

AMES 40 x 80/80 x 120 FOOT WIND TUNNEL

TURNING VANES DESIGN

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E. MCFARLAND

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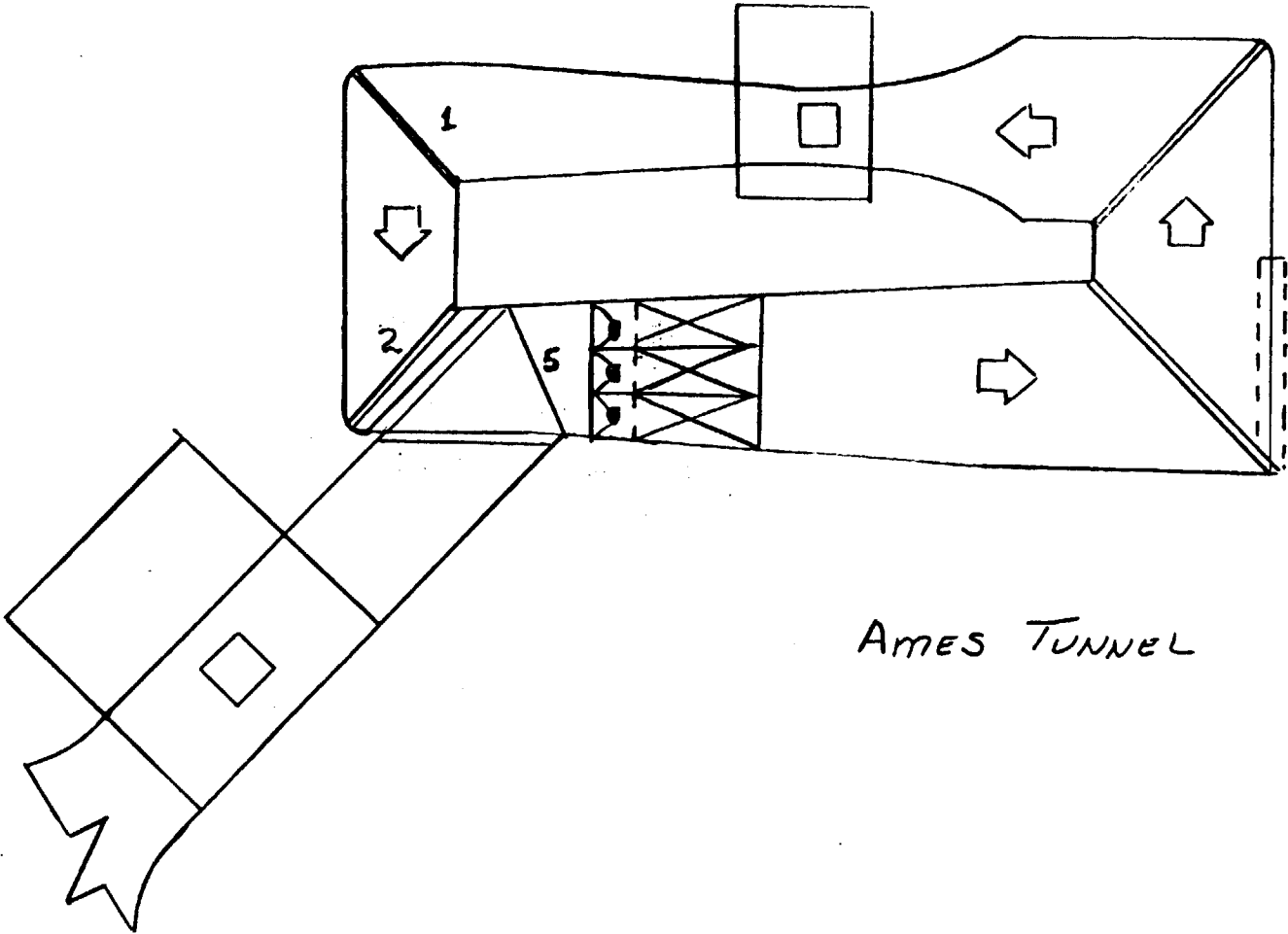
R. CAVICCHI

N 92-70490

P. 14

57-09

*[Handwritten signature]*



AMES TUNNEL

## COMPUTATIONAL DESIGN TOOLS

o DESIGN CODE - SANZ

HODOGRAPH SOLUTION

BOUNDARY LAYER CORRECTION

o ANALYSIS CODE - McFARLAND

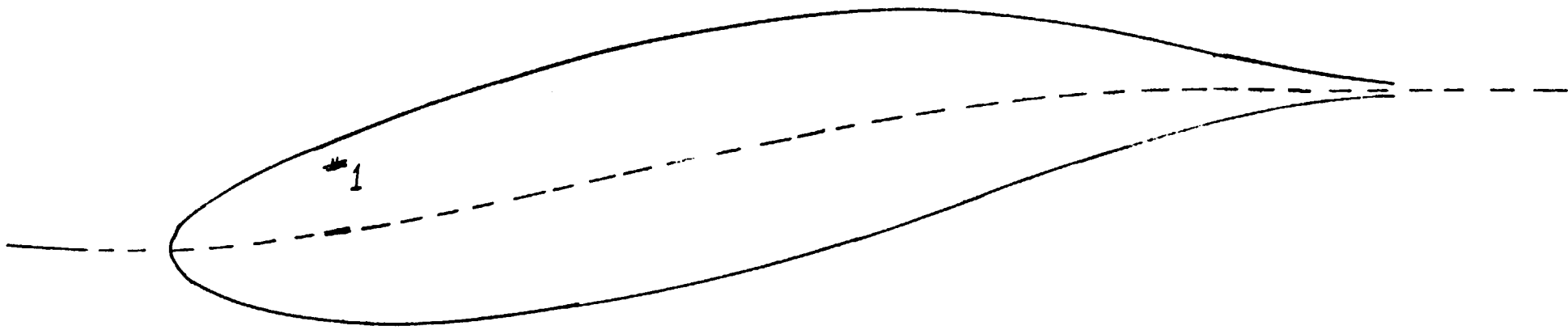
PANEL METHOD

o BOUNDARY LAYER - McNALLY

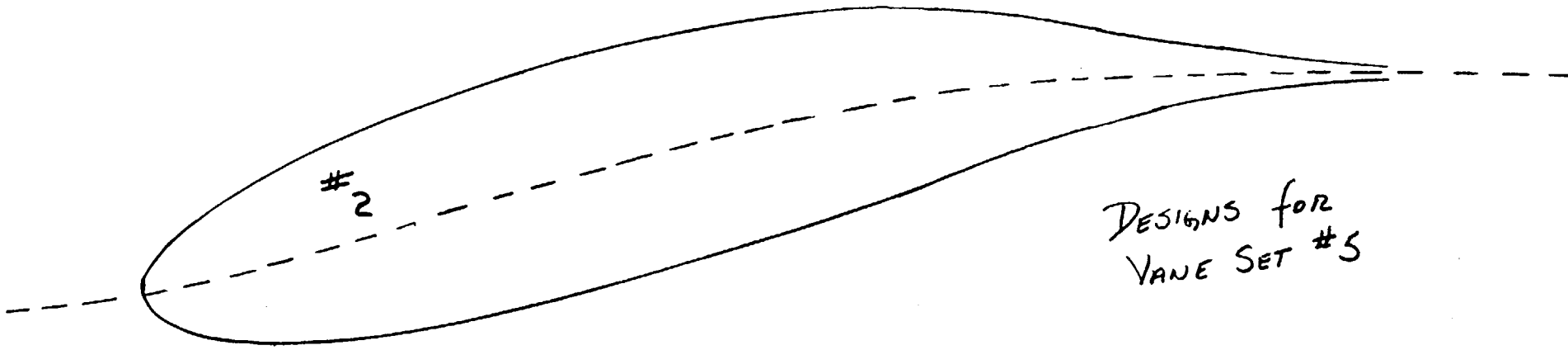
INTEGRAL METHOD

## VANE SET 5 DESIGN CONSTRAINTS

- o TWO MODES OF OPERATION
  
- o LOW LOSS - ZERO TURNING
  
- o 45 DEGREES TURNING - HIGHER LOSS ACCEPTABLE

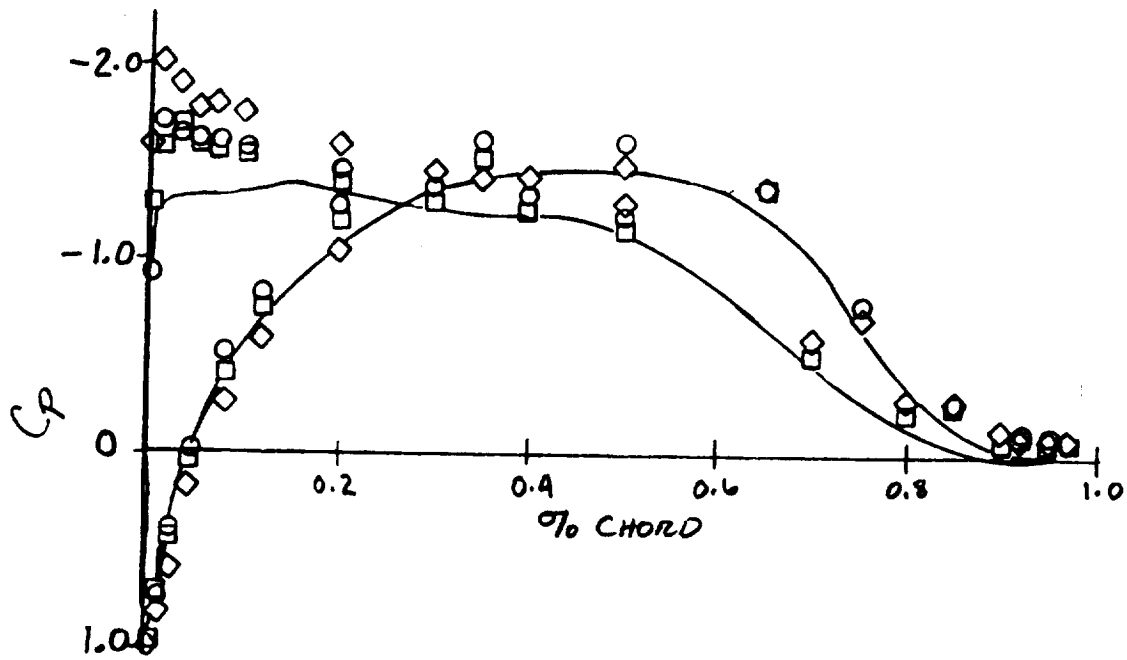


#1

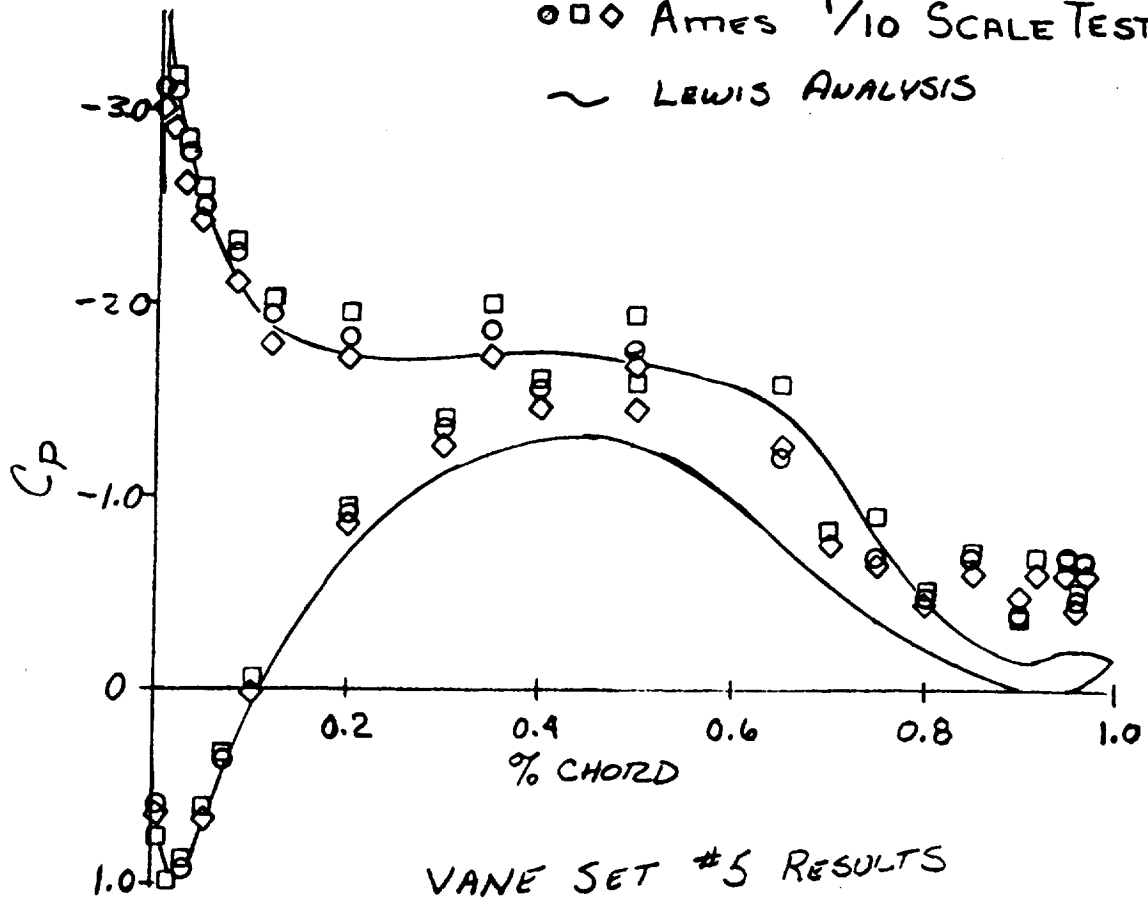


#2

DESIGNS FOR  
VANE SET #5

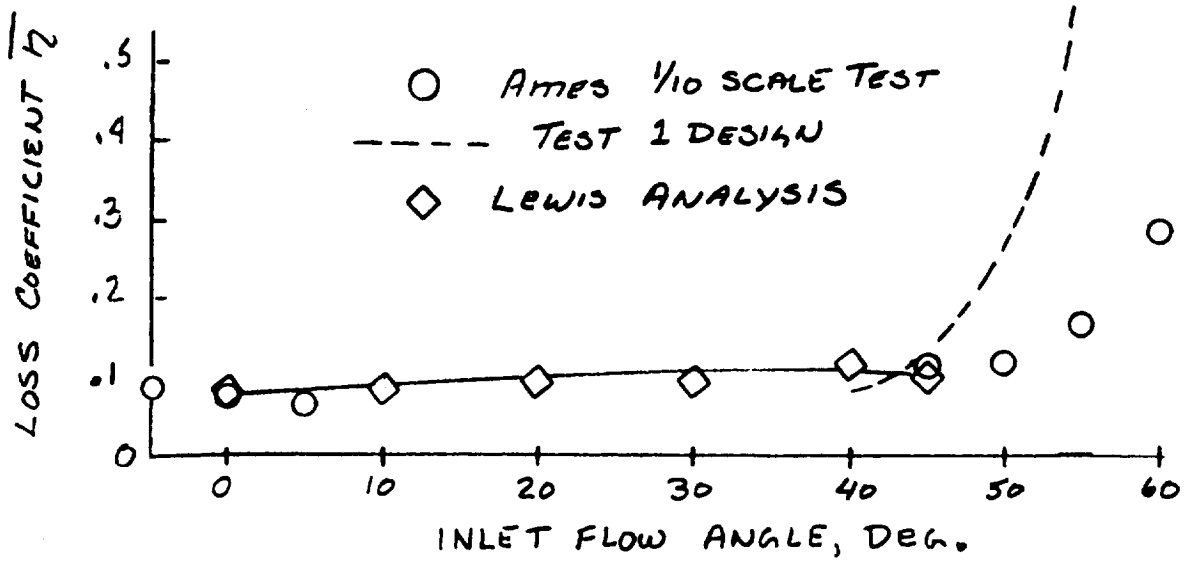
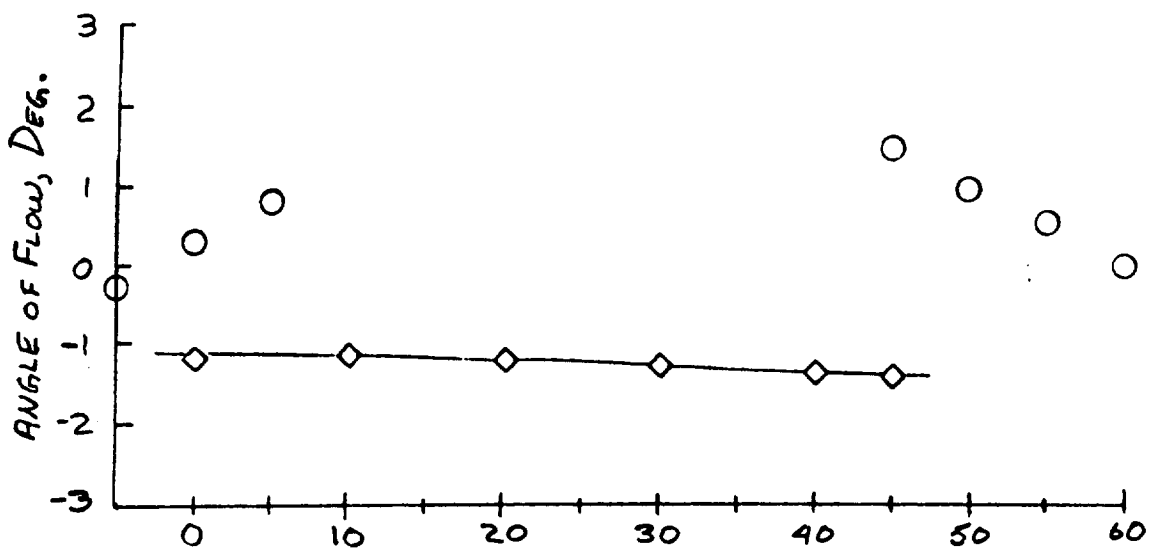


□□□ AMES 1/10 SCALE TEST  
~ LEWIS ANALYSIS



VANE SET #5 RESULTS

C-4



LOSS AND TURNING VANE SET #5

## VANE SETS 1 AND 2 DESIGN CONSTRAINTS

o SINGLE MODE OF OPERATION

90 DEGREES OF TURNING - LOW LOSS

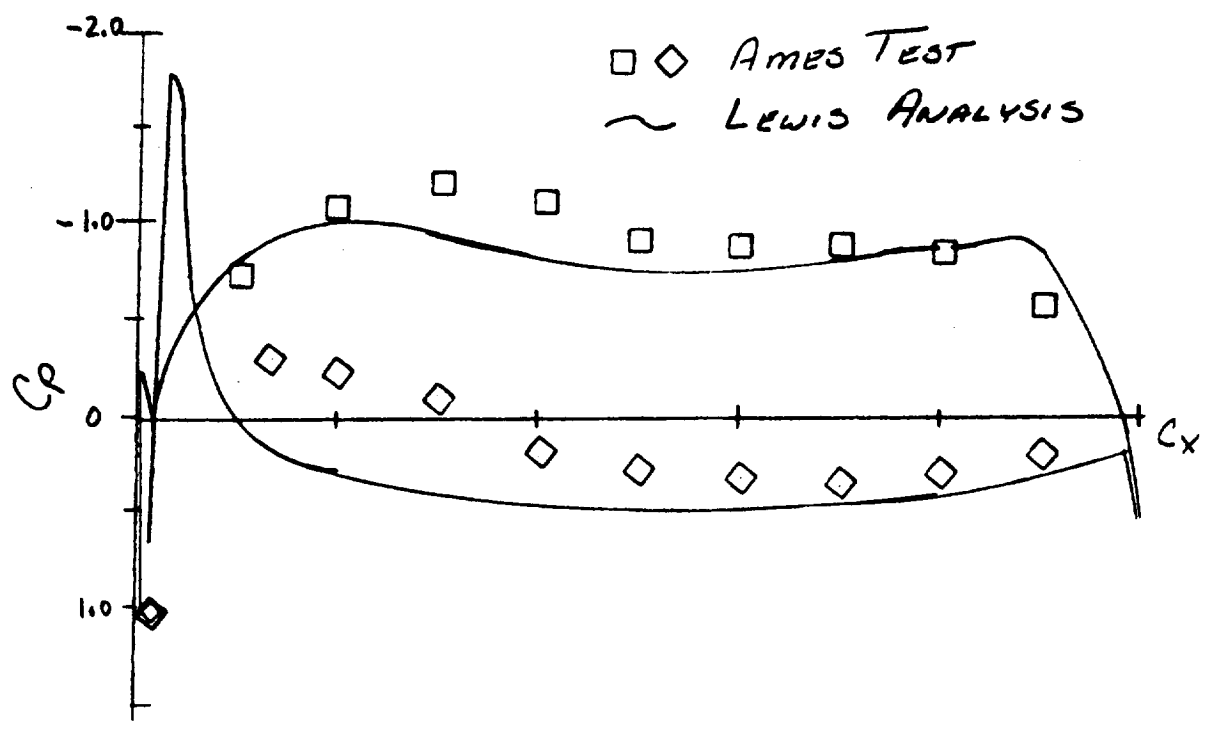
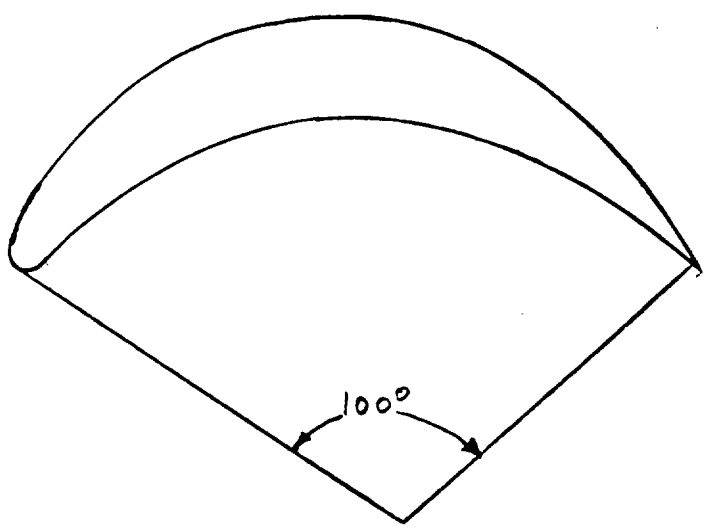
o CONSTRUCTION

CIRCULAR TUBE FOR LEADING EDGE

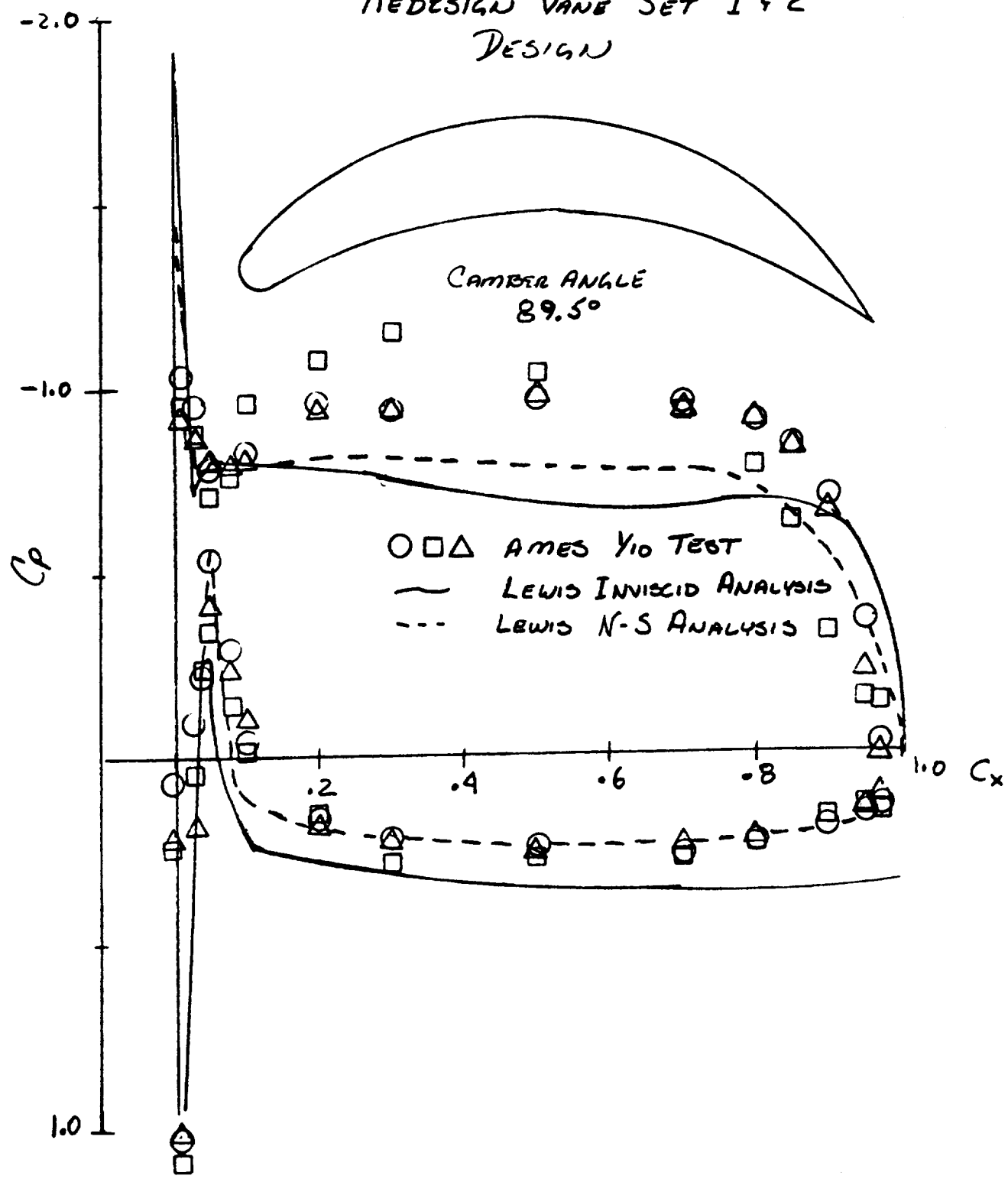
CIRCULAR ARCS FOR THE SUCTION AND  
PRESSURE SURFACES



# ORIGINAL VANE SET 1 & 2

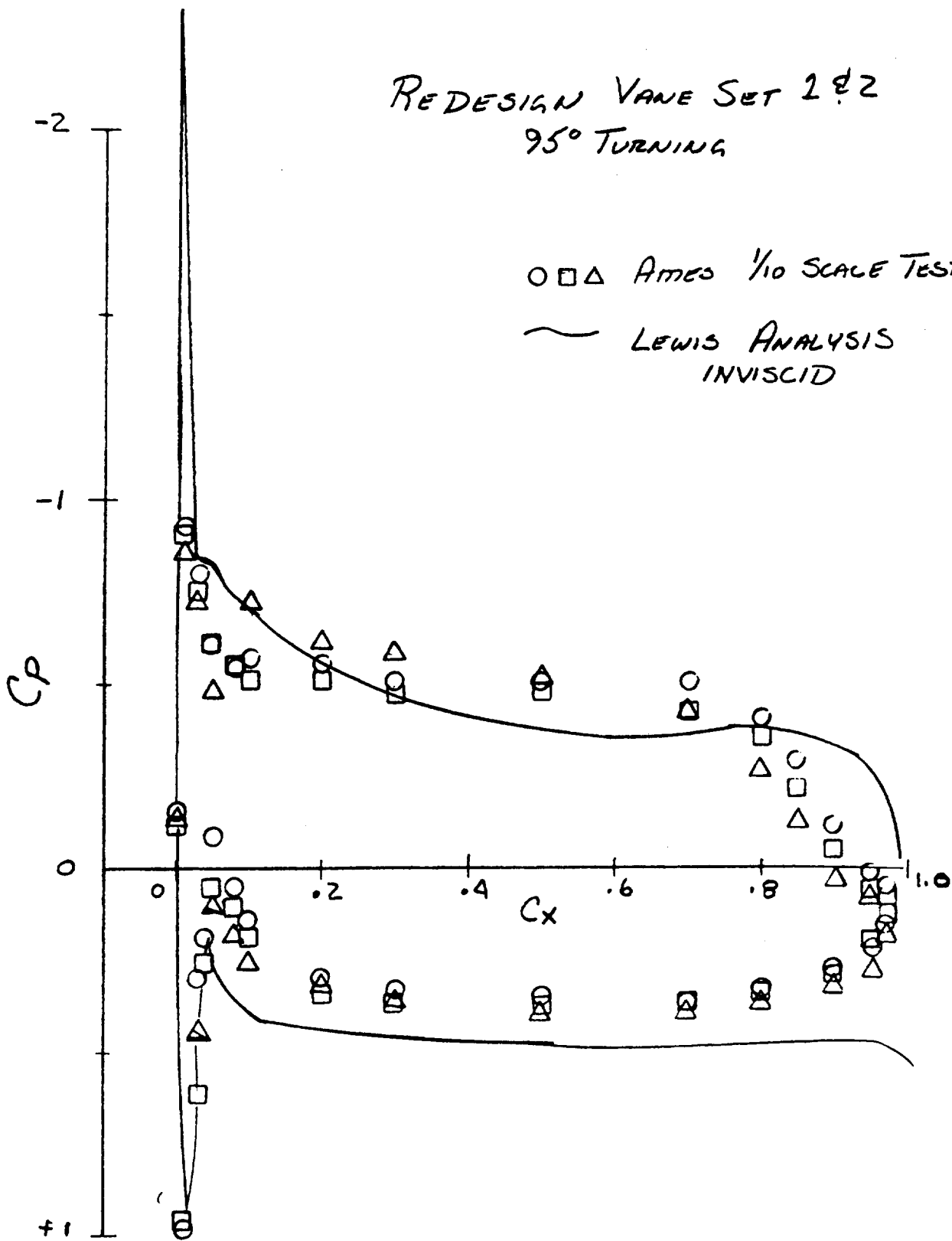


# REDESIGN VANE SET 1 & 2 DESIGN

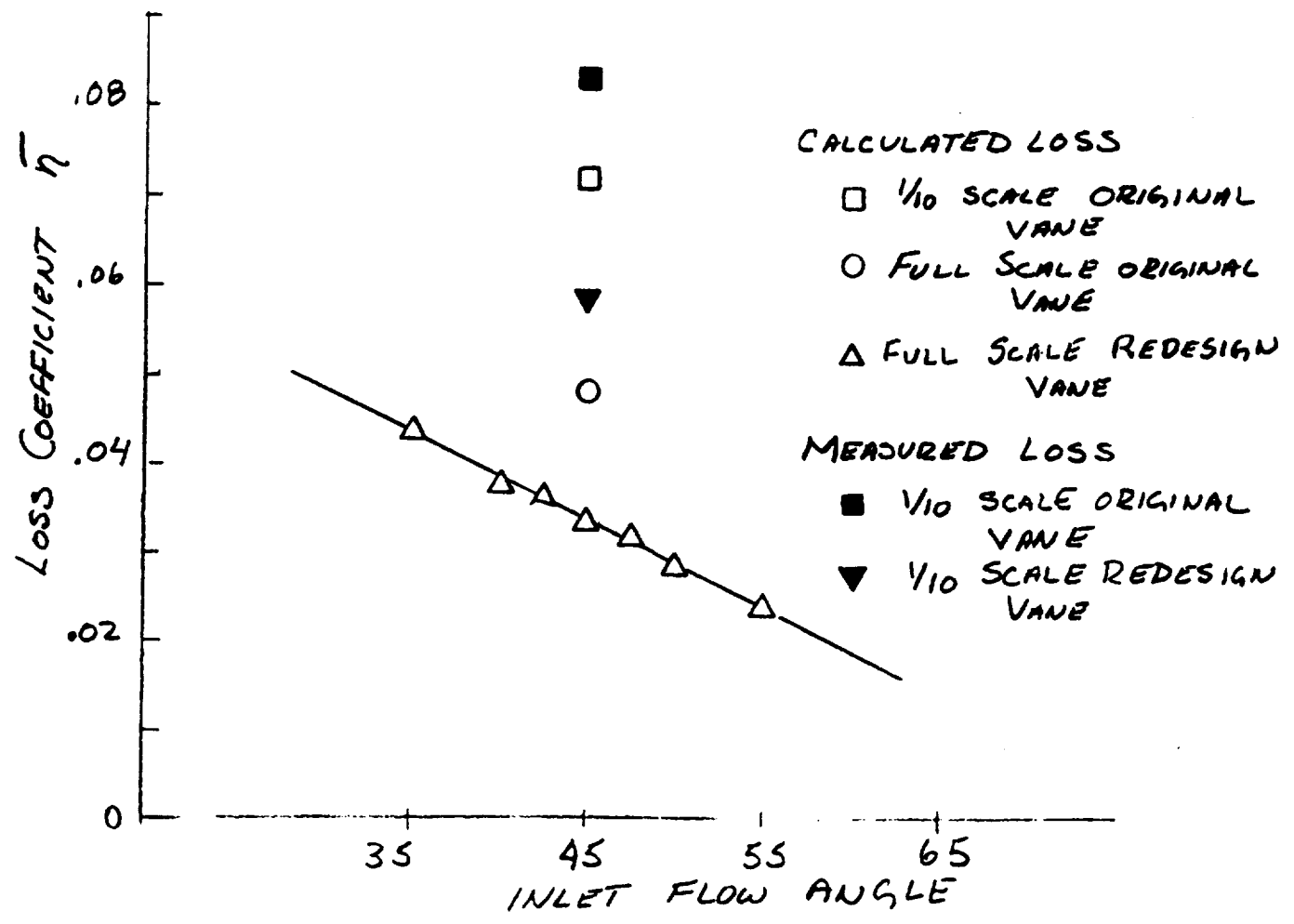


REDESIGN VANE SET 2 & 2  
95° TURNING

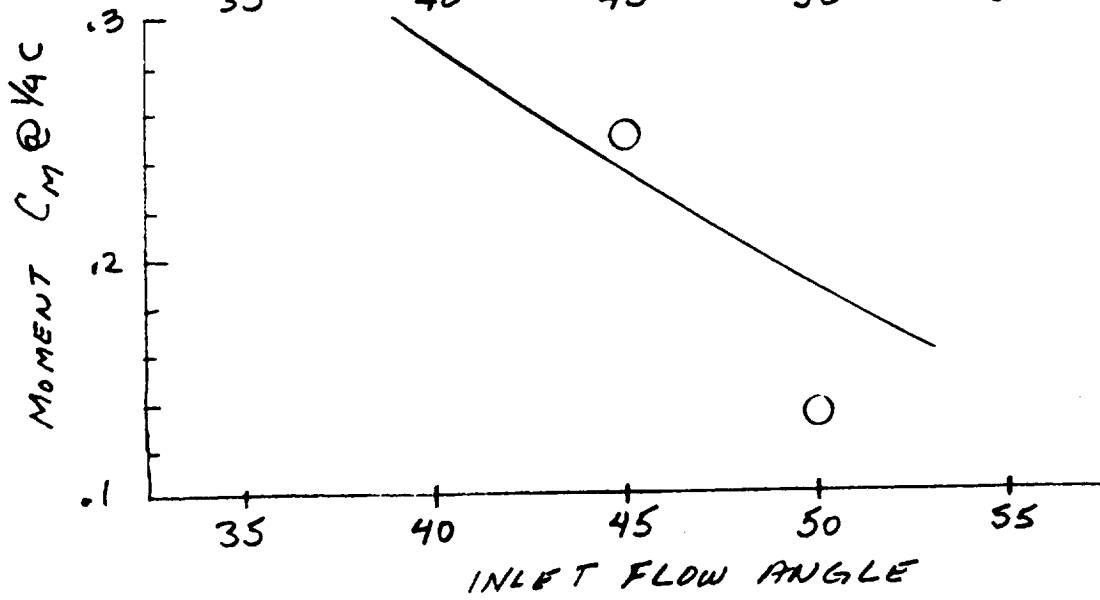
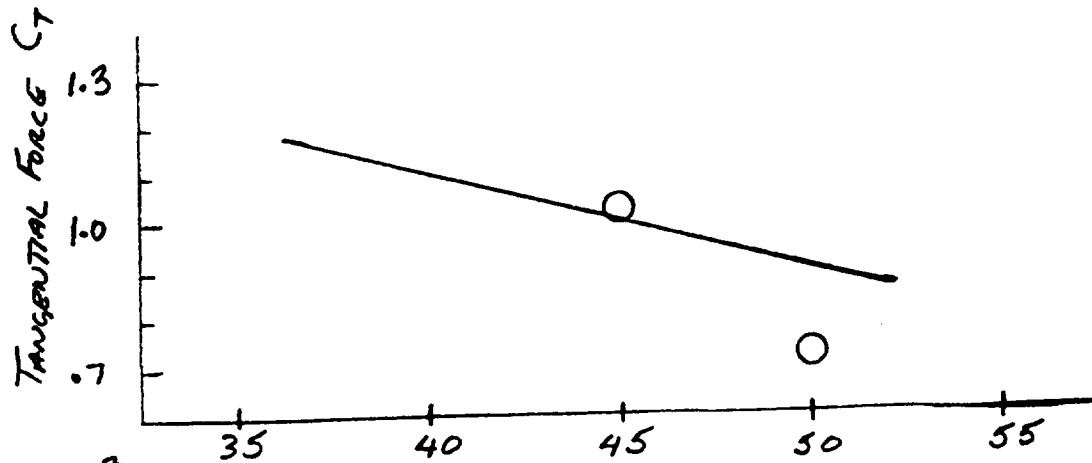
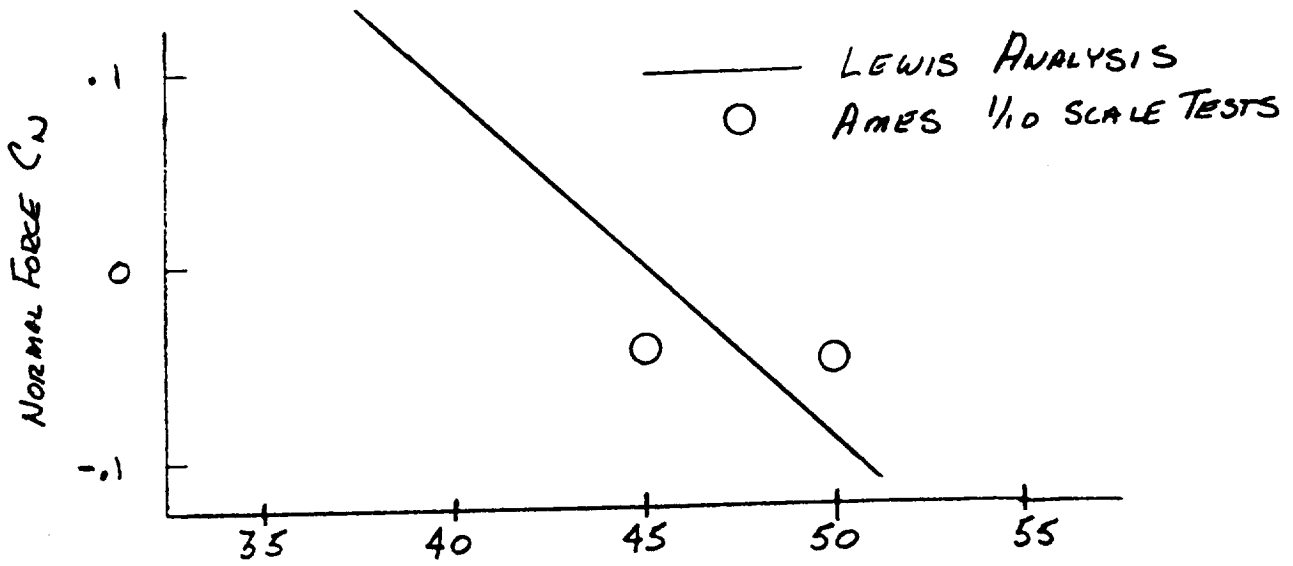
○ □ △ AMES 1/10 SCALE TEST  
— LEWIS ANALYSIS  
INVISCID

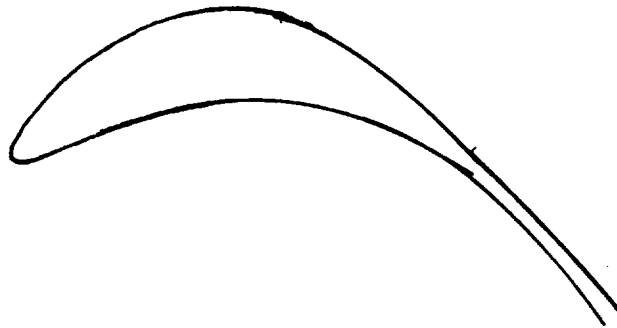
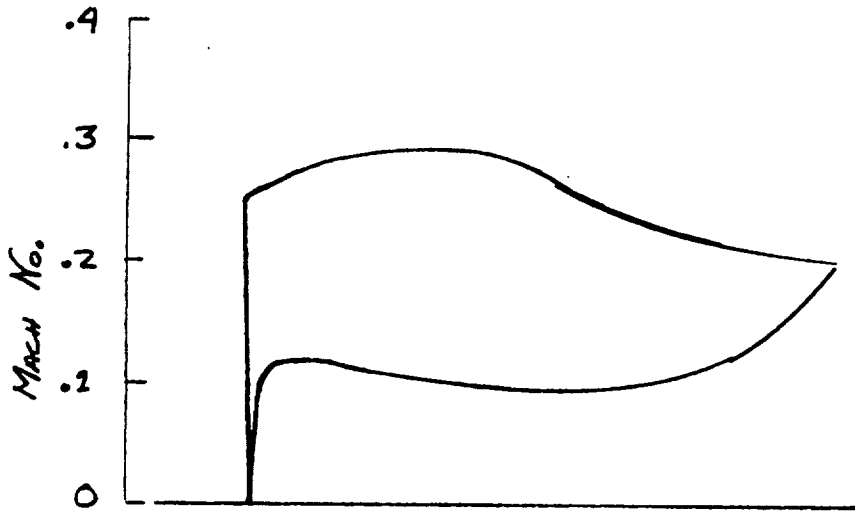


### VANE SET 1 & 2 LOSS



# REDESIGN FORCE COEFFICIENTS





CONTROLLED DIFFUSION 90° TURNING VANE