J. Barber, OP01, Technical Memorandum, April 1971

WATERBORNE TRANSPORTATION

Transportation Systems Center, B. Blood, OP01, Technical Memorandum, April 1971

PROPULSION, BRAKING AND POWER SYSTEMS

Transportation Systems Center, R. Cacossa, H. Zuckerburg, and J. Barber, OP01, Technical Memorandum, April 1971

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

PUBLIC AUTOMOBILE SYSTEM

Transportation Systems Center, R. Casey, OP01, Technical Memorandum, April 1971

POLLUTION FREE VEHICLES

Transportation Systems Center, D. Sheldon, OP01, Technical Memorandum, April 1971

TUNNELING TECHNOLOGY

Transportation Systems Center, J. Petukian, OP01, Technical Memorandum, April 1971

DEMAND RESPONSIVE SYSTEMS

Transportation Systems Center, C. Toye, OP01, Technical Memorandum, April 1971

DUAL MODE SYSTEMS

Transportations Systems Center, G. Kovatch and R. Casey, OP01, Technical Memorandum, April 1971

COMPARATIVE ANALYSIS OF MOVING GUIDEWAY SYSTEMS

Transportation Systems Center, R. Casey, OP01, Technical Memorandum, May 1971

TACV TECHNOLOGY

Transportation Systems Center, W. Rhine and B. Blood, OP01, Technical Memorandum, May 1971

PRT SYSTEM CAPACITY

Transportation Systems Center, G. Zames, OP01, Technical Memorandum, May 1971

SUSPENSION AND SUPPORT SYSTEMS

Transportation Systems Center, J. Barber, OP01, Technical Memorandum, June 1971

DIAL-A-RIDE

Transportation Systems Center, C. Toye, OP01, Technical Memorandum, May 1971

URBAN MASS

TRANSPORTATION ADMINISTRATION,
WASHINGTON, D. C. 20590

A SURVEY OF POWER CONDITIONERS FOR THE TACV DULLES PROJECT

Transportation Systems Center, R. A. Cacossa UM01, Preliminary Report, March 1971

DULLES/TACV SAFETY PLAN

Transportation Systems Center, UM01, Technical Report, March 1971

TACV NOISE POLLUTION

Transportation Systems Center, G. Economou, UM01, Preliminary Report, December 1970

ELECTRIC POWER SUPPLY FROM VIRGINIA ELECTRIC AND POWER COMPANY (VEPCO) TO THE DULLES PROJECT

Transportation Systems Center, Alexander Kusko Inc., UM01, Technical Report, March 1971

LINEAR INDUCTION MOTOR FOR THE DULLES PROJECT

Transportation Systems Center, Alexander Kusko Inc., UM01, Technical Report, March 1971

AUXILIARY POWER SYSTEM

Transportation Systems Center, UM01, Preliminary Report, March 1971

POWER CONTROL SYSTEM

Transportation Systems Center, UM01, Preliminary Report, March 1971

TECHNICAL SUMMARY FOR POWER COLLECTION

Transportation Systems Center, C. H. Spenny, UM01, Preliminary Report, March 1971

SLIDING CONTACT POWER COLLECTION SURVEY OF EXISTING POWER COLLECTION SYSTEMS

Transportation Systems Center, C. H. Spenny, UM01, Preliminary Report, March 1971

CRITERIA FOR EVALUATION OF BUSINESS-MANAGEMENT PROPOSALS FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, DULLES INTERNATIONAL AIRPORT

Transportation Systems Center, UM01, Technical Report

CRITERIA FOR EVALUATION OF BUSINESS-MANAGEMENT PROPOSALS FOR TRACKED CUSHION VEHICLE (TACV) SYSTEM, LOS ANGELES, INTERNATIONAL AIRPORT ACCESS PROGRAM

Transportation Systems Center, UM01, Technical Report, December 1970

CRITERIA FOR EVALUATION OF TECHNICAL PROPOSALS FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, DULLES INTERNATIONAL AIRPORT

Transportation Systems Center, UM01, Technical Report

CRITERIA FOR EVALUATION OF TECHNICAL PROPOSALS FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, LOS ANGELES INTERNATIONAL AIRPORT ACCESS PROGRAM

Transportation Systems Center, UM01, Technical Report, December 1970

INSTRUCTIONS FOR PREPARATION OF BUSINESS-MANAGEMENT PROPOSAL FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, DULLES INTERNATIONAL AIRPORT

Transportation Systems Center, UM01, Technical Report, February 1971

* Document is available to the public through the National Technical Information Service.

14. METHODS AND EQUIPMENT

INSTRUCTIONS FOR PREPARATION OF BUSINESS MANAGEMENT PROPOSAL FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, LOS ANGELES INTERNATIONAL AIRPORT ACCESS PROGRAM

Transportation Systems Center, UM01, Technical Report, December 1970

INSTRUCTIONS FOR PREPARATION OF TECHNICAL PROPOSAL FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, LOS ANGELES INTERNATIONAL AIRPORT ACCESS PROGRAM

Transportation Systems Center, UM01, Technical Report, December 1970

PERFORMANCE SPECIFICATION AND ENGINEERING DESIGN REQUIREMENTS FOR URBAN TRACKED AIR CUSHION VEHICLE (TACV)

Transportation Systems Center, UM01, Technical Report, May 1971

PERFORMANCE SPECIFICATION FOR INTRA-AIRPORT TRANSPORTATION (IAT) SYSTEM AT LOS ANGELES INTERNATIONAL AIRPORT

Transportation Systems Center, UM01, Technical Report, January 1971

INSTRUCTIONS FOR PREPARATION OF TECHNICAL PROPOSAL FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM FOR DULLES INTERNATIONAL AIRPORT

Transportation Systems Center, UM01, Technical Report, February 1971

SPECIAL TERMS AND CONDITIONS PROCUREMENT OF TACV SYSTEM FOR LOS ANGELES AIRPORT ACCESS PROJECT

Transportation Systems Center, UM01, Technical Report

STATEMENT OF WORK & SPECIFICATION FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM FOR DULLES INTERNATIONAL AIRPORT (PHASE II)

Transportation Systems Center, UM01, Technical Report

REPORT ON THE TEST AND EVALUATION OF THE CITY II PROGRAM

Transportation Systems Center, UM02, Technical Report, May 1971

CITY II SUBPROGRAM CROSS REFERENCE TABLES (APPENDIX D TO REPORT ON THE TEST AND EVALUATION OF THE CITY II PROGRAM)

Transportation Systems Center, UM02, Technical Report, May 1971

CITY II DECISION FORMAT GUIDE (APPENDIX C TO REPORT ON THE TEST AND EVALUATION OF THE CITY II PROGRAM)

Transportation Systems Center, UM02, Technical Report, May 1971

OPERATING GUIDELINES FOR THE DIAL-A-RIDE BASIC AND ADVANCED PROGRAMS

Transportation Systems Center, UM02, Technical Report

**GSP-001 Transportation Systems Center
UMTA REQUIREMENTS AND CONSTRAINTS FOR A PERSONAL RAPID TRANSIT SYSTEM**
UM05, Working Paper

PRT GOALS AND SIMPLIFIED COST MODEL
Transportation Systems Center, UM05, Working Paper

STUDY OF RADAR SURVEILLANCE FOR HEADWAY CONTROL
Transportation Systems Center, UM05, Working Paper

GUIDEWAY DESIGN USING TYPE R RECTAGRID
Transportation Systems Center, UM05, Working Paper

MORGANTOWN COMMAND AND CONTROL SYSTEM - OPERATIONS DESCRIPTION
Transportation Systems Center, UM05, Working Paper

14. METHODS AND EQUIPMENT

Includes the following Groups: Cost Effectiveness; Laboratories, Test Facilities, and Test Equipment; Recording Devices; Reliability; Reprography.

UNITED STATES COAST GUARD WASHINGTON, D. C. 20591

**TSC-USCG-71-7 Transportation Systems Center
AN INVESTIGATION OF OIL FLUORESCENCE AS A TECHNIQUE FOR THE REMOTE SENSING OF OIL SPILLS ***

J. F. Fantasia, T. M. Hard, and H. C. Ingrao, CG03, Technical Progress Report - July 1, 1970 - June 30, 1971

Oil Spills, Oil, Remote Sensing, Oil Fluorescence, and Laser.

For primary bibliographic entry, see Field 17.

FEDERAL AVIATION ADMINISTRATION WASHINGTON, D. C. 20590

**DOT-TSC-FAA-71-7 Transportation Systems Center
EVALUATION OF AIR TRAFFIC CONTROL MODELS AND SIMULATIONS ***

L. O. Higgins and P. Mpontisikaris, Service Technology Corp., Cambridge, FA06, Technical Report, June 1971

Air Traffic Control (ATC), Modeling and Simulation of ATC, and Evaluation of ATC Models.

For primary bibliographic entry, see Field 1.

FAA/NAFEC TEST PLANT TEST AND EVALUATION OF COLLISION PREVENTION PILOT WARNING INSTRUMENTS

Transportation Systems Center, FA14, Technical Report

FEDERAL HIGHWAY ADMINISTRATION WASHINGTON, D. C. 20590

SURVEY TRIP REPORTS

Transportation Systems Center, HW04, Working Paper

* Document is available to the public through the National Technical Information Service.

RELIABILITY REQUIREMENTS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

REQUIREMENTS FOR MAINTAINABILITY OF HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

**FEDERAL RAILROAD ADMINISTRATION
WASHINGTON, D. C. 20590****DOT-TSC-FRA-71-3 Transportation Systems Center
TECHNOLOGICAL INNOVATION IN GRADE CROSSING
PROTECTIVE SYSTEMS ***

J. B. Hopkins and M. E. Hazel, RR02, Technical Report, June 1971

Grade crossing protection, train detection, microwave telemetry, and railroad signals.

For primary bibliographic entry, see Field 13.

ATO COST/BENEFIT

Transportation Systems Center, RR01, Interim Technical Report

PROPOSED STUDIES ON THE METROLINER ELECTRICAL SYSTEMS RELIABILITY

Transportation Systems Center, C. W. Watt, RR06, Memorandum, August 1971

**NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
WASHINGTON, D. C. 20590****DOT-TSC-NASA-71-8 Transportation Systems Center
MULTI-SENSOR NAVIGATION SYSTEM DESIGN ***

D. R. Downing, Technical Report, March 1971, 138 pp. Multi-Sensor Navigation Systems, Design Procedure Design Option, and System Evaluation.

For primary bibliographic entry, see Field 9.

**DOT-TSC-50 Transportation Systems Center
NORTH ATLANTIC SATELLITE ATC CENTER STUDY**

I.B.M. Corp., NA02, Technical Report
North Atlantic, oceanic control center, satellite system, air traffic control.

For primary bibliographic entry, see Field 17.

**NATIONAL HIGHWAY TRAFFIC
SAFETY ADMINISTRATION
WASHINGTON, D. C. 20591****DOT-TSC-NHTSA-71-2 Transportation Systems Center
SUMMARY AND EVALUATION OF RESPONSES RECEIVED ON THE ALCOHOL SAFETY INTERLOCK SYSTEM ***

E. D. Sussman, HS02, Technical Memorandum, May 1971, 25 pp.

Alcohol Intoxication Interlock Driving Psychomotor-performance.

For primary bibliographic entry, see Field 13.

* Document is available to the public through the National Technical Information Service.

**DOT-TSC-NHTSA-71-5 Transportation Systems Center
SURVEY OF NON-DESTRUCTIVE TIRE INSPECTION
TECHNIQUES ***

A. L. Lavery, I. Litant, R. P. Ryan, N. Knable, and H. L. Ceccon, Preliminary Memorandum, July 1971

For primary bibliographic entry, see Field 13.

**FEASIBILITY STUDY OF ROADSIDE ANALYZER FOR
ALCOHOL AND DRUGS**

Transportation Systems Center, M. Salomon and A. E. Barrington, HS02, Technical Report, August, 1970

**OFFICE OF THE SECRETARY
OF TRANSPORTATION
WASHINGTON, D. C. 20590****DOT-TSC-OST-71-3 Transportation Systems Center
TRIP-THE TRANSPORTATION ROUTING AND INTER-
MODAL PLANNING SYSTEM: AN AID FOR TODAY'S
TRAVELER ***

G. Kovatch and J. Taub, OS12, Technical Report, January, 1971, 35 pp.

Computer Display Technology and Comparative Cost and Time Data.

For primary bibliographic entry, see Field 9.

**DOT-TSC-OST-71-11 Transportation Systems Center
PERSONALIZED RAPID TRANSIT SYSTEMS: A FIRST
ANALYSIS ***

G. Kovatch and G. Zames, OP01, Final Report: October 1970 - August 1971

Transportation Systems Analysis, PRT Systems, and Urban Transportation.

For primary bibliographic entry, see Field 5.

PRELIMINARY EVALUATION OF FLUXGATE MAGNETOMETERS AND ACTIVE METAL DETECTORS

Transportation Systems Center, OS13, Conference Paper, January 1971

**PRELIMINARY EVALUATION OF METAL DETECTORS
FOR USE IN AIRPORT SCREENING SYSTEMS**

Transportation Systems Center, OS13, Technical Report, February 1971

**TECHNICAL EVALUATION OF METAL DETECTORS
FOR CONCEALED WEAPONS**

Transportation Systems Center, OS13, Technical Report, June 1971

**URBAN MASS TRANSPORTATION
ADMINISTRATION
WASHINGTON, D. C. 20590****CRITERIA FOR EVALUATION OF BUSINESS-MANAGEMENT PROPOSALS FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, DULLES INTERNATIONAL AIRPORT**

Transportation Systems Center, UM01, Technical Report

17. NAVIGATION, COMMUNICATIONS, DETECTION AND COUNTERMEASURE

CRITERIA FOR EVALUATION OF BUSINESS-MANAGEMENT PROPOSALS FOR TRACKED CUSHION VEHICLE (TACV) SYSTEM, LOS ANGELES INTERNATIONAL AIRPORT ACCESS PROGRAM

Transportation Systems Center, UM01, Technical Report, December 1970

CRITERIA FOR EVALUATION OF TECHNICAL PROPOSALS FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, DULLES INTERNATIONAL AIRPORT

Transportation Systems Center, UM01, Technical Report

CRITERIA FOR EVALUATION OF TECHNICAL PROPOSALS FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, LOS ANGELES INTERNATIONAL AIRPORT ACCESS PROGRAM

Transportation Systems Center, UM01, Technical Report, December 1970

INSTRUCTIONS FOR PREPARATION OF BUSINESS-MANAGEMENT PROPOSAL FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, DULLES INTERNATIONAL AIRPORT

Transportation Systems Center, UM01, Technical Report, February 1971

INSTRUCTIONS FOR PREPARATION OF BUSINESS-MANAGEMENT PROPOSAL FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, LOS ANGELES INTERNATIONAL AIRPORT ACCESS PROGRAM

Transportation Systems Center, UM01, Technical Report, December 1970

INSTRUCTIONS FOR PREPARATION OF TECHNICAL PROPOSAL FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM, LOS ANGELES INTERNATIONAL AIRPORT ACCESS PROGRAM

Transportation Systems Center, UM01, Technical Report, December 1970

INSTRUCTIONS FOR PREPARATION OF TECHNICAL PROPOSAL FOR TRACKED AIR CUSHION VEHICLE (TACV) SYSTEM FOR DULLES INTERNATIONAL AIRPORT

Transportation Systems Center, UM01, Technical Report, February 1971

SPECIAL TERMS AND CONDITIONS PROCUREMENT OF TACV SYSTEM FOR LOS ANGELES AIRPORT ACCESS PROJECT

Transportation Systems Center, UM01, Technical Report

PRT GOALS AND SIMPLIFIED COST MODEL

Transportation Systems Center, UM05, Working Paper

15. MILITARY SCIENCES

No reports.

16. MISSILE TECHNOLOGY

No reports.

* Document is available to the public through the National Technical Information Service.

17. NAVIGATION, COMMUNICATIONS, DETECTION AND COUNTER-MEASURES

Includes the following Groups: Acoustic Detection; Communications; Direction Finding; Electromagnetic and Acoustic Countermeasures; Infrared and Ultraviolet Detection; Magnetic Detection; Navigation and Guidance; Optical Detection; Radar Detection; Seismic Detection.

UNITED STATES COAST GUARD WASHINGTON, D. C. 20591

DOT-TSC-CG-71-1 Transportation Systems Center SURVEY OF METEOROLOGICAL REMOTE SENSORS * A. E. Barrington, CG04, Technical Memorandum: July 1970 - May 1971

Meteorology, Remote Sensing, Data Buoy, and Instrumentation

The preliminary results of a survey are presented which identify techniques for determining meteorological data by remote sensing, applicable to automatic data buoy platforms. Both passive and active techniques are reviewed with emphasis on the former, in view of their more advanced development status. The principal references listed in the bibliography section of the memorandum indicate that experimental data to date have been obtained using only stable instrument platforms in a clean environment. Operation on unstable instrument platforms in the severe ocean environment requires further study.

DOT-TSC-CG-71-3 Transportation Systems Center TWO CANDIDATE SYSTEMS FOR UNMANNED FOG BANK DETECTION *

J. R. Lifshitz and H. C. Ingrao, Technical Report, June 1971
Fog Bank Detection, LIDAR, Aid-to-Navigation, and Radiometer.

The detection of coastal fog banks by remote sensing methods is discussed. The feasibility of laser backscattering (LIDAR) and infrared radiometry is explored in detail. These techniques are analyzed theoretically and experimental data are presented supporting the analysis. A design study is carried out for several laser systems, considering safety, reliability, cost, convenience, efficiency and maximum range. A fog bank detector utilizing a GaAs laser array is described which best satisfies these criteria. Before the prototype design is selected, a brief "in situ" test program is recommended, using apparatus designed at the Transportation Systems Center under Contract No. CG-02/99-712104, with the U. S. Coast Guard. In addition to clarifying several critical questions underlying the LIDAR design, the proposed test program would allow further evaluation of the infrared radiometric method. The latter technique, if its reliability can be verified, offers the advantages of being simpler and less expensive for fog bank detection than the LIDAR method.

17. NAVIGATION, COMMUNICATIONS, DETECTION AND COUNTERMEASURE

TSC-USCG-71-7 Transportation Systems Center AN INVESTIGATION OF OIL FLUORESCENCE AS A TECHNIQUE FOR THE REMOTE SENSING OF OIL SPILLS *

J. F. Fantasia, T. M. Hard, and H. C. Ingrao, CG03, Technical Progress Report: July 1970 – June 1971

Oil Spills, Oil, Remote Sensing, Oil Fluorescence, and Laser.

The feasibility of remote sensing of oil spills by laser-excited oil fluorescence is investigated. The required parameters are measured in the laboratory; these parameters are fed into a physical model to predict signal and background levels; and the predictions are verified by field experiments. Airborne detection, identification, and quantification of oil spills at sea are shown to be feasible with existing equipment, day or night.

A TECHNIQUE FOR MEASURING THE BEHAVIOR OF A NAVIGATIONAL BUOY

Transportation Systems Center, CG01 No. 3, International Telemetry Conference Paper, September 1971

STC-DOT-43-71-808 Transportation Systems Center USERS MANUAL FOR MODIFIED HARBOR MODEL Service Technology Corp., Cambridge, CG01, Technical Report

FEDERAL AVIATION ADMINISTRATION WASHINGTON, D. C. 20590

DOT-TSC-FAA-71-2 Transportation Systems Center HUMAN FACTORS IN COCKPIT INPUT AND DISPLAY FOR DATA LINK *

E. H. Hilborn, FA16, Technical Memo: July 1970 – January 1971, 18 pp.

Data Link, Air-Ground-Air Messages, ARINC Proposal, Vocabulary Messages, and Display Problems.

For primary bibliographic entry, see Field 1.

DOT-TSC-FAA-71-4 Transportation Systems Center A FUNCTIONAL DESCRIPTION OF AIR TRAFFIC CONTROL *

J. R. Coonan and P. Mpontsikaris, FA06, Technical Note, March 1971, 81 pp.

ATC Event Sequence and ATC Functions.

This document contains a description of air traffic control in terms of generic operational functions. The functions are grouped by flight phase and by major system function (navigation, surveillance, control and communication). More detailed descriptions of these functions, and estimates of related parameters are contained in the appendix. A diagram is shown of the sequence of events for a typical IFR flight through the current ATC system. Also, certain aspects of ATC which cannot be described in terms of operational functions (e.g., legal responsibilities) are discussed.

DOT-TSC-FAA-71-5 Transportation Systems Center THE IMPACT OF INERTIAL NAVIGATION ON AIR SAFETY *

R. M. Hershkowitz, D. O'Mathuna, and K. R. Britting, FA04, Technical Report, May 1971, 25 pp.

Inertial navigation, Collision risk model, En route navigation statistics, and Blunders.

* Document is available to the public through the National Technical Information Service.

An analysis of inertial navigation system performance data was carried out to assess the probable impact of inertial navigation on the aircraft collision risk in the North Atlantic region. These data were used to calculate the collision risk between two aircraft flying at the same nominal flight level on adjacent tracks. The inertial system's error sources are treated in a statistical sense to infer the en route error behavior from the terminal error data. Collision risk estimates are derived for easterly and westerly transatlantic flights. The results of this relatively conservative analysis shows that there is strong evidence to support the concept that the widespread use of inertial navigators will lead to reduced separation standards in the North Atlantic region while maintaining present safety standards.

DOT-TSC-FAA-71-6 Transportation Systems Center COLLISION RISK MODEL FOR NAT REGION *

R. Hershkowitz, FA04, Technical Report, May 1971, 55 pp. Collision Risk Model, Composite Problem, Vertical Separation, and Lateral Separation.

This paper reviews and summarizes the essential features of the collision risk model used to analyze the effects of separation standards on safety for the parallel tracking system employed in the North Atlantic. The derivation of the model is traced from a set of basic assumptions to formulation of various philosophies and a brief set of conclusions and recommendations for future work. Section VII contains a complete reference list.

DOT-TSC-FAA-71-7 Transportation Systems Center EVALUATION OF AIR TRAFFIC CONTROL MODELS AND SIMULATIONS *

L. O. Higgins and P. Mpontsikaris, Service Technology Corp., Cambridge, FA06, Technical Report, June 1971
Air Traffic Control (ATC), Modeling and Simulation of ATC, and Evaluation of ATC Models.

For primary bibliographic entry, see Field 1.

DOT-TSC-FAA-71-8 Transportation Systems Center LINEARIZED MATHEMATICAL MODELS FOR DEHAV- ILLAND CANADA "BUFFALO AND TWIN OTTER" STOL TRANSPORTS

R. A. MacDonald, Mel Garelick, and J. O'Grady, FA18, Technical Note

Aircraft Math Models and STOL Aircraft Stability & Control.

For primary bibliographic entry, see Field 1.

DOT-TSC-FAA-71-13 Transportation Systems Center FINAL REPORT: OCEANIC SURVEILLANCE AND NAV- IGATION ANALYSIS, FY 71

R. M. Hershkowitz, FA04, Technical Report, June 1971

Air Traffic Control, Collision Risk Model, Inertial Navigation, and Separation Standards Surveillance.

This report summarizes the oceanic surveillance and navigation analysis performed at Transportation Systems Center under PPA FA04 for FY 71. Three major efforts are reviewed and discussed herein: (1) a tutorial summary of the NAT/SPG collision risk model; (2) a study of the impact of inertial navigation on air safety; and (3) an investigation of the modeling techniques required to assess the effect of ATC satellite surveillance on separation standards in the North Atlantic region.

17. NAVIGATION, COMMUNICATIONS, DETECTION AND COUNTERMEASURE

DOT-TSC-FAA-71-15 Transportation Systems Center LARGE SCALE SYSTEMS - A STUDY OF COMPUTER ORGANIZATIONS FOR AIR TRAFFIC CONTROL APPLI- CATIONS *

J. Dumanian and D. Clapp, FA03, Technical Report, June 1971, 152 pp.

Computers, NAS Stage A Data Processing, and ARTS III Data Processing.

For primary bibliographic entry, see Field 9.

DOT-TSC-FAA-71-16 Transportation Systems Center SYSTEM RELIABILITY AND RECOVERY *

C. A. Dancy, III, FA03, Technical Report, June 1971, 61 pp. Reliability, recovery, reconfiguration, multiprocessor, and failsafe/soft.

For primary bibliographic entry, see Field 9.

DOT-TSC-FAA-71-17 Transportation Systems Center TIME/FREQUENCY SYSTEMS *

E. H. Farr, L. A. Frasco, H. D. Goldfein, and R. M. Snow, Technical Report, June 1971, 82 pp.

Time/Frequency, Multipath, ATC Systems, and Coding.

This report summarizes the work performed at DOT/TSC on the Time/Frequency ATC System study project. Principal emphasis in this report is given to the evaluation and analysis of the technological risk areas. A survey and description of proposed T/F system is included. The technical risk areas include the effects of multipath on signalling over radio links. Material is presented which bears on the comparative analysis of T/F with alternative technologies, including satellite and beacon-based system concepts. It is concluded that the most critical problems areas requiring further study are (a) multipath effects on T/F systems, and (b) systems operability under non-ideal conditions leading to graceful degradability.

DOT-TSC-FAA-71-18 Transportation Systems Center PROPOSED CONTROL TOWER AND COCKPIT VISIBIL- ITY READOUTS BASED ON AN AIRPORT - AIRCRAFT SYSTEM INFORMATION FLOW *

H. C. Ingraio and J. R. Lifszitz, FA15, Technical Report, July 1971

Visibility, Air Traffic Control, and Cockpit Display.

For primary bibliographic entry, see Field 1.

DOT-TSC-FAA-71-19 Transportation Systems Center CLEAR AIR TURBULENCE RADIOMETRIC DETECTION PROGRAM *

G. W. Wagner, G. G. Heroules, and W. E. Brown, FA20, Annual Report FY-71: July 1970 - June 1971, 47 pp. Radiometer.

This report presents a review of accomplishments of the Clear Air Turbulence Detection Program. The objectives, instrumentation, supporting hardware and interfaces leading up to and including the test flights for the reporting period are given.

The ultimate goal of this program is the development of a remote method of detecting and thereby alerting high-altitude, high-speed aircraft in sufficient time to avoid the hazards associated with Clear Air Turbulence, CAT.

DOT-TSC-FAA-71-23 Transportation Systems Center COMPUTER SYSTEMS PERFORMANCE MEASUREMENT TECHNIQUES *

J. Gertler, H. Glynn, V. Hobbs, and F. Woolfall, FA03, Technical Report, June 1971, 71 pp.

Computer Measurement, ARTS III Data Processing, Executive Systems, and Simulation.

For primary bibliographic reference, see Field 9.

THE CALCULATION OF AIRCRAFT COLLISION PROBA- BILITIES

Transportation Systems Center, J. F. Bellatoni, FA17, Internal Report, June 1971

For primary bibliographic entry, see Field 1.

AIAA NO. 71-770 Transportation Systems Center 4-D GUIDANCE OF STOL AIRCRAFT

R. J. Hynes, L. E. Stevenson, and E. B. Capen, AIAA Paper, July 1971

Prior to the advent of large-scale commercial STOL service, some challenging navigation and guidance problems must be solved. Proposed terminal area operations may require that these aircraft be capable of accurately flying complex flight paths, and in some situations, maintaining a time of arrival envelope at waypoints along these paths (4-D guidance capability). This paper discusses problems that arise in performing 4-D guidance and presents the results of an initial investigation of two of the candidate 4-D guidance schemes that have been suggested. The investigation was primarily concerned with evaluating basic concepts and assumed a single aircraft environment and the availability of perfect information to both the pilot and the controller. Other techniques are being investigated by the FAA that may hold more promise when actual operational constraints are imposed on the problem. Preliminary simulation results are presented and future work on the 4-D guidance of STOLs is outlined. The results although presented for STOLs are applicable also to the 4-D guidance of any RNAV equipped aircraft.

M71-84 Transportation Systems Center THE USE OF MONOPULSE TECHNIQUES IN THE RADAR BEACON SYSTEM

MITRE Corporation, Bedford, Mass., FA19, Technical Report, April 1971

DEVELOPMENT OF METHODOLOGY FOR OCEANIC AIR TRAFFIC CONTROL SURVEILLANCE SYSTEM

Transportation Systems Center, J. S. Tyler and D. E. Stegner, Systems Control, Inc., Cambridge, FA04, Technical Report, April 1971

RPT-553 Transportation Systems Center PHASE II LATERAL CONTROL SYSTEM

Service Technology Corp., Cambridge, FA07, Technical Report, October 1970

The goal of the Inertially Aided Landing System (IALS) program is to determine the implications of applying inertial system technology to the all-weather landing problem. Many

* Document is available to the public through the National Technical Information Service.

17. NAVIGATION, COMMUNICATIONS, DETECTION AND COUNTERMEASURE

commercial airliners utilize inertial navigators to provide information required to perform enroute navigation. However this inertially measured information is not used during the approach and landing phase of the flight. Instead, the guidance information required during this latter portion of the flight is derived from ground based radio aids supplemented with visual cues. The purpose of the IALS program is to determine the manner in which information measured by the inertial navigators can be utilized to improve the performance of the automatic approach/landing system.

The performance improvement that can be achieved with better quality guidance information comes about in two ways: the improved accuracy reduces the magnitude of the undesired steering commands and the improved quality permits a redesign of the approach coupler. Simply improving the quality and accuracy of the guidance information without changing the approach coupler design will result in better tracking of the desired flight path and will reduce the rolling motion of the aircraft that would normally be caused by noise on the guidance information. However the tracking errors and rolling motion which is a result of aerodynamic disturbances (wind gusts and shear) will not be affected by improving the guidance information alone. In order to improve the performance of the system when subjected to aerodynamic disturbances, it is necessary to redesign the approach coupler and autopilot. In general this redesign takes the form of increasing the position and velocity feedback gains which is made possible by the improved quality of these feedback signals.

This report presents a design of the lateral portion of the approach/landing system assuming that perfect feedback information would be available. The only compromises which were made in the design of the system were for reasons of stability, physical constraints, or constraints on the motion of the aircraft. Therefore the performance of this system should represent the best performance obtainable by redesigning the system.

RPT-580 Transportation Systems Center
COMPLEMENTARY FILTER SCHEME FOR PREMIXING INS AND ILS INFORMATION
Service Technology Corp., Cambridge, FA07, Technical Report, October 1970

Many commercial airliners utilize inertial navigation systems (INS) to provide information required to perform enroute navigation. However during an automatic approach and landing, the steering commands are derived from ground based radio aids (ILS). The performance of the automatic system is primarily a function of the accuracy of the guidance information conveyed by these radio aids.

This report discusses the results of an investigation into a very simple scheme of mixing INS and ILS measurements which will improve the accuracy of the guidance information required by the automatic approach/landing systems and thereby improve the performance of the automatic system.

It was found that this method of mixing the INS and ILS measurements was very powerful in reducing the control surface activity (a factor of 4 improvement) resulting from typical ILS errors. It was also found that the angular motion of the aircraft was reduced by a factor of 2 and the tracking

performance was improved by a factor of 1.5 when compared to the performance of the automatic approach/landing system using only ILS information.

The principal attractiveness of this premixing concept is that this performance improvement can be obtained without physically or functionally modifying the existing autopilot. The INS and ILS measurements are mixed outside of the autopilot in a "black box" whose output is substituted for the normal ILS input to the autopilot.

RPT-608 Transportation Systems Center
PERFORMANCE EVALUATION OF THE LATERAL AXIS OF A CONVENTIONAL AND AN INERTIALLY AUGMENTED AUTOMATIC LANDING SYSTEM
Service Technology Corp., Cambridge, FA07, Technical Report, January 1971

RPT-626 Transportation Systems Center
REVISED ERROR MODEL FOR THE INERTIAL NAVIGATION SYSTEM
Service Technology Corp., Cambridge, FA07, Technical Report, March 1971

This report presents a detailed discussion of the INS error model proposed in RPT-476 (Reference 1). It describes the circumstances under which the above model is a good representation of the INS errors. It shows the relationship between the position, the velocity, and the acceleration initial conditions in the above model. It also describes how to take into account the fact that the INS in practice is not located at the center of gravity of the aircraft.

RPT-629 Transportation Systems Center
ILS BEAM NOISE OPTIONS FOR CTOL SUBROUTINE BNOS
Service Technology Corp., Cambridge, FA07, Technical Report, March 1971
For primary bibliographic entry, see Field 9.

RPT-685 Transportation Systems Center
IALS LATERAL CONTROL SYSTEM OPTIONS
Service Technology Corp., Cambridge, FA07, Technical Report, March 1971
For primary bibliographic entry, see Field 9.

RPT-701 Transportation Systems Center
IALS LONGITUDINAL CONTROL SYSTEM OPTIONS
Service Technology Corp., Cambridge, FA07, Technical Report, March 1971
For primary bibliographic entry, see Field 9.

STC-DOT-TSC-43-71-755 Transportation Systems Center
SECOND ORDER COMPLEMENTARY FILTER FOR PREMIXING ILS AND ILS INFORMATION
Service Technology Corp., Cambridge, FA07, Technical Report, May 1971
Instrument landing system, automatic landing system, complementary filter, inertial navigation system.

For primary bibliographic entry, see Field 1.

* Document is available to the public through the National Technical Information Service.

17. NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURE

STC-DOT-TSC-43-71-823 Transportation Systems Center

FEASIBILITY STUDY OF CATEGORY II LANDINGS USING A CATEGORY I LOCALIZER BEAM

Service Technology Corp., Cambridge, FA07, Technical Report, June 1971, 17 pp.

Category II landings, localizer beam specifications, and inertially aided ILS (Instrument Landing System)

The lateral portion of the instrument landing system performance is considered here. The effects of the localizer beam errors on the aircraft tracking accuracy of three selected designs are analyzed. Frequency response results for the above systems are given. The effects of the receiver centering error, course misalignment, dog legs and the beam bends have been simulated using the inertially aided landing system (IALS) program simulation. The results are presented in relation with Category II landing specifications.

STC-DOT-TSC-43-71-838 Transportation Systems Center

DESIGN REQUIREMENTS OF A DIGITAL CONTROLLER FOR THE IALS PROGRAM

Service Technology Corp., Cambridge, FA07, Technical Report, June 1971

Digital controller, control system, computer core size, computer iteration rate.

For primary bibliographic entry, see Field 9.

R-166 Transportation Systems Center

OPTIMAL AND SUBOPTIMAL FLIGHT PATH CONTROL IN THE TERMINAL AREA USING RADIO-INERTIAL MEASUREMENTS

M. Desai, D. MacKinnon and P. Madden (M.I.T. Charles Stark Draper Laboratory, Cambridge), FA07, Lab Report, July 1970

The problems of air traffic control, complicated by burgeoning volume without a corresponding increase in facilities have generated an intense interest in improved automatic flight concepts for the terminal area. A particularly promising approach involves the use of inertial navigation data (or inertial measurements) and radio aid information to improve the capability of the aircraft automatically to fly along complicated paths in the terminal area up to and including automatic final approach and landing.

This report extends the work presented in previous reports in this series. Inertially measured information is combined with radio data using a discrete Kalman filter. The resultant superior estimates of vehicle position and velocity provide the basis for a set of improved trajectory control systems.

The definition of the feedback gains associated with the inertially-aided trajectory control systems is complicated by the large number of parameters involved and the availability of a selection of vehicle effectors. A systematic parameter optimization approach is developed which optimizes the response of the vehicle to stochastic environmental disturbances. This algorithm permits the performance capabilities of various feedback-effector combinations to be explored.

ADR-754 Transportation Systems Center

DESIGN, DEVELOPMENT AND FLIGHT EVALUATION OF INERTIALLY AUGMENTED LANDING SYSTEMS

R. Gadbois, G. Soderland and S. Davis (Lear Siegler, Inc., Santa Monica, Ca.), FA07, Technical Report, March 1971

Exploratory development analysis prior to May 1, 1969 has indicated that the performance and safety of automatic approach and landing systems of conventional aircraft can be substantially improved by the integration of Inertial Navigation System (INS) derived translational state information into the landing system design.

A joint NASA/FAA program was developed to apply this concept to a large conventional, turbojet transport aircraft, the FAA's CV-880 test aircraft. The Astronics Division of Lear Siegler, Inc., which designed and built the existing all-weather landing system (AWLS) installed in this aircraft, was selected to design, develop, and flight test an inertially augmented minimum modification system for the CV-880 under contract to NASA/ERC, begun May 1, 1969, and continued by DOT/TSC after July 1, 1970. Performance improvement predictions were made based on simulations of the new system design in comparison with the existing AWLS. The design was hardware implemented primarily by the addition of an ARINC 561-2 INS (the LTN-51), a lateral INS/AWLS coupler and a longitudinal INS/AWLS coupler.

Flight testing at the National Aviation Facilities Experimental Center in New Jersey, indicates excellent correlation between flight behavior and simulation predictions in those areas that have been completely tested to date. Although continued flight testing is planned, the validity of the basic concept has been proven and the level of performance improvement that can be obtained from a minimum modification design has been established.

AN INVESTIGATION OF MICROWAVE LANDING GUIDANCE SYSTEM SIGNAL REQUIREMENTS FOR CONVENTIONALLY EQUIPPED CIVILIAN AIRCRAFT

Transportation Systems Center, FA08, Technical Report, September 1971

SIMULATION MODEL FOR THE CORVAIR CV-880 AND BOEING 720B AIRCRAFT-AUTOPILOT SYSTEMS IN THE APPROACH CONFIGURATION

Transportation Systems Center, FA12, Preliminary Memorandum

RPT-594 Transportation Systems Center

IALS TIME REDUCTION STUDY

Service Technology Corp., Cambridge, FA12, Technical Report, December 1970

RPT-745 Transportation Systems Center

SYNCHRONIZATION CONTROL IALS DIGITAL PROGRAM SOLUTION TIME-STRIP CHART RECORDER PAPER SPEED (STC-DOT-TSC-43-71-745)

Service Technology Corp., Cambridge, FA12, Technical Report, April 1971

* Document is available to the public through the National Technical Information Service.

17. NAVIGATION, COMMUNICATIONS, DETECTION AND COUNTERMEASURE

SUMMARY REPORT ON IMPLICATIONS OF AUTOMATION FOR ATC CONTROLLERS

Transportation Systems Center, FA13, Technical Report, July 1971

PSD-PWI-1.0 Transportation Systems Center OPTICAL IR PILOT WARNING INDICATOR EVALUATION

FA14, Technical Program Plan

STATIC FIELD TEST PLAN OPTICAL IR PILOT WARNING INDICATOR EVALUATION

Transportation Systems Center, FA14, Test Plan

FAA/NAFEC TEST PLANT TEST AND EVALUATION OF COLLISION PREVENTION PILOT WARNING INSTRUMENTS

Transportation Systems Center, FA14, Technical Report

FTG/71-95 Transportation Systems Center OPTICAL MEASUREMENT REPORT

Flash Technology Corporation of America, FA14, Technical Report, April 1971

FEDERAL HIGHWAY ADMINISTRATION WASHINGTON, D. C. 20590

HIGHWAY COMMUNICATIONS AND DETECTOR SYSTEMS

Transportations Systems Center, HW01, Technical Report

ENVIRONMENTAL RECOMMENDATIONS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

QUALITY ASSURANCE REQUIREMENTS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

RELIABILITY REQUIREMENTS FOR HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

REQUIREMENTS FOR MAINTAINABILITY OF HIGHWAY ELECTRONIC EQUIPMENT

Transportation Systems Center, HW04, Technical Report

AUTOMATIC DETECTION OF VEHICLES IN AERIAL PHOTOGRAPHS OF HIGHWAYS

Transportation Systems Center, J. G. Raudseps, HW05, Conference Paper, May 1971

FEDERAL RAILROAD ADMINISTRATION WASHINGTON, D. C. 20590

DOT-TSC-FRA-71-3 Transportation Systems Center TECHNOLOGICAL INNOVATION IN GRADE CROSSING *

PROTECTIVE SYSTEMS

J. B. Hopkins and M. E. Hazel, RR02, Technical Report, June 1971

Grade crossing protection, train detection, microwave telemetry, and railroad signals.

For primary bibliographic entry, see Field 13.

AUTOMATIC TRAIN CONTROL AND OPERATION STATE-OF-THE-ART TECHNOLOGY

Transportation Systems Center, RR01, Interim Technical Report

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION WASHINGTON, D. C. 20590

DOT-TSC-NASA-70-1 Transportation Systems Center EARTH SURVEY BIBLIOGRAPHY: A KWIC INDEX OF REMOTE SENSING INFORMATION*

W. I. Thompson, III, Technical Report, February 1971, 265 pp.

Earth Resources, Infrared, Radar, Visible, and Microwaves.

For primary bibliographic entry, see Field 8.

DOT-TSC-NA-71-5 Transportation Systems Center LABORATORY EVALUATION OF FECKER AND LORAL OPTICAL IR PWI SYSTEMS *

M. Gorstein, J. N. Hallock, M. Houten, and I. G. McWilliams, Technical Report, February 1971, 81 pp.

Electro-Optical PWI, Flashing Xenon Strobe, Fault Correction, and Calibrate in Azimuth Elevation and Range.

Flight hardware and a flight test evaluation of two Electro-Optical Pilot Warning Indicators, using a flashing xenon strobe and silicon detectors as cooperative elements, were prepared by the previous NASA group prior to the closure of ERC in June 1970. Several design deficiencies are pointed out. The present laboratory evaluation program, which provides the ideal environment for performing the most detailed studies of the PWI system, has corrected these faults which prevented the equipment from operating, and has calibrated the sensitivity of both systems in azimuth elevation and range.

DOT-TSC-NASA-71-6 Transportation Systems Center ATMOSPHERIC TRANSMISSION HANDBOOK: A SURVEY OF ELECTROMAGNETIC WAVE TRANSMISSION IN THE EARTH'S ATMOSPHERE OVER THE FREQUENCY (WAVELENGTH) RANGE 3 kHz (100 km) - 3,000 THz (0.1 μ m) *

W. I. Thompson, III, Technical Report, February, 1971, 300 pp.

Earth-to-Space Paths, Transmission Fundamentals, Transmission Properties, Transmission Information, Propagation, Infrared, Visible, Radio, Microwave, and Ultraviolet.

This handbook presents material on electromagnetic wave transmission in the earth's atmosphere with emphasis on earth-to-space paths up to January 1970. This type of information is needed in such varied fields as air pollution,

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17. NAVIGATION, COMMUNICATIONS, DETECTION AND COUNTERMEASURES

astronomy, communications, earth resources, geodesy, meteorology, and navigation.

Part I presents basic background information dealing with transmission fundamentals, the properties of electromagnetic waves, the electromagnetic spectrum, and the earth's atmosphere.

Part II is a guide to information on the transmission properties of the earth's atmosphere to electromagnetic radiation. A major feature of Part II is the listing of tables of contents of several books and major articles on atmospheric transmission.

Part III contains selected transmission information on the following observable quantities: refraction, absorption, and scattering.

Part IV is a bibliography to be published in a separate volume entitled Atmospheric Transmission Bibliography 1960-1969: A KWIC Index of Electromagnetic Wave Transmission in the Earth's Atmosphere Over the Frequency (Wavelength) Range 3 kHz (100 km) - 3,000 THz (0.1 μ m). The bibliography covers the frequency regions: radio, microwave, infrared, visible, and ultraviolet. There is a listing of citations by local accession number, a key-word-in-context (KWIC) index or permuted title index, and an author index.

DOC. NO. 1724 Transportation Systems Center
DESIGN AND TEST PLAN, BUZZARDS BAY MEASUREMENT INSTRUMENT FOR OCEANOGRAPHIC RESEARCH

H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report

DOT-TSC-50 Transportation Systems Center
NORTH ATLANTIC SATELLITE ATC CENTER STUDY
I.B.M. Corp., NA02, Technical Report

North Atlantic, oceanic control center, satellite system, air traffic control.

A study of present oceanic ATC methods leads to the conclusion that ATC in the North Atlantic should continue to be based on an organized track concept in those areas where traffic densities are high. However, there is clearly a need to improve communications in the North Atlantic area, and a satellite system can provide both communications and surveillance services. The satellite oceanic control center (SOCC) described is highly automated. In implementing such a system it appears desirable initially to use surveillance data derived from the inertial navigation system (INS) and transmitted via data link to the control center. Subsequently, independent surveillance data could be implemented by a two-satellite tone ranging scheme, with the aircraft transponding encoded pressure altitude. The implementation data provided for the proposed SOCC includes data flow paths, sizing analysis, facility design, and staging plan.

TSC-71-6004 Transportation Systems Center
A SATELLITE OCEANIC ATC CENTER
C. E. Bading, I.B.M. Corp., NA02, Technical Report, April 1971

TEST PLAN FOR L-BAND/VHF ATC COMMUNICATIONS EXPERIMENT

Transportation Systems Center, NA05, Technical Report, March 1971

PGS-NA11-1.0 Transportation Systems Center
STOL NAVIGATION AND GUIDANCE DEVELOPMENT PLAN

NA11, Technical Report, November 1970

For primary bibliographic entry, see Field 1.

PGS-NA11-2.0 Transportation Systems Center
SYSTEM SPECIFICATION, PHASE I STOL NAVIGATION AND GUIDANCE SYSTEM

NA11, Technical Report, December 1970

This specification establishes the performance, design, development, and test requirements for the Phase I Navigation and Guidance System. All elements, components, and end items of the system shall conform with the requirements delineated herein.

STC-DOT-TSC-43-71-724 Transportation Systems Center
STOLNAV PALLET EMI PLAN

Service Technology Corp., Cambridge, NA11, Technical Report, April 1971

For primary bibliographic entry, see Field 1.

STC-DOT-TSC-43-71-787 Transportation Systems Center
COMPARISON OF ERRORS AND COMPUTATION LOADING FOR VOR/DME AND DME/DME NAVIGATION MODES IN PLANAR AND SPHERICAL EARTH REPRESENTATIONS

Service Technology Corp., Cambridge, NA11, Technical Report, May 1971

STC-DOT-TSC-43-71-669 Transportation Systems Center
COMPUTATION REQUIRED FOR THE AYA 4 HYPERBOLIC COORDINATE CONVERTER

Service Technology Corp., Cambridge, NA11, Technical Report, February 1971

MATHEMATICAL MODEL OF VOR/DME

Transportation Systems Center, NA11, Technical Report, January 1971

VOR FILTERING ANALYSIS

Transportation Systems Center, NA11, Technical Report, February 1971

VOR/DME TO LATITUDE/LONGITUDE COORDINATE CONVERSION ANALYSIS

Transportation Systems Center, NA11, Technical Report, June 1971

* Document is available to the public through the National Technical Information Service.

17. NAVIGATION, COMMUNICATIONS, DETECTION AND DETECTION

DME/DME/VOR TO LATITUDE/LONGITUDE COORDINATE CONVERSION ANALYSIS

Transportation Systems Center, NA11, Technical Report, May 1971

PGS-NA11-3.A.9.1.1.1 Transportation Systems Center VOR FILTERING FLIGHT MODULE SPECIFICATION

NA11, Technical Report, June 1971

PGS-NA11-3.A.9.1.2.1 Transportation Systems Center TIME DIFFERENCE TO LATITUDE/LONGITUDE CONVERSION FLIGHT MODULE SPECIFICATION

NA11, Technical Report, July 1971

PGS-NA11-3.A.9.1.2.2 Transportation Systems Center VOR/DME TO LATITUDE/LONGITUDE COORDINATE CONVERSION FLIGHT MODULE SPECIFICATION

NA11, Technical Report, May 1971

PGS-NA11-3.A.9.1.2.3 Transportation Systems Center DME/DME/VOR TO LATITUDE/LONGITUDE COORDINATE CONVERSION FLIGHT MODULE SPECIFICATION

NA11, Technical Report, June 1971

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION WASHINGTON, D. C. 20591

DOT-TSC-NHTSA-71-3 Transportation Systems Center DEVELOPMENT OF ANTICIPATORY AUTOMOBILE CRASH SENSORS *

Hopkins, Holmstrom, Apgar, Hazel, White, and Newfell, Annual Report: July 1970 - June 1971, HS04.

Automobile Safety, Occupant Protection, Passive Restraint Activation, and Anticipatory Crash Sensing.

For primary bibliographic entry, see Field 13.

SPECIAL REPORT OF THE TIRE TESTING TASK FORCE

Transportation Systems Center, HS03, Technical Report, October 1970

TSC-10018 Transportation Systems Center MICROWAVE CRASH SENSOR FOR AUTOMOBILES

Dr. F. R. Holmstrom and Dr. J. B. Hopkins, HS04, Patent Disclosure

TSC-16025 Transportation Systems Center FOCUSING, PROTECTIVE ENCLOSURE FOR ULTRASONIC TRANSDUCER

Dr. E. G. Apgar, HS04, Patent Disclosure

OFFICE OF THE SECRETARY OF TRANSPORTATION WASHINGTON, D. C. 20590

DOT-TSC-OST-71-4 Transportation Systems Center A THEORY OF AIRCRAFT COLLISION AVOIDANCE SYSTEM DESIGN AND EVALUATION *

Edmund J. Koenke, Technical Report, March 1971, 184 pp. Anti-collision system, Collision avoidance, Air traffic models, Collision detection and avoidance, and Traffic model formulations (air).

The problem of aircraft anti-collision system design and evaluation is discussed in this work. Two evaluation criteria, "conflict ratio and probability of missed critical alarm" are formulated and are found to be independent of both traffic density and traffic model. These parameters depend only on system alarm thresholds, critical miss distances and relative position prediction uncertainty. This results in a simple method for system evaluation and examination of new anti-collision concepts. A closed-form method for estimating system alarm rate is also developed based on both a new traffic model and empirical data. Anti-collision systems are numerically compared by use of the criteria developed in this thesis. In the terminal area it is found that the "conflict ratio" ranges from about 900 for a simple PWI device to about 25 for a full state collision avoidance system. The difference in the en-route environment is found to be less severe. The design of a low conflict ratio collision avoidance system is also discussed in this thesis and both an algorithm and display are developed.

DOT-TSC-OST-71-8 Transportation Systems Center A REVIEW OF AVAILABLE L-BAND AND VHF AIRCRAFT ANTENNAS FOR AN AIRCRAFT-SATELLITE COMMUNICATIONS LINK *

OS08, Technical Report, May 1971, 93 pp.

L-Band Antenna, VHF Antenna, Slot-Dipole Antenna, and Boeing.

One of the problems encountered in designing an aircraft to use a satellite system for communications (and for surveillance and navigation) is that of finding a suitable aircraft antenna. There is, at present, no antenna which will satisfy all requirements. The purpose of this paper is to briefly review the characteristics of some of the L-Band and VHF antennas which have been proposed for an aircraft-satellite link.

DOT-TSC-OST-71-12 Transportation Systems Center AN AIRPORT AIRSIDE SYSTEM MODEL *

I. Englander, OS04, Technical Report, June 1971

For primary bibliographic entry, see Field 9.

ANALYTICAL REQUIREMENTS FOR ANALYSIS AND SIMULATION FOR ATC SYSTEMS

Transportation Systems Center, OS03, Technical Report, July 1971

ATC REAL TIME EXPERIMENTAL RESULTS

Transportation Systems Center, OS03, Internal Report, July 1971

* Document is available to the public through the National Technical Information Service.

20. PHYSICS

**D6-24898 Transportation Systems Center
PHASE I REPORT - STUDY AND CONCEPT FORMULATION OF A FOURTH GENERATION AIR TRAFFIC CONTROL SYSTEM**

Boeing, OS04, Technical Report, April 1971

For primary bibliographic entry, see Field 1.

**C71-61.5/301 Transportation Systems Center
STUDY AND CONCEPT FORMULATION FOR A FOURTH GENERATION AIR TRAFFIC CONTROL SYSTEM**

Autonetics, OS04, Interim Report, April 1971

**DOT-TSC-140 Transportation Systems Center
CONCEPT FORMULATION STUDIES OF THE CONTROL ASPECTS OF THE FOURTH GENERATION AIR TRAFFIC CONTROL SYSTEM**

MIT/Lincoln Laboratory, Cambridge, OS04, Interim Report, April 1971

FOURTH GENERATION AIR TRAFFIC CONTROL SYSTEM PROGRAM PLAN

Transportation Systems Center, OS04, Technical Report, February 1971

PRELIMINARY EVALUATION OF METAL DETECTORS FOR USE IN AIRPORT SCREENING SYSTEMS

Transportation Systems Center, OS13, Technical Report, February 1971

PRELIMINARY EVALUATION OF METAL DETECTORS FOR USE IN AIRPORT SCREENING SYSTEMS

Transportation Systems Center, OS13, Technical Report, February 1971

TECHNICAL EVALUATION OF METAL DETECTORS FOR CONCEALED WEAPONS

Transportation Systems Center, OS13, Technical Report, June 1971

**URBAN MASS TRANSPORTATION ADMINISTRATION
WASHINGTON, D. C. 20590**

STUDY OF RADAR SURVEILLANCE FOR HEADWAY CONTROL

Transportation Systems Center, UM05, Working Paper

18. NUCLEAR SCIENCE AND TECHNOLOGY

No reports.

19. ORDNANCE

Includes the following Groups: Ammunition, Explosives, and Pyrotechnics; Bombs; Combat Vehicles; Explosions, Ballistics, and Armor; Fire Control and Bombing Systems; Guns; Rockets; Underwater Ordnance.

**OFFICE OF THE SECRETARY OF TRANSPORTATION
WASHINGTON, D. C. 20590**

PRELIMINARY EVALUATION OF FLUXGATE MAGNETOMETERS AND ACTIVE METAL DETECTORS

Transportation Systems Center, OS13, Conference Paper, January 1971

PRELIMINARY EVALUATION OF METAL DETECTORS FOR USE IN AIRPORT SCREENING SYSTEMS

Transportation Systems Center, OS13, Technical Report, February 1971

TECHNICAL EVALUATION OF METAL DETECTORS FOR CONCEALED WEAPONS

Transportation Systems Center, OS13, Technical Report, June 1971

20. PHYSICS

Includes the following Groups: Acoustics; Crystallography; Electricity and Magnetism; Fluid Mechanics; Masers and Lasers; Optics; Particle Accelerators; Particle Physics; Plasma Physics; Quantum Theory, Solid Mechanics; Solid-state Physics, Thermodynamics; Wave Propagation.

**UNITED STATES COAST GUARD
WASHINGTON, D. C. 20591**

**DOT-TSC-CG-71-3 Transportation Systems Center
TWO CANDIDATE SYSTEMS FOR UNMANNED FOG BANK DETECTION ***

J. R. Lifshitz and H. C. Ingraio, CG02, Technical Report, June 1971

Fog Bank Detection, LIDAR, Aid-to-Navigation, and Radiometer.

For primary bibliographic entry, see Field 17.

**FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D. C. 20590**

**RPT-629 Transportation Systems Center
ILS BEAM NOISE OPTIONS FOR CTOL SUBROUTINE BNOS**

Service Technology Corp., Cambridge, FA07, Technical Report, March 1971

For primary bibliographic entry, see Field 9.

**STC-DOT-TSC-43-71-823 Transportation Systems Center
FEASIBILITY STUDY OF CATEGORY II LANDINGS USING A CATEGORY I LOCALIZER BEAM**
Service Technology Corp., Cambridge, FA07, Technical Report, June 1971

* Document is available to the public through the National Technical Information Service.

Category II landings, localizer beam specifications, and inertially aided ILS (Instrument Landing System)
For primary bibliographic entry, see Field 17.

**NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
WASHINGTON, D. C. 20590**

DOT-TSC-NASA-71-6 Transportation Systems Center
ATMOSPHERIC TRANSMISSION HANDBOOK: A SURVEY OF ELECTROMAGNETIC WAVE TRANSMISSION IN THE EARTH'S ATMOSPHERE OVER THE FREQUENCY (WAVELENGTH) RANGE 3 kHz (100 km) - 3,000 THz (0.1 μ m) *

W. I. Thompson, III, Technical Report, February 1971, 300 pp.

Earth-to-Space Paths, Transmission Fundamentals, Transmission Properties, Transmission Information, Propagation, Infrared, Visible, Radio, Microwave, and Ultraviolet.

For primary bibliographic entry, see Field 17.

DOT-TSC-NASA-71-7 Transportation Systems Center
MILLIMETER-WAVE GENERATION WITH SPIRALING ELECTRON BEAMS *

Bernhard Kulke, NA10, Technical Report, February 1971, 98 pp.

Spiraling Electron Beam, Microwave Cavity, 9.4 and 94 GHz, and High-Power Millimeter Waves

An investigation has been carried out of the feasibility of using the interaction between a thin, solid, spiraling electron beam of 10-20kV energy and a microwave cavity to generate watts of CW millimeter-wave power. Experimental results are given for several prototype devices operating at 9.4 GHz and at 94 GHz. Power outputs of 5W, and electronic efficiencies near 3%, were obtained at X-band, and moderate gain was obtained at 94 GHz. The small-signal theory gives a good fit to the X-band data, and the device behavior at 94 GHz is as expected from the given beam characteristics. The performance is limited chiefly by the velocity spread in the spiraling electron beam, and once this can be brought under control, high-power generation of millimeter waves appears quite feasible with this type of device.

DOT-TSC-NASA-71-10 Transportation Systems Center
EVALUATION OF NONDESTRUCTIVE TENSILE TESTING *

J. J. Bowe and S. M. Polcari, NA08, Technical Report, May 1971

Semiconductor Devices, Nondestructive Testing, and Chip and Wire Bonding.

For primary bibliographic entry, see Field 9.

DOC. NO. 1693A Transportation Systems Center
HANDBOOKS, MICROWAVE RADIOMETERS, BUZZARDS BAY MEASUREMENT INSTRUMENT FOR OCEANOGRAPHIC RESEARCH

P. Gatti, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report

DOC. NO. 1737 Transportation Systems Center
FINAL REPORT, CONTRACT DOT-TSC-14

H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report

DOC. NO. 1740 Transportation Systems Center
PRELIMINARY RESULTS, APRIL 5 - JUNE 15, 1971, BUZZARDS BAY MEASUREMENT INSTRUMENT FOR OCEANOGRAPHIC RESEARCH

H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report, June 1971

**NATIONAL HIGHWAY TRAFFIC AND
SAFETY ADMINISTRATION
WASHINGTON, D. C. 20591**

DOT-TSC-NHTSA-71-1 Transportation Systems Center
OCCUPANT MOTION SENSORS *

J. L. Horner, Ph.D., HS05, Technical Report, July 1970 - January 1971, 54 pp.

Fourier Spectrum, Bandwidth, Acceleration, Rotational Motion, Sensors, and Transducers.

For primary bibliographic entry, see Field 13.

DOT-TSC-NHTSA-71-4 Transportation Systems Center
OCCUPANT MOTION SENSORS: METHODS OF DETECTION AND ANALYSIS *

J. L. Horner, D. S. Ofsevit, G. R. Plank, and G. G. Lawrence, HS05, Technical Report, July 1971, 55 pp.

Bandwidth, Rotational Motion, Fourier Analysis, Sensor, Transducer, Acceleration, Angular Motion, and Digital Filtering.

For primary bibliographic entry, see Field 13.

DOT-TSC-NHTSA-71-5 Transportation Systems Center
SURVEY OF NON-DESTRUCTIVE TIRE INSPECTION TECHNIQUES *

A. L. Lavery, I. Litant, R. P. Ryan, N. Knable, and H. L. Cecon, Preliminary Memorandum, July 1971

For primary bibliographic entry, see Field 13.

**URBAN MASS
TRANSPORTATION ADMINISTRATION
WASHINGTON, D. C. 20590**

A SURVEY OF POWER CONDITIONERS FOR THE TACV DULLES PROJECT

Transportation Systems Center, R. A. Cacossa, UM01, Preliminary Report, March 1971

TACV NOISE POLLUTION

Transportation Systems Center, G. Economou, UM01, Preliminary Report, December 1970

21. PROPULSION AND FUELS

Includes the following Groups: Air-breathing Engines; Combustion and Ignition; Electric Propulsion; Fuels; Jet

* Document is available to the public through the National Technical Information Service.

21. PROPULSION AND FUELS

and Gas Turbine Engines; Nuclear Propulsion; Reciprocating Engines; Rocket Motors and Engines; Rocket Propellants.

FEDERAL RAILROAD ADMINISTRATION WASHINGTON, D. C. 20590

DOT-TSC-FRA-71-1A Transportation Systems Center **POWER CONDITIONING FOR HIGH-SPEED TRACKED VEHICLES ***

F. L. Raposa, RR05, Interim Technical Report, February 1971, 65 pp.

Linear Induction Motor, Speed Control, Power Conditioner, On-Board Electric Power Sources, and Wayside Electric Power Sources.

The linear induction motor is to provide the propulsion of high-speed tracked vehicles and speed control of the motor is essential for vehicle operation. The purpose of power conditioning is to provide the matching interface between the available power and the desired power for driving the motor. As an integral part of the propulsion system the power conditioner provides the means for controlling both the thrust and the braking of the vehicle.

This interim technical report identifies and describes candidate power conditioners for driving linear induction motors in the variable frequency power mode. The power conditioners described include those for application with either on board electric power sources or with wayside electric power sources.

DOT-TSC-FRA-71-2 Transportation Systems Center **METROLINER AUXILIARY POWER ELECTRICAL SYSTEM RELIABILITY STUDY ***

J. D. Abbas and C. W. Watt, Jr., Interim Report, June 1971, 135 pp.

The reliability of the electrical system of any vehicle is greatly affected by the way the system is configured. The propulsion and braking systems of a train must be unaffected by failures occurring in the nonessential power areas. With these criteria in mind the so-called "Auxiliary Power System" of the Metroliner car was analyzed. This auxiliary power system was found to be deficient in achieving these ends. Recommendations suggest methods of satisfying these criteria by segregating the essential from the nonessential elements, thereby enhancing the overall availability of the Metroliner car.

RAILROAD POLLUTION CONTROL

Transportation Systems Center, RR01, Work Statement

OFFICE OF THE SECRETARY OF TRANSPORTATION WASHINGTON, D. C. 20590

DOT-TSC-OST-71-5 Transportation Systems Center **AIRCRAFT EMISSIONS SURVEY ***

A. J. Broderick, W. F. Harriott, and R. A. Walter, OS10, Technical Memorandum: July 1970 - March 1971

Air Pollution, Gas Turbines, Emissions, Jet Engines, and Instrumentation.

For primary bibliographic entry, see Field 1.

LOW-POLLUTION PROPULSION TECHNOLOGY BUILD-UP PLAN

Transportation Systems Center, OS14, Technical Report

GAS TURBINE POWERED TRUCKS

Transportation Systems Center, D. Sheldon, OP01, Technical Report Memorandum, April 1971

PROPULSION, BRAKING AND POWER SYSTEMS

Transportation Systems Center, R. Cacossa, H. Zuckerburg, and J. Barber, OP10, Technical Memorandum, April 1971

POLLUTION FREE VEHICLES

Transportation Systems Center, D. Sheldon, OP01, Technical Report, April 1971

URBAN MASS

TRANSPORTATION ADMINISTRATION WASHINGTON, D. C. 20590

A SURVEY OF POWER CONDITIONERS FOR THE TACV DULLES PROJECT

Transportation Systems Center, R. A. Cacossa, UM01, Preliminary Report, March 1971

ELECTRIC POWER SUPPLY FROM VIRGINIA ELECTRIC AND POWER COMPANY (VEPCO) TO THE DULLES PROJECT

Transportation Systems Center, Alexander Kusko, Inc., UM01, Technical Report, March 1971

LINEAR INDUCTION MOTOR FOR THE DULLES PRO- JECT

Transportation Systems Center, Alexander Kusko, Inc., UM01, Technical Report, March 1971

LIM PRIMARY VOLTAGE PHASE CONTROL

Transportation Systems Center, Alexander Kusko, Inc., UM01, Technical Report, March 1971

AUXILIARY POWER SYSTEM

Transportation Systems Center, UM01, Preliminary Report, March 1971

POWER CONTROL SYSTEM

Transportation Systems Center, UM01, Preliminary Report, March 1971

TECHNICAL SUMMARY FOR POWER COLLECTION

Transportation Systems Center, C. H. Spenny, UM01, Preliminary Report, March 1971

SLIDING CONTACT POWER COLLECTION SURVEY OF EXISTING POWER COLLECTION SYSTEMS

Transportation Systems Center, C. H. Spenny, UM01, Preliminary Report, March 1971

* Document is available to the public through the National Technical Information Service.

TRAPATT OSCILLATIONS IN A P-I-N AVALANCHE DIODE

Transportation Systems Center, D. Parker, Stanford Research Institute, Menlo Park, Calif., NA04, IEE Transactions article, Vol. ED-18, No. 5, May 1971

TRAPATT OSCILLATIONS WITH A HALF-WAVE RECTIFIED SINE WAVE CURRENT

Transportation Systems Center, D. Parker, Stanford Research Institute, Menlo Park, Calif., NA04, Letter in IEEE Proceedings, May 1971

TEST PLAN FOR L-BAND/VHF ATC COMMUNICATIONS EXPERIMENT

Transportations Systems Center, NA05, Technical Report, March 1971

AVIS STATEMENT OF WORK

Transportation Systems Center, NA09, Working Paper

MIDAS USERS MANUAL

Transportation Systems Center, Service Technology Corp., Cambridge, NA09, Technical Report, June 1971

MIDAS SAMPLE DATA

Transportation Systems Center, Service Technology Corp., Cambridge, NA09, Technical Report, June 1971

MIDAS PROGRAM DESCRIPTION

Transportation Systems Center, Service Technology Corp., Cambridge, NA09, Technical Report, June 1971

STC-DOT-TSC-43-71-599 Transportation Systems Center**MICROELECTRONIC DATA BANK**

Service Technology Corp., Cambridge, NA09, Technical Report, January 1971

STC-DOT-TSC-43-71-601 Transportation Systems Center**MICROELECTRONIC DATA BANK PROPOSED DATA FIELDS**

Service Technology Corp., Cambridge, NA09, Technical Report, January 1971

STC-DOT-TSC-43-71-625 Transportation Systems Center**MICROELECTRONIC DATA BANK TECHNICAL DISCUSSION**

Service Technology Corp., Cambridge, NA09, Technical Report, February 1971

STC-DOT-TSC-43-71-669 Transportation Systems Center**COMPUTATION REQUIRED FOR THE AYA 4 HYPERBOLIC COORDINATE CONVERTER**

Service Technology Corp., Cambridge, NA11, Technical Report, February 1971

STC-DOT-TSC-43-71-724 Transportation Systems Center**STOLNAV PALLET EMI PLAN**

Service Technology Corp., Cambridge, NA11, Technical Report, April 1971

For primary bibliographic entry, see Field 1.

STC-DOT-TSC-43-71-782 Transportation Systems Center**DISTORTIONS IN DISTANCE FROM ORIGIN IN PLANAR MAPPING OF EARTH SURFACE**

Service Technology Corp., Cambridge, NA11, Technical Report, May 1971

STC-DOT-TSC-43-71-787 Transportation Systems Center**COMPARISON OF ERRORS AND COMPUTATION LOADING FOR VOR/DME AND DME/DME NAVIGATION MODES IN PLANAR AND SPHERICAL EARTH REPRESENTATIONS**

Service Technology Corp., Cambridge, NA11, Technical Report, May 1971

STC-DOT-TSC-43-71-794 Transportation Systems Center**ERRORS DUE TO USE OF ALTITUDE MEASUREMENT IN PLANAR REPRESENTATION OF EARTH SURFACE**

Service Technology Corp., Cambridge, NA11, Technical Report, May 1971

PGS-NA11-1.0 Transportation Systems Center**STOL NAVIGATION AND GUIDANCE DEVELOPMENT PLAN**

NA11, Technical Report, November 1970

For primary bibliographic entry, see Field 1.

PGS-NA11-2.0 Transportation Systems Center**SYSTEM SPECIFICATION PHASE I STOL NAVIGATION AND GUIDANCE SYSTEM**

NA11, Technical Report, December 1970

For primary bibliographic entry, see Field 17.

MATHEMATICAL MODEL OF VOR/DME

Transportation Systems Center, NA11, Technical Report, January 1971

VOR FILTERING ANALYSIS

Transportation Systems Center, NA11, Technical Report, February 1971

VOR/DME TO LATITUDE/LONGITUDE COORDINATE CONVERSION ANALYSIS

Transportation Systems Center, NA11, Technical Report, June 1971

DME/DME/VOR TO LATITUDE/LONGITUDE COORDINATE CONVERSION ANALYSIS

Transportation Systems Center, NA11, Technical Report, May 1971

* Document is available to the public through the National Technical Information Service.

22. SPACE TECHNOLOGY

22. SPACE TECHNOLOGY

Includes the following Groups: Astronautics; Spacecraft; Spacecraft Trajectories and Reentry; Spacecraft Launch Vehicles and Ground Support.

FEDERAL AVIATION ADMINISTRATION WASHINGTON, D. C. 20590

AIAA NO. 71-770 Transportations Systems Center
4-D GUIDANCE OF STOL AIRCRAFT

R. J. Hynes, L. E. Stevenson, and E. B. Capen, AIAA Paper, July 1971

For primary bibliographic entry, see Field 17.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION WASHINGTON, D. C. 20590

DOT-TSC-NASA-70-1 Transportation Systems Center
**EARTH SURVEY BIBLIOGRAPHY: A KWIC INDEX OF
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W. I. Thompson, III, Technical Report, February 1971, 265 pp.

Earth Resources, Infrared, Radar, Visible, and Microwaves.

For primary bibliographic entry, see Field 8.

DOT-TSC-NA-71-5 Transportation Systems Center
**LABORATORY EVALUATION OF FECKER AND LORAL
OPTICAL IR PWI SYSTEMS ***

M. Gorstein, J. N. Hallock, M. Houten, and I. G. McWilliams, Technical Report, February 1971, 81 pp.

Electro-Optical PWI, Flashing Xenon Strobe, Fault Correction, Calibrate in Azimuth, and Elevation and Range.

For primary bibliographic entry, see Field 17.

DOT-TSC-NASA-71-6 Transportation Systems Center
**ATMOSPHERIC TRANSMISSION HANDBOOK: A SUR-
VEY OF ELECTROMAGNETIC WAVE TRANSMISSION IN
THE EARTH'S ATMOSPHERE OVER THE FREQUENCY
(WAVELENGTH) RANGE 3 kHz (100 km) - 3,000 THz
(0.1 μ m) ***

W. I. Thompson, III, Technical Report, February 1971, 300 pp.

Earth-to-Space Paths, Transmission Fundamentals, Transmission Properties, Transmission Information, Propagation, Infrared, Visible, Radio, Microwave, and Ultraviolet.

For primary bibliographic entry, see Field 17.

DOT-TSC-NASA-71-7 Transportation Systems Center
**MILLIMETER-WAVE GENERATION WITH SPIRALING
ELECTRON BEAMS ***

B. Kulke, NA10, Technical Report, February 1971, 98 pp.
Spiraling Electron Beam, Microwave Cavity, 9.4 and 94 GHz, and High-Power Millimeter Waves.

For primary bibliographic entry, see Field 20.

DOT-TSC-NASA-71-8 Transportation Systems Center
MULTI-SENSOR NAVIGATION SYSTEM DESIGN *

D. R. Downing, Technical Report, March 1971, 138 pp.

Multi-Sensor Navigation Systems, Design Procedure, Design Option, and System Evaluation.

For primary bibliographic entry, see Field 9.

DOT-TSC-NASA-71-9 Transportation Systems Center
METALLIZATION FAILURES *

R. Beatty, Technical Report, May 1971, 116 pp.

Metallization Failures, Integrated Circuit Failures, Metallization Material, Multilevel Material, Integrated Circuit Design, and Beam Lead Technology.

For primary bibliographic entry, see Field 9.

DOT-TSC-NASA-71-10 Transportation Systems Center
**EVALUATION OF NONDESTRUCTIVE TENSILE TEST-
ING ***

J. J. Bowe and S. M. Polcari, NA08, Technical Report, May 1971

Semiconductor Devices, Nondestructive Testing, and Chip and Wire Bonding.

For primary bibliographic entry, see Field 9.

DOT-TSC-NASA-71-10 Transportation Systems Center
**MEASUREMENTS OF TRANSATMOSPHERIC ATTENUA-
TION STATISTICS AT THE MICROWAVE FREQUEN-
CIES: 15, 19 and 34 GHz ***

G. G. Haroules, W. E. Brown, III, and G. J. Bishop, Technical Report, June 1971

Earth-to-space paths, Electromagnetic Wave Propagation, and Atmospheric Attenuation.

For primary bibliographic entry, see Field 3.

DOC. NO. 1724 Transportation Systems Center
**DESIGN TEST PLAN, BUZZARDS BAY MEASUREMENT
INSTRUMENT FOR OCEANOGRAPHIC RESEARCH**

H. I. Ewen and A. H. Barrett, Ewen Knight Corp., Wellesley, Mass., NA01, Technical Report

DOT-TSC-50 Transportation Systems Center
NORTH ATLANTIC SATELLITE ATC CENTER STUDY

I.B.M. Corp., NA02, Technical Report

North Atlantic, ocean control center, satellite system, air traffic control.

For primary bibliographic entry, see Field 17.

TSC-71-6004 Transportation Systems Center
A SATELLITE OCEANIC ATC CENTER

C. E. Bading, I.B.M. Corp., NA02, Technical Report, April 1971

**DEVELOPMENT OF HIGH POWER TRANSFERRED
ELECTRON DEVICES FOR X- AND Ku-B AND OSCIL-
LATORS**

Transportation Systems Center, S. Y. Narayan and A. R. Gobat, RCA Electronics Components, Princeton, N.J., NA04, Technical Report, October 1970

**AVALANCHE DIODE OSCILLATOR CIRCUIT WITH
TUNING AT MULTIPLE FREQUENCIES**

Transportation Systems Center, D. Parker, et al, Stanford Research Institute, Menlo Park, Calif., NA04, Technical Report, February 1971

* Document is available to the public through the National Technical Information Service.

PGS-NA11-3.A.9.1.2.1 Transportation Systems Center
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 NA11, Technical Report, July 1971

PGS-NA11-3.A.9.1.1.1 Transportation Systems Center
VOR FILTERING FLIGHT MODULE SPECIFICATION
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PGS-NA11-3.A.9.1.2.2 Transportation Systems Center
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 NA11, Technical Report, May 1971

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 NA11, Technical Report, June 1971

DOT-TSC-NASA-71-1 Transportation Systems Center
**END ITEM SPECIFICATION PARTS 1 AND 2, PARTS
 AND MATERIALS LIST, FM&A (FAILURE MODE AND
 EFFECTS ANALYSES NON-METALLIC MATERIALS
 LIST FOR IN FLIGHT AEROSOL ANALYSIS EXPERI-
 MENT T-003**
 NA12, Technical Report, December 1970

DOT-TSC-NASA-71-2 Transportation Systems Center
**RELIABILITY AND QUALITY ASSURANCE PLAN FOR
 IN-FLIGHT AEROSOL ANALYSIS EXPERIMENT T-003**
 NA12, Technical Report, December 1970

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**ASTRONAUT OPERATIONS REQUIREMENTS DOCU-
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 MENT T-003**
 NA12, Technical Report, January 1971

DOT-TSC-NASA-71-4 Transportation Systems Center
**TEST PLAN FOR IN-FLIGHT AEROSOL ANALYSIS
 EXPERIMENT T-003**
 NA12, Technical Report, December 1970

REPORT NO. 5354 Transportation Systems Center
**T-003 AEROSOL ANALYZER ELECTRONICS SUB-
 SYSTEM FINAL DESIGN**
 Bendix Corp., NA12, Technical Report

REPORT NO. 5338 Transportation Systems Center
**ELECTRONICS ASSEMBLY, AEROSOL ANALYZER PRO-
 GRAM RELIABILITY AND QUALITY ASSURANCE PLAN**
 NA12, Technical Report, October 1970

**OFFICE OF THE SECRETARY
 OF TRANSPORTATION
 WASHINGTON, D. C. 20590**

DOT-TSC-OST-71-8 Transportation Systems Center
**A REVIEW OF AVAILABLE L-BAND AND VHF AIR-
 CRAFT ANTENNAS FOR AN AIRCRAFT-SATELLITE
 COMMUNICATIONS LINK ***
 The Telecommunications Division, OS08, Technical Report,
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 L-Band Antenna, VHF Antenna, Slot-Dipole Antenna, and
 Boeing.

For primary bibliographic entry, see Field 17.

CONTROLLER FUNCTIONS
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 Technical Report, July 1971

* Document is available to the public through the National Technical Information Service.

