STATUS AND PLANS FOR THE ANOPP / HSR PREDICTION SYSTEM

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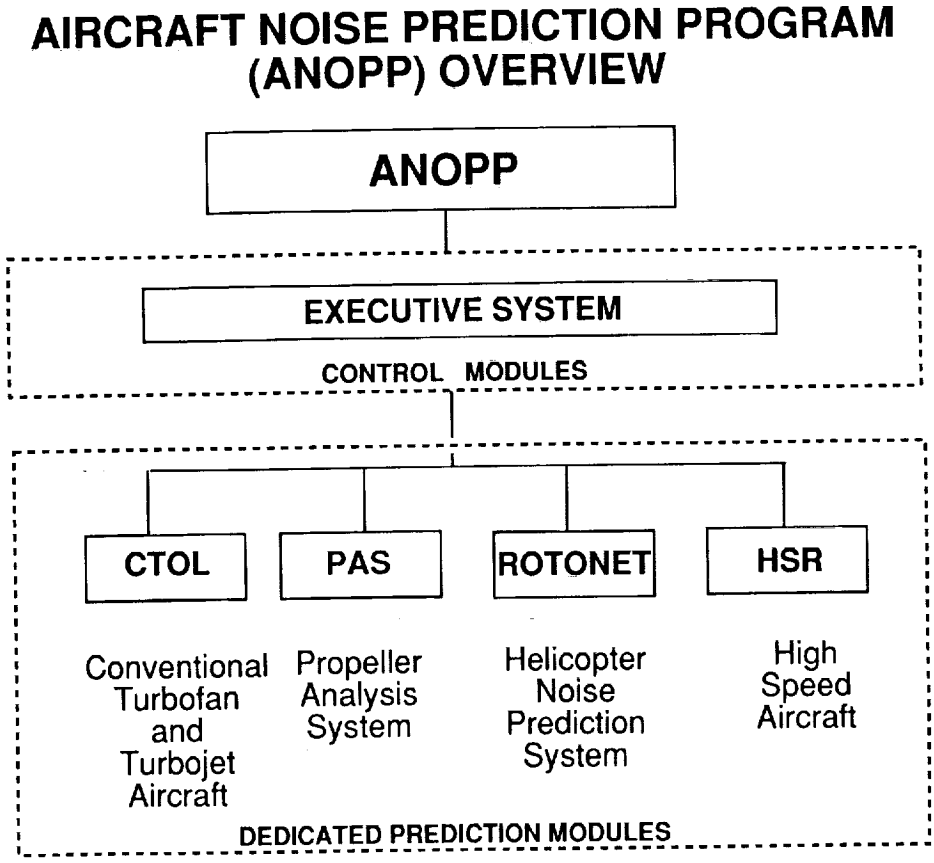
ANOPP is a comprehensive prediction system which has been developed and validated by NASA. Because ANOPP is a system prediction program, it allows industry to create trade-off studies with a variety of aircraft noise problems. The extensive validation of ANOPP allows the program results to be used as a benchmark for testing other prediction codes.

AIRCRAFT NOISE PREDICTION PROGRAM (ANOPP)

ANOPP is a system noise prediction program which the government has been developing over many years to help industry with trade off studies for a large variety of aircraft noise problems.

AIRCRAFT NOISE PREDICTION PROGRAM (ANOPP) OVERVIEW

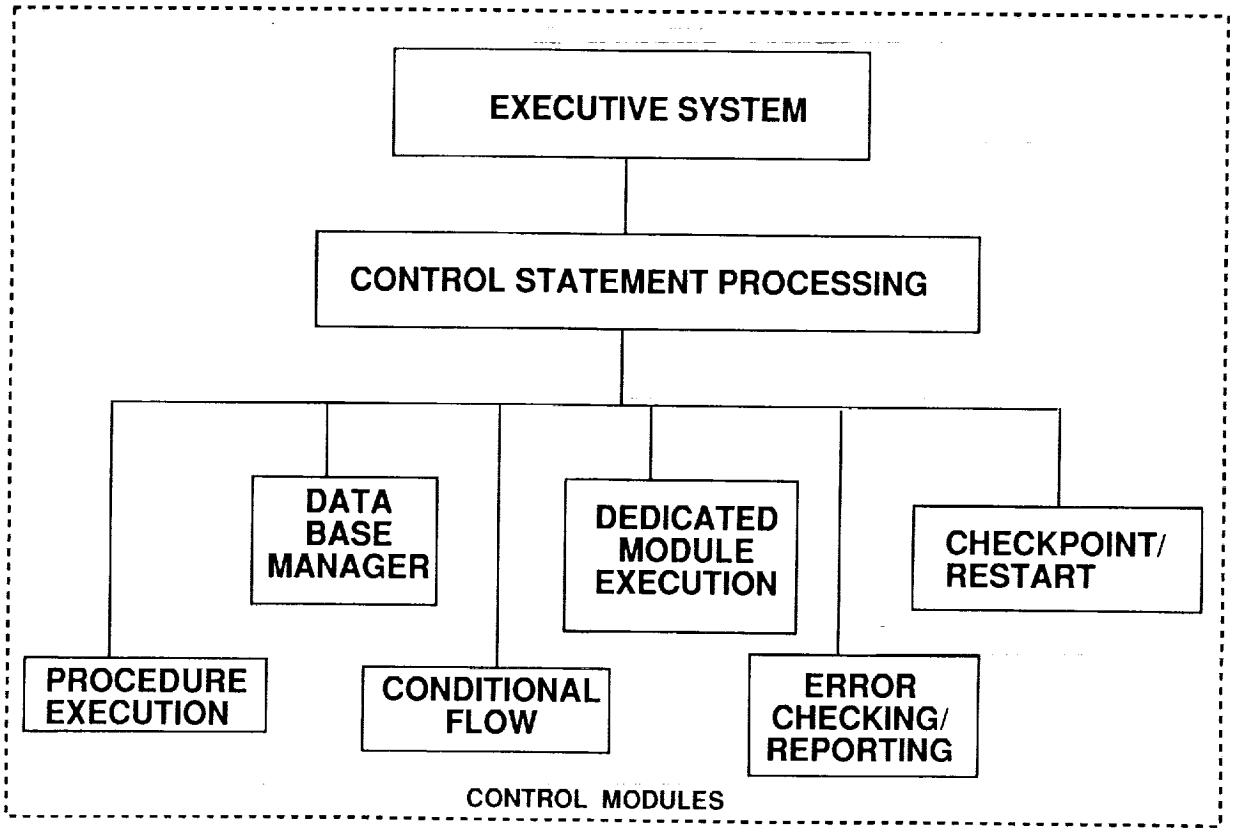
ANOPP is made up of two types of modules, control modules which comprise the ANOPP Executive System and dedicated prediction modules, each of which predicts a particular noise component. The dedicated modules make up the four prediction systems within ANOPP. The Conventional Takeoff and Landing System (CTOL) predicts conventional turbofan and turbojet aircraft noise. The Propeller Analysis System (PAS) predicts propeller noise. The Helicopter Noise Prediction System (ROTONET) predicts helicopter noise. The High-Speed Research System (HSR) predicts high speed aircraft noise. Each of the dedicated modules executes under the control of the ANOPP Executive System.



ANOPP EXECUTIVE CAPABILITIES

The ANOPP Executive System processes user supplied input in the form of control statements. Based on this input, the Executive System maintains the ANOPP data base, controls procedure and dedicated module execution, and directs the order in which the modules are executed. The Executive System provides a checkpoint and restart capability, which allows the user to create a break at any point in the execution and restart a prediction from that point with or without modifications. Extensive error checking and reporting of error messages is maintained by the Executive System.

ANOPP EXECUTIVE CAPABILITIES



In the evaluation of ways to improve ANOPP, replacing the executive system with a smaller less flexible system or eliminating the executive system entirely and going to small stand-alone programs was considered. The evaluation concluded that the current capabilities and flexibility of the Executive System are required by ANOPP users. The ANOPP Executive System has many advantages. It contains its own database manager which makes the code portable to different computer systems. The system is flexible and easy to modify and customize, which allows users to easily create their own model from which to predict aircraft noise. The extensive error checking and reporting done by the Executive System aids the ANOPP support team in quickly responding to user questions and problems. Because most users of ANOPP would be unwilling to give up the capabilities of the current system, it was concluded that the perception of ANOPP being too large or complex, not the actual program size or capabilities, may cause any negative feelings toward ANOPP. One solution to change this perception is to increase the user friendliness of ANOPP.

EVALUATION OF ANOPP EXECUTIVE SYSTEM

Advantages of ANOPP Executive System:

- Portable
- Flexible
- Easy to Modify and Customize
- Easy to Respond to User's Questions and Problems

ANOPP users require the capabilities and flexibility of the current ANOPP Executive System

Perception of ANOPP system, not the program, causes any negative attitude towards ANOPP.

Solution to problem is to increase user friendliness of ANOPP

SOLUTIONS TO PERCEIVED PROBLEMS WITH ANOPP

When dealing with system noise predictions, regardless of the prediction system selected, the program will be large and complex due to the scope and complexity of aircraft noise problems. When first confronted with such a diverse system, some users perceive that ANOPP is difficult to learn, user unfriendly, too complex, and hard to understand. In order to change this perception and make ANOPP more user friendly, some enhancements to the HSR system are currently under development. These enhancements include an introductory User's Guide, to aid new users or users trying new capabilities of the system; an Interactive Input Program, which will prompt the user for input data and create an input deck in the format required by ANOPP; Templates, which will contain example user-supplied input decks for a variety of noise prediction problems; a Glossary / Cross Reference which will contain definitions of ANOPP terms; and a Contour Package, which will allow the user to create ground contours.

SOLUTIONS TO PERCEIVED PROBLEMS WITH ANOPP

Perceived Problem:	Solution:
Difficult to learn	User's Guide Hands-on Training User Support
User Unfriendly	Interactive Input Program
Too Complex	Templates
Hard to Understand	Glossary/ Cross Reference
No Graphic Output	Contour Package

The HSR User's Guide will provide new or infrequent users with a concise reference to explain the capabilities of the HSR system and how to initiate its use. It will contain an overview of ANOPP and the HSR system, a list of the types of noise prediction problems that HSR can solve, a list of available dedicated modules with an explanation of their function, and a flow chart of the HSR system which will indicate the order in which the dedicated modules can be used. The User's Guide will also contain information about computer systems for which an ANOPP version exists, information about system design with a general description of the different types of database items, and a description of available HSR templates that can be used as modifiable examples of user supplied input decks.

HSR USER'S GUIDE

PURPOSE: To provide new users with a concise manual to explain the capabilities of the HSR system and how to initiate its use.

DESCRIPTION:

1. Overview of ANOPP and the HSR prediction system.
2. Types of problems that the HSR prediction system can execute.
3. Available dedicated modules with flow charts and general input and output requirements.
4. Available computer system versions of ANOPP.
5. Pertinent information about HSR system design.
6. Description of available HSR input templates.

In order to produce noise prediction data with HSR, the user must provide a file of input data in the specific format required by ANOPP. The Interactive Input Program that is currently being developed will provide users with a menu driven method of creating this input file. The program will display available options and will insure a logical execution flow. Default input values will be displayed and the user will be given the option to change any or all of the default values. An HSR input file will be created and will contain comments to explain where to insert or modify additional data. Optionally, the user can issue a command within the Input Program to execute HSR using the created input file.

HSR INTERACTIVE INPUT PROGRAM

PURPOSE: To provide an interactive, menu driven method of creating an input deck for HSR execution.

DESCRIPTION OF PROGRAM:

1. Displays available options.
2. Guides the user in creating an HSR input deck.
3. Prompts the user for input data.
4. Creates an input deck with comments on where to insert or modify data.
5. Optionally executes ANOPP using the created HSR input deck.

Example HSR input files for a wide range of noise prediction problems are being developed. These examples are called HSR Templates. The user will select and modify the Template closest to the problem that they are modeling. The input deck will be fully documented with a description of both the prediction problem and listed data. Templates will include but not be limited to noise predictions with takeoffs, landings, steady flyovers, stationary single or multiple noise sources, propagation from source to observers, and ground contours.

HSR TEMPLATES

PURPOSE: To provide examples of HSR input decks for specific noise prediction problems and to assist users in creating their own input decks by modifying the example templates.

DESCRIPTION:

1. Fully documented with an explanation of the template prediction problem and data.

2. Templates will be provided to include but not limited to the following types of noise predictions:

   Takeoffs
   Landings
   Steady flyovers
   Stationary single or multiple noise source
   Propagation
   Contours

A Glossary of ANOPP terms with a cross reference to where these terms are used in ANOPP is being designed. The ANOPP terms will come from both input and output data. The glossary will contain a global list of user parameter names with descriptions related to industry standard quantities and a cross references to the dedicated modules that require or produce them. It will also contain a global list of ANOPP database members with descriptions of the data that they contain and cross references to the dedicated modules that require or produce them. These cross references are important because the output from one or more dedicated modules is used as input data to other dedicated modules.

ANOPP GLOSSARY / CROSS REFERENCE

PURPOSE: To provide users with a description of ANOPP input and output data.

DESCRIPTION:

1. Will contain a global list of user parameter with descriptions related to industry standard quantities and cross references to dedicated modules which require or produce them.

2. Will contain a global list of ANOPP data base unit members and tables with cross references to dedicated modules which require or produce them.

HSR CONTOUR CAPABILITY

The capability to produce ground contours from within an HSR system procedure is under development. HSR currently contains a Contour Module which creates a file containing contour data. This data can be used to produce contours using an external graphics package such as DI3000. The HSR Contour Package will be distributed with the ANOPP executable tapes and will produce contours using the data from the Contour Module. The additions of the Contour Module and Contour Package to HSR will result in a single procedure that will execute an HSR prediction and produce a ground contour.

HSR CONTOUR CAPABILITY

PURPOSE: To provide HSR users with the ability to produce contours within ANOPP procedures.

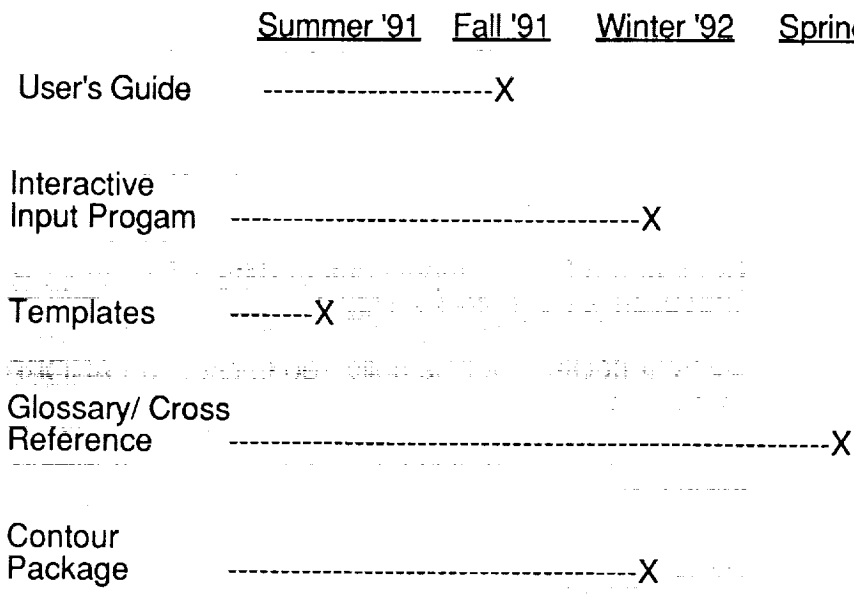
DESCRIPTION:

1. Contouring package currently under development.
2. Contour module to output contour data within an HSR execution is currently available.
3. Contour package will be delivered to users on ANOPP update tapes.
4. Contours will be produced using noise data from HSR predictions
5. A single control structure will be used to run HSR predictions and /or produce contours

SCHEDULE FOR COMPLETION OF HSR ENHANCEMENTS

Enhancements to the ANOPP/HSR Prediction System are scheduled to be completed by Spring of 1992. The HSR Templates will be completed by the Summer of 1991. The HSR User's Guide will be completed by the Fall of 1991. The HSR Interactive Program and Contour Package will be completed by the Winter of 1992. The Glossary / Cross Reference will be completed by the Spring of 1992.

SCHEDULE FOR COMPLETETION OF HSR ENHANCEMENTS



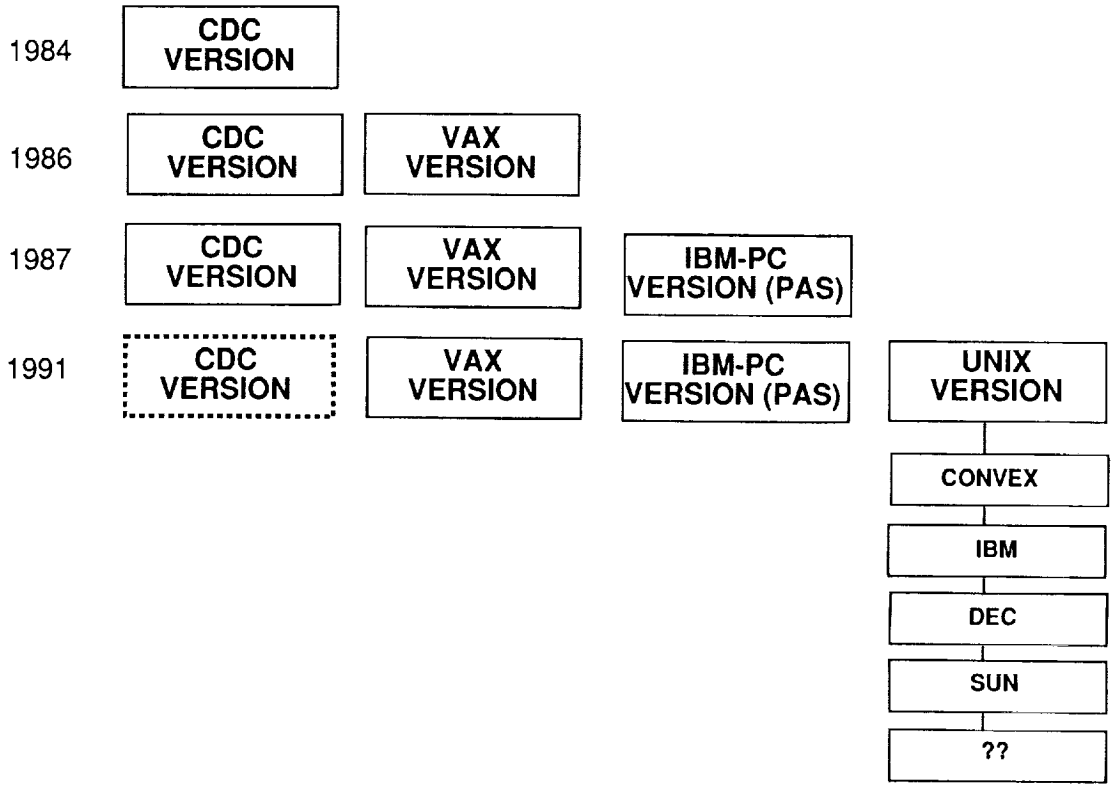
COMPUTER VERSIONS OF ANOPP

In addition to the efforts to make ANOPP more user friendly, work has been initiated to increase the types of computer systems on which ANOPP can be executed. ANOPP was originally designed to run on a Control Data Corporation (CDC) Cyber computer under the NOS operating system. In 1986 because of computer access limitations and requests from users in industry, ANOPP was converted to run on Digital Equipment Corporation (DEC) VAX computers under the VMS operating system. In 1987, an IBM-PC version of the ANOPP Propeller Analysis System (PAS) was completed.

In 1989, because of NASA Langley's decision to decrease CDC computer support and use CONVEX and CRAY, UNIX based computers , and because of requests from industry and other government agencies, the conversion to a a UNIX version of ANOPP was initiated. In 1990, the initial conversion of ANOPP to run on a CONVEX computer was completed. A generic UNIX version that will run on most UNIX based computers with only minor code changes is currently under development. This conversion will make ANOPP available on a greater variety of faster UNIX based computers and workstations.

When the UNIX conversion is completed later this year, we will announce a schedule to discontinue support and updates to the CDC version of ANOPP, which currently represents 35-40% of our maintenance effort and represents only 3 of the over 65 distributed copies of ANOPP which we support.

COMPUTER VERSIONS OF ANOPP



GENERAL POLICY FOR SECURE HANDLING OF ANOPP CODE AND USER SUPPLIED DATA

Multiple control methods are used to restrict access to ANOPP and data related to ANOPP. These restrictions include limited access to ANOPP source code, ANOPP executables, ANOPP database files, any NASA supplied data under ANOPP maintenance and any user supplied data from industry or other government agencies.

GENERAL POLICY FOR SECURE HANDLING OF ANOPP CODE AND USER SUPPLIED INPUT DATA

Restricted access to :

1. ANOPP source code
2. ANOPP executable
3. ANOPP data base
4. NASA data
5. User supplied data

GENERAL POLICY FOR SECURE HANDLING OF ANOPP CODE AND USER SUPPLIED DATA

Our protection methods include restricted access to computer systems containing ANOPP code and data. A user must have an account and password in order to access the computer. The source code and restricted data are stored on a separate computer used only for ANOPP development. Within that computer system, ANOPP is stored on a separate disk that requires permission on a control list to access the disk and directories on which the code or data is stored. Source code and restricted input data are stored in a version control library where the user must be on a restricted list to extract code or data from the library. Finally, all files can be protected with an individual control list .

GENERAL POLICY FOR SECURE HANDLING OF ANOPP CODE AND USER SUPPLIED INPUT DATA

Protection Methods:

Restricted access to computer systems containing ANOPP code and data.

Password required for all computer access.

Source code and restricted access code stored on computer used only for ANOPP development and noise prediction runs.

Controlled access list for disk and directories on which items are stored.

Source code and restricted input data stored in version control library with restricted access list.

Individual files can be protected with a controlled access list.

SUMMARY

An evaluation of ANOPP, the Executive System, and the HSR Prediction System resulted in five action items to increase the user friendliness of ANOPP / HSR. The conversion of ANOPP to a UNIX version will make ANOPP available on a greater variety of faster computers and workstations. Multiple control methods are used to insure restricted access to ANOPP code and related data.

SUMMARY

- Overview of ANOPP/HSR Prediction Program and Evaluation of the ANOPP Executive
- Action Items to Increase ANOPP User Friendliness
  - HSR User's Guide
  - Interactive Input Program
  - HSR Templates
  - Glossary / Cross Reference
  - Contour package
- Conversion Of ANOPP to UNIX Version
- Secure Handling of ANOPP Code and User Supplied Input Data.

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Session IX. Sonic Boom (Human Response and Atmospheric Effects)

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