informatics inc

DIRECTORY OF COMPUTERIZED

NOISE PREDICTION MODELS

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Prepared for

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by

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PREFACE

This Directory was compiled in order to assemble as much information as possible about existing computerized noise prediction programs. The term "computerized noise prediction model" has been deliberately defined broadly, and even includes one calculation method that has not yet been programmed for computer. All items have been roughly categorized as either equipment design programs or environmental noise prediction programs.

In our description of "known users", we have distinguished between "clients" and "computer program recipients". The former receive results generated by a computerized (and usually proprietary) model but have no direct access to the model. The latter have received their own copy of the program, and are, therefore, a more fruitful source of information on the practical vices and virtues of a particular program.

Also, it will be seen that some programs are very similar in their inputs and outputs; however, they may differ in the numerical results because of different data sets contained in the built-in tables (example: data for noise signatures of single flyovers, by aircraft type). It was beyond the scope of the present effort to obtain and analyze contents of such data sets. For each detailed information, the documentation or the contact person is the best source.

We would be interested in receiving comments, suggestions, and critizism, as well as descriptions of any new noise prediction models for future use.

CONTENTS

ENVIRONMENTAL NOISE PREDICTION MODELS

Corporate Source: Cavanaugh-Copley Associates, In

Name of Model:
RHODE ISLAND I-84

Country of Origin: United States

Aircraft _____ Highway X

Community _____ Other: _____

INPUTS

I. From data in a pre-existing land use data bank, a noise data bank is created with the following five items per grid cell: (1) noise threshold (est. ambient noise as function of existing land use, partially validated by field study); (2) effective population (number of residents or arbitrarily assigned number for other land uses); (3) topographic elevation; (4) ground cover elevation; (5) ground cover density.

II. Highway noise source: Average Daily Traffic (ADT);
Design Speed (V);
Percentage of Trucks.

Input Formats:

OUTPUTS Three types of maps of L_{10} levels: (1) noise sensitivity of study area (= vulnerability of existing land uses); (2) noise exposure from highway alternative; (3) noise impact of highway alternative (impact on existing land uses).

Output Formats: Plot Contours X Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Computer generated maps. Also calculates areas under contours.

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: _____ Tape: _____ Other: * Listing

Documentation:

* Copley, L. G.; A Computer Oriented Highway Noise Model Illustrated by the Rhode Island I-84 Environmental Impact Study. Steinitz Rogers Associates Inc., Feb. 1972 (part of total EIS submitted to State of Rhode Island).

* Based verbatim on material supplied by author.

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY

Contact Person: Dr. Lawrence G. Copley
112 Newtonville Ave.
Newton, MA 02158
(617) 969-2871

KNOWN USERS

Client — Steinitz Rogers Associates, for State of Rhode Island.

NOTES

Developed in 1971. Superseded By: MICHIGAN/117

Other: Model was developed to help plan Interstate I-84 (R.I.). For this highway no receiver grid points were closer than 300 ft. Thus certain effects are neglected that might be significant at closer distances (e.g. shielding from elevated roadway).

Effects of grade or pavement surface are ignored. Effects of depression accounted for by using data bank values for topographic elevation and the smooth highway profile generated by SRA. Noise near interchanges assumed L_{10} = 71 dBA at 300 ft. Noise impact data in built-in tables derived from many sources; includes sleep disturbance, task interference, speech interference, etc.

Name of Model:
MICHIGAN/117

Corporate Source: Mich. Dept. State Highways
Country of Origin: United States
Aircraft _____ Highway X
Community _____ Other: _____

INPUTS

ADT, %ADT, vehicles speeds, distance to center of lane, site parameters including barriers and relative elevations, grade (one of 4 grades), surface (smooth, normal or rough), barrier length (semi-infinite or infinite), etc. Will handle up to 8 lanes of traffic. See page 28 of Report R-828 for complete data sheet.

Input Formats: Time-share mode (real-time). Also possible batch mode if read statements are modified. See Page 111 of Report R-828.

OUTPUTS L_{10}, L_{50}, some diagnostics for one point per run. (However, a locus of similar prints along straight highway may be used to determine a contour.) Intermediate values for trucks, cars, separate segments.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Tabular.

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: _____ Tape: _____ Other: * Listing

* DeFrain, L. E., Milliman, P., Grove, G. H., Gray, P. G., Pollution of Michigan Urban Atmospheres By Highway Generated Noise, Research Laboratory Section, Testing and Research Division, Michigan State Highways, Report R-828.

HARDWARE REQUIREMENTS

Developed to Run on Borroughs 5500 and Running on _____
Time-share Mode
Amount of Core Required 4K

AVAILABILITY

Free upon request from DOT, Federal Highway Administration.

Contact Person:

Copies of Program:
Mr. J. Reagan, HEV-10
FHWA, DOT, 400 7th St. S.W.
Washington, D.C. 20590
Telephone 426-9727

Technical Information:
L. T. Oehler
Dept. of State Highways
Research Laboratory Station
735 E. Saginaw St.
Lansing, MI. 48906
(517) 373-2730

KNOWN USERS

Clients:

Sent by DOT to all state highway agencies of which many are users, including Connecticut (Joe Pulaski, 203/566-5302), Indiana (L.D. Cooper, 317/663-5816), Virginia (Mr. Andry, Dept. of Hwys., 1221 E. Broad St., Richmond), Booz Allen, Chicago, Boeing, Computer Services Div. (John Fletcher), and about 30 other private users.

NOTES

Developed in 1971. Superseded By: MICHIGAN/144

Other: Michigan Dept. of State Highways developed the model from the Highway Research Board's report (NCHRP No. 117), which was a pencil-and-paper calculation method. One of two methods approved by the FHWA in PPM 90-2. Program was written with a view towards ease of use on a time-share computer terminal. Oct. 1973 version MICHIGAN/144 result of revisions due to BBN reports 2209 and 2209R, users suggestions, and Aug. 1973 FHWA seminar on "Fundamentals and Abatement of Highway Traffic Noise."

Corporate Source: Texas Highway Dept.

Name of Model:
FREEWAY LEVEL OF SERVICE

Country of Origin: United States
Aircraft _____ Highway X
Community _____ Other: _____

INPUTS: (Modification of MICHIGAN/117 using less data) For each Segment:
Average daily traffic (ADT);
K factor (hourly volumes)

Input Formats:

OUTPUTS: Noise as a function of distance in L_{50}
Distance as a function of desired noise level in L_{50}

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Tabular.

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: _____ Tape: X Other: _____

Documentation: Input forms and other documentation for in-house use.

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY

Contact Person: Leo Miller or Bob Bliss
Environmental Section
Texas Highway Dept.
(512) 475-3046

KNOWN USERS:

Texas Highway Department only.

NOTES

Developed in _____(year). Superseded By: _____

Other: No allowances for grade, pavement smoothness, etc. (see MICHIGAN/117). Other outputs of the model include Level-of-Service numbers as function of location along road network.

Name of Model:

MICHIGAN/144

Corporate Source: Mich. Dept. State Highways

Country of Origin: United States

Aircraft _____ Highway X

Community _____ Other: _____

INPUTS

Number of roadway elements, number of lane groups per roadway element, hourly flow rate (free or interrupted), percent commercial, commercial and auto speeds, roadway elevation, distance to center of near lane, roadway length type, barrier length type, number of lanes per lane group, grade, surface and shielding corrections. Certain situations may require one or more of the following inputs: median width, roadway element angle, observer height, shoulder, cut distances, barrier height, location distance, included angle and end-normal angle. See page 27 of the Report R-890.

Input Formats: Time-share mode (real time). Can be modified for batch use as described on page 19 of Report R-890.

OUTPUTS

See MICHIGAN 117. In addition, it will calculate the proper distance to center of near lane for a given L_{10} input (Iterate mode).

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: FORTRAN IV, and will be programmed FOCAL(PDP 8/e) when time permits.

Available in Cards: _____ Tape: _____ Other: _____

Documentation: * Grove, G. H., Traffic Noise Level Predictor Program, Research Laboratory Section, Testing & Research Div., Mich. State Highway and Transportation Commission, Report R-890. Contains worked examples.

Background: Highway Research Boards reports NCHRP 117 and 144.

HARDWARE REQUIREMENTS

Developed to Run on Borroughs 5500 Time-share mode.

Amount of Core Required 4K

AVAILABILITY

Free upon request from DOT or State of Michigan

Contact Person:

Copies of Program:	Technical Information:
Mr. J. Reagan HEV-10	Mr. L. T. Oehler
FHWA, DOT, 400 7th St. S.W.	Research Lab. Station
Washington, D. C. 20590	Dept. of State Highways
Telephone 426-9727	735 E. Saginaw St.
	Lansing, MI. 48906 (517/373-2730)

KNOWN USERS

Computer Program Recipients:

Minnesota Highway Department
St. Paul, Minnesota
(Mr. Gary Orlich)

USC, Inc.
Pittsburgh, PA
(Mr. Armond Russ)

Expanded mailing list used for MICHIGAN 117.

NOTES

Developed in 1973.

Other: A new version of MICHIGAN/117 model, resulting from revisions due to BBN reports 2209 and 2209R, users' suggestions, and an Aug. 1973 FHWA seminar on "Fundamentals and Abatement of Highway Traffic Noise." Better prediction of attenuation from barriers. Auto and truck noise sources located at pavement and 8 feet above pavement level, respectively.

Name of Model: NOISE
Supersedes Conn. DOT's original modification of Michigan's model

Corporate Source: Conn. Dept. of Trans.

Country of Origin: United States

Aircraft _____ Highway X

Community _____ Other: _____

INPUTS

Input is identical to the Parameter Work Sheet given in NCHRP Report No. 117 with the addition of certain control variables (heading, number of locations and elements, and a traffic parameter).

Input Formats:
All variables except for the heading are input under a free format.

OUTPUTS

Output is identical to the Parameter Work Sheet and the Noise Prediction Work Sheet given in NCHRP Report No. 117.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: FORTRAN V

Available in Cards: X Tape: _____ Other: _____

Documentation:
Paul D. Bevacqua, Conn. Dept. of Transportation,
Bureau of Planning and Research, Environmental Section
Background: NCHRP Report #117; NCHRP Report #144; Michigan Department of Highway's original Model (Michigan/117)

* Based verbatim on material supplied by author.

HARDWARE REQUIREMENTS

Developed to Run on Univac 1006 and Running on Univac 1106

Amount of Core Required 11K words

AVAILABILITY

Terms:
Free upon request from Conn. DOT

Contact Person: Tech. information General Availability information
Joseph Pulaski or Paul D. Bevacqua
Conn. Dept. of Transportation
Bureau of Planning and Research (4402)
P.O. Drawer A, Wethersfield, Connecticut 06109

KNOWN USERS

Clients:

Conn. Dept. of Transportation only

Computer program recipients:

NOTES

Developed in 1973. Superseded By:

Other:
Program will become available upon publication of Conn DOT's program description report probably Spring, 1974.
Program is entirely user-oriented, with 22 selfexplanatory error messages for data input debugging. All variables used are easily understood and correlated to NCHRP Report #117 and #144. As described above, all input and output are easily understood by anyone having a good understanding of the two reports.

Name of Model:

TSC/HIGHWAY

Corporate Source: DoT Trans. Systems Center

Country of Origin:

Aircraft _____ Highway __X__

Community _____ Other: _____

INPUTS

Main Groups: Road and vehicle; barrier; ground cover; and receiver parameters.

Within which: location of roadways (up to 10 straight-line sections per roadway) in XYZ coordinates. Traffic flow in vehicles per hour. Average operating speeds (may be determined from Highway Capacity Manual 1965) or speeds as function of vehicle type. Location of barriers (up to 10 segments per barrier), height(s) of barriers, whether barriers absorbing or reflecting.

Ground cover: area, location, high grass/shrubbery vs. trees.

Receiver: XYZ locations of up to 15 receivers -- more if program is modified.

Also the following may be specified: receiver height adjustment number of frequency bands in calculation, standard deviation of noise levels for cars or for trucks, source height adjustments, noise spectrum adjustment for "new vehicles."

Input Formats:

Punched cards

OUTPUTS: A-weighted octave band levels, overall levels in dBA (energy mean, or L_{eq}), L_{90}, L_{10}, L_{50} for each receiver point.

Output Formats: Plot Contours_____ Levels at Grid Coordinates __X__ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: FORTRAN

Available in Cards: __X__ Tape: _____ Other: Listing*

Documentation: *Appendix B of:

Wesler, J. E., Manual for Highway Noise Prediction, Report No. DoT-TSC-FHWA-72-1, March 1972. Appendix B is a separate volume.

The above report, or a short form of it (DoT-TSC-FHWA-72-2) serves as background information.

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY : Distributed by DoT/FHWA to all 50 state highway agencies. List of recipients appended under IV.

Contact Person: Technical Information:

Mr. Robert Hinckley
Transportation Systems Center
55 Broadway
Cambridge, Mass. 02142 (617) 494-2585

KNOWN USERS

NOTES

Developed in _____(year). Superseded By: _____

Other: Mathematical and acoustical bases for program done by BBN (Ulrich J. Kurze) under contract to TSC. Because Gaussian distribution is assumed, $L_{10}-L_{50}=L_{50}-L_{90}$. Results obtained when ground absorption is important are intended for comparison with field data and should be interpreted with caution.
One of two models approved for use by the FHWA in PPM 90-2.

Corporate Source: J. H. Wiggins Co.

Name of Model:
WIGGINS VERSION OF TSC/HIGHWAY

Country of Origin: United States
Aircraft _____ Highway X
Community _____ Other: _____

INPUTS:

TSC/HIGHWAY, but with variable barrier absorption coefficients added.

Input Formats:

OUTPUTS; Series of output modifications of TSC/Highway including scale interpolation option.

Output Formats: Plot Contours X Levels at Grid Coordinates X XYZ Coordinates of Iso-Levels X

Other:

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: _____ Tape: _____ Other: _____

Documentation:

HARDWARE REQUIREMENTS

Developed to Run on IBM 370, CDC 6600 (batch); CDC 6400 (time share).

Amount of Core Required _____

AVAILABILITY :

Proprietary.

Contact Person: John Parnell, Vice President
J. H. Wiggins Co.
1650 S. Pacific Coast Highway
Redondo Beach, California 90277
(213) 378-0257

KNOWN USERS :

Clients (using Wiggin's services but no direct access to program):

Municipalities in California area.

NOTES

Developed in _____(year). Sponsored by: _____

Other:

Name of Model:
ANGER

Corporate Source: University Computing Co.
Country of Origin: United Kingdon
Aircraft _____ Highway __X__
Community _____ Other: _____

INPUTS

Topographical data of site, road cross section coordinates, road level of service, including vertical alignment data.

Input Formats:

OUTPUTS

Road cross section and earth berm design data.
Noise levels at specified distances from the proposed road.

Output Formats: Plot Contours_____ Levels at Grid Coordinates __X__ XYZ Coordinates of Iso-Levels _____

Other: Contours may be plotted manually.

COMPUTER PROGRAM

Language: _____

Available in Cards: _____ Tape: _____ Other: _____

Documentation: Proprietary.
Based on British Dept. of Environment's Design Bulletin 26

HARDWARE REQUIREMENTS

Developed to Run on dual 1108's and Running on dual 1108's

Amount of Core Required _____

AVAILABILITY

Proprietary.

Contact Person: University Computing (GB) Ltd.
344 Easton Road
London, NW 1, England

KNOWN USERS

Clients: U. K. highway engineers.

NOTES

Developed in 1972.

Other: Metric units throughout.

Name of Model:
NOISE

Corporate Source: University Computing Co.
Country of Origin: United Kingdom
Aircraft _____ Highway X
Community _____ Other: _____

INPUTS

Similar to ANGER

Input Formats:

OUTPUTS

Loci of points with equal noise levels. Graphical loudness contours of cross sections

Output Formats: Plot Contours X Levels at Grid Coordinates X XYZ Coordinates of Iso-Levels X

Other:

COMPUTER PROGRAM

Language: _____

Available in Cards: _____ Tape: _____ Other: _____

Documentation: Proprietary

HARDWARE REQUIREMENTS

Developed to Run on dual 1108's and Running on dual 1108's

Amount of Core Required _____

AVAILABILITY

Proprietary

Contact Person: University Computing (G. B.) Ltd.
344 Easton Road
London, N.W.1, England

KNOWN USERS

Clients: Highway engineers in the U. K.

NOTES

Developed in _____(year).

Other: Program can be used to check that proposed barriers have desired effect. Metric units throughout.

Name of Model:
MWAY

Corporate Source: Applied Research of Cambridge
Country of Origin: United Kingdom
Aircraft _____ Highway X
Community _____ Other: _____

INPUTS

1. Motorway path data
2. Motorway section data
3. Noise coordinates of adjacent streets
4. Block coordinates and angle of twist
5. Block dimensions and number of units
6. Block heights and floors and spot heights
7. Local ambient noise levels.

Input Formats:

OUTPUTS

1. L_{10} noise levels at front or back facades of housing units in adjacent area, for various floors and times of day.
2. Insulation that will be required at each point according to various noise standards, (cont.)

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Tabular form.

COMPUTER PROGRAM

Language: _____

Available in Cards: _____ Tape: _____ Other: _____

Documentation: Applied Research of Cambridge, Ltd., "MWAY System: Users Manual," Sept, 1971. Alogorithm for barrier noise reduction is considerably revised copy of Building Research Station method (BSR Current paper 20/71, May, 1971). Alogrithm for propagation through streets is that developed by the National Physical Laboratory (NPL Report AC 54, October, 1971).

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY

Terms: Proprietary

Contact Person: Mr. John Tracey-White or Mr. L.H. Hall
Transportation Environment Group
Applied Research of Cambridge, Ltd.
5 Jesus Lane
Cambridge, CB5 8BA, England

KNOWN USERS

NOTES see other

Developed in _____(year). Superseded By: _____

Other: Model also predicts visual intrusion and shading (reduction of sunlight). Model developed in conjunction with Austin-Smith Lord, planners, of London. Metric units probably used throughout. Model takes into account shielding by barriers, shielding by buildings, and ground attenuation.

Cont'd. from Page 1: OUTPUTS, No. 2 - such as Wilson day standard of 65 dB, night standard of 50 dB, and Noise Abatement Council Standard of 70 dB.

Name of Model:
CONTOUR

Corporate Source: Applied Research of Cambridge

Country of Origin: United Kingdom

Aircraft _____ Highway __X__

Community _____ Other: _____

INPUTS

1. Digitized data from 1:1250 plan of proposed road and surrounding topography.
2. Data on traffic flow and speed.
3. % heavy vehicles.

Input Formats:

OUTPUTS

Output Formats: Plot Contours * X Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

* Colored Contour overlay.

Other:

COMPUTER PROGRAM

Language: _____

Available in Cards: _____ Tape: _____ Other: _____

Documentation: Algorithm derived from U.K. Dept. of Environment's Design Bulletin 26

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY

Program itself probably proprietary. Costs to user about £100-120 ($247-297) per kilometer.

Contact Person: Mr. L.H. Hall
Transport Environment Group
Applied Research of Cambridge, Ltd.,
5 Jesus Lane
Cambridge, CB5 8BA, England

KNOWN USERS

NOTES

Developed in _____(year). Superseded By: _____

Other: Used to assess likely compensation claims if new road is built. Less exact and detailed than ARC's other program, MWAY. Metric units probably used throughout.

Corporate Source: USAF

Name of Model:

U.S. AIR FORCE NEF

Country of Origin: United States

Aircraft X Highway ____

Community ____ Other: ____

INPUTS Aircraft noise and performance, airbase operations data. Fully described in manual: AFAMRL-TR-73-108 Computer Program Operator's Manual.

Input Formats:

OUTPUTS Listing of input, printed grids, binary grid dumps, BCD output compatible with CALCOMP GPCP routines. See: AFAMRL-TR-73-108.

Output Formats: Plot Contours X Levels at Grid Coordinates X XYZ Coordinates of Iso-Levels X

Other:

COMPUTER PROGRAM

Language: FORTRAN-IV. Available BCD tape (7 tr-556BPI) or as Control Data Update OLDPL format.

Available in Cards: ____ Tape: ____ Other: ____

Documentation: Technical Report AFAMRL-TR-73-109 "Computer Program Description", Report ARAMRL-TR-73-108 "Computer Program Operators Manual." (Both reports preliminary, pre-publication.)

*Based verbatim on material supplied by author.

HARDWARE REQUIREMENTS

Developed to Run on CDC-6000 and Running on CDC-6400

Amount of Core Required 117200_8 of which 41453_8 data storage in labelled common.

AVAILABILITY Subject to review by U.S. Air Force

Terms:

Contact Person: Mr. Jerry D. Speakman
6570 AMRL/BBE
Wright-Patterson AFB, Ohio 45433

KNOWN USERS Bolt Beranek and Newman Inc.
P.O. Box 633
Canoga Park, California 91305
Attention: Mr. N. H. Reddingius

Above contractor maintains program for USAF.

NOTES CALCOMP's GPCP program is complementary with this program. It is not included in the package and must be procured separately.

Developed in _____(year). Superseded By: _____

Other:

Corporate Source: Wyle Labs.

Name of Model:

NOISE 1

Country of Origin: United States

Aircraft X Highway ____

Community ____ Other: ____

INPUTS

Airport Data	Aircraft Data	Control Information
Runway Coordinates	Performance Profiles	Contour Values
Airport Altitude	Traffic Mix	Error Tolerance
Wind Direction and Velocity	Noise Abatement Options	Diagnostic Options
Ground Track Definitions	Noise Characteristics	Grid Points
		Start and Stop Points

Input Formats: Non-interactive batch, 80 column punched cards.

OUTPUTS Using the contour option, the coordinates defining the contour are printed in tabular form, written on magnetic tape and the contours are plotted. All input data is printed at the user's option. Also, the user can request varying degrees of diagnostic information to be printed. (Continued on next page)

Output Formats: Plot Contours X Levels at Grid Coordinates X XYZ Coordinates of Iso-Levels X

Other: Diagnostic information.

COMPUTER PROGRAM

Language: FORTRAN IV AND UCC FORTRAN V

Available in Cards: X Tape: X Other: ____

Documentation:

* Based verbatim on material supplied by author.

HARDWARE REQUIREMENTS

Developed to Run on Univac 1108 and Running on Univac 1108.

Amount of Core Required 53 K words

AVAILABILITY

Terms: Available through the Department of Transportation Joint Office of Noise Abatement, Washington, D.C.

Contact Person: John Wesler (202) 426-4558

KNOWN USERS

Clients:

1. Department of Transportation, Washington, D.C.
2. San Francisco International Airport
3. Portland International Airport
4. Port Authority of New York and New Jersey

NOTES

Developed in 1973, Superseded By:

Other: Outputs continued: Using the grid option, the user can specify an N by M matrix at which the noise levels will be computed. The coordinate points and noise levels are printed. Printed diagnostic information is an option.

Corporate Source: FAA

Name of Model:

ASDS (AIRCRAFT SOUND DESCRIPTION SYSTEM)

Country of Origin:

Aircraft X Highway _____

Community _____ Other: _____

INPUTS

1. Aircraft operations for each runway for each time-of-day period, for all takeoffs and landings: aircraft type, contour run no.
2. Aircraft ground tracks. For each runway for each day for each item in (1) above: which exposure zones are overflown (for example, when there are 3 ground tracks departing from a single runway as many as 6 separate zones can be created by the overlap of the contours of a single aircraft); takeoff times in min (= takeoffs per zone x $\frac{1}{4}$); landing times in min (=landings per zone x 1/6); areas of zones.
3. Runway locations. Runway identifier, true bearing in degrees, XY coordinates of runway threshold (ft.) runway lengths (ft.).
4. Ground track data. Ground track code, takeoff or landing, coordinates of start point, length and bearing of each of up to 3 straight segments; and radius, L or R, and final bearing of up to 2 turn segments. U.S. Geological Survey 7.5 min. Quad. Topographic Maps.

Input Formats:
Punched Cards.

OUTPUTS

1. Total dwell time above 85 dBA noise levels for areas near airports.
2. Situation Index (=figure of merit, in acre-minutes, for overall exposure over 85 dBA of given zone).

Output Formats: Plot Contours X Levels at Grid Coordinates X XYZ Coordinates of Iso-Levels X

Other:

COMPUTER PROGRAM

Language: PL-1

Available in Cards: X Tape: X Other: _____

Documentation:
Background: Cruz, J. E., Aircraft Sound Description System, Rept. No. FAA-EQ-73-3. March 1973. Final Report.
Aircraft Sound Description System (ASDS) Applications Manual Rept. FAA-EQ-73-4 Vol. 1 July 1973.
Mitre plans to submit user's level manual with listing of the program to FAA by early 1974.

* Based verbatim on material supplied by author.

HARDWARE REQUIREMENTS

Developed to Run on IBM 370/145 and Running on same

Amount of Core Required 140 K bytes max. (for largest sub-program).

AVAILABILITY

(A) Program in process of being documented for public availability.

Contact Person:

Technical Information:
Frank Maginnis
MITRE Corp.
1820 Dolly Madison Blvd.
McClean, Virginia 22101
703/893-3500 ext. 2352

General Information:
J. E. Cruz
FAA
800 Independence Avenue, S. W.
Room 939
Washington, D. C.
202/426-8722

KNOWN USERS

Mitre Corporation

NOTES

Developed in 1972.

Other:
Vitro Labs, Division of Automation Industries, developed the data in the program for 85 dBA (peak) contours for single events for various aircraft types.
Mitre Corporation is developing the computer program for FAA.

Corporate Source: DoT Trans. Systems Center

Name of Model:
TSC/NOISE EXPOSURE MOD-5

Country of Origin:

Aircraft __X__ Highway _____

Community _____ Other: _____

INPUTS

Main groups: aircraft class, airport, flight, aircraft noise, noise exposure index parameters.

Within which, including: runway position, direction, touchdown points, percent thrust on flight segments, number and location of segments and turns, time of day data for flights. Noise emissions for aircraft types from either built-in or user-specified noise tables.

Input Formats: Punched cards.

OUTPUTS: NE (Noise Exposure), NEF (Noise Exposure Forecast) or WECPNL (Weighted Equivalent Continuous Perceived Noise Level). Also, areas within contours.

Output Formats: Plot Contours *X Levels at Grid Coordinates X XYZ Coordinates of Iso-Levels up to 3 contours

Other:

* CALCOMP subroutines.

COMPUTER PROGRAM

Language: FORTRAN--IV level H

Available in Cards: _____ Tape: _____ Other: Listing

Documentation: Program is listed in Taub, J.; T. Foreman, B. Brownfield; The Noise Exposure Model MOD-5 (Vol. 2), Report DoT-TSC-OST-72-5, Nov. 1971 Revised June 1972.

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on MIT's 360/75

Amount of Core Required 80--100 K bytes (?)

AVAILABILITY

Available upon request from DoT.

Contact Person: Mr. Robert Hinckley
Transporation Systems Center
55 Broadway
Cambridge, MA 02142 (617) 494-2585

KNOWN USERS

NOTES

Developed in _____(year). Sponsored by: _____

Other:

Corporate Source: J. H. Wiggins Co.

Name of Model:
WIGGINS VERSION OF TSC/MOD-5

Country of Origin: United States
Aircraft X Highway ____
Community ____ Other: ____

INPUTS:

Same as TSC/Mod-5

Input Formats:

OUTPUTS:

Same as TSC/Mod-5, but with interpolation and plotting program options.

Output Formats: Plot Contours X Levels at Grid Coordinates X XYZ Coordinates of Iso-Levels X

Other:

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: ____ Tape: ____ Other: ____

Documentation:
Proprietary.

*Based verbatim on material supplied by author.

HARDWARE REQUIREMENTS

Developed to Run on IBM 370; CDC 6600(batch); CDC 6400 (time share).

Amount of Core Required 80-100 K bytes.

AVAILABILITY:

Proprietary.

Contact Person: Mr. John Parnell, Vice President (213) 378-0257
J. H. Wiggins Co.
1650 S. Pacific Coast Highway
Redondo Beach, CA 90277

KNOWN USERS

NOTES

Developed in _____(year). Sponsored by: _____

Other: Extends capacity of TSC/MOD-5:
Number of Flight Segments from 4 to 12;
Number of Flights from 75 to 250.

Corporate Source: NASA

Name of Model:

SONIC BOOM PROPAGATION IN STRATIFIED ATMOSPHERE

Country of Origin: United States

Aircraft X Highway _____

Community _____ Other: _____

INPUTS Atmospheric properties and horizontal winds as functions of altitude, flight path parameters, and aircraft F-functions.

Input Formats:

OUTPUTS Ray-tube areas; midfield pressure signatures at any altitude.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Tabular.

COMPUTER PROGRAM

Language: ASA FORTRAN

Available in Cards: X Tape: _____ Other: _____

Documentation: Available for $21.00 from COSMIC, Barrow Hall, University of Ga., Athens, Georgia 30601

HARDWARE REQUIREMENTS

Developed to Run on IBM 1130;CDC 6600 and Running on _____

Amount of Core Required _____

AVAILABILITY

For sale by COSMIC. Price of program (1,990 cards): $400.00.
Program No. LAR-10480

Contact Person:

KNOWN USERS

NOTES

Developed in _____(year). Sponsored by: _____

Other: Developed in approximately 1969 for NASA by Aeronautical Research Associates of Princeton, Inc., N. J. A synthesis of established theory plus some new features.

Name of Model:
AVGY Noise Exposure Program

Corporate Source: Aviation Systems, Inc.

Country of Origin: United States
Aircraft ___X___ Highway _____

Community _____ Other: _____

INPUTS

Aircraft ground and flight paths are identified by flight profile and ground track (straight lines and circular arcs) on takeoff and approach.
Noise levels are identified by noise vs distance relationships for each segment of the operation.
Aircraft are classified by noise characteristics at takeoff and climb powers and under the varying approach conditions.
Variables in aircraft path and noise level can be adjusted to simulate actual operations.

Input Formats:
Punched Cards

OUTPUTS

NEF (Noise Exposure Forecast), L_{eq} (Equivalent Noise Level), L_{dn} (Day-Night weighted equivalent noise level) or any similar measure for which noise vs distance data are available for the specified operating conditions.

Output Formats: Plot Contours __X*__ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels Up to 6 contours

Other:
*CALCOMP subroutines

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: _____ Tape: _____ Other: Listing

Documentation:
Used by aircraft industry in SAE Program for developing NEF concept and updated continuously from that time, 1966-7. See FAA reports FAA DS-67-14, 15, 16, 17.

* Based verbatim on material supplied by the author.

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on UNIVAC 1110

Amount of Core Required 60K words.

AVAILABILITY

Terms: Proprietary
Available as part of consulting service.

Contact Person: **Tech. information** **General Availability information**
Mr. John M. Tyler
Aviation Systems Inc.
25 Knob Hill Road
Glastonbury, Connecticut 06033 Phone: (203) 633-2835

KNOWN USERS

Clients:
SAE Research Committee R2.5 in 1966-7
Aviation Systems Inc.; see above
Noise Control Systems Inc.
Contact: Mr. L.V. Hinton; 4112 Rosemary St.; Chevy Chase, MD. 20015

Computer program recipients:

NOTES

Developed in 1966-67. Superseded By: _____

Other:
This was the original grid system program. It has been refined as needed to meet requirements over the years.
Number of flight Profile segments: 4
Number of ground track segments: 7
Number of flight operations/aircraft type: unlimited

Name of Model:
STATISTICAL PREDICTION MODEL FOR GLASS BREAKAGE FROM NOMINAL SONIC BOOM LOADS

Corporate Source: Booz-Allen
Country of Origin: United States
Aircraft _____ Highway _____
Community _____ Other: X

INPUTS

BMD statistical program package (available on tape at many data centers).
Sonic boom overpressure data.
Window strength data.

Input Formats:
Compatible to BMD package.

OUTPUTS

Probability of sonic boom window breakage as function of nominal overpressure window size, flight path angle, window condition, and boom duration.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:
Breakage probability tables.

COMPUTER PROGRAM

Language: BMD Instructions

Available in Cards: _____ Tape: BMD Tape Other: _____

Documentation: Hershey, R. L. and T. H. Higgins, Booz Allen Applied Research, Inc.; Final Report, (FAA-RD-73-79), 30 July 1973, 216 p.

* Based verbatim on material supplied by author.

HARDWARE REQUIREMENTS

Developed to Run on CDC-6600 and Running on CDC-6600

Amount of Core Required 27K

AVAILABILITY

Manual for BMD computer programs available from Univ. of California Press, Berkely, CA.; for $8.25.
Report on the statistical model (previous page) available from NTIS, Springfield, VA.; 22151, Report No. AD-763-594 for $6.75.

Contact Person: **Tech. information** **General Availability information**
Mr. Robert Hersey
Booz Allen Applied Research, Inc.
4733 Bethesda Ave.
Bethesda, Maryland 20014

KNOWN USERS

Clients:
FAA

Computer program recipients:
N/A

NOTES

Developed in 1972. Superseded By:

Other:

Corporate Source: Serendipity Inc.

Name of Model:

SERENDIPITY

Country of Origin: United States

Aircraft _____ Highway _____

Community __X__ Other: _____

INPUTS

Motor vehicles: Density of operations for each vehicle type (vehicles/sq. mile), was derived from average daily traffic/segment statistics. Octave band levels for each type for each speed. Three types: automobiles, light trucks, heavy trucks and buses, contained in built-in lookup tables. Average speeds for each type by segment.

Railroads: Noise emissions of typical reference trains, by speed (in built-in table).
Density (= number of such trains); offset distances from track.

Aircraft: Lookup tables of emissions for 11 plane types (built-in); Hourly and Annual average ops by aircraft type, time of day (day/night), and mileage of trip; flight tracks location, flight profiles.

Input Formats:

OUTPUTS: Median (L_{50}) noise levels by grid area for rush hour and off-hour conditions broken down by contributions of streets only and streets and highways. Also projections to future conditions. Same for railroads.

Output Formats: Plot Contours_____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Tabular.

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: X Tape: _____ Other: Listing

Documentation: Methodology in Appendix A of Vol VI, "Community Transportation Noise," of A Study of the Magnitude of Transportation Noise Generation and Potential Abatement. Serendipity, Inc., Arlington, Virginia, Nov. 1970. Under contract for DoT. Report No. DoT-ONA-71-1-Vol. 6.

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY N/A because no longer used.

Contact Person:

KNOWN USERS (in modified form):

DoT/Transportation Systems Center
55 Broadway
Cambridge, Massachusetts

NOTES

Developed in 1969-70 Superseded By: TSC/COMMUNITY

Other: Actually, community transportation noise. An area-type model, with options for considering contributions of noise sources from both finite and infinite areas.

Corporate Source: J. H. Wiggins Co.

Name of Model:

WIGGINS VERSION OF SERENDIPITY MODEL

Country of Origin: United States

Aircraft _____ Highway _____

Community __X__ Other: _____

INPUTS: Parameters for transportation, industrial, and construction noise sources.

Population distribution data.

Railroad inputs include type of rail (welded?) and type of absorbers(hydraulic?).

Input Formats:

OUTPUTS: Combined noise levels (energy summation)

Output Formats: Plot Contours __X__ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels __X__

Other:

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: _____ Tape: _____ Other: _____

Documentation: Proprietary.

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY

Proprietary.

Contact Person: Mr. John Parnell, Vice President
J. H. Wiggins Company
1650 S. Pacific Coast Highway
Redondo Beach, California 90277
Phone: (213) 378-0257

KNOWN USERS :

Cities in the Los Angeles area;
San Antonio, Texas;
Air Transport Assoc. (ten large airports study).

NOTES

Developed in _____(year). Superseded By: _____

Other: They have adapted TSC models for aircraft and highway noise and the earlier Serendipity work for "Community" and railroad noise.

Name of Model:
TSC/COMMUNITY

Corporate Source: Trans. Systems Center
Country of Origin: United States
Aircraft _____ Highway _____
Community X Other: _____

INPUTS

Input Formats:

OUTPUTS

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: _____ Tape: _____ Other: *Listing

Documentation: *Report DoT-OST-ONA-71-6: complete FORTRAN listing
Background: Community Sound Levels (A comparison of measured and estimated data) Report DoT-OST-ONA-71-8, July 1971.

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY

Terms:

Contact Person: Mr. Robert Hinkley
Transportation Systems Center
55 Broadway
Cambridge, Mass. 02142 (617) 494-2585

KNOWN USERS

NOTES

Developed in about 1969-70.

Other: Developed from the Serendipity model by making the noise source definition(s) more explicit. Verified by field measurements made by TSC in Medford, Massachusetts. (See under "documentation," previous page)

Corporate Source: ESL, Inc.

Name of Model:

DRONE

Country of Origin: United States

Aircraft _____ Highway _____

Community __X__ Other: _____

INPUTS Modules for aircraft, highway, rapid transit noise sources:.

Highway: Vehicle mix and volume, speeds, highway geometry, adjacent topography, barrier geometry -- from topographic or site maps or self-generated height data.

Airport/aircraft: Noise data on single events per aircraft type in built-in tables. Data on airport mix, runway usage, etc., from client.

Rapid transit: Headway (time) between vehicles, both directions; source strength (self-measured).

General: Weather Bureau climatological data (for wind sheer, thermal gradient, humidity if refraction).

Input Formats:

OUTPUTS L_{eq}, L_{50}, L_{10}, in dBA or PNdB. Number of people impacted if proper land use data is available. NEF.

Output Formats: Plot Contours __X__ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Tabular.

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: _____ Tape: _____ Other: _____

Documentation: Proprietary.

Background information: ESL, "Control Roadway Noise Now" (pamphlet).

HARDWARE REQUIREMENTS

Developed to Run on IBM 360/440 OS, and running on IBM 370/145.

Amount of Core Required est. 150 K bytes

AVAILABILITY

Contact Person: Mr. Harry Seidman or Dr. C. Michael Hogan
ESL, Inc.
495 Java Drive
Sunnyvale, CA 94086 (408) 734-2244

KNOWN USERS

Clients: Virginia Highway 66 Study;
Baltimore Total Transportation Review;
Boston Transportation Plan Review.

NOTES -- Originally Design of ROadways with Noise Evaluation.

Developed in _____(year). Sponsored by: _____

Other: Similar to TSC and MICHIGAN/117 models but developed independently. Different way of accounting for refraction. ESL has applied to have FHWA approve DRONE as a PPM90-2 prediction method.

Rapid transit: ESL has BART data base, geometry applicable to other BART-like systems. Trains are treated as finite line source at wheel height. Also, fragmentary emissions data on railroad trains.

Name of Model:

R. F. WESTON CO.

Corporate Source: R. F. Weston

Country of Origin: United States

Aircraft _____ Highway _____

Community X Other: _____

INPUTS Background noise levels (CNEL) for x, y grid points. (11 x 11 grid = 121 pts. May be scaled up or down to cover desired area).

x, y location of proposed source, treated as an idealized point source.

Noise level of proposed source.

Input Formats: Grid coordinates.

OUTPUTS Levels associated with proposed source. Combined levels due to background noise and propossed source.

Output Formats: Plot Contours X Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: Fortran IV

Available in Cards: 100 (approx.) Tape: _____ Other: _____

Documentation:

HARDWARE REQUIREMENTS

Developed to Run on 1130 and Running on 1130
Will soon run on General Auto 1830.

Amount of Core Required: less than 10 k bytes

AVAILABILITY

Contact Person: Mr. Ted Boras
Head, Computer Section,
Roy F. Weston Co.
Lewis Lane
West Chester, PA 19380 (215) 692-3030

KNOWN USERS

Clients:

Boeing-Vertol

NOTES

Developed in 1973. Superseded By: _____

Other: Very simple model was developed in house to answer question of impact of proposed incinerator on the community. Source treated as point source with simple free-field inverse-square-law decrease of level with distance. A line-source routine was written but is not presently in the program.

Name of Model:
URBAN NOISE PREDICTION MODEL,
BONN, WEST GERMANY

Corporate Source: Uberwachungs-Verein Rhineland

Country of Origin: West Germany

Aircraft _____ Highway _____

Community _____ Other: _____

INPUTS

Input Formats:

OUTPUTS

Calculations and plottings of area noise level distributions to predict community noise situations at planning stage.

Output Formats: Plot Contours X Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: _____

Available in Cards: _____ Tape: _____ Other: _____

Documentation:

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY

Terms:

Contact Person: **Tech. information** **General Availability information**
Dr. H. G. Thomassen,
Köln
West Germany

KNOWN USERS

Clients:
Ministerium fur Arbeit, Gesundheit und Soziales des Landes Nordrhein-Westfalen, West Germany

Computer program recipients:

NOTES

Developed in 1971-1973. Superseded By: _____

Other:

Corporate Source: Wyle Labs

Name of Model:

L_{dn} NOISE CONTOURS FOR RAILROAD YARD OPERATIONS

Country of Origin: United States

Aircraft _____ Highway _____

Community _____ Other: Railroad

INPUTS Average number of cars classified in hump yard and flat yard per day, switcher locomotive usage at specific areas, number of engine load tests, percent time locomotives spend idling, typical numbers of mechanical refrigerator cars and their respective locations on the yard property. Also required is a detailed yard or terminal layout for a suitable scale (1 inch = 200-500 feet preferred). A 32-step hand calculation method has been developed which incorporates a series of charts, tables and nomograms. A detailed worksheet is also provided which is keyed to the individual steps.

Input Formats:

OUTPUTS The methodology yields L_{dn} noise contours (80, 75, 70 and 65 dB) around major subsource noise elements (retarders, concentrated switch engine operations, idling locomotives, etc.) and presents a method for combination of these contours to yield total composite yard contours.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Tabulated distance to desired L_{dn} or CNEL noise contours for discrete noise sources and for composite noise contours from specific points along the track.

COMPUTER PROGRAM

Language: Hand calculations only via series of tables and nomograms.

Available in Cards: _____ Tape: _____ Other: _____

Documentation: Wyle Report No. WCR 73-5

HARDWARE REQUIREMENTS: N/A

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY

Through Association of American Railroads, Wyle Laboratories Report No. WCR 73-5, "Assessment of Noise Environments Around Railroad Operations".

Contact Person: James Coxey, Manager of Environmental Studies, AAR, 1920 L St. NW, Wash. D.C. (202) 293 4000

KNOWN USERS

Clients:

Southern Pacific Transportation Co.
Atchison, Topeka and Santa Fe Railway Co.
Union Pacific RR
Association of American Railroads (AAR)

NOTES

Developed in 1973. Superseded By: _____

Other:

Corporate Source: Lockheed

Name of Model:

Country of Origin: United States

PREDICTING FAR-FIELD ACOUSTIC ENVIRONMENTS DUE TO A MOVING ROCKET SOUND SOURCE

Aircraft _____ Highway _____

Community _____ Other: Rocket.

INPUTS Data for movement of the sound source, engine parameters, molecular absorption of acoustic energy, sound power spectrum characteristics and a distribution factor.

Input Formats:

OUTPUTS Acoustic environment as a function of frequency, time and location. Octave band frequencies and their corresponding spl's are printed out in tabular form. Semilogarithmic plot is made of spl vs. frequency for each vehicle position and point of observation.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Graphical plots, tabular data.

COMPUTER PROGRAM

Language: FORTRAN IV 27%), MAP (73%)

Available in Cards: X Tape: _____ Other: _____

Documentation: Available from COSMIC, Barrow Hall, Univ. of Ga., Athens, Georgia 30601. Price: $11.00
Also from NTIS as NASA-TN-D-4117

HARDWARE REQUIREMENTS

Developed to Run on IBM 7094 and UNIV 1170, SC 4020 Plotter.

Amount of Core Required _____

AVAILABILITY For sale by COSMIC (3, 731 cards) Program No. MFS-14416

Contact Person:

KNOWN USERS Developed by Lockheed Missiles and Space Co., Sunnyvale, Calif.

NOTES

Developed in _____(year). Superseded By: _____

Other: Uses algorithm of Wilhold, Guest and Jones for far-field acoustic environment prediction. Permanent program data include distribution data curves.

Corporate Source: NASA

Name of Model:
SOUND LEVEL APPROXIMATION
(SLAP 1)

Country of Origin: United States

Aircraft _____ Highway _____

Community _____ Other: Rockets

INPUTS

Not given

Input Formats: Mag. tape

OUTPUTS

Time, time delay, relative intensity of sound, elevation angle, slant range.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Tabular

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: X Tape: _____ Other: _____

Documentation: Available from COSMIC, Barrow Hall, Univ. of Ga., Athens, Georgia 30601. Price $6.00

HARDWARE REQUIREMENTS

Developed to Run on GE 635 and Running on _____

Amount of Core Required _____

AVAILABILITY

For sale by COSMIC for $25.00 (107 cards). Program No. KSC-10420

Contact Person:

KNOWN USERS

Developed at John F. Kennedy Space Center, Cocoa Beach, Florida

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NOTES

Developed in _____(year). Superseded By: _____

Other: Approximates relative intensity of a moving sound source (the rocket). Wind considerations and the curved path of sound propagation are neglected.

Corporate Source: NASA

Name of Model:

SOUND FOCUSING PREDICTION

Country of Origin: United States

Aircraft _____ Highway _____

Community _____ Other: Rockets

INPUTS Data from rawinsonde tape containing weather parameters vs. altitude, supplied at intervals during pre-launch activities.

Input Formats: Tape in card image format or cards.

OUTPUTS For each azimuth, all requested sound ray departure angles. If requested, altitude and ground range components of sound rays for each azimuth.

Output Formats: Plot Contours X Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: FORTRAN IV (30%) GMAP (70%)

Available in Cards: _____ Tape: _____ Other: _____

Documentation: From COSMIC, Barrow Hall, Univ. of Ga., Athens, Georgia 30601. Price: $7.50.

HARDWARE REQUIREMENTS

Developed to Run on GE 635 and Running on _____

Amount of Core Required _____ Bytes

AVAILABILITY

For sale by COSMIC for $350.00 (1,346 cards) Program No. KSC-10438

Contact Person:

KNOWN USERS NASA, John F. Kennedy Space Center, Cocoa Beach, Fla.

NOTES

Developed in _____(year). Superseded By: _____

Other: Used during rocket launches to describe any sound focusing situation due to meteorological conditions. The plots present a particular sound focus profile for the azimuth of any requested location.

EQUIPMENT DESIGN MODELS

Name of Model:

EVALUATION OF ACOUSTIC CAVITIES

Corporate Source: Rocketdyne

Country of Origin: United States

Aircraft _____ Highway _____

Community _____ Other: Equipment Design

INPUTS

Parameters of cylindrical chamber, radially-directed and axially-directed cavities within it.

Input Formats:

OUTPUTS

Solution of iterative form of characteristic equation for the cylindrical chamber; acoustic impendence of relatively general types of cavity configurations.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Tabular data.

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: 376 in deck Tape: _____ Other: _____

Documentation: From COSMIC, Barrow Hall, U. of Ga., Athens, GA., 30601.
Program (No. MSC-15977): $25.00.
Documentation: $2.50

HARDWARE REQUIREMENTS

Developed to Run on GE 430 and Running on _____

Amount of Core Required _____

AVAILABILITY

Terms: See above.

Contact Person:

KNOWN USERS

Contact Rocketdyne, Canoga Park, CA.

NOTES

Developed in _____ (year). Sponsored by: _____

Other: The root of the characteristic equation is a complex eigenvalue. The real part is the non-dimensional frequency and the imaginary part is the non-dimensional damping coefficient.

Corporate Source: JPL

Name of Model:
ACOUSTIC HORN DESIGN

Country of Origin: United States

Aircraft _____ Highway _____

Community _____ Other: Equipment Design

INPUTS

Parametric data for one or more horns.

Input Formats:

OUTPUTS

Various options, including averaging of horn data for up to three horns.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Graphical.

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: X Tape: _____ Other: _____

Documentation: Available from COSMIC, Barrow Hall, Univ. of Ga., Athens, Georgia 30601. Price: $22.50

Corporate Source: Lord Corp.

Name of Model:
FLUID FLOW SYSTEMS DESIGN

Country of Origin: United States

Aircraft _____ Highway _____

Community _____ Other: Equipment Design

INPUTS

Temperature, allowable pressure drop, desired noise reduction, air flow, maximum geometrical envelope (space limitations). Type of materials: locally or non-locally reacting, flow resistance, structure factor, porosity. One or more of 15 configurations.

Input Formats: Interactive mode from remote terminal.

OUTPUTS

Predicts attenuation, pressure drop, self-noise, maximum machine number between baffles, dimensions of standard configurations for silencer systems.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other: Tabular form

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: _____ Tape: _____ Other: _____

Documentation: Exists but is proprietary.

HARDWARE REQUIREMENTS

batch mode computer at 2 CDC (?) 1108's with
Developed to Run on Case Inst. of Tech. and Running on PDP interface.

Amount of Core Required very large (exceeds capacity of standard GE and IBM computers)

AVAILABILITY

Program not available. Services deriving from program available from Lord.

Contact Person: Services: Mr. Richard John
Technical: Mr. John Valas
Allforce Acoustics Division, Lord Corporation
3016 W. Lake Road
Erie, Pennsylvania (814) 838-7691

KNOWN USERS

Clients: Used over 100 times to date for various Lord clients.

NOTES

Developed in 1972. Superseded By:

Other: Works for 15 different silencer configurations. Can put "silencer elements in series" to get complete results for the total system in one run of computer. Can also be used for topless enclosures around machines in industrial applications. (The enclosure is taken as silencer with 0-flow condition). If design parameter is exceeded, automatic terminate feature. Developed by BBN for Lord. Took 2 years to develop, 8 months to de-bug. Fully developed by mid-1972.

Corporate Source: NASA Langley Research Center

Name of Model:
SONIC-BOOM PRESSURE SIGNATURES

Country of Origin: United States

Aircraft ___X___ Highway _____

Community _____ Other: _____

INPUTS

Distribution of cross sectional area formed by supersonic area-rule cutting planes of the aircraft in question; distribution of equivalent cross-sectional area due to lift, derived from integration of the lifting force per unit length along the aircraft longitudinal axis.

Input Formats:

OUTPUTS

The complete pressure field, including shock wave strengths, and locations for bodies in supersonic flow. Sonic boom characteristics of airplane configurations for a variety of flight conditions.

Output Formats: Plot Contours_____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: FORTRAN IV (47%) MAP (53%)

Available in Cards: X Tape: _____ Other: _____

Documentation: From COSMIC, Barrow Hall, Univ. of Ga. Athens, Georgia, 30601. Also from NTIS as NASA-TN-D-3082.

HARDWARE REQUIREMENTS

Developed to Run on IBM 7094 and Running on _____

Amount of Core Required _____

AVAILABILITY

For sale by COSMIC $400.00 (for 1,512 cards). Program No. LAR-10096

Contact Person:

KNOWN USERS

Developed at Langley Research Center, NASA, Langley Station, Va.

NOTES

Developed in _____(year). Superseded By: _____(continued)

Other: Estimates sonic-boom overpressures for level flight at a constant supersonic Mach number on the basis of theory plus wind-tunnel and flight measurements. Algorithm uses a numerical method, based on modified linear-theory of Whitham.

Name of Model:
Response of a Panel Structure to Reverberant Acoustic Excitation

Corporate Source: Lockheed Missiles & Space Co.
Country of Origin: U.S.
Aircraft _____ Highway Equip.
Community _____ Other: Design

INPUTS

Output tape from the Structural Network Analysis Program (SNAP Dynamics-available as MFS-21531 from COSMIC) along with data cards. SNAP output tape provides natural frequencies and mode shapes normalized to unit generalized mass, of a panel structure to be exposed to a reverberant acoustic field.

Input Formats:
Tape & Data Cards

OUTPUTS

Four SC-4020 plots giving the power spectral densities of response displacement and acceleration.

Output Formats: Plot Contours X Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: X Tape: _____ Other: _____

Documentation:
MFS-21774
Computer Software Management & Info. Center
Barrow Hall
Univ. of Georgia
Athens, GA. 30601

HARDWARE REQUIREMENTS

Developed to Run on Univac 1108 and SC 4020 Plotter and Running on _____

Amount of Core Required _____

AVAILABILITY

Terms:

Price for program $25.00

Price for documentation $19.00

(MFS-21774)

Contact Person: **Tech. information** **General Availability information**

KNOWN USERS

Clients:

Computer program recipients:

NOTES

Developed in _____(year). Superseded By: _____

Other:

Although program was written for a reverberant acoustic field, it can be easily modified to handle other types of acoustic fields by changing the material correlation calculation. However, the program is designed strictly for panel-type responses and only determines response perpendicular to the plane of the panel.

Name of Model:
VALVE SIZING AND VALVE NOISE PREDICTION MODEL

Corporate Source: Fisher Controls Co.

Country of Origin: U.S.
Aircraft _____ Highway _____
Community _____ Other: Equip. Design

INPUTS

Complete service conditions for specific application; user can also feed in desired sound pressure maximum.

Input Formats:
Data sheet for each application filled in by user. punched cards.

OUTPUTS

Printed document listing back all input data Velocity conditions, valve size and style, required sizing coefficient, sound pressure levels for service conditions requested. List of alternative equipment selection if desired maximum sound pressure level exceeded, designed to reduce sound pressure level to an acceptable level.

Output Formats: Plot Contours _____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: FORTRAN IV

Available in Cards: _____ Tape: _____ Other: _____

Documentation:

HARDWARE REQUIREMENTS

Developed to Run on _____ and Running on _____

Amount of Core Required _____

AVAILABILITY

Terms:
Program for sale to clients; price not disclosed.

Contact Person: Tech. information
Mr. Larry L. Allen
Fisher Controls Co.
Marshalltown, IA.
Tel. 515/754-3011

General Availability information

KNOWN USERS

Clients:

Not disclosed

Computer program recipients:

NOTES

Developed in 1973. Superseded By: _____

Other:

Name of Model:
Industrial Sound- level Distributions Illustrated by Isograms

Corporate Source: Total Environmental Systems

Country of Origin: U.S.

Aircraft _____ Highway _____

Community _____ Other: Industrial

INPUTS

Program consists of a specially modified contouring package with provisions for handling sampling discontinuities such as barriers, enclosures, walls, doors, large equipment, etc. Also available are sub-programs for inserting equipment layouts.

Input Formats:

OUTPUTS

Display of noise exposure levels by means of isometric contours as a function of sampling locations. To show noise level contours, the finished diagram is color-coded according to OSHA table of Permissible Noise Exposures.

Output Formats: Plot Contours X Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:
Technique may also be used to predict sound levels at varying distance from a known sound source to evaluate effects of equipment alteration or relocation.

COMPUTER PROGRAM

Language: _____

Available in Cards: _____ Tape: _____ Other: _____

Documentation:

HARDWARE REQUIREMENTS

Developed to Run on CDC-6500 and Running on _____

Amount of Core Required _____

AVAILABILITY

Terms:

Contact Person: Tech. information General Availability information
D.W. Merritt
R.R. James
Total Environmental Systems Inc.
East Lansing, Michigan

KNOWN USERS

Clients:

Computer program recipients:

NOTES

Developed in _____(year). Superseded By: _____

Other:

Name of Model:
BOEING NOISE-TIME HISTORY PREDICTION/NOISE CONTOUR (FOOTPRINT) PREDICTION

Corporate Source: Boeing

Country of Origin: U.S.
Aircraft _____ Highway _____
Community _____ Other: _____

INPUTS

General data parameters (&GDATA input data set)*; Noise component parameters (&NOISIN input data sets)** (two programs necessary).

* = including airport meteorological data (altitude, humidity, temperature, pressure, ground impedance, etc), output specifications.

**= including specification of one or more of up to twelve noise source modules (primary jet, core and turbine, fan exit, blown-flap, propeller, helicopter, measured data, etc.) specification of duct lining configuration and attenuation. Each noise source module has a subset of input parameters (e.g. for primary jet area of nozzle exit, engine inclination angle, primary mass flow, etc.).

Input Formats:
Punched Cards

OUTPUTS

1/3 octave band noise estimates for advanced technology quiet engines, lift fans, lift/cruise fans, propellers, helicopters; conventional jet engines. Computation of noise contours (footprints) in "real-time" operation with the NASA Ames flight simulator.

Output Formats: Plot Contours_____ Levels at Grid Coordinates _____ XYZ Coordinates of Iso-Levels _____

Other:

COMPUTER PROGRAM

Language: _____

Available in Cards: _____ Tape: _____ Other: _____

Documentation:

(1) D.G. Dunn, and N.A. Peart, NASA CR114649 "Aircraft Noise Source and Contour Estimation", July 1973.

(2) D.G. Dunn, et.al., NASA CR114517 "Jet Engine Noise Source and Noise Footprint Computer Programs", October 1972

HARDWARE REQUIREMENTS

Developed to Run on IBM-360/SIGMA VII and Running on _____

Amount of Core Required 110 K decimal bytes, plus 8K for SIGMA

AVAILABILITY

Terms:

Contact Person: **Tech. information**
D. H. Hickey
NASA-Ames Research Center
Moffett Field, CA. 94035

General Availability information
programs may be obtained from COSMIC; 112 Barrow Hall; Univ. of Georgia; Athens, GA.; 30601

KNOWN USERS

Clients:

Computer program recipients:

NOTES

Developed in approximately 1972-73. Superseded By: _____

Other:
Developed by Boeing under Contract NASA-6969 for Ames Research Center, (NASA).

III. INDEX OF CORPORATE SOURCES

STATE HIGHWAY DEPARTMENTS

Alabama	State of Alabama Highway Department State Highway Building 11 South Union Street Montgomery, Alabama 36104	205/269-7321
Alaska	Department of Highways P.O. Box 1467 Juneau, Alaska 99801	907/364-2121
Arizona	Arizona Highway Department 206 South 17th Avenue Phoenix, Arizona 85007	602/261-7011
Arkansas	Arkansas State Highway Department State Highway Department Building 9500 New Benton Highway P.O. Box 2261 Little Rock, Arkansas 72203	501/569-2000
California	Department of Public Works Division of Highways Public Works Building 1120 N. St. P.O. Box 1499 Sacramento, California 95814	916/445-2201
Colorado	State Department of Highways 4201 East Arkansas Avenue Denver, Colorado 80222	303/757-9201
Connecticut	Department of Transportation P.O. Drawer "A" Wethersfield, Connecticut 06109	203/566-3477
Delaware	Department of Highways & Transportation Highway Department Administration Bldg. P.O. Box 778 Dover, Delaware 19901	302/678-4303

District of Columbia	Department of Highways & Traffic Room 508 Presidential Building 415 12th Street, N. W. Washington, D. C. 20004	202/628-6000
Florida	Florida Department of Transportation Haydon Burns Bldg. 605 Suwannee Street Tallahassee, Florida 32304	904/599-6321
Georgia	Department of Transportation No. 2 Capitol Square Atlanta, Georgia 30334	404/656-5200
Guam	Department of Public Works Government of Guam Agana, Guam 96911	/746-5831
Hawaii	Department of Transportation 869 Punchbowl Street Honolulu, Hawaii 96813	808/548-3205
Idaho	Department of Highways 3211 West State Street P. O. Box 7129 Boise, Idaho 83707	208/384-2411
Illinois	Department of Transportation 2300 South 31st Street Springfield, Illinois 62706	217/525-2276
Indiana	State Highway Commission 100 North Senate Avenue State Office Building Indianapolis, Indiana 46204	317/633-4577

Iowa	Iowa State Highway Commission State Highway Commission Building 826 Lincoln Way Ames, Iowa 50010	515/232-7250
Kansas	State Highway Commission of Kansas State Office Building Topeka, Kansas 66612	913/296-3461
Kentucky	Department of Highways State Office Building High and Clinton Streets Frankfort, Kentucky 40601	502/564-3730
Louisiana	Department of Highways Capitol Station P. O. Box 44245 Baton Rouge, Louisiana 70804	504/389-5112
Maine	Maine Department of Transportation State House Augusta, Maine 04330	207/289-2551
Maryland	Maryland Department of Transportation 300 West Preston Street P. O. Box 717 Baltimore, Maryland 21203	301/383-4202
Massachusetts	Executive Office of Transportation 18 Tremont Street 12th Floor Boston, Massachusetts 02108	617/727-7680
Michigan	Michigan Department of State Highways State Highway Building 425 West Ottawa P. O. Drawer L Lansing, Michigan 48904	517/373-2090

Minnesota	Department of Highways State Highway Building St. Paul, Minnesota 55155	612/296-3000
Mississippi	State Highway Department Woolfolk State Office Building Northwest Street P. O. Box 1850 Jackson, Mississippi 39205	601/354-6034
Missouri	Missouri State Highway Commission State Highway Building 119 W. Capitol Avenue Jefferson City, Missouri 65101	314/636-3121
Montana	Department of Highways East Sixth Avenue & Roberts Streets Helena, Montana 59601	406/449-2482
Nebraska	Department of Roads P. O. Box 94759 Statehouse Station Lincoln, Nebraska 68509	402/477-6012
Nevada	Nevada Department of Highways Administration Building Room 201 1263 South Stewart Street Carson City, Nevada 89701	702/882-7521
New Hampshire	Department of Public Works & Highways John O. Morton State Office Building 85 Loudon Road Concord, New Hampshire 03301	603/271-3734
New Jersey	Department of Transportation 1035 Parkway Avenue Trenton, New Jersey 08625	609/292-3535

New Mexico	New Mexico State Highway Department 1120 Cerillos Road P. O. Box 1149 Santa Fe, New Mexico 87501	505/983-7381
New York	State Department of Transportation State Campus Site 1220 Washington Avenue Albany, New York 12226	518/457-4422
North Carolina	Department of Transportation & Highway Safety Highway Building 1 South Wilmington Street Raleigh, North Carolina 27611	919/829-7384
North Dakota	State Highway Department State Highway Building Capitol Grounds Bismark, North Dakota 58501	701/224-2581
Ohio	Ohio Department of Transportation Highway Department Building 25 South Front Street Columbus, Ohio 43215	614/469-6600
Oklahoma	Oklahoma Department of Highways Jim Thorpe Building Lincoln Boulevard at NE 21st Street Oklahoma City, Oklahoma 73105	405/521-2631
Oregon	State Department of Transportation State Highway Building Room 129 Salem, Oregon 97310	503/378-6570
Pennsylvania	Pennsylvania Department of Transportation Transportation and Safety Building Commonwealth & Forsters Streets Harrisburg, Pennsylvania 17120	717/787-5574

Puerto Rico	Puerto Rico Highway Authority Box 3909 G. P. O. San Juan, Puerto Rico 00936	809/725-5840
Rhode Island	Department of Transportation State Office Building Providence, Rhode Island 02903	401/277-2481
Samoa (American)	Department of Public Works Government of American Samoa Pago Pago, American Samoa 96799	No Area Code 32131
South Carolina	State Highway Department State Highway Building Columbia, South Carolina 29201	803/758-2716
South Dakota	Department of Highways, State Highway Building East Broadway Pierre, South Dakota 57501	605/224-3265
Tennessee	Department of Transportation Highway Building Corner 6th Ave., North & Deaderick St. Nashville, Tennessee 37219	615/741-2848
Texas	Texas Highway Department State Highway Building Corner 11th & Brazos Streets Austin, Texas 78701	512/475-3525