AWT DYNAMICS AND CONTROLS DISCUSSION

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AWT DYNAMICS AND CONTROLS

TASK TEAM MEMBERS

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ROBERT SEIDEL	DYNAMICS AND CONTROLS BRANCH
JOSEPH GABY	AWT PROJECT OFFICE
JAMES DOLCE	AWT PROJECT OFFICE
ART KIEFFER	SYSTEMS ENGINEERING AND CONTROLS BRANCH
SUSAN KROSEL	DYNAMICS AND CONTROLS BRANCH
OTHERS	T.B.D.

AWT PROJECT
MODELING / DESIGN / CONSTRUCTION INTERFACES

PER

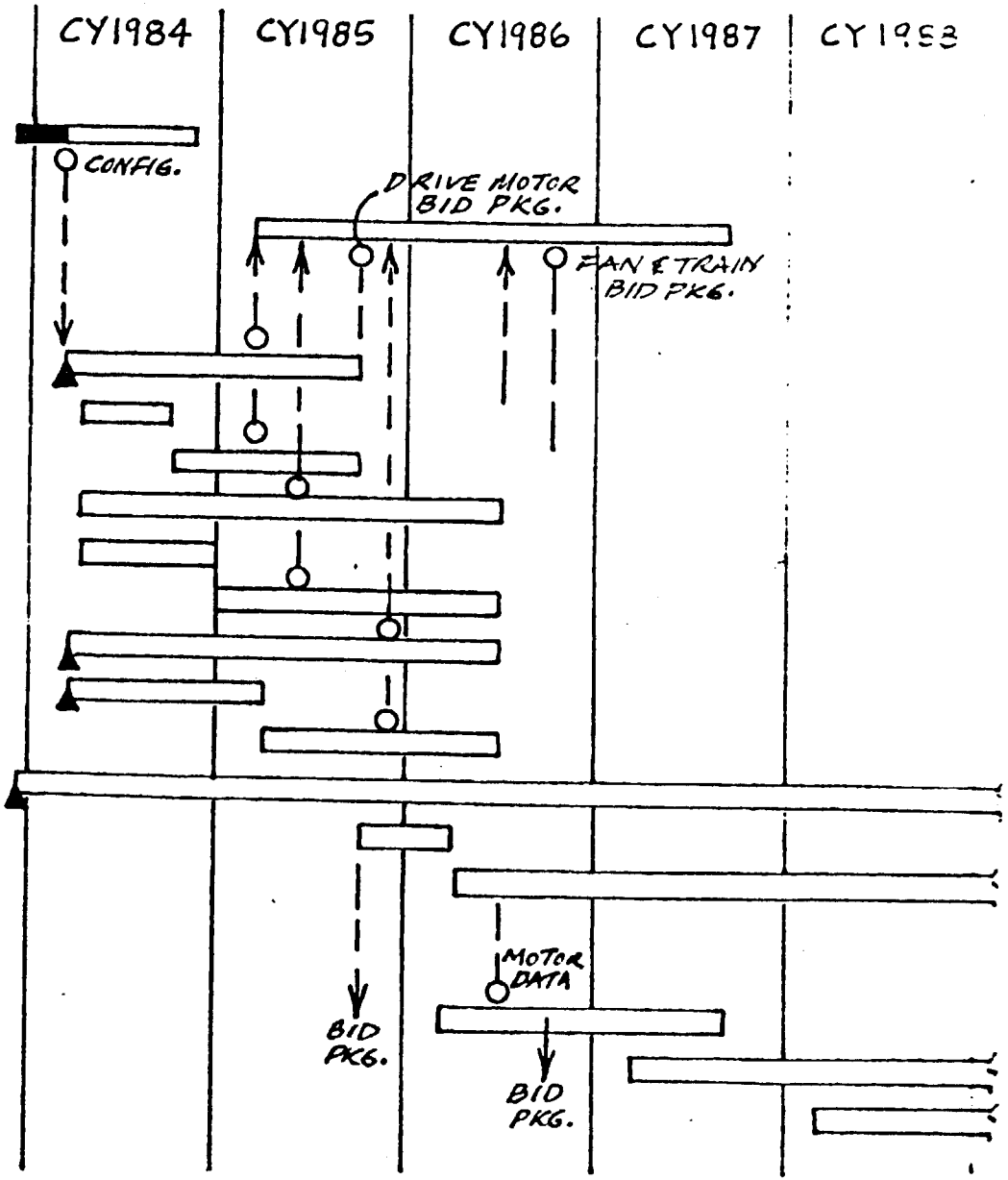
FINAL DESIGN

MODELING

- COMPONENTS – ANALYSIS
  - TEST DESIGN & FAB.
  - DATA
- HI-SPEED LEG – ANALYSIS
  - TEST DESIGN & FAB.
  - DATA
- FAN – ANALYSIS
  - TEST DESIGN & FAB
  - DATA
- FULL CIRCUIT – ANALYSIS
  - TEST DESIGN & FAB.
  - DATA

CONSTRUCTION

- DRIVE MOTOR & CONTROLS
- FAN FAB., ASSEM. & INSTALL.
- SHELL MODS & INTERNALS



AWT DYNAMICS AND CONTROLS

OBJECTIVES

- DEVELOP AN UNDERSTANDING OF THE AWT PROCESS DYNAMICS AND INTERACTIONS
- ASSESS AND VERIFY PROPOSED CLOSED-LOOP CONTROL CONCEPTS
- CONSIDER AND EVALUATE ALTERNATIVE CONTROL CONCEPTS THAT MAY OFFER IMPROVED PERFORMANCE AND/OR RELIABILITY

AWT DYNAMICS AND CONTROLS

LANGLEY DISCUSSIONS INDICATED

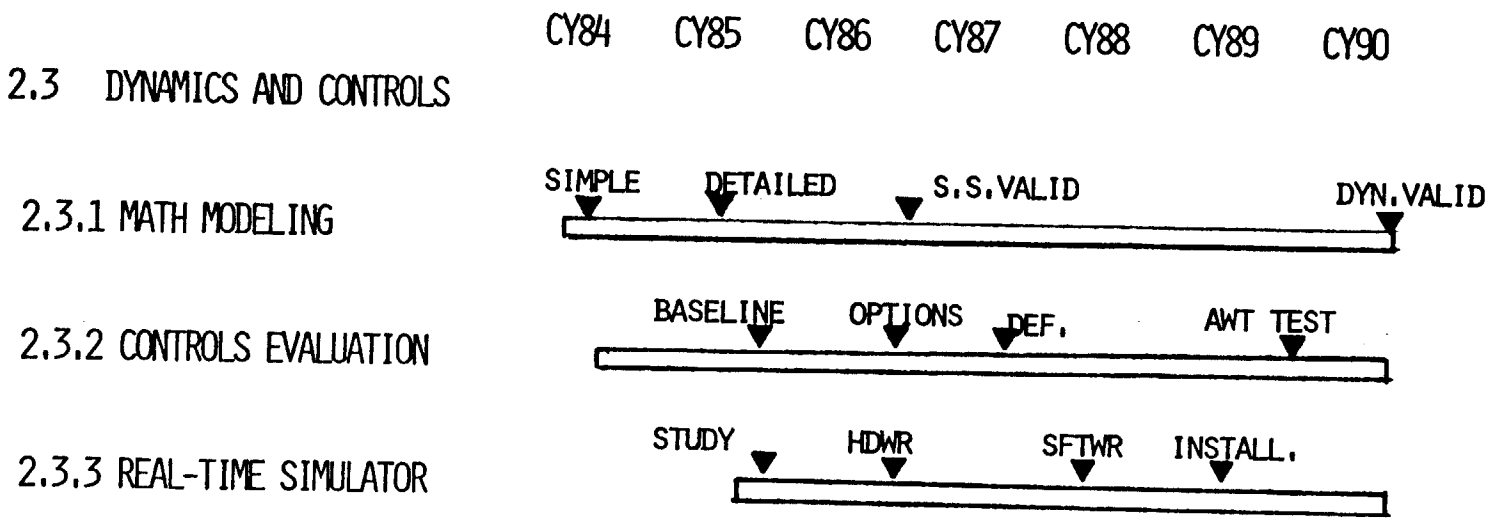
- o HIGH DEGREE OF CONFIDENCE IN 1-D, 15-VOLUME MODEL OF NTF AND CONTROL ALGORITHMS DEVELOPED WITH IT
- o QUALITATIVE AGREEMENT BETWEEN MODEL RESULTS AND AVAILABLE DATA
- o POSSIBILITY OF CONTRACTING FOR MODELING AND CONTROLS DESIGN (E.G. DR. GUMAS OF PENN STATE)
- o LOW PRIORITY PLACED ON SUB-SCALE PHYSICAL MODEL TESTS FOR MODEL VERIFICATION AND CONTROLS ASSESSMENT
- o NEED FOR A REAL-TIME SIMULATOR FOR CONTROLS CHECKOUT

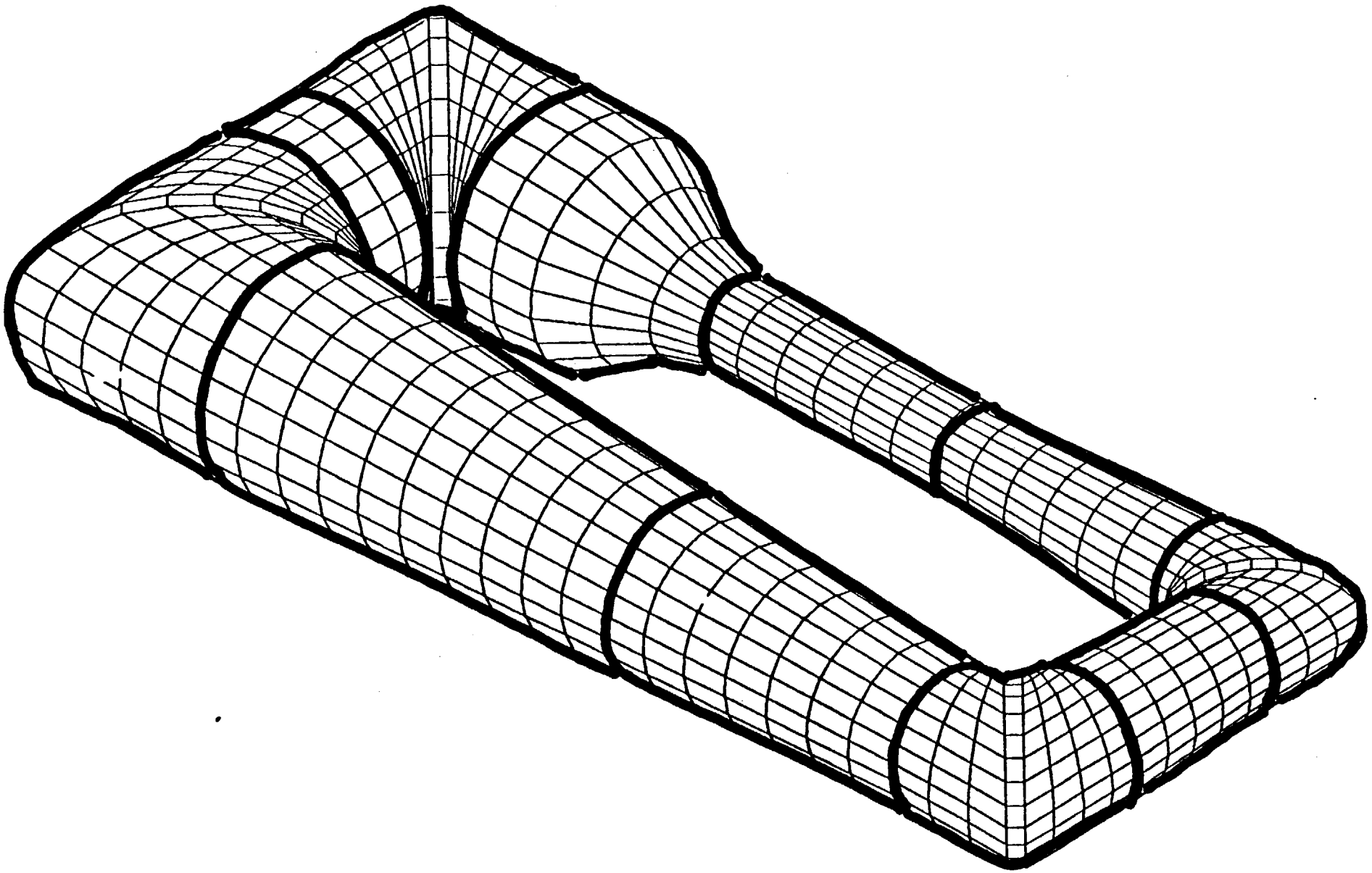
AWT DYNAMICS AND CONTROLS

APPROACH

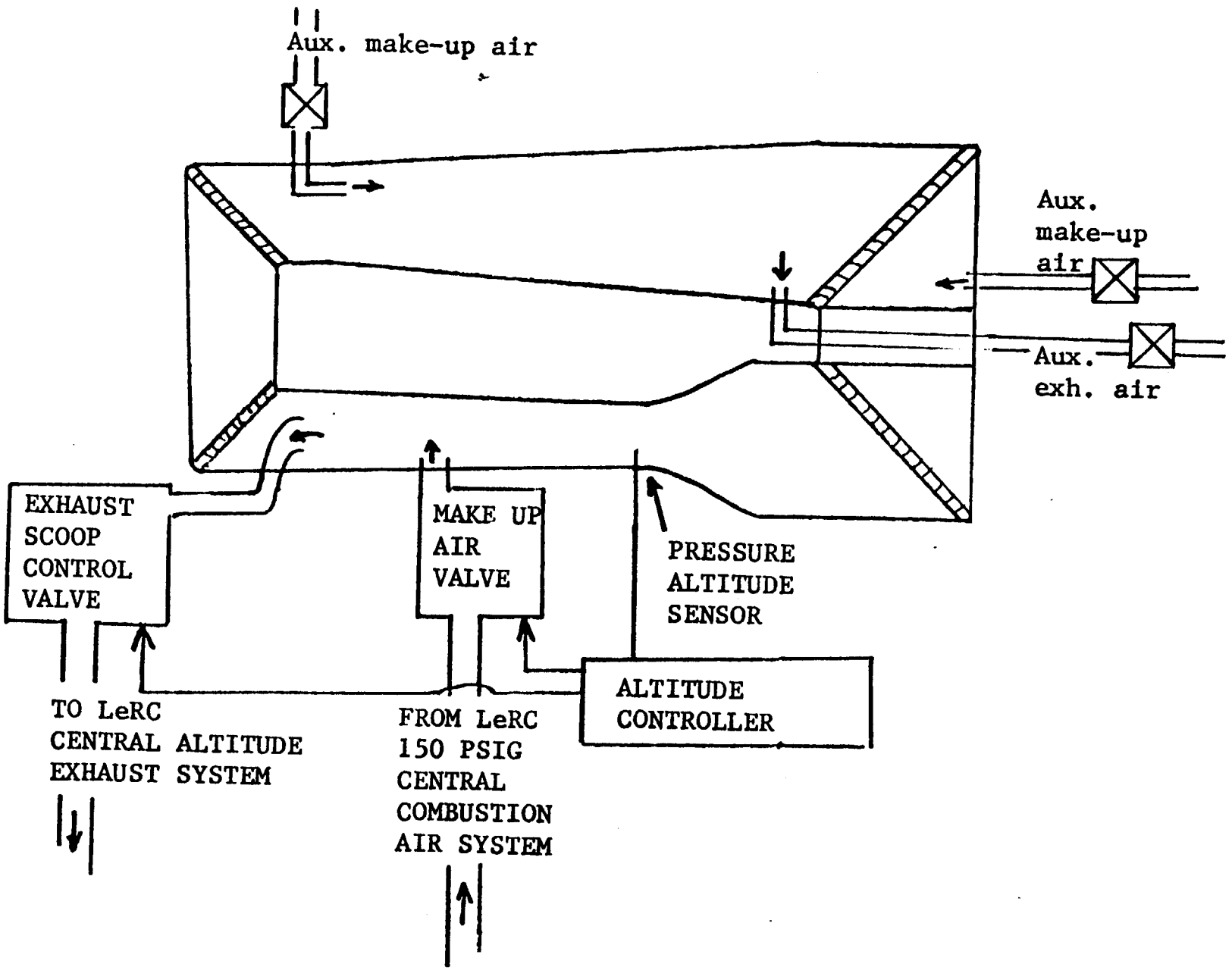
- o FOCUS ON THE IN-HOUSE DEVELOPMENT OF A 1-D, LUMPED PARAMETER MODEL
- o CONTRACT FOR INDEPENDENT DEVELOPMENT OF A "STATE-OF-THE-ART" MODEL
- o USE THE MATH MODEL(S) AS A TEST-BED TO
  - DETERMINE SYSTEM DYNAMICS
  - ANSWER "WHAT IF..." QUESTIONS
  - EVALUATE CONTROL CONCEPTS
  - ESTABLISH AN ANALYTICAL BASIS FOR SUB-SCALE AND FULL-SCALE TESTS
- o DETERMINE COSTS/BENEFITS OF DEVELOPING A REAL-TIME AWT SIMULATOR

AWT DYNAMICS AND CONTROLS

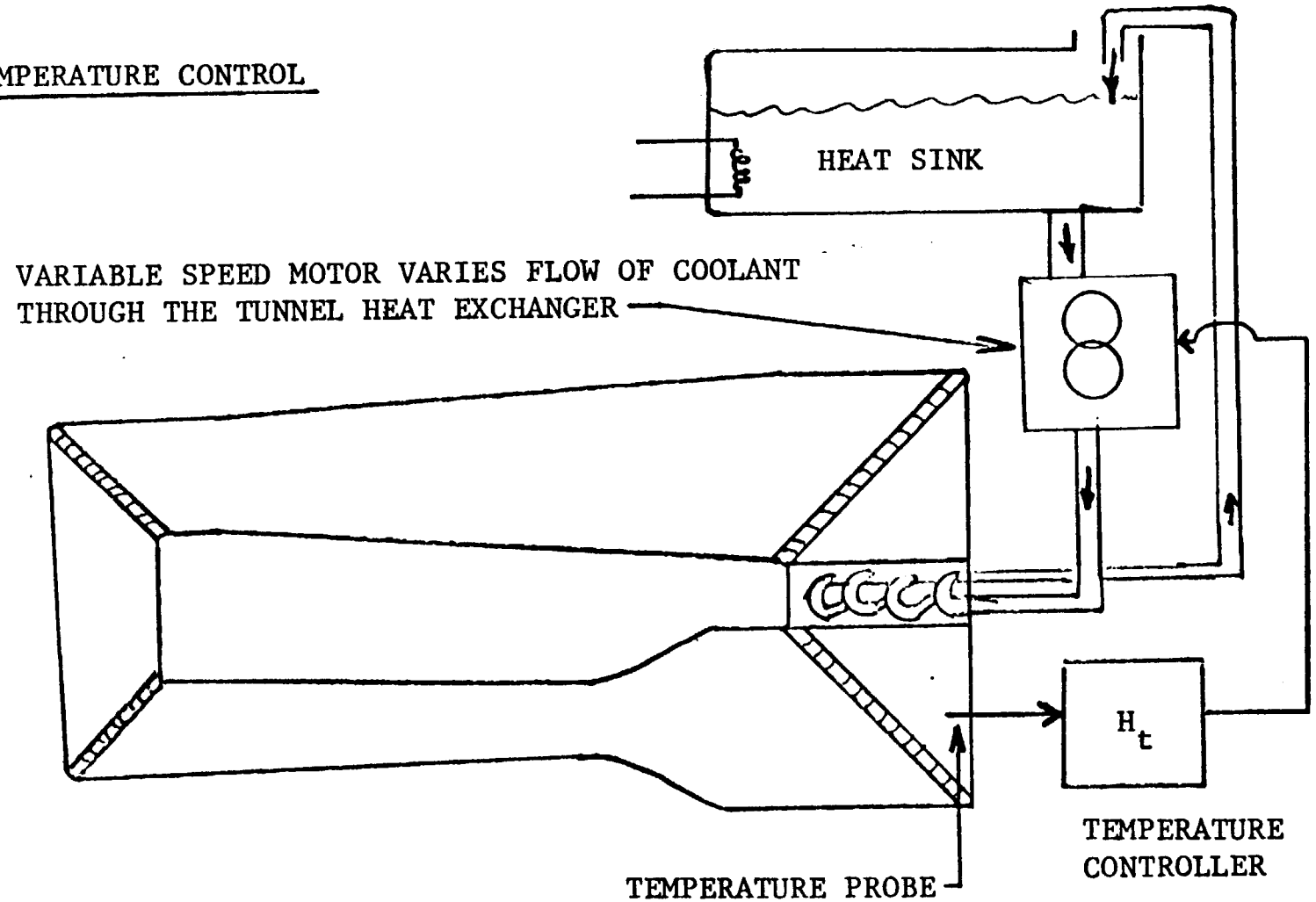




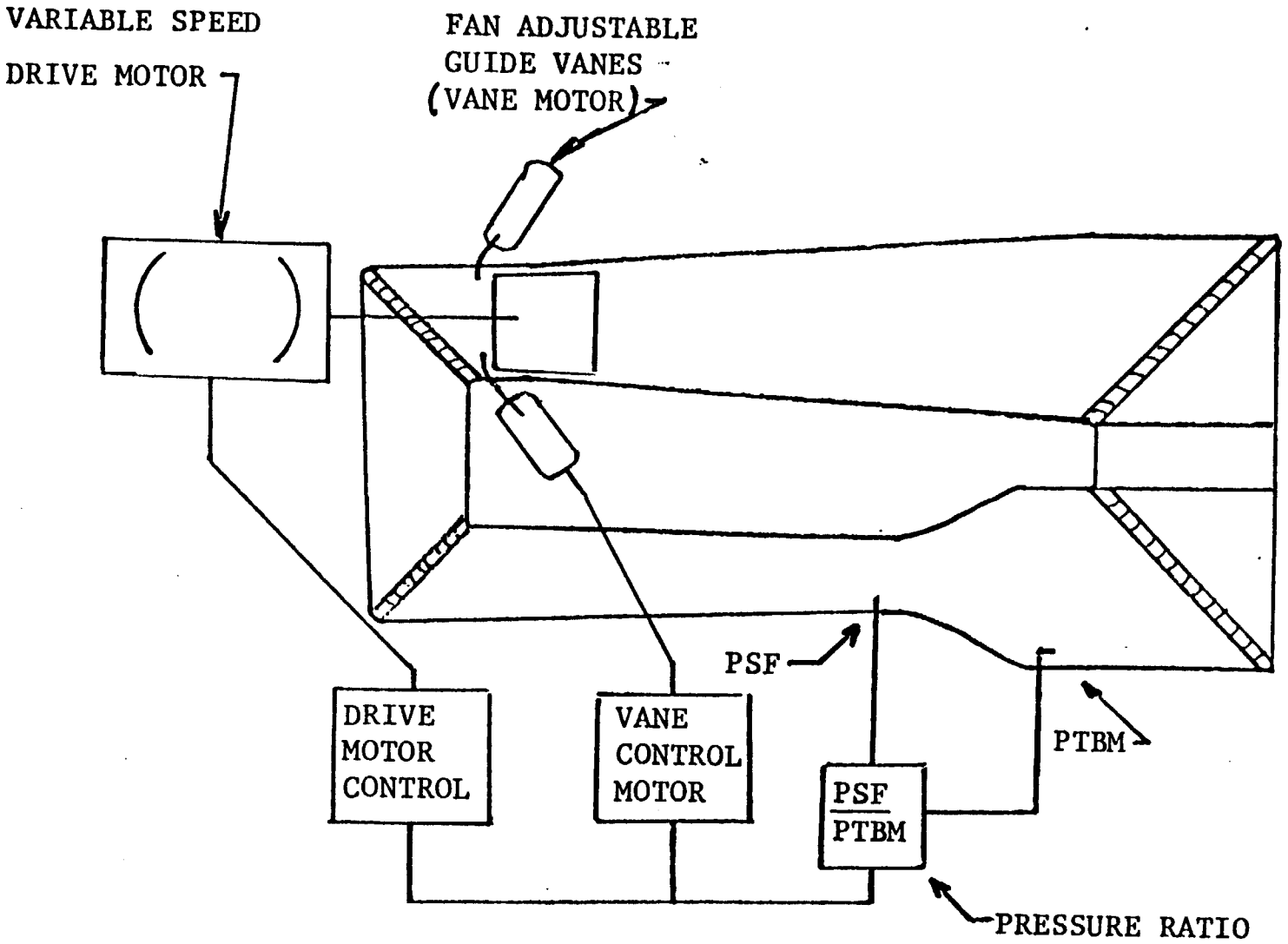
PRESSURE ALTITUDE CONTROL



TEMPERATURE CONTROL

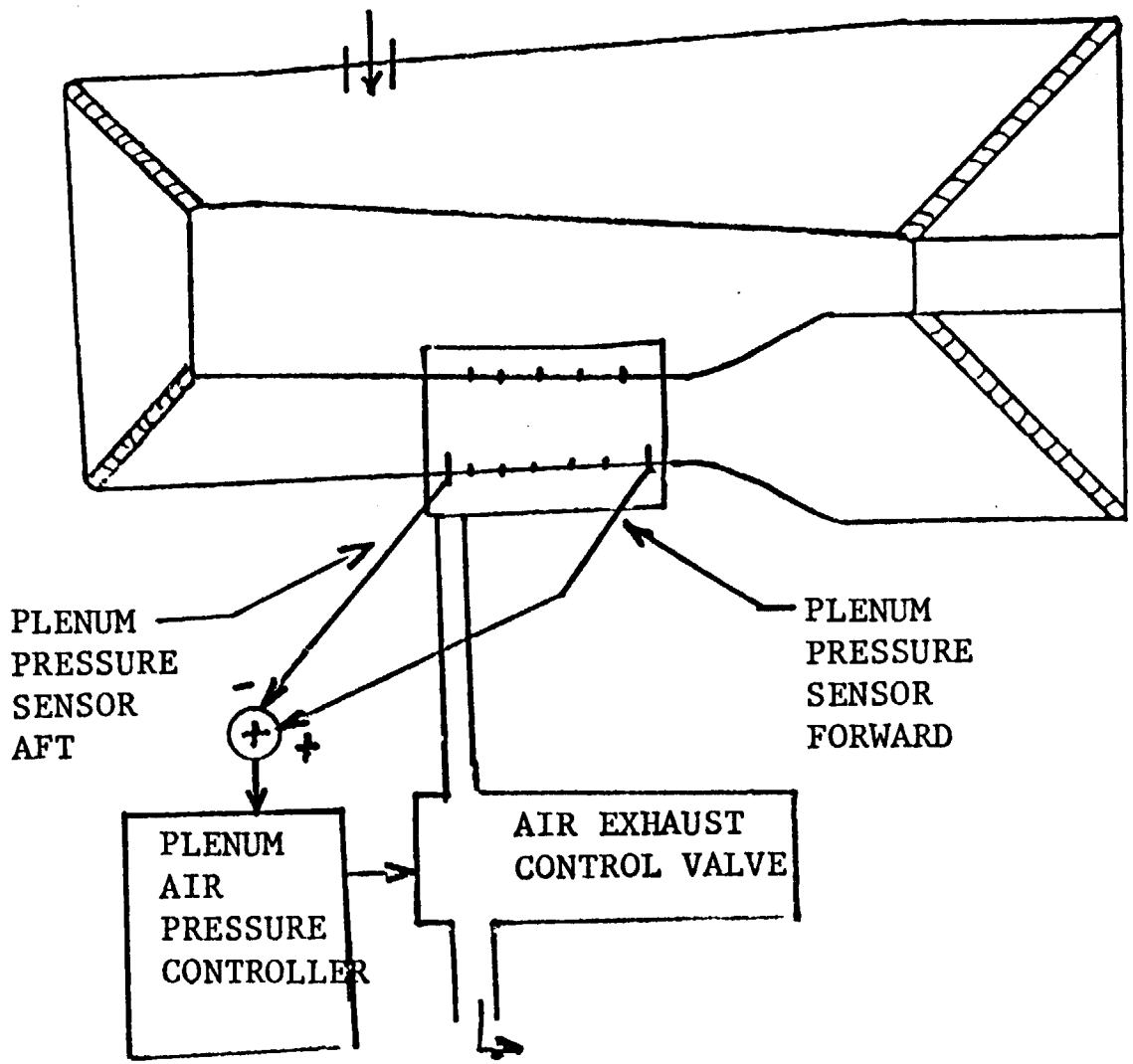


MACH NUMBER CONTROL



PLENUM EVACUATION CONTROL

Slots in wall-to-plenum



AWT DYNAMICS AND CONTROLS

ISSUES TO DISCUSS

- HOW ACCURATE OR DETAILED A MODEL IS NEEDED FOR CONTROLS DESIGN AND EVALUATION? IS A DISTRIBUTED (500 LUMPS) MODEL NEEDED?
- SHOULD AN INTEGRATED SIMULATION/CONTROLS PACKAGE LIKE EASY5 BE USED EXCLUSIVELY?
- CAN SUB-SCALE PHYSICAL MODEL TESTS GIVE USEFUL DYNAMIC PERFORMANCE AND CONTROLS INFORMATION? ARE THEY NEEDED?
- WILL MODERN (I.E. OPTIMAL) CONTROLS BE NEEDED FOR EFFICIENT OPERATION OF THE AWT?
- SHOULD WE DEVELOP A REAL-TIME SIMULATOR? WHAT SHOULD THE REAL-TIME MODEL LOOK LIKE?