Reference

REPORT NO. DOT-TSC-OST-72-34, SUPPLEMENT I

# REPORTS BIBLIOGRAPHY SUPPLEMENT 1 JANUARY-JUNE 1973 UNLIMITED-DISTRIBUTION REPORTS

Transportation Systems Center
Management Services Division
Information Services Branch
Kendall Square
Cambridge MA 02142



SEPTEMBER 1973

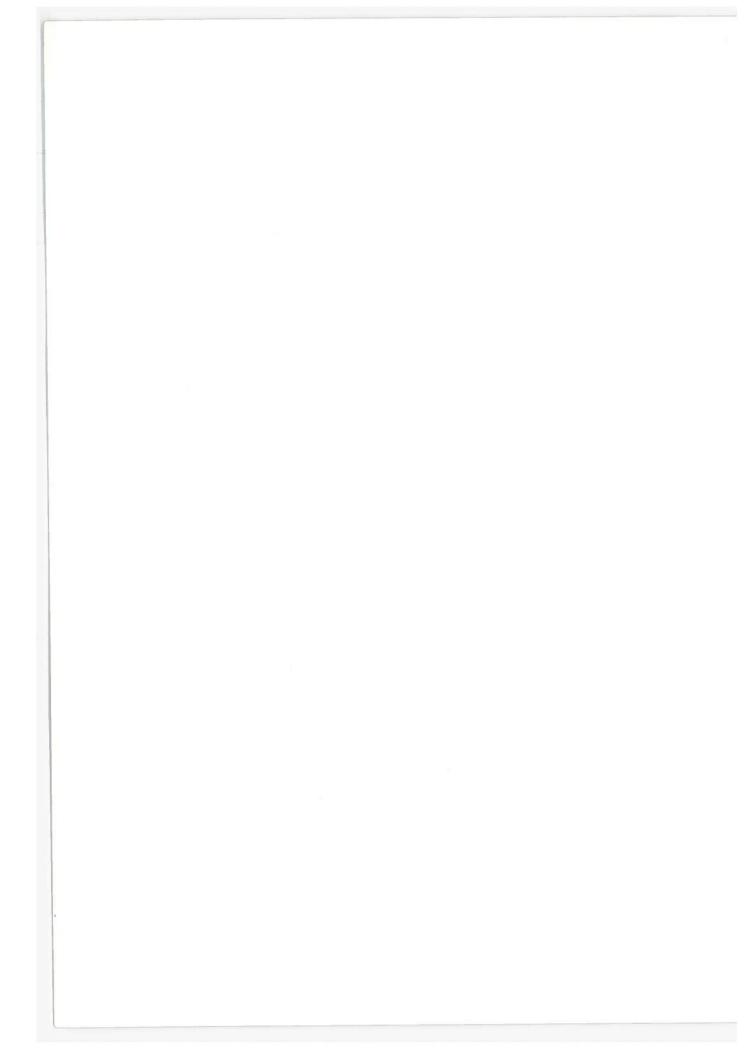
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OFFICE OF THE SECRETARY
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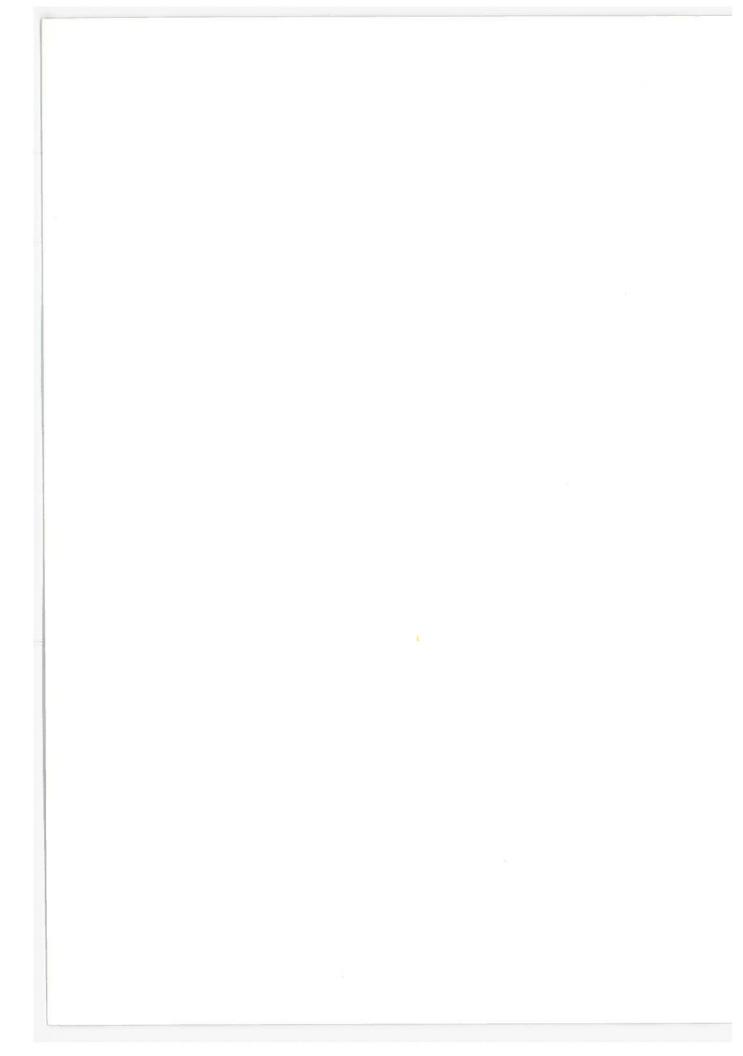
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16. Abstract				
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# UNLIMITED-DISTRIBUTION REPORTS FEDERAL AVIATION ADMINISTRATION

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ALS Localizer Performance Study-Part 1: Dallas/Fort Worth Regional Airport and Model Validation - Syracuse Hancock Airport, by C. Chin, L. Jordan, D. Kahn, S. Morin, and D. Newsom, Final Report, July 1972

DOT-TSC-FAA-72-20/FAA-RD-72-109
Preliminary Evaluation of Synthetic Speech,
by E. Hilborn,
Interim Report, August 1972

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by G. Wang,
Final Report, April 1973

DOT-TSC-FAA-72-26/FAA-RD-72-142 Oceanic Surveillance and Navigation Analysis, FY72, by G. Gagne and R. Hershkowitz, Final Report, March 1973

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Instrument Landing System Scattering,
by G. Chin, L. Jordan, D. Kahn and S. Morin,
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AD754517

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AD758407

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A System of Sixteen Synchronous Satellites for Worldwide Navigation,
by J. Morrison,
Interim Report, March 1973

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DOT-TSC-FAA-72-32/FAA-RD-73-22 O'Hare ASDE-2 Radome Performance in Rain; Analysis and Improvement, by R. Weigand, Final Report, March 1973

AD757744

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A Preliminary Requirements Analysis for Airport Surface Traffic Control Systems,
by G. Baran, R. A. Bales, J. F. Koetsch, and R. E. Le Van
Interim Report, January 1973 (Contractor Report)

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AD760401

DOT-TSC-FAA-73-3
Flight Plans: Stol Avionics Flight Test Program,
by L. Hyatt,
Preliminary Memorandum, April 1973 (Contractor Report)

DOT-TSC-FAA-73-6/FAA-RD-73-55
Human Factors Experiments for Data Link
Interim Report No. 2,
by E. H. Hilborn,
Interim Report, April 1973

DOT-TSC-FAA-73-8/FAA-RD-73-75
Feasibility Analysis of an Air Traffic Control Radar Beacon
System (ATCRBS) Based Surface Trilateraction Surveillance
System,
by J. Vinatieri
Final Report, June 1973 (Contractor Report)

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1. Report No.	2. Government Acce	ssion No. 3	Recipient & Catalog	No.
FAA-RD-72-96				
4. Title and Subtitle ILS LOCALI	ZER PERFORM	ANCE STUDY - 15	Report Date	
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7. Author's) G. Chin, L. Jo	rdan, D. Ka	hn .	Performing Organiza	tion Report Ne.
S. Morin and D. Newso	m =	· 1	OT-TSC-FAA	72-15
9. Performing Organization Name and Address Department of Transpo	*	10.	Work Unit No.	
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Cambridge, MA 02142			Type of Report and	
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localizer (Alford 1B)	is used but	only marginal	ly accepta	ble when
the Standard V-Ring I	ocalizer is	used. Categor	v II requi	rements for
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17. Key Words Dallas Fort Wor	tn Regional	18. Distribution Statement		
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1. Report AA-RD-72-109	2. Government Accession No.	J. Recipient's Catalog No.	
4. Title and Subtitle		5. Report Date August 1972	
PRELIMINARY EVALUATION	ON OF SYNTHETIC SPEECH	6. Performing Organization Code	
Author(s) Edwin H. Hil	lborn	6. Performing Organization Report No. DOT-TSC-FAA-72-20	
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5. Supplementary Notes			

### 16. Abstract

This report briefly discusses the methods for storing and generating synthetic speech and a preliminary evaluation of the intelligibility of a speech synthesizer having a 75-word vacabulary selected for air traffic control messages. A program is suggested for additional testing based upon a vocabulary expanded to 128 words.

18. Distribution Stetement

Synthetic Speech, Air Traffic
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18. Distribution Stetement

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FAA-RD-72-101	2. Government Accession No.	3 Recipient's Catalog No	
4. Title end Subtitle ADVANCED COMPUTER ARCHITECTURE FOR		5 Report Date April 1973	
LARGE-SCALE REAL-TIME	APPLICATIONS	6. Performing Organization Code	
7. Author(s) Gary Y. Wang		8 Performing Organization Report No DOT-TSC-FAA-72-21	
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Washington, D.C. 205	91	14. Sponsoring Agency Code	

#### 15. Supplementary Notes

#### 16. Abatract

In this study the air traffic control automation is identified as a crucial problem which provides a complex, real-time computer application environment. A novel computer architecture in the form of a pipeline associative processor is conceived to achieve greater performance improvement over the present air traffic control system by parallel processing. This new processor is structured into a multiprocessor configuration for reliability enhancement. Problems associated with multiprocessors are identified with special emphasis on execution time anomalies and memory conflict. A direct graph model is used for analysis from which simple heuristics are established for memory allocation and dynamic task scheduling to achieve optimal performance with minimal system overhead. These schemes are simulated and the results obtained follow closely the predicted

17. Key Words Parallel Processor, Associative Processor, Multiprocessing, Memory Allocation, Dynamic Task Scheduling, Graph Modelling, Air Traffic, Real-Time Systems

18. Distribution Statement

DOCUMENT IS AVAILABLE TO THE PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22151.

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1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
FAA-RD-72-142			
4. Title and Subtitle	AND NAVIGATION ANALYSIS,	5. Report Date August 1972	
FY72	MD MAVIGATION ANABIOTO,	6. Performing Organization Code	
7. Author(s)		8. Performing Organization Report No.	
Gilbert A Gagne, Rona	ald M. Hershkowitz	DOT-TSC-FAA-72-26	
9. Performing Organization Name and Add Department of Transpo	ortation	10. Werk Unit No. R3144	
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15. Supplementary Notes			

This report summarizes the Oceanic Surveillance and Navigation Analysis performed, at or under the direction of, the Transportation Systems Center under PPA FA-204 for FY72. A methodology has been developed by Systems Control, Inc. for relating the safety (collision risk) of the North Atlantic organized Track System in the lateral dimension to the general characteristics of the on-board navigation system, the independent satellite surveillance system and the ATC procedures. The initiation of this effort by TSC was reported in TR DOT-TSC-FAA-71-13. The analysis and results are detailed herein. Extensions of this methodology to the latitude and vertical dimensions are also discussed and preliminary results are presented. A study has also been initiated to investigate and evaluate various configurations of aided inertial navigation system in the NAT region. The requirements, goals and contract award for this study are reviewed.

March, 1973  17. Key Words Air Traffic Cont Collision Risk Model, Hy ertial Navigation, Satel veillance, Latitude, ver Longitudinal separation	brid - In- lite Sur-	18. Distribution Statement  DOCUMENT IS AVAIL  THROUGH THE NATI INFORMATION SERV VIRGINIA 22181.	ONAL TECHNICAL ICE, SPRINGFIELD,	
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1. Report No. FAA-RD-72-137	2. Gavernment	Accession No.	3. Recipient's Cer	alog No.
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7. Author(s)			8. Performing Orga	Inization Report No.
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Signal Design, Multipath, AEROSAT, Avionics

18. Distribution Statement

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7. Author(s) Maurice H. L	anman, III	8. Performing Organization Report No. DOT - TSC - FAA - 72 - 30
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Washington, D.C.  S. Supplementery Notes	20591	The state of the s

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

Conclusions point toward the requirements for a reevaluation of the MLS as sole primary landing aid; the problem arises during flareout in turbulence, when elevation information is inadequate to maintain precise sink rate control. Minimum suitable data rate and maximum allowable noise for final approach are also recommended.

Mircowave Landing MLS All weather landing Automatic landing	g	THROUGH T INFORMATIO VIRGINIA	IS AVAILABLE TO HE NATIONAL TEC DN ERVICE, SPRIN	HNICAL
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FAA-RD-73-30		
4. Title and Subtitle A SYSTEM OF SIXTEEN SY	NCHRONOUS	5. Report Date March 1973
SATELLITES FOR WORLDWI AND SURVEILLANCE	DE NAVIGATION	6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No.
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Systems Research and D. Washington D.C. 20591	evelopment Service	14. Spensoring Agency Code
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16. Abstract

This report considers the orbital mechanics aspects of a system of satellites to be used for position determination of any point on or near the surface of the earth. Only satellites having a period of twenty-four hours are examined. No perturbing forces are taken into account. Three and four satellites are required to be visible at twenty and ten degrees elevation angles respectively. A system of sixteen satellites is described which has the required properties.

17. Key Werds Communication		18. Distribution Statemen	nt	
Navigation Surveillance Satellite coverage Satellite constellation Global coverage, Icosah	ıs edron	DOCUMENT IS AVAILABLE TO THE PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22151.		,
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TECHNICAL REPORT STANDARD TITLE PAGE 1. Report No. 2. Government Accession No. 3. Recipient's Catalog No. FAA-RD-73-22 4. Title and Subtitle 5. Report Date O'Hare ASDE-2 Radome Performance in Rain; Analysis March 1973 6. Performing Organization Code and Improvement 7. Author(s) 8. Performing Organization Report No. Robert M. Weigand DOT-TSC-FAA-72-32 9. Performing Organization Name and Address 10. Work Unit No. R-2156 Department of Transportation Transportation Systems Center Contract or Grant No. Kendall Square, Cambridge, MA FAA-217-0 13. Type of Report and Period Covered 12. Spensoring Agency Name and Address
Department of Transportation Final Report Federal Aviation Administration Jan 1972 - July 1972 Systems Research and Development Service 14. Sponsoring Agency Code Washington, DC 20591 15. Supplementary Notes The operational performance of the ASDE-2 radar at O'Hare Airport is

severely limited during periods of moderate to heavy rainfall. Using the system performance specifications, an estimate has been made of the ASDE-2's tolerance to power loss and degradation of its circular polarization produced by a radome. Three aspects of the O'Hare radome have been examined as potential sources of excessive loss. These are (a) the metal space frame, (b) the dielectric constant and loss tangent of the membrane material, and (c) the membrane surface properties. It has been concluded that the membrane surface properties permit a water film buildup during rain which will cause severe losses. Hydrophobic coatings were tested in the laboratory before and after exposure to the environment. Two coating materials were found to retain their water shedding properties for several months. One of these coating materials was applied to the O'Hare ASDE-2 radome. Since coating the radome, very substantial improvement in operation has been noted during

17. Key Words			
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7. Author(s)			TIF	
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			ort Date	
4. Title and Subtitle		No	vember 197	2
HUMAN FACTORS EXPERIM	ENTS FOR DATA		forming Organization	
7. Author(s)		8. Per	forming Organization	Report No.
Edwin H. Hilbor	n		OT-TSC-FAA	-72-37
9. Performing Organization Name and Addre	118	1 - 1	irk Unit No.	
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c timent t	to the Data Li	ink Operational	Experimen	is Program
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1. Report No.	2. Government Acco	ssien No. 3.	Recipient's Catalog	No.
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4. Title and Subtitle		5,	Report Date	
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CLEAR AIR TURBULENCE RADI	OMETRIC DEVE	CTION PROGRAM	Performing Organiza	tion Code
7. Author(s)		8.	Performing Organizat	ion Report No.
George W. Wagner, G.G. H	laroul <b>es,</b> W.E	Brown	OT-TSC-FAA-72	
9. Performing Organization Name and Address Department of Transportation		10,	Work Unit No.	
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12. Sponsoring Agency Name and Address			inal Report	
U.S. Department of Transport		1		- June 30,1972
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Federal Aviation Administrat	ion	14.	Sponsoring Agency	Code
Washington, D.C. 20591				
15. Supplementary Notes				
	1.80			
16. Abstract The report present Detection Program for the Pe	s the accomp	lishments of the C	lear Air Tur	bulence
effort during this time peri	od was devot	ad mainly to the f	1972. Ine e	xperimental
quisition of flight data and	evaluation	of flight data obt	ained. The	program
established the ability of t	he DOT/FAA d	etection system to	sense turbu	lence and
verify the encounter by mean	s of other o	n-board atmospheri	c sangors.	The total of
15 flights represents 31 fli turbulence encounters report	ght hours an	d 26 hours of data	tape. Eigh	t of the
and ranged from moderate to	ed during the	ese ilignis are co	nsidered sig	nificant
(within 350 miles) from NASA	/Flight Page	rest trights were	conducted I	ocally
Instrumentation, supp	orting hardw.	are and interfaces	are briefly	reviewed.
Improvements to the measurem	ent technique	e are also present	ed.	
Included are curves,	tables and c	omments which supp	ort the even	ts during
particular flights where the	data indica	tes changes in atm	ospheric con	ditions were
sensed before and during tur for additional flight tests	that are coo	inters. The conci	usions empha	size the need
turbulence conditions in the	moderate to	severe classifics	tions.	redictions or
Operational experienc	e gained with	h each flight allo	wed problems	in equipment
functions and data evaluation	m to be asse	ssed and corrected	so as to im	prove the
"follow-on" flights that wer	e conducted.	Design improveme	nts are reco	mmended for
existing and future sensor s	ystems as we	ll as use of more	efficient me	thods of
data reduction as a result o				
A continuation of the	flight test	program is planne	d for the co	ming year by
FAA.				
February 1973				
17. Key Words Clear Air Turbulence		18. Distribution Statement		
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4. Title and Subtitle		5.	Report Date	
CONTROLLER-REPORTED PERFOR	MANCE DEFECT	S IN THE AIR	March 1973	
TRAFFIC CONTROL RADAR BEACON SYSTEM (1971 SURVEY)		971 SURVEY) 6.	Performing Organiza	tion Code
7. Author(s)		8.	Performing Organiza	tion Report No.
Bruce Rubinger		D	OT-TSC-FAA-72	2-40
9. Performing Organization Name and Address		10.	Work Unit No.	
Department of Transportati		L	R-3124	
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survey initiated by the Be began on 27 November 1971 37 facilities with problem cluded were enroute center lations.  Examination nationwide problem was the This is followed by broken time, and false targets. involved in the reported d refined on the basis of er error matrix. Attention i crepancies associated with are derived and employed the sulting data reveals significant carriers, as well as be which the survey was conducted automating future performation.	and lasted for some considered s, civilian of the deficions of bear target slash. The returns a screpancies for category, s focused on this group a o normalize of ficant perforetween different discontinuous disco	representative of representative of cowers and militar ciency data reveal con coverage for a part of the sorted to iden for each aircra and the performa the air carriers are catalogued. At the discrepancy in mance variation agent aircraft. Fi	ticipation wanthe entire and the that the manner period so of coverage tify the type for the data and the beactir traffic so formation. If mong the differential to the mally, the mally, the matter that the control of the differential to the manner that t	as limited to system; in- c instal-  most common d of time. ge for long e of aircraft is further ed by an on dis- tatistics The re- ferent
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4. Title and Subtitle Microwave Scanning Beam Ap Landing System Phased Arra Volume I	•	5. Report Date February 1973 6. Performing Organization Code TER
7. Author(s) R.M. Kalafus, G. J P.J. Pantano, W.R. Wade, R		8. Performing Organization Report No. DOT-TSC-FAA-72-41
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#### 15 Supplementary Notes

#### 16. Abstract

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

The first annual report, having the same title, was published in September 1971 as report number FAA-RD-71-87 (TSC-FAA-71-29).

This report, the second annual report, is printed in two volumes. Volume I contains sections 1 through 7.

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4. Title and Subtitle		5. Report Date	· · · · · · · · · · · · · · · · · · ·
Microwave Scanning Bean		February 197	'3
Landing System Phased Array Antenna Volume II		6. Performing Organizat	ion Code
7. Author's) R. M. Kalatus, G. J.	Bishop, F.J. LaRussa,	8. Performing Organizat	on Report No.
P.J. Pantano, W.R. Wad	e, R.S. Yatsko	DOT-TSC-F	AA-72-41
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	ng to ground reflections, n		
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fications are included, as	well as test results.		
The first annual repo	rt, having the same title,	was published in	n
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SURFACE TRAFFIC CONTROL SY	STEMS	1	. Performing Organizatio	n Code
7. Author(s)		8	. Performing Organizatio	n Report No.
G. Baran, R.A. Bales, J	.F. Koetsch, R	.E. Le Van	MTR-6273	
9. Performing Organization Name and Addres	16	1	Q. Work Unit No.	i
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15. Supplementary Notes Printed July 1973				
in the 1970-1980 period a peak periods at the Chica and Los Angeles in poor value polation for the other siments for improvement beinglementation.  The primary measurement are; controller communicaler capability to handle dictated by traffic demantic with small headways,	msequently, the resy TSC is planned.  ed on the analysis and Chicago O'Haz ional six airports ia) using data-of-:  tudy indicate a neat the baseline airport isibility condition a airports surveyering generally less of that were used to simultaneously the id, and controller relative to the exition of the value coupled with process.	of the ASTC requirements to obtain baseling (Seattle-Tacoma, Bracecord and the result of for immediate improrts, with the need mader all visibility is. Similar results in the course of tritical with respect determine the requirements of the course of the course of the course of the communication channel traffic required to appair to accept the course of potential ASTC improdural changes, would the course of potential ASTC improdural changes, would not consider the course of	ents at three airnors at three airnors at three airnors at date, and extrapolated by Cleveland, Detrovement of the ASTC for improvements during and at are obtained by extra study, with the state of the time of the control overloads, the control overloads, the control overloads, the control overloads and release runway is the traffic demand.	ts  tted  croit,  rnort  system  ring  doston  ra-  require-  lr  ents  rrol-  rates  traf-  that
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	4. Title and Subtitle FLIGHT PLANS: STO	L AVIONIC	S FLIGHT-	5; Report Date A)	oril 1973
	TEST PROGRAM	1111011101		6. Performing Organ	ization Code
	7. Author(s) PGS STOL Pr	ogram Off:	ice	DOT - TSC - FA	ization Report No. A - 73 - 3
	9. Performing Organization Name and Department of Tran	sportation	n [	10. Work Unit No. FA318/R310	5
	Transportation Sys Kendall Square		ļ	11. Contract or Grant DOT - TSC - 37	9
	Cambridge, MA 02			3. Type of Report a	nd Period Covered
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	U.S. DOT/Transport	ation Syst	ems Center	STOL Avio	nics
	Flight-Test Program	m. Tests	described	include:	-
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	b. NAFEC Che	ckout Test	iscom rieid	9	
		gation Tes			
		Flight Tes	its,		
1	e. VOR Filte		_		
ı	f. Land/Sea	Interface	Tests,		
	g. Maneuver	Flight Tes	ts,	650	
	h. Philadelph	hia Noise	Tests,	25	
1	i. Northeast	Corridor	Tests,		
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1	k. New York	City Tests	•		
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4. Title and Subtitle		5, Report Date	
HUMAN FACTORS EXPERIMENTS FOR DATA LINK Interim Report No. 2		April 1973	
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7. Author(s)		8. Performing Organization Report No.	
Edwin H. Hilborn		DOT-TSC-FAA-73-6	
Leonard R. Devanna		DO1=13C=FAA=73=0	
9. Performing Organization Name and Address Department of Transportation Transportation Systems Center Kendall Square		10. Work Unit No.	
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15. Supplementary Notes

#### 16. Abstract

Two experiments involving the coding of Air Traffic Control messages for Digital Data Link transmission are reported. Reaction times and error rates to slide presentations were recorded for both experiments as a means for assessing the relative meaningfulness of messages.

Experiment I studied the differences between long and short abbreviations with and without spaces. The need for the use of spaces was demonstrated. The experiment also indicated that with proper spacing, short and somewhat cryptic abbreviations were as useful as the longer and seemingly more meaningful abbreviations, even with only brief training of the experimental subjects.

Experiment II provided a procedural variation using the same stimulus material as that reported in Section III of Report FAA-RD-72-150, with generally comparable results. It was again determined that for short ATC messages differences in type font were not significant, that arrows were generally better than words for altitude and heading commands, that a format of three short lines was better than one extended line, and that "L" and "R" as heading commands in messages such as "HDGL230" were extremely difficult to comprehend.

17. Key Words Air Traffic Control		18. Distribution Statement		
Data Link Message Coding		DOCUMENT IS AVAILATHROUGH THE NATION SERVICE VIRGINIA 22151.	HAL TECHNICAL	с
19. Security Classif. (of this report) Unclassified	20. Security Classi Unc 1	f. (of this page) assified	21- No. of Pages 46	22. Price

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1. Report Na.	2. Government Acce	ssien No. 3.	Recipient's Catalog	No.
FAA-RD-73-75				
4. Title and Subtitle		5	Report Date	
FEASIBILITY ANALYSIS OF	AN AIR TRA		Iune 1973	
RADAR BEACON SYSTEM (AT	CRBS) BASED	SURFACE 6.	Performing Organiza	tion Code
TRILATERATION SURVEILLA			• • •	
7. Author(s)		8.	Performing Organization	tion Report No.
John D. Vinatie		,	None	
9. Performing Organization Name and Addres			Work Unit No.	,
THE MITRE CORPORATION			Contract or Grant N	
Bedford, Massachusetts	01730		OT-TSC-393	
		13.	Type of Report and	Period Covered
12. Sponsoring Agency Name and Address		Fi	nal Report	
Department of Transpor		1	June 1972-	1 Sept. 1972
Federal Aviation Admin		114	Spensoring Agency	Cada
System Research and De	velopment S	ervice	spensoring Agency	
Washington D.C. 0.25	91			
Performed under	contract t	o the Departmen	t of Trans	portation,
PPA FA-321, Transportat	cion System	s Center, Kenda	III Square,	Cambriage,
MA 02142	9			
Analysis indicat	es there a	re feasible met	hods for a	chieving
surveillance of vehicle	es on the a	irport surface	by means o	f time-of-
arrival measurements of	the vehic	le's ATCRBS Tra	nsponder r	eply at
three or more receiver aircraft equipment whil	sites. So	me methods requ	ire modifi	cation to
with modification to ai	rcraft equ	inment On the	ance will	be superior
with modification to an ber of vehicles capable	of partic	inating in the	evetem wil	1 he smaller
The principle problems	to be over	come in system	design are	the noten-
tial garbling of replie	s through	fruit responses	. multinat	h responses
and responses from more than one vehicle to a single interrogation. The analysis indicates that techniques exist to overcome these effectives.				rogation
The analysis indicates	that techn	iques exist to	overcome t	hese effects
with sufficient promise Data Acquisition Subsys	to warran	t an austere im	plementati	on of a
Data Acquisition Subsys	com.			
Contained herein	is a defi	nition of an AT	CRBS Based	Surface
Surveillance System, an	alyses of	various problem	s and tech	niques to
achieve a satisfactory	Data Acqui:	sition Subsyste	m. and cri	teria for
conducting a test progr	am for fur	ther verificati	on of feas	ibility and
design.				
17. Key Words		18. Distribution Statement		
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Ground Surveillance		INFORMATION	E NATIONAL TECHI SERVICE, SPRING	
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# FEDERAL HIGHWAY ADMINISTRATION

# DOT-TSC-FHWA-73-1

Freeway Traffic Flowing a Lane Blockage, by D. Kahn and R. Mintz Final Report, January 1973

Unlimited-Distribution Report



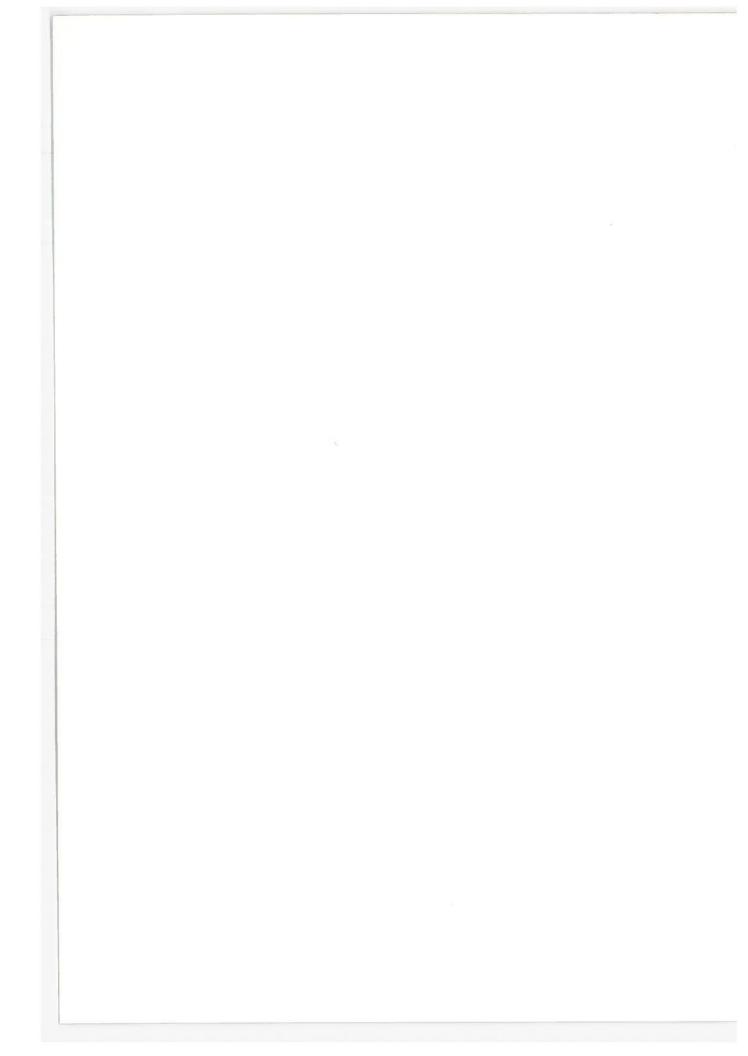
DOT-TSC-FHWA-73-1	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title end Subtitle FREEWAY TRAFFIC FLOW FOLLOWING A LANE BLOCKAGE		5. Report Date  January 1973  6. Performing Organization Code	
7. Author(s) David Kahn and Ronald Mintz		8. Performing Organization Report No DOT - TSC - FHWA - 73 - 1	
9. Performing Organization Name and Address Department of Transportation Transportation Systems Center Kendall Sqaure		10. Work Unit No. R3204 11. Contract or Grant No. HW 308 13. Type of Report and Period Covered Final Report July 1973	
Cambridge. MA 02142  12. Spensoring Agency Name and Address  Department of Transportation Federal Highway Administration Fairbanks Highway Research Station McLean, VA 22101			
		14. Sponsoring Agency Code	

#### 15. Supplementary Notes

#### 16. Abstract

The theory of traffic flow following a lane blockage on a multi-lane freeway has been developed. Numerical results have been obtained and are presented both for the steady state case where the traffic density remains constant and the non-steady state case where the traffic density changes with time.

Traffic flow, Disco Shock wave, Lane bl Propagation	ontinuity, lockage,	''''''	S AVAILABLE TO T IE NATIONAL TECH N SERVICE, SPRING	NICAL
19. Security Classif, (of this report) UNCLASSIFIED	20. Security Class UNCLA	SSIFIED	21- No. of Pages 60	22. Price



#### FEDERAL RAILROAD ADMINISTRATION

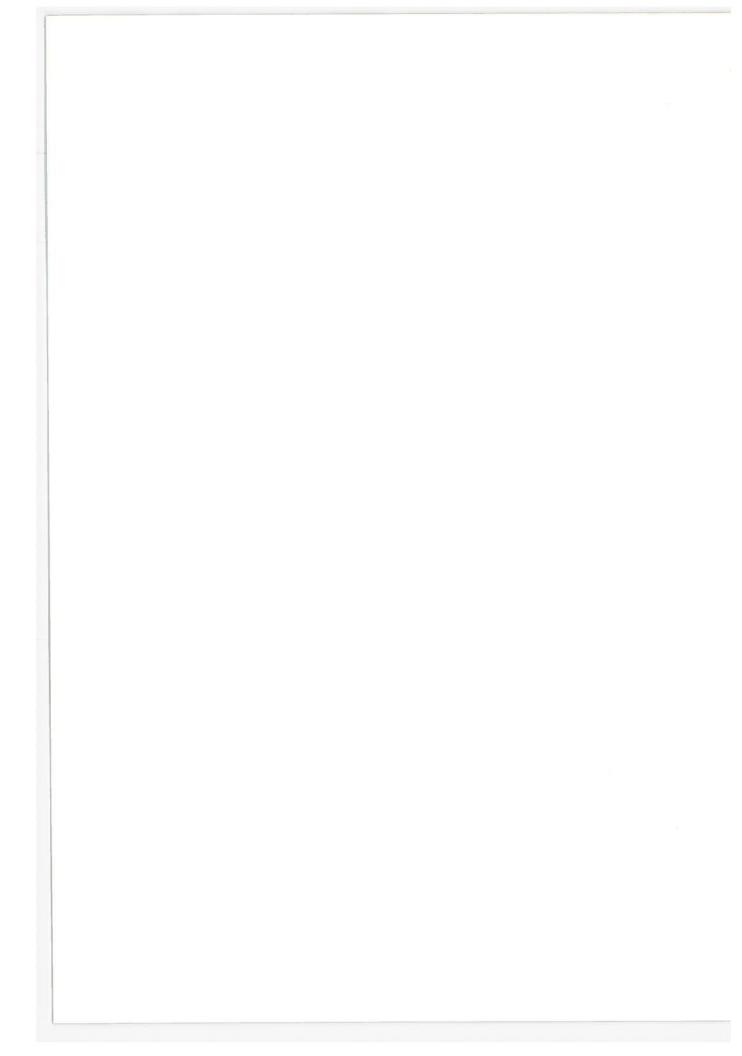
DOT-TSC-FRA-72-1/FRA-RT-73-15
Simulation of Power Collection Dynamics for Simply Supported Power Rail by C. H. Spenny,
Final Report, February 1973

DOT-TSC-FRA-72-10/FRA-RT-73-21
Analytical Studies of the Lift and Roll Stability of a Ram Air Cushion Vehicle,
by T. M. Barrows
Interim Report, March 1973

DOT-TSC-FRA-72-12/FRA-RT-73-24
The Effect of Solid State Power Converter Harmonics on Electric Power Supply Systems,
by A. Kusko,
Final Report, March 1973 (Contractor Report)

DOT-TSC-FRA-72-13/FRA-ORD&D-74-9
Power Conditioning for High-Speed Tracked Vehicles,
by F. Reposa, T. Knutrud, and J. Wawzonek,
Final Report, February 1973

Unlimited-Distribution Reports



1. Report No. FRA-RT-73-15	2 Government A	cossion No	3 Recipient s Cata	log No		
4 Title and Subtitle SIMULATION OF POWER CO SIMPLY SUPPORTED POWER	NAMICS FOR	5 Repart Date NOVEMBER 1972 6 Performing Organization Code				
7 Author(s) C.H. Spenny			8. Performing Organ DOT-TSC-FRA-	ization Report No. 72-1		
9. Performing Organization Name and Transportation Systems			0. Work Unit No R2301			
Kendall Square Cambridge, MA 02142			1 Contract or Grant RR205	No		
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15 Supplementary Nates	770					
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The mathematical model of a sprung mass moving along a simply supported beam is used to analyze the dynamics of a power-collection system. A computer simulation of one-dimensional motion is used to demonstrate the phenomenon of collector-power rail interaction. Parametric resonance in an undamped collector is shown to exist at several speeds below 300 miles per hour. However, it is demonstrated that amplitude can be controlled at all of these resonant speeds with the proper use of damping.						
February 1973		100 00 00 00				
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1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FRA-RT-73-21		
4. Title and Subtitle	•	5. Report Date
ANALYTICAL STUDIES OF	THE LIFT AND ROLL STA-	December 1972
BILITY OF A RAM AIR CU	SHION VEHICLE	6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No.
Timothy M. Barrows		DOT-TSC-FRA-72-10
9. Performing Organization Name and Address		10. Work Unit No.:
Department of Transpor	tation	R3316
Transportation Systems	Center	11. Contract or Grant No.
Kendall Square		RR307
Cambridge, MA 02142		13. Type of Report and Period Covered
12. Spensoring Agency Name and Address		Interim Report
Department of Transpor	tation	July 1971 to June 1972
Federal Railroad Admin		
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Washington, D.C. 2059	0	
15: Supplementery Notes		

#### 16. Abstract

A ram air cushion vehicle (a type of ram wing) is described schematically and compared with a conventional air cushion vehicle design. The nonlinear equations for the flow in the cushion region are derived. A review is made of the most recent literature on the subject of wings operating in a rectangular channel, and an approximate solution is developed which shows the relative effects of momentum and viscosity on the pressure distribution. Several analytic solutions are presented which show the effect of a small roll angle on the flow pattern; equations for the rolling moment coefficient are also obtained. It is recommended that future efforts be aimed at developing proper numerical techniques which can solve the nonlinear flow relations and that recent experimental efforts to obtain the lateral stability coefficients be continued and expanded.

March 1973	·	18. Distribution Statem	ent	· · · · · · · · · · · · · · · · · · ·
Ram Wing Ram Air Cushion Tracked Air Cushion Ve	ehicle	DOCUMENT IS AVAILATINGUES THE NATION SERVICE VIRGINIA 22151.		
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1. Report No. FRA - RT - 73 - 24	2. Government Acces	sion Na.	3. Recipient's Catalog No.			
4 <sub>iii</sub> Title and Subtitle	4. Title and Subtitle					
The Effect of Solid Sta	te Power Co	nverter	March 1973_			
Harmonics on Electric P			6. Performing Organization Code			
7. Author(s)	1		8. Performing Organization Report No.			
Alexander Kusko			DOT-TSC-FRA-72-12			
9. Performing Organization Name and Address	6		10. Work Unit No.			
Alexander Kusko, Inc.			R3306			
161 Highland Avenue	02104		DOT-TSC-203			
Needham Heights, Mass.	02194		13. Type of Report and Period Covered			
12. Sponsoring Agency Neme and Address			1			
Department of Transport			FINAL REPORT			
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15. Supplementary Notes						
Prepared under Contract	No. DOT-TS	C-203 and Te	chnical Directive			
DOT-TSC-203-2 for Frank	L. Raposa,	Code TMP Te	chnical Monitor, U.S.	ļ		
DOT, TSC, Cambridge, Ma	. 02142					
The United States utili	tv industry	has not set	suitable standards of	her		
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of solid-state wayside				74		
limit the harmonic curr						
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niques for calculating	the harmoni	er and by the	nave been developed and	1		
can be applied to trans	it systems.	We propose	a standard of 10 per-			
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within the transit syst	em such as	the power ra	ails.			
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17. Key Werds		18. Distribution State	ment			
Power Harmonic Effects			deem add at a to the time.			
Solid-State Converter F	armonics	Document i	is available to the pub	lic		
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	ial monics	through th	ne national technical on service, Springfield			
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1. Report No. DOT-TSC-FR-71-1A	2. Government Accession No.	3. Recipient's Cetalog No.
4. Title and Subtitle POWER CONDITIONING FOR HICLES	HIGH SPEED TRACKED VE-	5. Report Date January, 1973 6. Performing Organization Code
7. Author(s) Frank L. Rapos John J. Wawzonek	a, Thorlief Knutrud,	8. Performing Organization Report No. DOT-TSC-FRA-72-13
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Transportation Systems Kendall Square	11. Contract or Grant No. RR-205	
Cambridge Mass 02142		13.: Type of Report and Period Covered
Federal Railroad Admini Office of Research Deve	stration	Final Report
Washington, D.C. 20590	-	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract The linear induction motor is to provide the propulsion of high-speed tracked vehicles; speed and brake control of the propulsion motor is essential for vehicle operation. The purpose of power conditioning is to provide the power matching interface between the available power and the desired power for driving the propulsion motor.

This report presents a technical survey of power conditioners that are applicable for driving the linear induction motor in the variable frequency power mode. Power conditioning systems have been selected for technical evaluation and the results are also presented in this report. These systems include the motor-alternator, naturally commutated inverter, forced commutated inverter, and the synchronous inverter-condenser power conditioners.

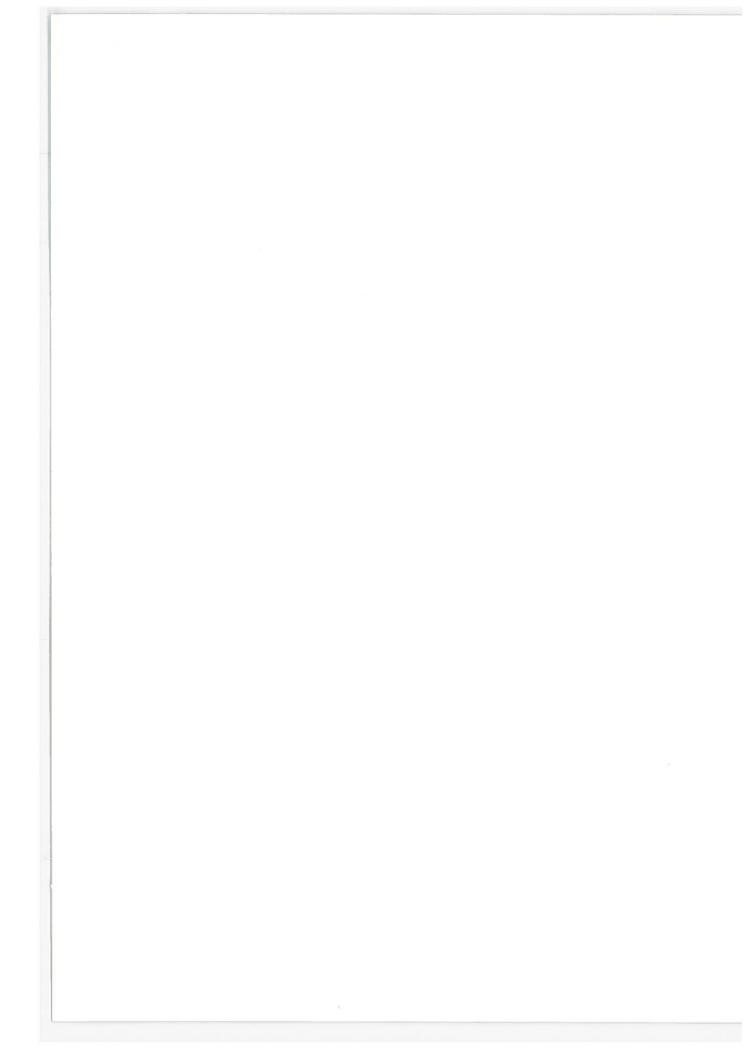
#### February 1973

17. Key Words Variable Frequency Powe Power Conditioning	er,	THROUGH TH	STOMENT S AVAILABLE TO TH E NATIONAL TECHI I SERVICE, SPRINGI 151.	HICAL
19. Security Classif. (of this report)	20. Security Class	nif. (of this page)	21- No. of Pages	22. Price
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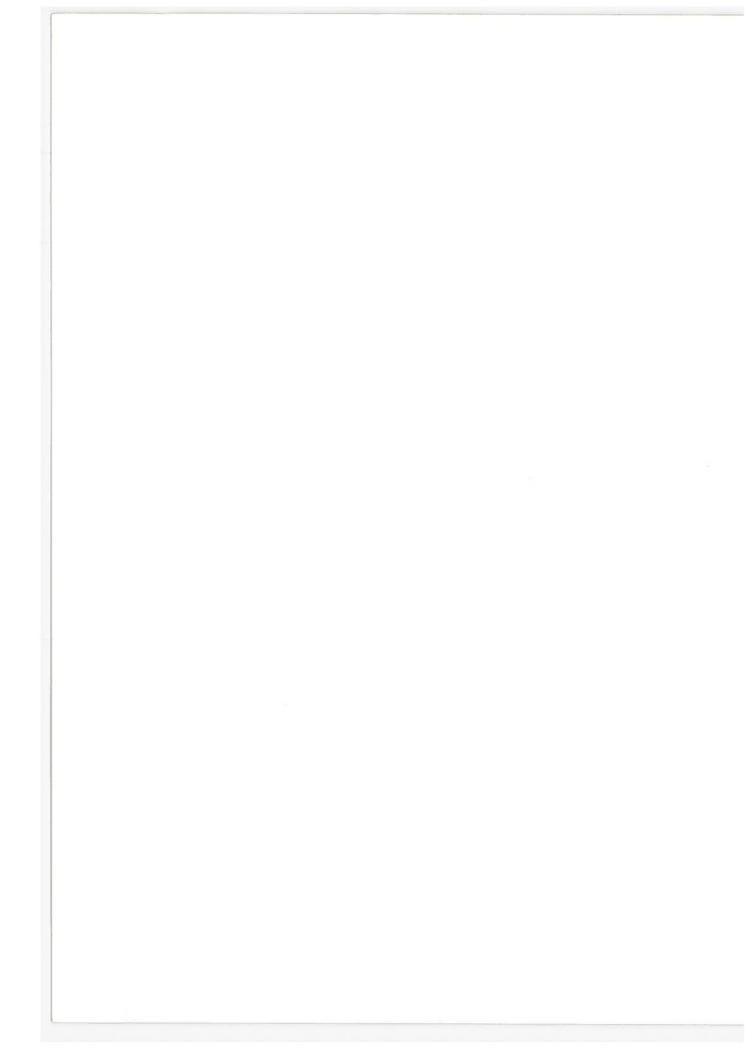
#### NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

DOT-TSC-NASA-72-2
L-Band Orthogonal-Mode Crossed-Slot Antenna and VHF Crossed-Loop Antenna,
by T. Olsson and B. Stapleton,
Final Report, August 1972 (Contractor Report)

Unlimited-Distribution Report



1. Report No. DOT - TSC - NASA - 72 - 2	2. Government Acc	ession No.	3. Recipient's Catalo	og Na.	
	L-BAND ORTHOGONAL-MODE CROSSED-SLOT				
ANTENNA AND VHF CRO	ANTENNA AND VHF CROSSED-LOOP ANTENNA				
7. Author(s) Tryggvi Olsson and	Brian P.		1. Performing Organi D6-60163	zetion Report No.	
9. Performing Organization Name and a The Boeing Company	Address	<u>  F</u>	Nork Unit No NA	R-2525	
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Washington, D.C.		["	. openioning regard	,	
15. Supplementary Notes Key Wo	ords Cont.	Antenna,	Aeronautio	cal	
low-gain, lineraly polarized, L-band antenna; and a low-gain, circularly polarized, upper hemisphere, VHF satellite communications antenna intended for airborne applications are described in this report. The text includes impedance and antenna radiation pattern data, along with physical description of the construction of the antennas.					
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17. Key Words Balanced fe	ed.	18. Distribution State	ment		
Orthogonal mode, Ci	rcular			ue punt	
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## NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

DOT-TSC-NHTSA-72-9

Instrumentation Development for Drug Detection on the Breath, by A. E. Barrington, and J. R. Hobbs, Final Report, September 1972

DOT-TSC-NHTSA-72-10

Exhaust-System Leak Test: Quantitative Procedure, by E. C. Klaubert, Final Report, June 1973

DOT-TSC-NHTSA-73-3

Laboratory Evaluation of Alcohol Safety Interlock Systems Volume I-Summary Report, by E. Sussman, and C. Abernethy III, Final Report, April 1973

DOT-TSC-NHTSA-73-3

Laboratory Evaluation of Alcohol Safety Interlock Systems, Volume II-Instrument Screening Experiments, by R. McFarland, J. Dougherty, E. Arees, J. Gird, Final Report, April 1973 (Contractor Report)

DOT-TSC-NHTSA-73-3

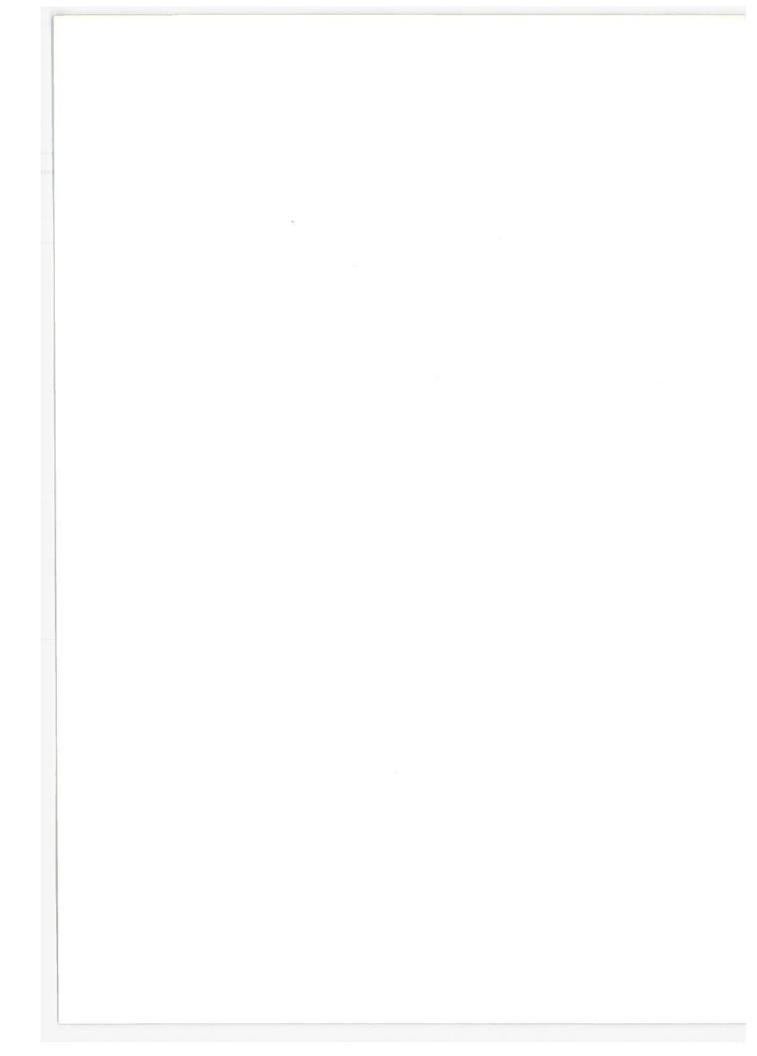
Laboratory Evaluation of Alcohol Safety Interlock Systems, Volume III-Instrument Performance At High Bal, by J. Oates, Jr., and R. McCay, Final Report, April 1973 (Contractor Report)

64149/DOT-TSC-409

Automobile Crash-Sensor Signal Processor by Burroughs Corporation Defense, Space and Special Systems Group, Final Report, February 1973 (Contractor Report)

Nondestructive Tire Inspection Studies at the Transportation Systems Center, by I. Litant, Paper to Society of Automotive Engineers (SAE), May 1973 meeting in Detroit, Michigan

Unlimited-Distribution Report



1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle		5. Report Date
INSTRUMENTATION DEVELOPME	ONT FOR DRUG DETECTION ON	September 1972
THE BREATH	ari Tok blod ballatar ar	6. Performing Organization Code
7. Author/s)		8. Performing Organization Report No.
J.R. Hobbs and A.E. Barri	ngton	DOT-TSC-NHTSA-72-9
9. Performing Organization Name and Address		10. Work Unit No.
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Cambridge, Ma. 02142		13. Type of Report and Period Covered
12. Spensoring Agency Name and Address	_	Pinal Provide
Department of Transportat	ion	Final Report
National Highway Traffic	Safety Administration	July 1971-April 1972
Research Institute		14. Spensering Agency Code
Washington, D.C. 20591		<u> </u>
M. Caralana and Mater		

#### 16. Abstrect

Based on a survey of candidate analytical methods, mass spectrometry was identified as a promising technique for drug detection on the breath. To demonstrate its capabilities, an existing laboratory mass spectrometer was modified by the addition of a membrane separator and a field-ionization source.

Fourteen drugs were selected for investigation and it was possible to identify the signatures (mass spectra) of ten of these drugs with the modified instrument. Some drugs have been detected by direct sniffing, others first had to be dissolved in a suitable solvent and evaporated. The mass spectra presented in the report indicate the basic simplicity of field ionization as compared with ionization by the conventional method of electron impact. The report concludes with a description of the ease and rapidity of the new technique for clinical analysis.

#### January 1973

17. Key Words		18. Distribution Statem	ient	
Mass Spectrometry Breath Analysis Drug Signatures		THROUGH THE N.	AILABLE TO THE PUBL ATIONAL TECHNICAL RVICE, SPRINGFIELD,	ıc
19. Security Classif. (of this report)	20. Security Clean	of, (of this page)	21. No. of Pages	22. Price
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1. Report No.	2. Government Accession No.	3. Recipient's Catalog	No.	
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4. Title and Subtitle	4. Title and Subtitle			
EXHAUST-SYSTEM LEA	K TEST.	June 1973		
QUANTITATIVE PROCE		6. Performing Organiza	tion Code	
7. Author(s)		8. Performing Organiza	tion Report No.	
Earl C. Klaube	ent	DOT-TSC-NHTS	A - 72 - 10	
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9. Performing Organization Name and Addres		10. Work Unit No.		
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Transportation Systems (	enter	III. Contract or Grant N	lo.	
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Cambridge MA 02142 12. Sponsoring Agency Name and Address		13. Type of Report and		
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National Highway Traffic	Safety Administration	July 1970 to	June 1972	
Department of Transports		14. Sponsoring Agency	C- 1-	
Washington, D.C. 20591		17. Sponsoring Agency	Code	
15. Supplementary Notes				
13. Supplementary Indies				
16. Abstract				
A quantitative,	periodic motor vehicle	safety-insp	ection test	
for determining the leak	age rate of engine exha	ust from an	automotive	
exnaust system was inves	tigated. Two technical	annroaches	were ovalue.	
red, and the better one	was selected for develo	pment of nec	essary snec-	
lial equipment and test p	rocedures. The results	of the meas	lirement are	
expressed as the diamete	r of a single round hol	e equivalen	t in leak-	
age rate to the sum of a	11 leaks in the exhaust	evetem bein	u tectod	
This method is capable of	f measuring leaks equiv	alent in cia	g testeu.	
about a 1/16-inch hole;	discrimination between	looks of 1/0	+0 1/2	
diameter is reliable and	Assilv achieved Total	1 time to 10	-to 1/2-inch	
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tion the test imposes a	roproducible management	to 5 minutes	In addi-	
tion, the test imposes a	reproductible pressure	stress on ea	ch system	
tested; this provides re	asonable assurance that	the system	will remain	
structurally intact unti	I the next inspection p	eriod withou	t developing	
catastrophic leakage. A	field test kit has bee	n developed	which can	
accommodate engine displ	acements to 460 cubic i	nches. Flow	calibration	
data are given. A detai	led test procedure comm	lete with le	ak-siza da-	
termination graphs and a	calculation nomograph	is presented	in an	
appendix.		-		
17. Key Werds Leak test, exha	11ST SVS - 18. Distribution Statem	ent		
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1. Report No.	2. Government Acces	sion No. 3.	Recipient's Catalog I	No.
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4. Title and Subtitle LABORATORY EVALUATION O	E VICOROI S		Report Date pril, 1973	
INTERLOCK SYSTEMS, VOLU			Performing Organizat	
7. Author(s)		8.	Performing Organizati	ion Report No.
E. Donald Sussman, Char	les N. Aber	nethy, III DO	T-TSC-NHTS	A-73-3
9. Performing Organization Name and Address	18		Work Unit No.	
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Cambridge, MA 02142		13.	Type of Report and I	Period Covered
12. Sponsoring Agency Name and Address	-4:		Final Repo	rt
Department of Transport National Highway Traffi	ation c Safety Ad	ministration	8/71 - 10/	
Research Institute	c basecy na		Sponsoring Agency C	ode
Washington, DC 20591				
15. Supplementally Notes				
16. Abstract This report co	ntains the	results of an e	experimenta	1 and
analytical evaluation o	f instrumen	ts and technique	ies designe	
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type "Alcohol Safety In				
private industry and by drawn from a class of i	nstruments	ortation System which detect in	ns center a	ind all were
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Volume I, Summary	Report - Su	mmarizes all o	f the ASIS	
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results of the eva		olume I is supp	ported by	
an extensive appen	dix.			
Volume II, <u>Instrum</u>				
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Volume III, Instru				
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1.ABORATORY EVALUATION OF AL	COHOL SAFETY 1	NIEKLUCK 515-	April 1973	C-do
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7. Author's)			. Performing Organizatio	n Report No.
Ross A. McFarland, Ph.D., J	ohn D. Dougher	ty, M.D.		
Edward A. Arees, Ph.D., Joy	ce J. Gird, B.	Α.	DOT-TSC-213-1	
9 Performing Organization Name and Address	18		10. Work Unit No.	
Guggenheim Center for Aeros	pace Health ar	.4 -4-1-7	HS306/R3407	
Harvard School of Public He	alth		II. Contract or Grant No. DOT-TSC-213	
665 Huntington Avenue		-	3. Type of Report and P	7.10
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15. Supplementary Notes				
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This report contains the r	eults of an e	vnerimental and	analytical eva	luation of
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in the subjects ability to	perform a psy	chomotor task.	The final repo	rt consists
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Volume T Summary Reno	rt - Contains	an overview and	summary of all	the
ASTS evaluation work n	erformed throu	gh July 1972 an	d the results o	r the
evaluation. Volume I	is divided bet	ween the overvi	ew and an exten	sive
appendix.				
			1	44.
Volume II, Instrument	Screening Expe	riments - Conta	ins details of	The Dublic
experiments conducted	by the Guggenh	eim Center, nar	vard school of	fubile
Health, including expe	rimental proce	dures, results	and some prein	illialy
data analyses.	77			81
Volume III, Instrument	Parformance	+ High BAL - Co	ntains the resu	lts of
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4. Title and Subtitle LABORATORY SAFETY INTERLOCK SYSTEMS	EVALUATION OF ALCOHOL	5. Report Date April 1973	
MENT PERFORMANCE AT HIGH		6. Performing Organization Code	
7. Author's)		8. Performing Organization Report No.	
John F. Oates, Jr.,	Robert T. McCay	DOT-TSC-251-4	
9. Performing Organization Name and Address Dunlap & Associates, Inc		10. Work Unit No. HS306/R3407	
One Parkland Drive Darien, Conn., 06820		11. Contract or Grant No. DOT - TSC - 251	
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12. Sponsoring Agency Nome and Address Department of Transport National Highway Traffi	ation c Safety Administration	Final Report 8/71 - 10/72	
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15. Supplementary Notes

This report contains the results of an experimental and analytical evaluation of instruments and techniques designed to prevent an intoxicated driver from operating his automobile. The prototype "Alcohol Safety Interlock Systems" tested were developed both by private industry and by the Transportation Systems Center and were all drawn from a class of instruments which detect intoxication by measuring changes in the subjects ability to perform a psychomotor task. The final report consists of the following documents:

Volume I, Summary Report - Contains an overview and summary of all of the ASIS evaluation work performed through July 1972 and the results of the evaluation. Volume I is divided between the overview and an extensive appendix.

Volume II, <u>Instrument Screening Experiments</u> - Contains details of the experiments conducted by the Guggenheim Center, Harvard School of Public Health, including experimental procedures, results and some preliminary data analyses.

Volume III, - Instrument Performance at High BAL - Contains the results of the experimental work performed by Dunlap and Associates, Inc., covering the performance of subjects with relatively high blood alcohol levels on selected instruments.

17. Key Words		18. Distribution Statement		
alcohol, intoxication intoxicated performandrinker	, interlock, ice, habitual	T 19	OCUMENT IS AVAILABLE MROUGH THE NATIONAL HFORMATION SERVICE, S IRGINIA 22151.	TECHNICAL
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7. Author(s)	·	8. Performing Organization Report No.
9. Performing Organization Name and Address Burroughs Corporation I Special Systems Group Paoli, Pennsylvania	efense, Space and	10. Work Unit No. HS304/R3403 11. Contract or Grant No. DOT - TSC - 409 13. Type of Report and Period Covered
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an automobile-installed solenoid or equivalent utilizes both digital	Signal Processor described doppler radar and an a lettromechanical device and analog techniques to apput signal amplitude as a intended to be implementations.	air bag activating ce. The processor c produce an output nd frequency conditions

are met. The device is intended to be implemented with monolithic MOS large scale integrated circuitry and Bipolar driver. The design and reliability studies indicate that very low cost and very high reliability can be achieved concurrently by monolighic techniques without compromising Processor performance.

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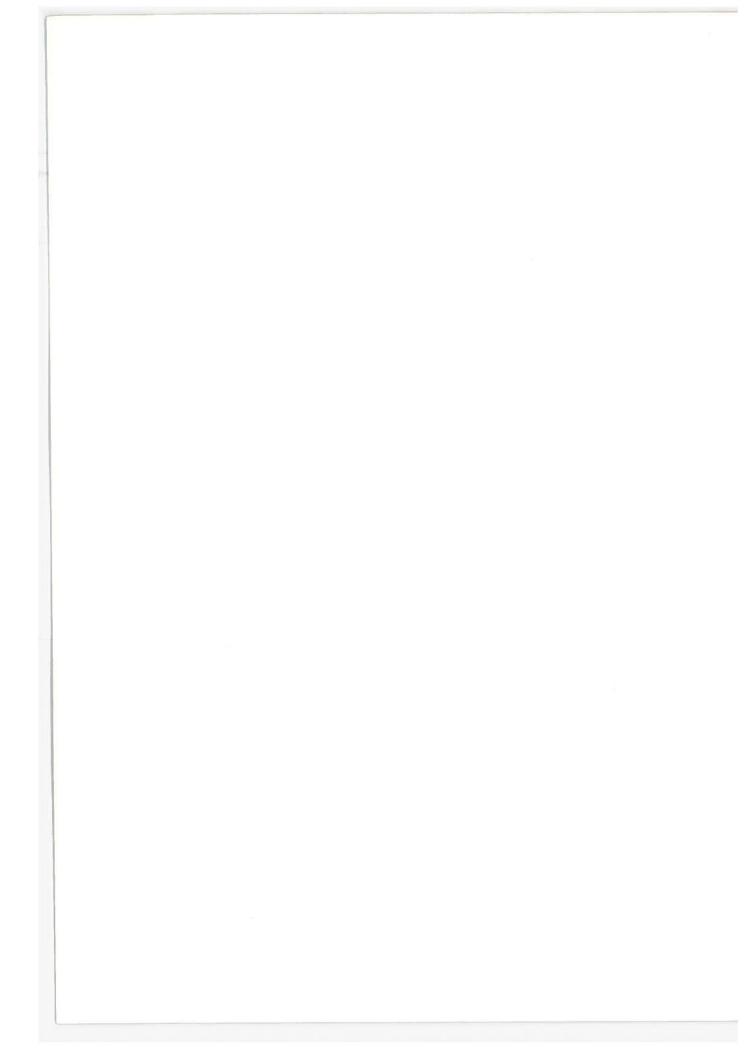
# NONDESTRUCTIVE TIRE INSPECTION STUDIES AT THE TRANSPORTATION SYSTEMS CENTER

#### I. LITANT

U.S. Department of Transportation Transportation Systems Center Kendall Square Cambridge, Mass. 02142

To be presented at the 1973 SAE National Automobile Engineering Meeting, May 14-18, 1973.





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DOT-OST-TSC-72-16

A Microwave Technique for Detecting and Locating Concealed Weapons, by R. M. Weigand, Final Report, December 1971

DOT-TSC-OST-72-19
Ambient Noise Level Measurements in Proposed Florida Airport Area,
by R. Quinn,
Final Report, December 1972

DOT-TSC-OST-72-24
FY 72 Computer Utilization at the Transportation System Center, by D. Hyatt,
Final Report, September 1972

DOT-TSC-OST-72-25
The Use of Models in Urban Transportation Planning, by W. G. Barker,
Final Report, April 1973

DOT-TSC-OST-72-30
Accumulative Probability Model for Automated Network Traffic Analyses,
by C. Toye,
Final Report, October 1972

DOT-TSC-OST-72-31

MBTA Rapid Transit System (Red Line) Wayside and In-Car Noise and Vibration Level Measurements, by E. Rickley, and R. Quinn Final Report, February 1973

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An Experimental Plan for Conducting Ionospheric Scintillation Measurements Using the ATS Geostationary Satellites at 136 and 1550 MHz
by W. E. Brown III, G. G. Haroules, and W. I. Thompson III Interim Report, April 1973

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J. Yaney
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A Summary of Optimization Techniques that can be Applied to Suspension System Design, by J. Hendrick,
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Investigation of Jet Noise Using Optical Holography,
by F. Salant,
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DOT-TSC-OST-73-14 PB-220 612 Research and Development Opportunities for Improved Transportation Energy Usage, by the Transportation Energy Panel Technical Report, April 1973

DOT-TSC-OST-73-16 I
Analysis of Dual Mode Systems In An Urban Area, Volume I:
Summary,
by P. Benjamin, J. Bailer, R. Favout, D. Golddel, C. Heaton,
R. Kangas, G. Paules, E. Roberts, L. Vance,
Final Report, April 1973

DOT-TSC-OST-73-19
Prediction of V/STOL Noise for Application to Community Noise Exposure,
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Final Report, May 1973 (Contractor Report)

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A MICROWAVE TECHNIQUE FOR DETECTING			December			
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7. Author(s) R.M. We	igand		8. Performing Orga	nization Report No.		
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Office of Systems Washington, D.C.	Engineeri 20590	ng	14. Sponsoring Agen	cy Code		
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16. Abstract The subject of this report is the evaluation of a microwave technique for detecting and locating weapons concealed under clothing. The principal features of this technique are: (1) Persons subjected to search are not exposed to "objectional" microwave radiation; (2) A simple threshold detector can be used as the decision element obviating complex signal processing; (3) System operation does not require extensive operator training; (4) The resolution of the system (2 inches x 2 inches) permits location of a suspected weapon. This latter feature eliminates the need for a complete search of a passenger. Results of a loboratory measurement program are presented in support of the technique. An engineering analysis of the system implementation identifies an optimum operating frequency and an estimate of system cost is presented. Finally, several areas requiring additional experimental evaluation preceeding a system implementation						
17. Key Words						
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7. Author(s) Robert W. Quinn		8.	Performing Organiza	tion Report No.	
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15. Supplementary Notes				ĺ	
12				-	
16. Abstract This report	16. Abstract This report documents the measurement results made				
at ten locations n	ear the thr	ee remainin	ng sites be	eing	
studied for the "S	outh Floric	a Regional	All por c.		
Tabulated data display a summary of the measured					
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exceeded 1, 10, 50	, 90 and 99	percent of	ion, minim	um and	
exceeded 1, 10, 50, 90 and 99 percent of the time in A-weighted decibels. The standard deviation, minimum and maximum A-weighted levels are also tabulated.					
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17. Key Words A-weighted Sound I	evel	18. Distribution State	oment		
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FY 72 COMPUTER UTILIZAT	ION AT THE TRANSPORTA-	August 1972
TION SYSTEMS CENTER		6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No.
		S. Ferrerming Organization Report No.
David B. Hiatt		
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#### 16. Abstract

The Transportation Systems Center currently employs a medley of on-site and off-site computer systems to obtain the computational support it requires. Examination of the monthly User Accountability Reports for FY72 indicated that during the fiscal year TSC personnel made direct expenditures for the use of eighteen different digital computer systems - eight on-site systems and ten systems owned and maintained outside TSC. The magnitude of this usage was equivalent to a single CDC 6600 computer system. The total computation hours utilized were equivalent to 1860 CDC 6600 CPU hours - a single shift - and the estimated dollar value was \$1.38 million - approximately the annual rental cost of a CDC 6600.

Examination of the pattern of this usage indicated that (a) TSC was still oriented toward hardware testing and component design - generally termed hard technology - in FY 72, and (b) TSC's scientific computer users rely on off-site systems for the bulk (69%) of their computer support.

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7 Author(s)		8. P	erforming Organization	on Report No.
William G. Barke	r	n.	OT-TSC-OST	77-75
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Office of Transportation Washington DC 20590	n Planning	Assistance   14	Sponsoring Agency C	040
15. Supplementary Notes				
16. Abstract				
The report desc	ribes the me	ost commonly us	ed models	in urban
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planning is given inclu	ding change	s in planning o	bjectives	and the
effects of Federal legi use of the models are a	1so present	enerai concepts ed An assessm	ent of the	situation
is made and recommendat	ions for im	provement are s	uggested.	0.7.0
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17. Key Words		18. Distribution Statement		
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4. Title and Subtitle ACCUMULATIVE PROBABILIT NETWORK TRAFFIC ANALYSE	Y MODEL FOR AUTOMATED S	5. Report Date October 1972 6. Performing Organization Code
Charles R. Toye	•	8. Performing Organization Report No.
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12. Sponsering Agency Name and Address Department of Transport Office of the Secretary Office of Systems Engine Washington, D.C. 20590  15. Supplementary Nates		13. Type of Report and Period Covered Final Report 1 July 1972 to 31 December 1972 14. Sponsoring Agency Code
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16. Abstract This report presents an illustration of the accumulative probability model which is applicable to ground transportation systems where high-speed and close headways are a performance requirement. The paper describes the model, illustrates it with a hypothetical problem, and then applies it to a network route that was actually configured in a Dual mode system study.

The paper also describes and gives a listing of a computer program called Dual which is used to illustrate the model and simulate various route structures.

February 1973

Modeling, Automated Gu Simulation, Dual Mode	THE LWOLK DO	Tibution Statement  CUMENT IS AVAILABLE TO THE PUBLI ROUGH THE NATIONAL TECHNICAL PORMATION SERVICE, SPRINGFIELD, RGINIA 22151.	c
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MRTA RAPID TRANSIT S	SYSTEM (RED LINE)	August 1972
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7. Author(s)		8. Performing Organization Report No.
Edward J. Rickley	, Robert W. Quinn	
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16. Abstract		
model mass transit and analyzed in thi Transit Car, design and currently in op Transportation Auth	car making up 2-car as report. The MBTA To ed and built by Pullm eration on the Red Lisority (MBTA) was meas	ion characteristics of a late nd 4-car trains are tabulated ype 1 South Shore Rapid an Standard, Chicago, Illino ne of the Massachusetts Bay ured.
Shore Extension of t 1, 1971 opening of t repeated six months	he Red Line 58 days a his extension. These later.	by the tracks of the South fter the official September wayside measurements were
In-car noise a	nd vibration measurem	ents are made in a selected is sections of the Red Line.

February 1973				
17. Key Words Noise, Abatement, Noise Transportation, Noise and		THEOLIGH THE NATION	ABLE TO THE PUBLIC	
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1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT-TSC-OST-72-33		
4. Title end Subtitle EXPERIMENTAL PLAN FOR CONDUCTING IONO- SPHERIC SCINTILLATION MEASUREMENTS USING ATS GEOSTATIONARY SATELLITES AT 136 AND 1550 MHz		5. Report Date April 1973 6. Performing Organization Code
7. Author(s) W.E. Brown III, G. G. Ha W. 1. Thompson III	roules and	8. Performing Organization Report No. DOT=TSC=OST=73=33
9. Performing Organization Name and Address Department of Transportation Transportation Systems Center Kendall Square Cambridge, MA 02142		10. Work Unit No. R-3559 11. Contract or Grant No. OS-334
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#### Té. Abstract

An experimental plan for conducting ionospheric scintillation measurements using the geostationary Applications Technology Satellites at 136 MHz and 1550 MHz is presented. A remote unmanned data collection platform is proposed together with detailed design configurations and data collection and analysis procedures. The data collection platform provides a real time readout capability utilizing the ATS-1 or the ATS-3 satellites as a convenient radio relay link. A comprehensive literature search and bibliography are presented in support of the analysis which lead to the design of the remote data collection platform.

17. Key Werds  Ionospheric scintillation	18. Distribution Statement		
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4. Title and Subtitle	5. Report Date November 1972	
SUMMARY DATA FOR SELECTED NEW URBAN TRANSPORTATION SYSTEMS		6. Performing Organization Code
7. Author(s) Robert F. Casey		8. Performing Organization Report No.
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### March 1973

#### 16. Abstract

In this report a selected set of information is presented for the most advanced of the new, unconventional or innovative urban transportation systems. Capsulized are system and vehicle physical characteristics, performance capabilities, costs and availabilities. A functional classification was developed and each system was categorized according to type of service provided. A method for using this data in the development of transportation plans for metropolitan areas is outlined.

17. Key Words		18. Distribution Statement		
New Urban Transportation Systems Urban Transportation System Classification		DOCUMENT IS AVAILABLE TO THE PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22151.		NICAL
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J.H.B. George  9. Performing Organization Name and Address Arthur D. Little Inc. 25 Acorn Park Cambridge MA. 02140  12. Sponsoring Agency Name and Address Office of the Secretary Office of the Assistant Secretary for			
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			d Address nc. 40 ress etary stant Secretary for t and Technology

16. Abstract This report summarizes an assessment of electro-chemical power sources (batteries and fuel cells) which are relevant to electric vehicle propulsion. The developments reported herein have taken place since a previous assessment on the same subject was completed by Arthur D. Little, Inc. in 1968 for the U.S. Department of Health, Education and Welfare.

#### February 1973

17. Key Words	Transporta Electric P Batteries Fuel Cells Automobile	Propulsions s ls		ALLEGUEN TH	AVAILABLE TO THE PUBLIC NATIONAL TECHNICAL SERVICE, SPRINGFIELD,	
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AIRPORT AND AIR SERVICE ACC	ESS	6. Performing Organization Code
7. Author's) Richard de Neufville, Nigel Walter Gelerman, Uzi Landau		8. Perferming Organization Report No.  R72-35
9. Performing Organization Name and Address Civil Engineering Systems Laboratory Department of Civil Engineering Massachusetts Institute of Technology		10. Work Unit No. 053 05/R3 502
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Office of R&D Policy Washington, D.C. 20590	8	14. Spensering Agency Code
15. Supplementary Notes		

16. Abstract The problems of airport and air service access are investigated in this report. Airport access, primarily an urban transportation system problem, is investigated using data obtained from the Cleveland-Hopkins Airport Access Study and other surveys and studies. The nature of airport access and of passenger behavior with regard to it is investigated to determine what governmental policies might be appropriate. Many of the factors that determine how passengers choose their access mode and, consequently, how they would use a new mode that might be provided cannot readily be affected by governmental action. Massive investment in access modes is not a cost-effective method of changing passenger flows to the airport; improvements in these modes should be of an operational nature.

Airport access is a subset of air service access; attention to problems of the latter may provide more chance to improve service for the air passenger. This study investigates two aspects of the air service access problem: air network configuration and the use of satellite airports. Using aggregate delay time as a measure of effectiveness, the most efficient network was found to be one in which traffic is concentrated, reducing network connectivity. However, tradeoffs between average quality of service & distributional effects must be considered in policy making.

Satellite airports may seem to be a convenient means to improve access to air service in a region, but competitive economic forces discourage both airlines & air passengers from using satellite airports and impell them to concentrate at major terminals.

Satellite or reliever fields will not be used significantly by air carriers without some form of governmental coercion.

17. Key Words		18. Distribution Statem	and	
Airport access Air service access Satellite airports Air networks	" v 	THROUGH INFORMA	NT IS AVAILABLE TO T N THE NATIONAL TECH ATION SERVICE, SPRING A 22151.	NICAL
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4. Title and Subtitle	N TECHNION	ES THAT CAN	5. Report Date March 1973	Î
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J. Karl Hedrick			None	-
9. Performing Organization Name and Address			10. Work Unit No.	
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School of Engineering	Fandlike.		11. Contract or Grant No	•
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Washington, D.C. 20590	- 50			
15. Supplementary Notes				
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16. Abstract Summaries are p	resented of	the analyti	c techniques	available
for three levitated veh	icle suspen	sion optimiz	ation problem	s: opti-
mization of passive ele	ments for f	ixed configu	ration; optim	ization of
a free passive configur	ation; opti	mization of	a free active	configura-
tion. The techniques a	re applied	to a heave d	ynamic model	which in-
cludes gravity forces,	random aero	dynamic forc	es and random	guideways
making use of penalty f	unctions wh	ich include	vehicle accel	eration,
suspension displacement	, gap varia	tion, power	requirements.	
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4. Title and Subtitle		5.	Report Date	
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HOLOGRAPHY 7. Author(s)			Performing Organizat	Nan Parast Na
			DOT-TSC-14	
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9. Performing Organization Name and Addres			Work Unit No.	
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Cambridge, MA 02139		13.	Type of Report and	Period Covered
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Department of Transportat		-		
Washington, D. C. 20590	1011	14:	Sponsoring Agency	Code
Holographic interfersupersonic air and nitrog of helium jets in the macdemonstrate that the acoumach waves, each of which the jet. The mach waves of the nozzle exit to a penents of mach angle indicagenerating disturbances in the jet velocity for the of the jet velocity for the velocity of the generating of the jet velocity. The rather than turbulent eddineasurements of nozzle vilupstream of the nozzle.	en jets in the number rang stic field in can be trace are generated osition near ate that the nach number rach number rach sturbances disturbances ies, and exte	e mach number range of 1.5 to 2.95.  the vicinity of s d back to a general from an axial posthe tip of the potaverage convection rogen jet is approange of 2.1 - 2.7, range of 2.8 -3. s in the helium jet appear to be cohend into the potent	ge of 2.1 to These holog such jets is ating disturb sition slight tential core. a velocity of eximately 84% and approxi 4. The aver et is approxi trent instabi tial core. A	3.4, and grams dominated by pance within ally downstream Measure—the 4 - 90% of mately 77% age convection mately 67% lities accelerometer
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1. Report No. DOT - TSC - OST - 73 - 14	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle RESEARCH AND DEVELOPME IMPROVED TRANSPORTATIO	September 1972 6. Performing Organization Code DOT-TSC-TMP	
7. Author's) Transportation Energy	Panel	8. Performing Organization Report No.
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Department of Transport Office of the Secretary 400 7th Street, S. W. Washington, D. C. 2059	•	Summary Technical Report  14. Sponsoring Agency Code DOT-OST-TST-14

15. Supplementary Notes

April 1973

16. Abstract The almost complete dependence of transportation systems upon petroleum products makes the transportation sector vulnerable to increased prices of petroleum or insecure sources of petroleum. Since the dependence of transportation upon imported petroleum is projected to increase substantially over the next two decades, both short-and long-term remedial actions should be initiated now and in the next few years because of the long time needed to bring about evolutionary changes in the Nation's transportation systems. Possible remedial actions include:

- Technological improvements for more efficient use of petroleum by transportation.
- 2. Technological changes to permit greater use of non-petroleum energy resources by transportation.
- Shift of transportation demand to more efficient modes from less efficient modes.
- 4. Reduction of demand for transportation services.

Transportation energy demand projections are given and R&D tasks in each of the first three categories are assessed.

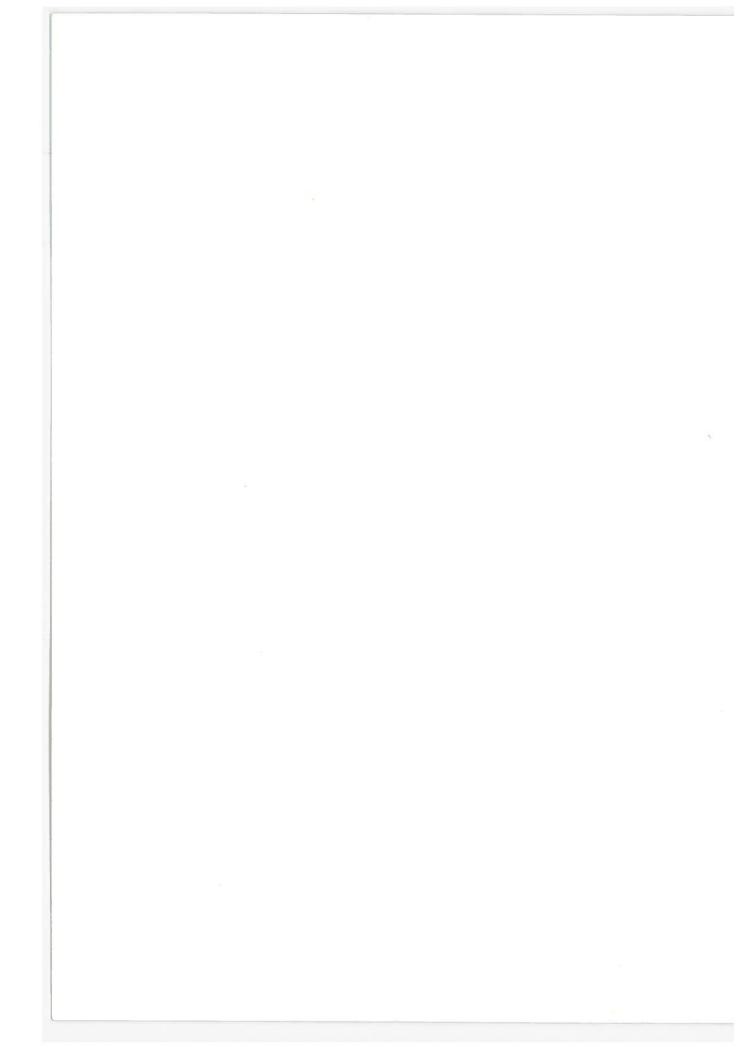
17. Key Words Transportation, Transportation Energy, Energy Utilization, Fuel Heat Engines		18. Distribution Statement  DOCUMENT IS AVAILABL THROUGH THE NATIONA INFORMATION SERVICE, VIRGINIA 22151.	L TECHNICAL	
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1. Report No.	2. Government Accession Ne.	3. Recipient's Catalog	No.
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4. Title and Subtitle		5. Report Date	
ANALYSIS OF DUAL MODE SY	CTEME IN AN HIDDAM ADEA		
		6. Performing Organizat	Lon Code
Volume I: Summar	У		7011
7. Author(s) p. P : : - Y	Dombon E Forest	8. Performing Organizat	ion Report No.
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7. Author's) P. Benjamin, J. D. Goeddel, C. Heaton, E. Roberts, L. Vance	K. Kangas, G. Taures,	DOT-TSC-OST-	73-16
9. Performing Organization Name and Address	3	10. Work Unit No.	
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16. Abstract Various forms o	f Decal Made Assessment	A *	
Valious Ioliks o	f Dual Mode transporta	tion were ana	lyzed in
order to determine the	economic viability of	the Dual Mode	concept.
Specially designed new	small Dual Mode venicl	es, modificat	ions of
existing automobiles, a	nd pallet systems, all	operating in	conjunction
with Dual Mode buses, w	ere examined. The stu		
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7. Author(s)		8. Pe	rformi, g Organizatio	n Report No.	
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Stratford, CT 06602  12. Sponsoring Agency Name and Address			ne 1972-De	,	
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Prepared Under Contrac	t No. DOT-TS	SC-438, DOT-TSC	C, Cambridg	e, MA 02142	
16. Abstract A computer prog	ram to predic	t the Effective	e Perceived	Noise	
Level (EPNL), the to	ne corrected	Perceived Noise	e Level (PN	ILT), and	
the A-Weighted Sound	Level (dBA)	radiated by a '	V/STOL vehi	cle as	
it flies along a prescribed takeoff, landing, or cruise flight					
path is described in	detail and	a complete user:	s guide for	the	
program is presented	. The proced	dures used to p	redict the	noise	
radiated by helicopt	er rotors, p	ropellers, turb	oshaft engi	nes,	
lift and cruise fans, and jets are described in detail. Heli-					
copter rotor noise and jet noise are theoretically predicted with					
some empirical modifications while propeller, fan, and turboshaft					
engine noise is calculated with primarily empirical procedures.					
The program is designed to be easy to use; thus it should be useful in V/STOL-port planning studies.					
ful in V/STOL-port p	lanning stud	ies.			
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There are major of the program; the	TIMILATIONS	vehicles cher	nnorogy on	v impul-	
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there are not yet ad	acures should	d not be predicti	ng the nois	e from	
deflected jets, augm	equate metho	hlown flance a	nd the nois	noise	
of augmented lift ST	Ontoi Wings,	cannot vet he n	na the like	There	
is in fact come an	idence to in	dicate that the	FDNI mases	ire does	
is, in fact, some evidence to indicate that not adequately predict the annoyance of impu			ve noise si	ignatures	
and it is hoped that improved measures to a			nt for the	annovance	
of impulsive noise will be developed in the			r future.	annoyance	
17. Key Words Noise Abatement		18. Distribution Statement			
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Sources, V/STOL Noise,	Community	DOCUMENT IS A	VAILABLE TO THE	PUBLIC	
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		VINGINIA 2210			
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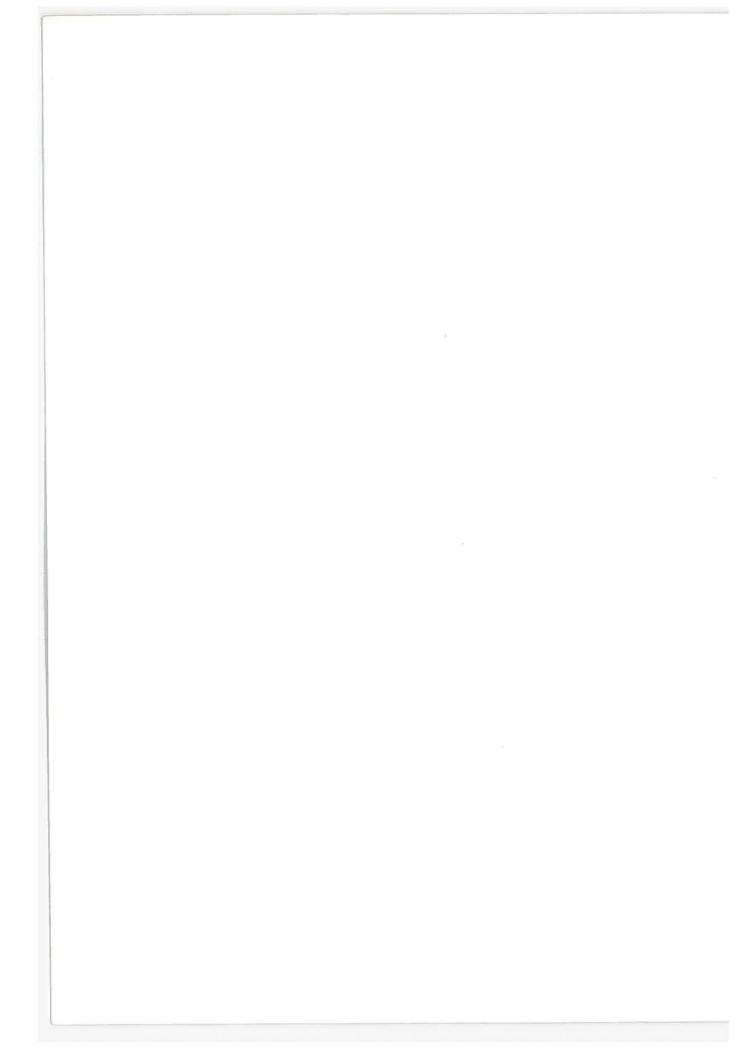


# URBAN MASS TRANSPORTATION ADMINISTRATION

# DOT-TSC-UMTA-73-1

Development and Testing of a Completely Passive, Air Suspended, Air Propelled Personal Rapid Transit Vehicle, by C. H. Smoot et al, Final Report, April 1973 (Contractor Report)

Unlimited-Distribution Report

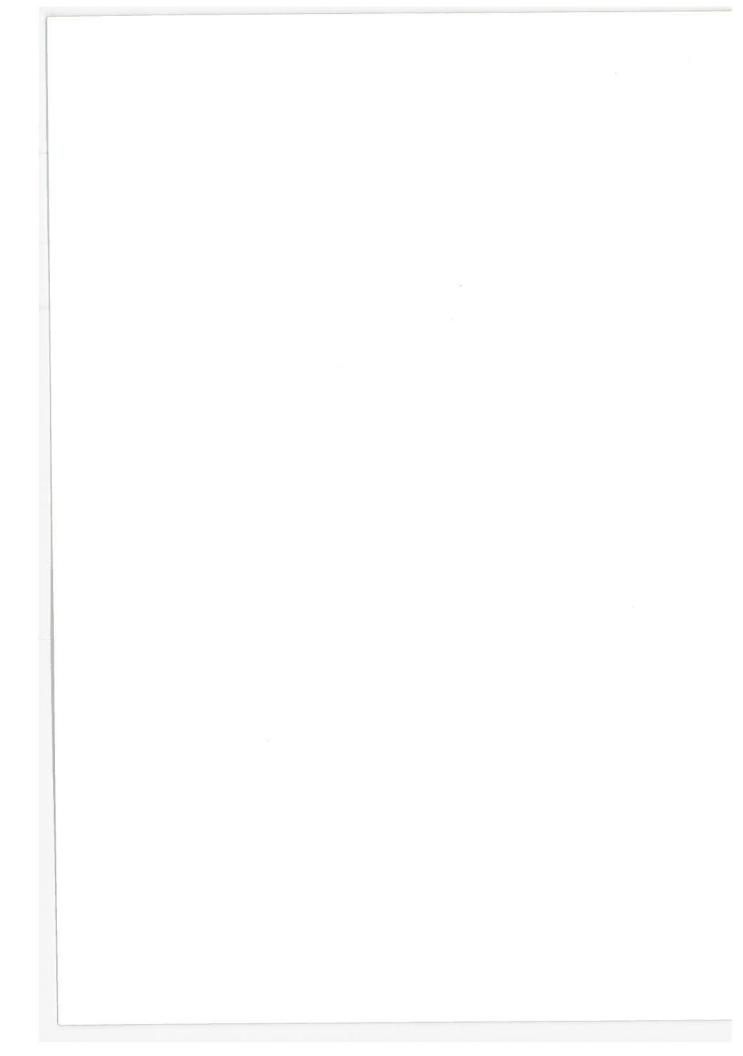


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4. Title and Subtitle DEVELOPMENT AND TESTING C PASSIVE, AIR SUSPENDED, AIR		LY	Report Date April, 1973 Performing Organizat	ion Code		
RAPID TRANSIT VEHICLE			<u>.</u>			
7. Author(s) Charles H. Smoot et al			Performing Organizat DOT-TSC-UMTA			
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16. Abstract						
A prototype Uniflo vehicle base with mock-up superstructure was tested on 55 ft. of full-scale track.  Sound treatment to meet NCA 60 at 25 ft. from the guideway enclosure and within the vehicle was proposed and the costs determined.  A heating and cooling system using passive vehicle heat sink elements with station berth recharging was found desirable because of its lower cost and reliability.  An evaluation of the estimated production quantity costs for the vehicle base, guideway surface, levitation and thrust elements showed a reduction of 49% compared to previous design estimates.  Extensive tests confirmed the feasibility of the track based linear air turbine used for acceleration and service braking in the Uniflo PRT system,  Ride quality measurements indicated a need for improved secondary suspension.  Empty vehicle speeds over 20 ft./sec. and accelerations exceeding 5 ft./sec.²  were achieved with an air flow of 72.0 ft.³/sec. Vehicle starting drag was less than 5 lbs. force.						
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# PROCEEDINGS

DOT-TSC-OST-72-13
Climatic Impact Assessment Program: Proceedings of the Survey Conference, February 15-16, 1972, by A.E. Barrington, Editor
Proceedings, September 1972

DOT-TSC-OST-73-4
Proceedings of the Second Conference on the Climatic Impact Assessment Program, November 14-17, 1972, by A.J. Broderick, Editor Proceedings, April 1973

DOT-TSC-OST-73-31
The Transportation Systems Center--A Special Briefing, by W.C. Dunlap, Editor
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## 16. Abstract

This volume contains the proceedings of a survey conference, held at the DOT Transportation Systems Center, which was the first of the reporting milestones of the Climatic Impact Assessment Program. CIAP, managed within the Office of the Secretary of Transportation, will assess, by report in 1974, the impact of climatic changes which might result from perturbation of the upper atmosphere by the exhaust effluent of a world high-altitude aircraft fleet, as projected to 1990.

The primary objective of this conference was to introduce the objectives and scope of CIAP to domestic and foreign representatives of industry, universities, and government agencies. Nineteen speakers were invited, at very short notice, to prepare informal introductory surveys in their respective disciplines which would be instructive to specialists in other areas and would illustrate the range of activities related to CIAP. These tutorials dealt with the general categories of engine emissions, the natural stratosphere, the physical and biological impact of stratospheric perturbations, and risk/benefit analysis. All but one of the talks are included in this volume, each followed by an abbreviated version of the ensuing open discussion.

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#### 16. Abstract

This volume contains the proceedings of the Second Conference on the Climatic Impact Assessment Program (CIAP), held at the DOT Transportation Systems Center on November 14-17, 1972. It includes 37 invited papers, four unscheduled presentations, three edited panel discussions, and edited question-and-answer sessions following some of the papers. The conference was essentially a progress report on CIAP. Therefore, some of the papers contain new data not yet published elsewhere, others describe detailed experiment plans or hardware for use in the near future, and a few deal with proposed investigations which may be directly relevant to CIAP. The subjects covered include aircraft-engine emissions, the nature of the "undisturbed" stratosphere of 1974, the nature of the "perturbed" stratosphere of 1990-2025, the possible resulting tropospheric perturbations, and the biological and economic effects of such perturbations.

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Center functions, its role in society, its staff capabilities, and its programs in transportation for fiscal years 1971, 1972, and 1973. Additionally, the center's procurement procedures and its financial picture are stressed.

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