

A Retrospective on Fifty Years of Fluid Mechanics

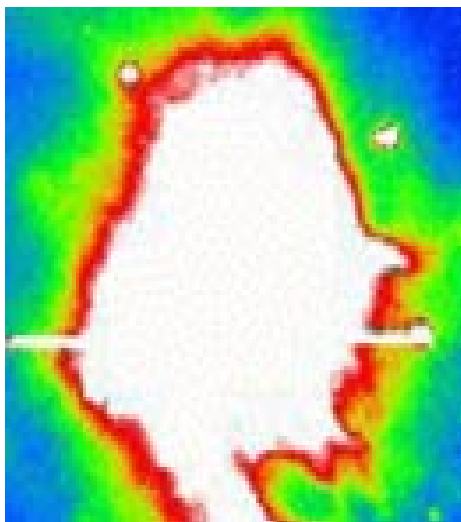
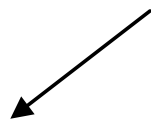
on the Niagara Frontier

November 20, 1998

BILL GEORGE: REVISIONIST HISTORIAN

(WITH A MESSIANIC OUTLOOK)

BIG BANG



CHAOS, TURBULENCE

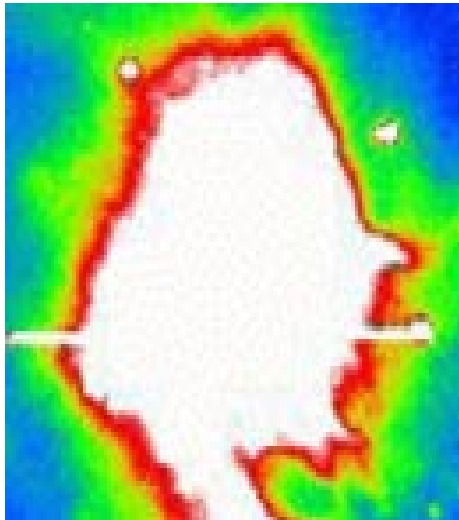
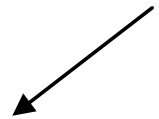


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BILL GEORGE: REVISIONIST HISTORIAN

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BIG BANG



CHAOS, TURBULENCE



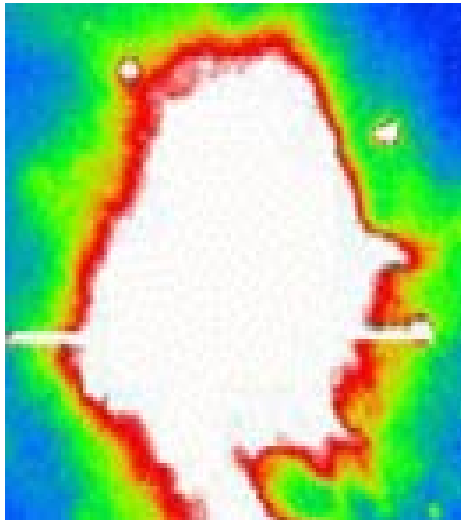
GOD'S PLAN:



BILL GEORGE: REVISIONIST HISTORIAN

(WITH A MESSIANIC OUTLOOK)

BIG BANG



(SOMEWHAT LESSER BANG)



CHAOS, TURBULENCE

GOD'S PLAN:



SOURCES:

PERSONAL EXPERIENCES

UB

BELL AIRCRAFT COMPANY

CURTISS - WRIGHT AIRPLANE DIVISION

CORNELL AERONAUTICAL LABORATORY

CALSPAN CORPORATION . . .

BUFFALO'S NAME:

BEAU FLEUVE ?

BISONS



SABRES

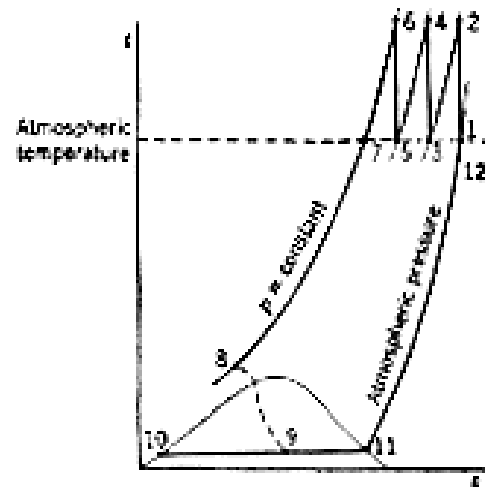
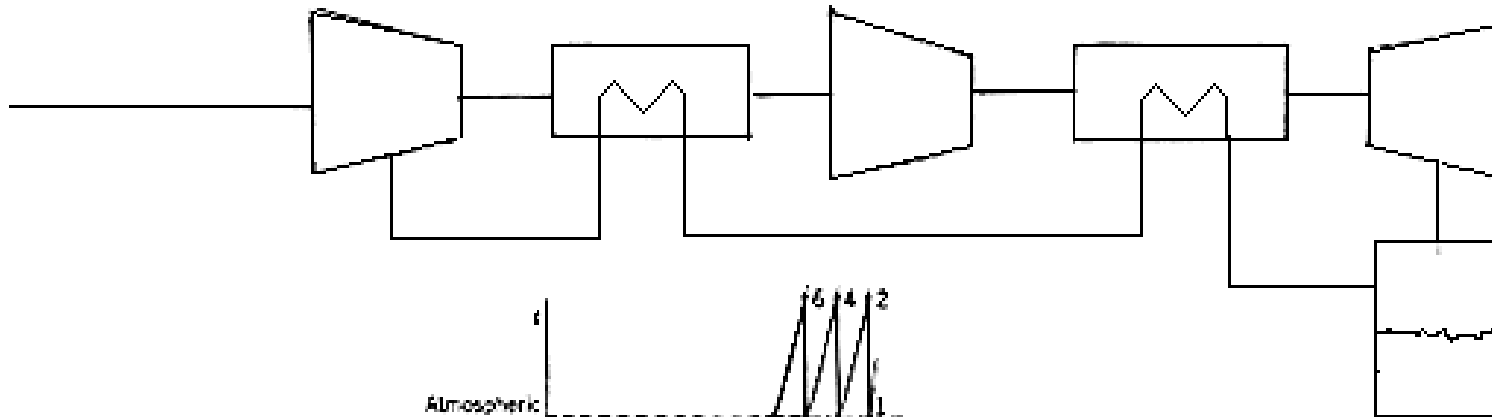


BILLS



FROM MY PERSONAL EXPERIENCE:

#1: PRAXAIR



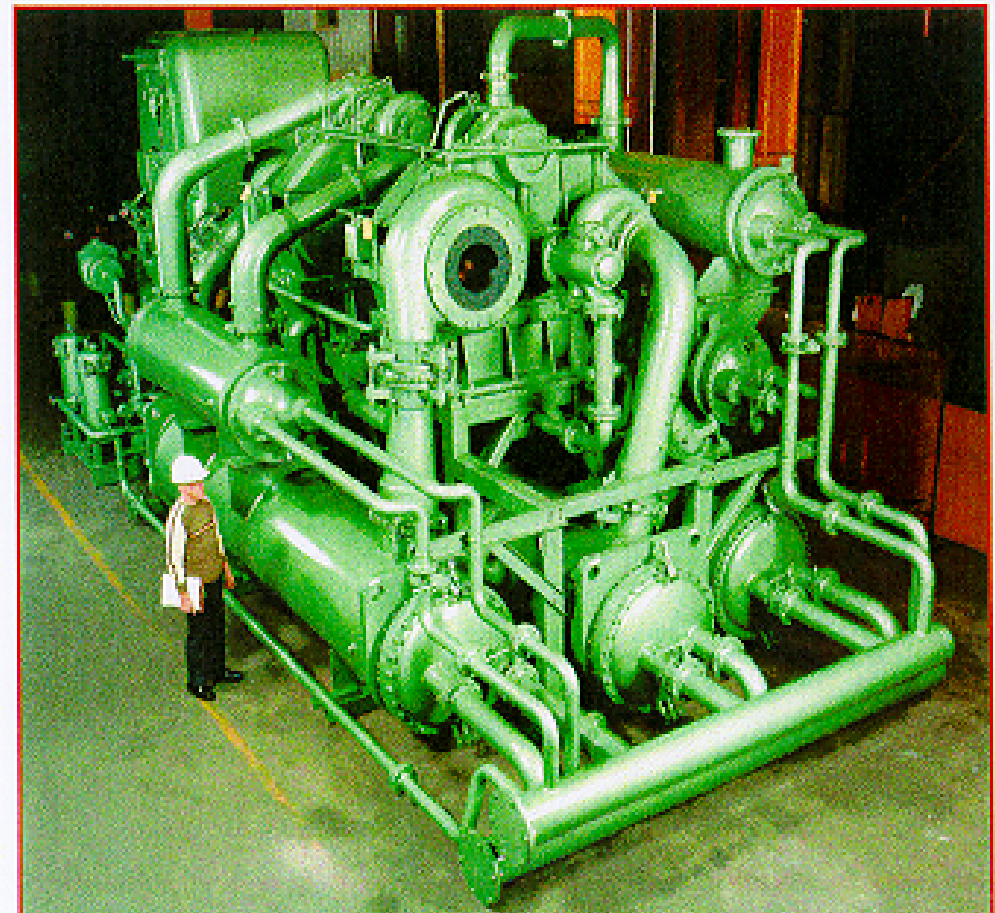
MAJOR ATTENTION TO EFFICIENCIES OF
COMPRESSORS

EXPANDERS; EFFECTIVENESS OF HEAT
EXCHANGERS



Milestones

- 1955: Joy Manufacturing Company establishes turbomachinery R&D facility in Buffalo, New York, USA.
- 1960: First small integral gear centrifugal compressor introduced to market – the 4MSG®-2 – creating a Revolution in Air Power.
- 1965: Introduced the first packaged centrifugal compressor – the Turbo Air®.
- 1971: First four-stage double gear box nitrogen recycle machine used for liquefaction of industrial gases.
- 1980: Introduced the first microprocessor-controlled compressor – the C-8 Series.
- 1987: Purchased by Cooper Industries, Inc. – major capital investments made.
- **1988: First 7-stage dual service machine with 3 pinions in each gear box; unit included high-efficiency 5-axis milled impellers.**



#3: BUFFALO FORGE COMPANY

(NOW A DIVISION OF HOWDEN CO.)

WILLIS H. CARRIER, 1876 - 1950

CHIEF ENGINEER, 1902 - 1915

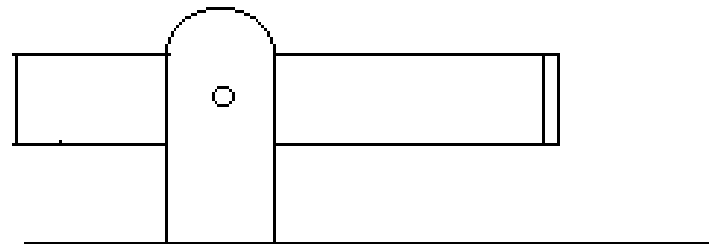
FAN ENGINEERING: 9TH EDITION IN
PREPARATION

DEVELOPER OF THE PSYCHROMETRIC CHART

#4: GENERAL MILLS - BUFFALO CEREAL PLANT

(MY FIRST SHOCK WAVE !)

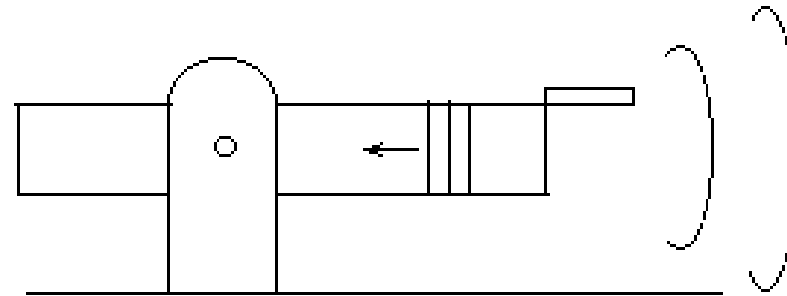
SUMMER 1949 : 'CEREAL GUNNER'



#4: GENERAL MILLS - BUFFALO CEREAL PLANT

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BELL AIRCRAFT COMPANY

CURTISS - WRIGHT AIRPLANE DIVISION

CORNELL AERONAUTICAL LABORATORY

CALSPAN CORPORATION . . .

Engineering the Future from the Ground Up:

1946-1996

**THE FIFTY
YEARS OF
ENGINEERING**



A History of the
First Fifty Years
of the
School of Engineering
and Applied Sciences at
the University at Buffalo
--and a Glimpse at the Future.

Compiled by Charles M. Fogel

Edited by
Anne B. McGrail



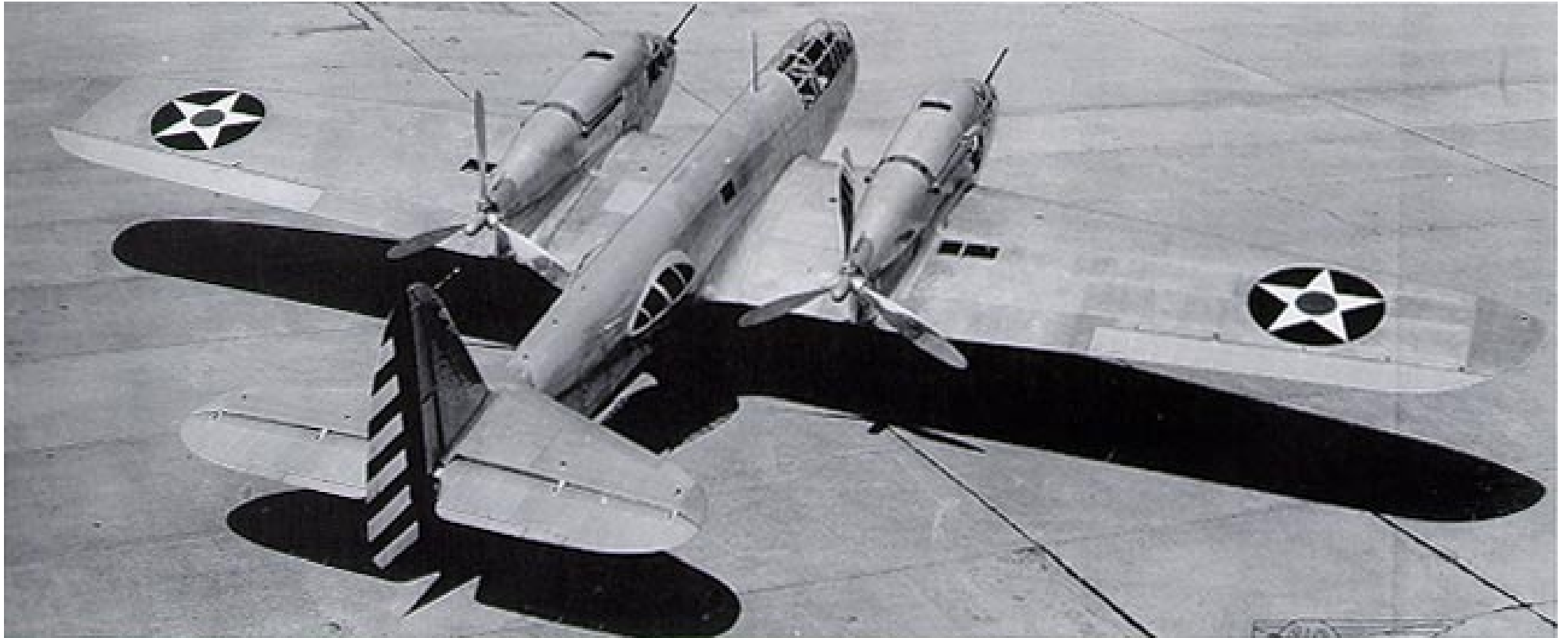
BELL AIRCRAFT: WWII: 30,000+ !

- LAWRENCE D. BELL
- AIRCRAFT
- ROCKETS: AGENA, LEM ASCENT ENGINE, . . .
- HELICOPTERS
- RESEARCH: HYPERSONICS, GASDYNAMIC

LASERS, . .

- EARLY FINITE-ELEMENT DEVELOPERS:
R. H. GALLAGHER, A. J. BAKER, . . .
- ATLANTIC RESEARCH CORPORATION





THE AIRACUDA

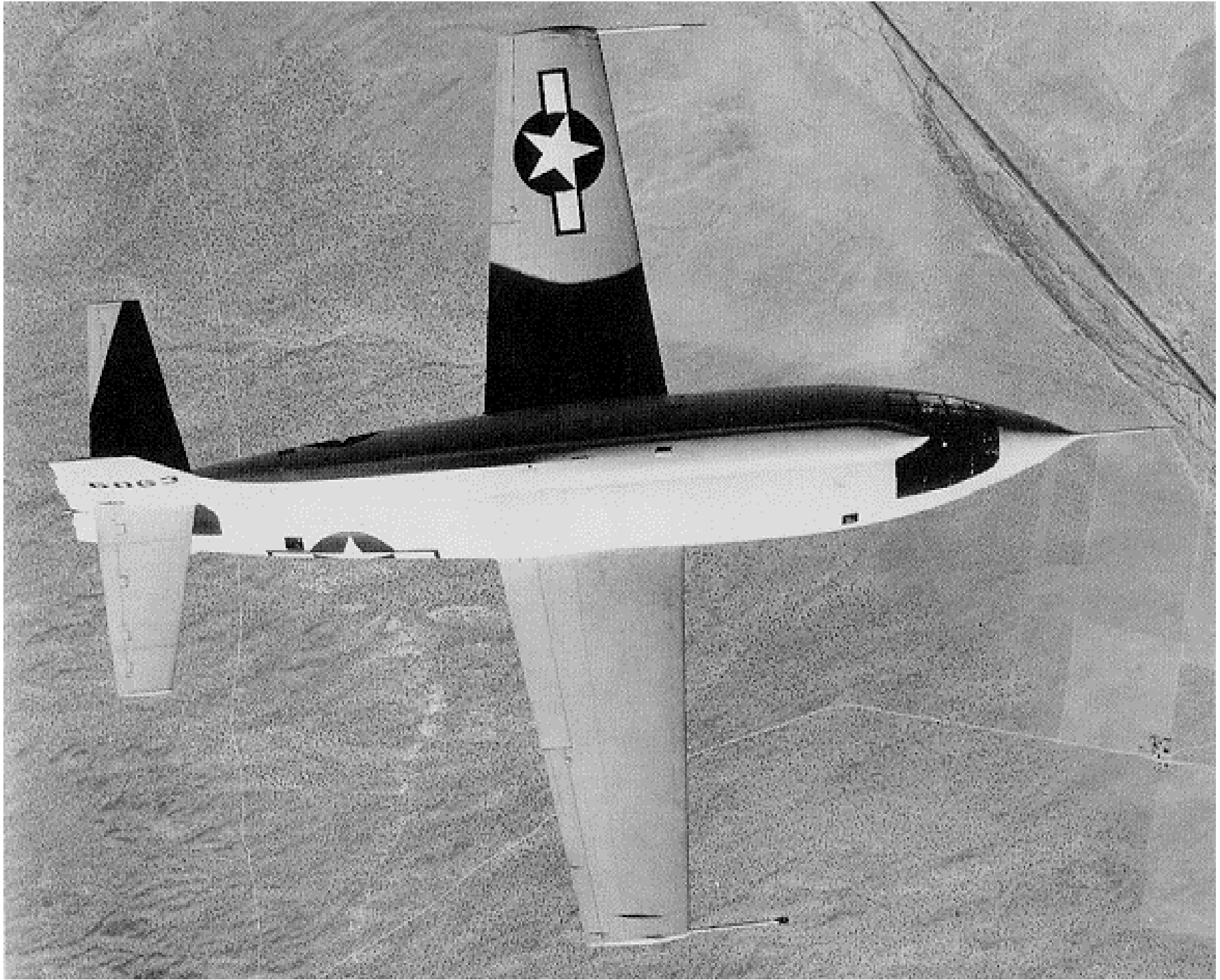


THE P-39 AIRACOBRA

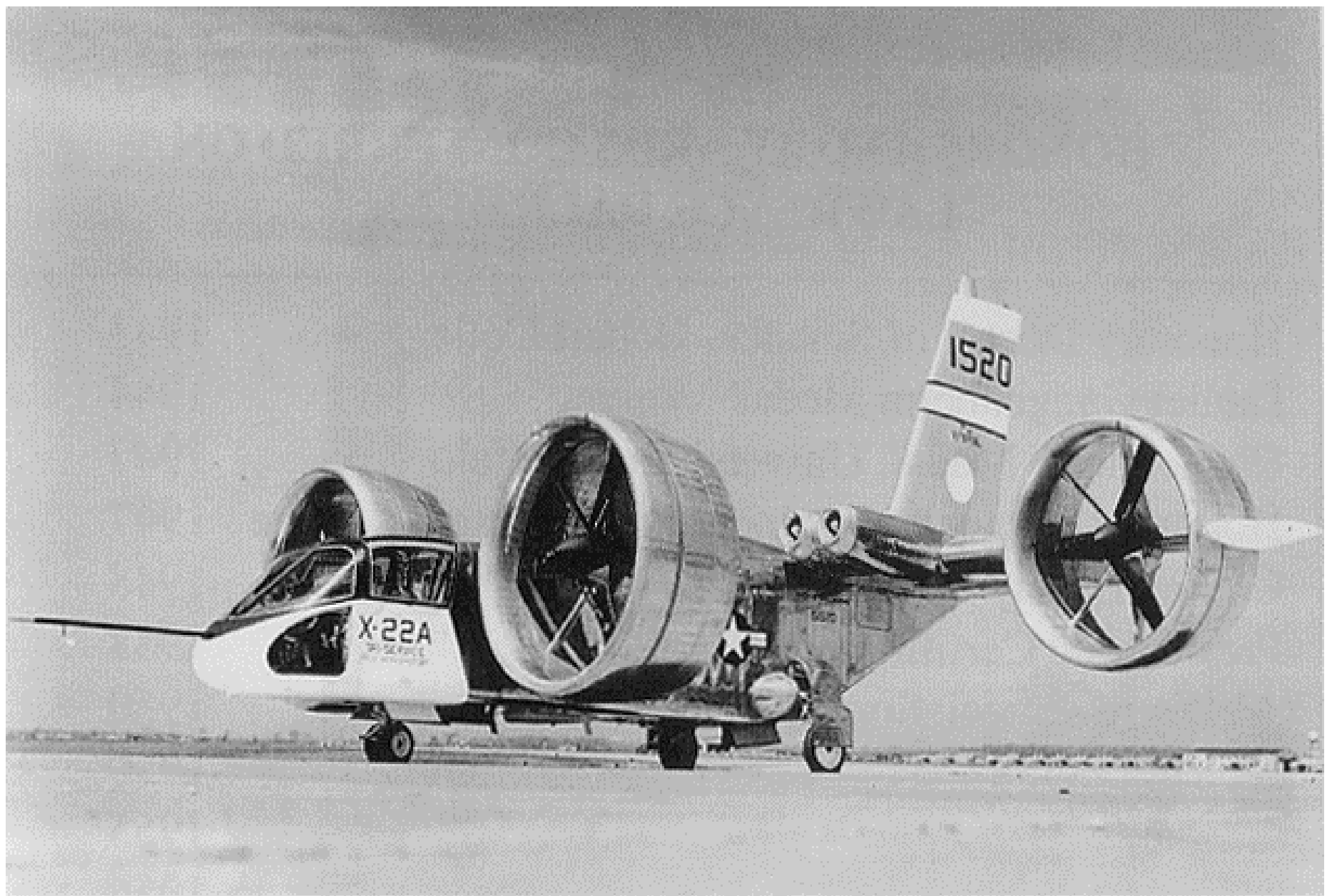




THE P - 59







SOURCES:

PERSONAL EXPERIENCES

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CURTISS - WRIGHT AIRPLANE COMPANY

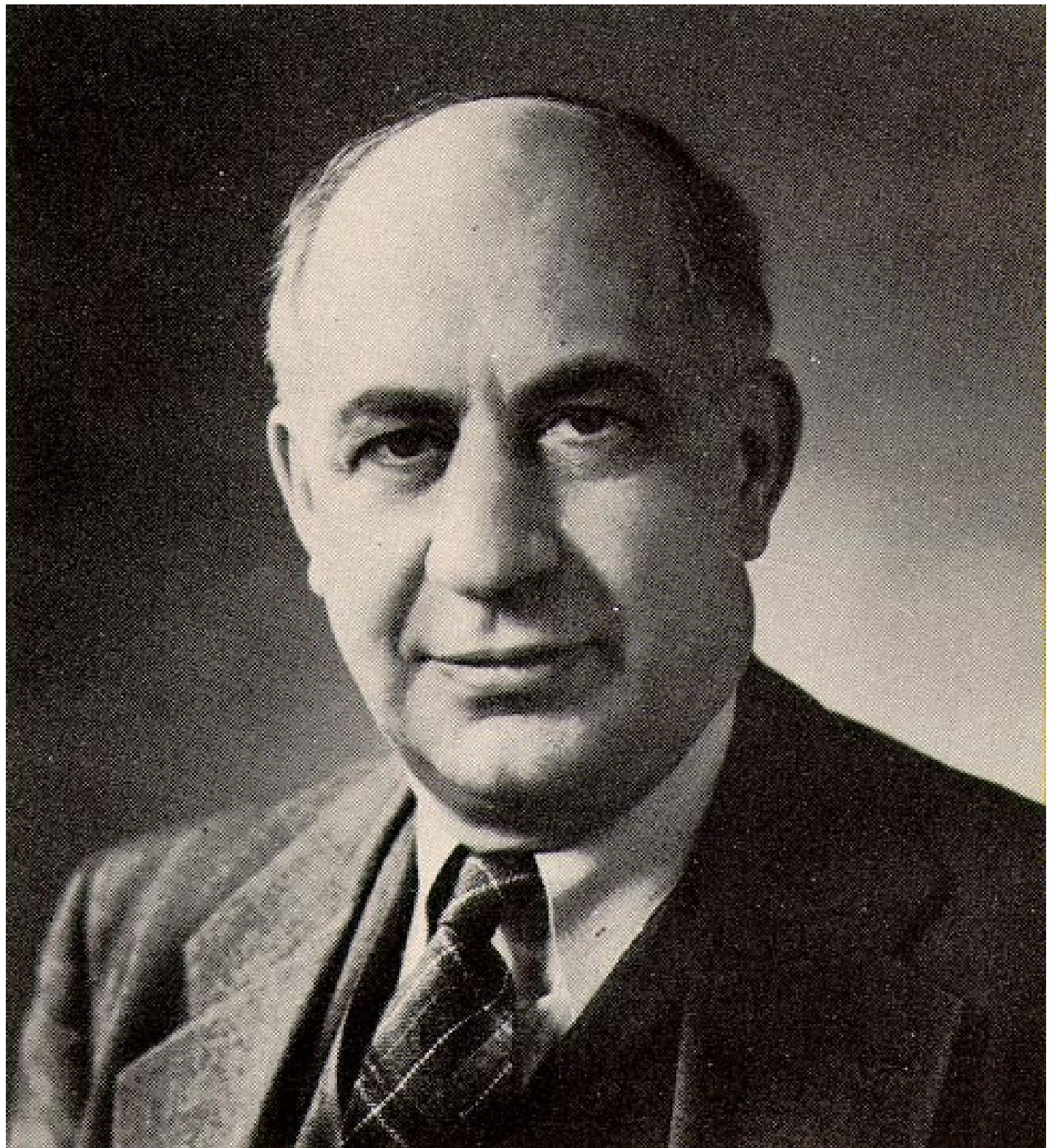
- P-40, C-46, SB2C, . . .

RESEARCH LAB: BURDETTE WRIGHT, CLIFFORD COOK FURNAS

JAN 1, 1946: CORNELL AERONAUTICAL LABORATORY

- WIND TUNNEL
- FLIGHT RESEARCH (W. F. MILLIKEN,
WALDEMAR O. BRUEHAUS, . . .)
- AERODYNAMICS (A. H. FLAX, . . .)
- AEROMECHANICS (ALLEN F. DONOVAN, BOB LOEWY, IRV
STATLER)
- ELECTRONICS, MATERIALS, . . .

**SUMMER STUDENTS, FELLOWSHIPS, SABBATICAL LEAVES, . . .
FIRST SEAT BELT, SPINOFF COMPANIES, . . .**



FLIGHT - RESEARCH HIGHLIGHTS:

WIND - TUNNEL HIGHLIGHTS:

1952 : POROUS WALLS FOR TRANSONIC FLOW

1973 : INTERFERENCE - FREE TUNNEL

(W. R. SEARS, J. C. ERICKSON, R. J. VIDAL,
...)

AERODYNAMIC HIGHLIGHTS:

HYPERSONICS, PHYSICAL GAS DYNAMICS, ...

THIN-FILM TECHNOLOGY FOR HEAT-TRANSFER
MEASUREMENTS



USAF NT-33A



USAF NC-131H TIFS

IN-FLIGHT SIMULATORS



USN X-22A



USAF F-16 / VISTA



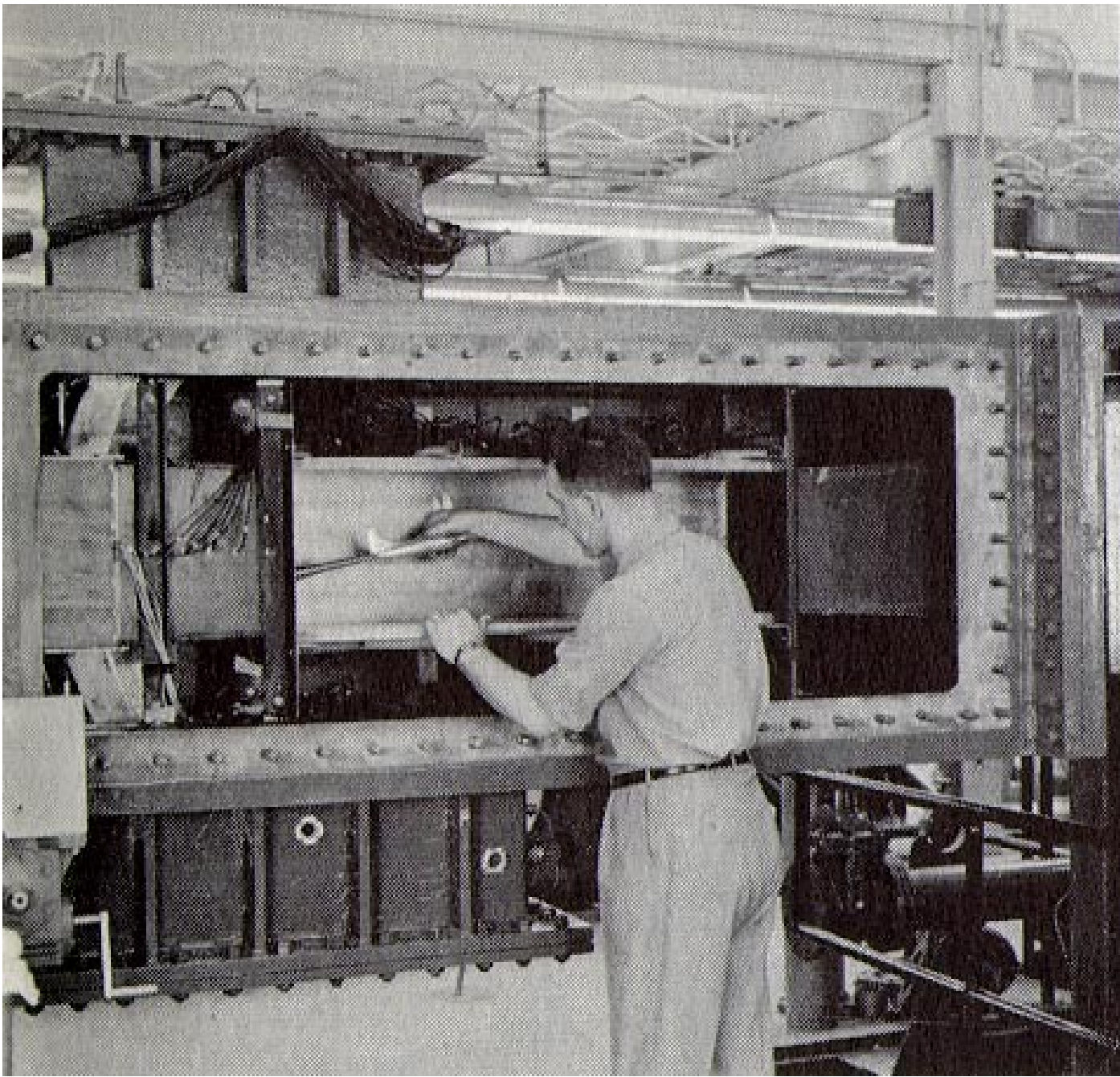
USAF NC-131H ASTTA

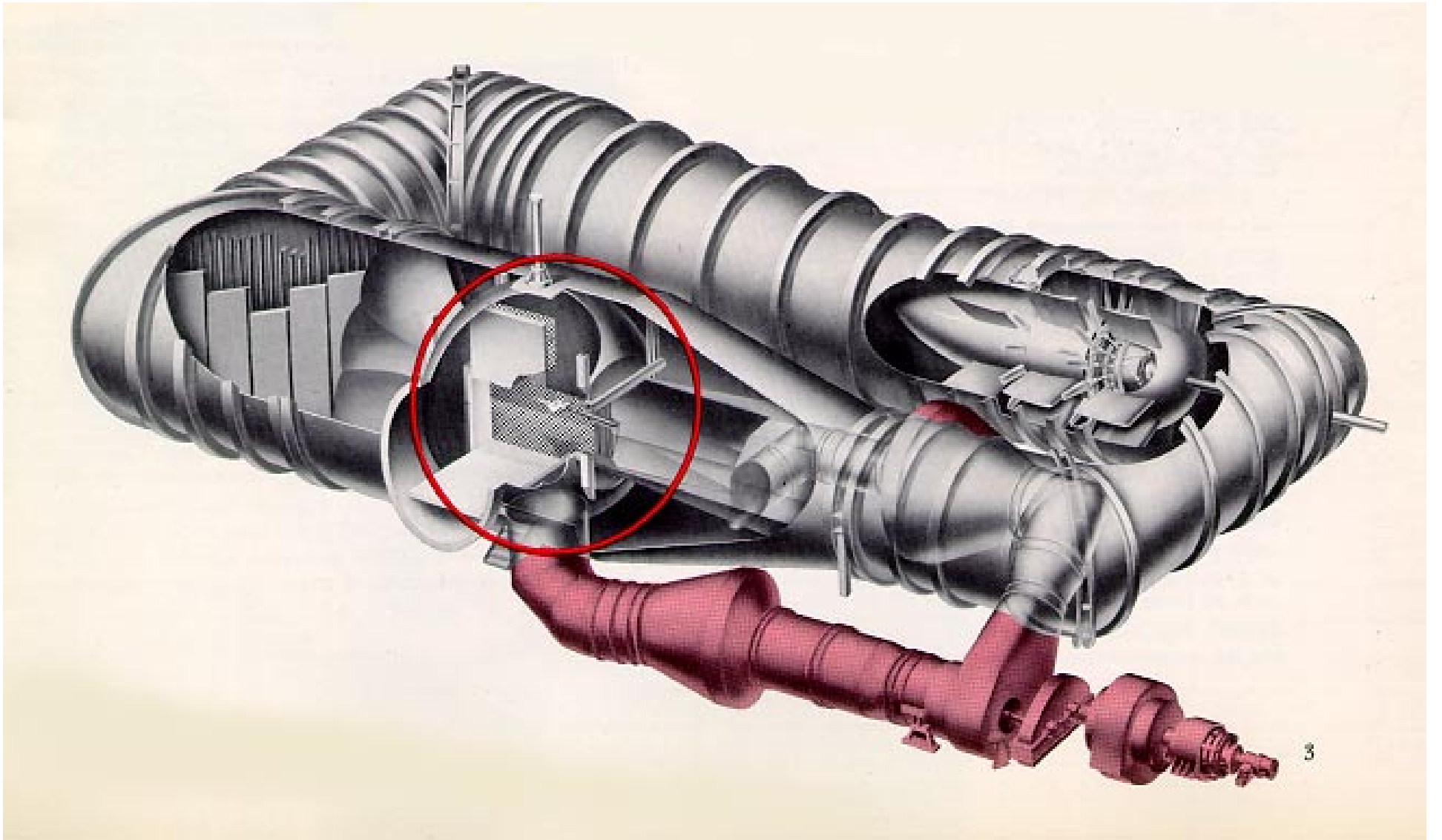


CALSPAN LEARJET "24"



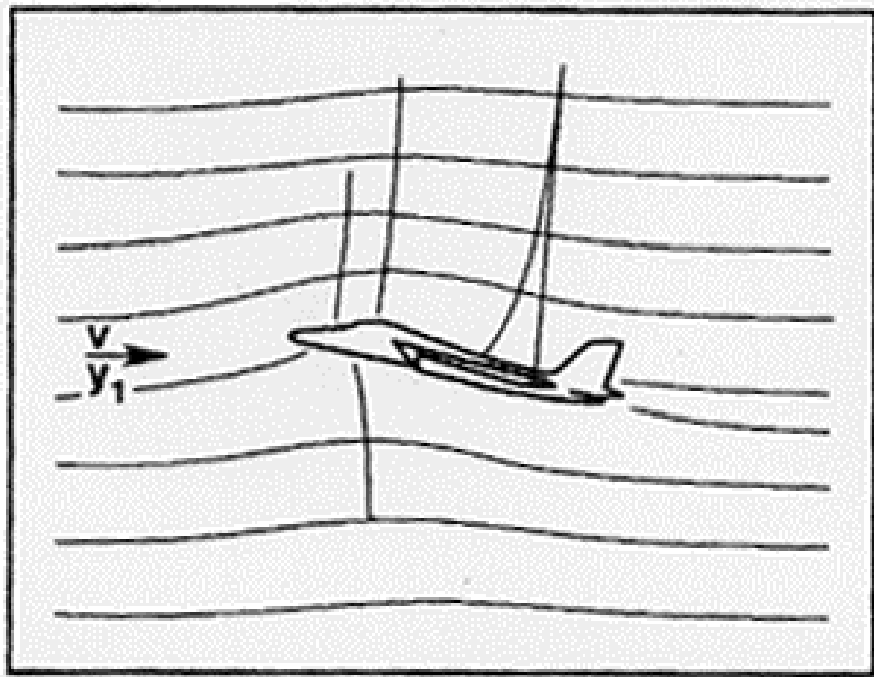
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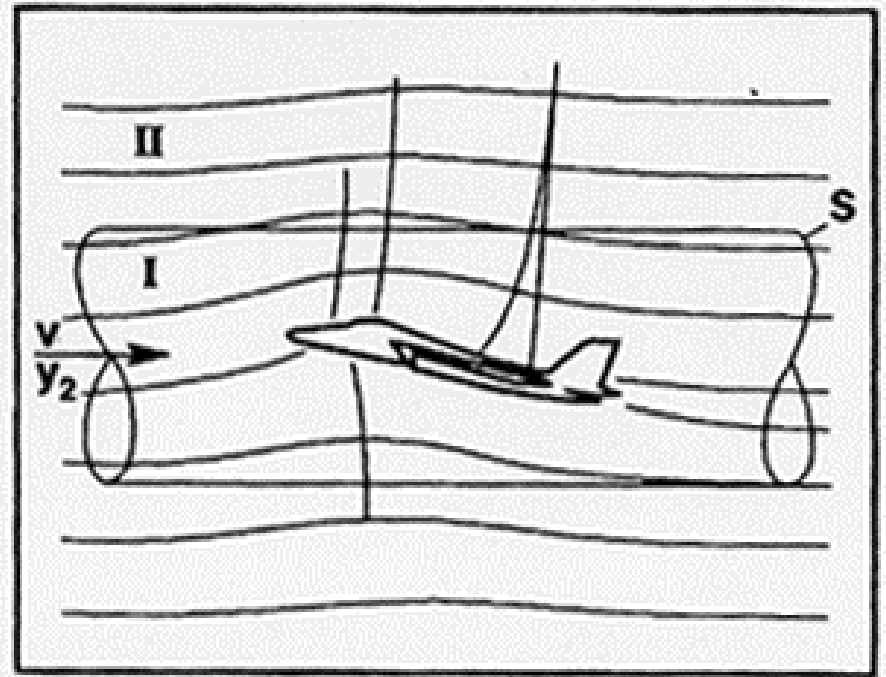




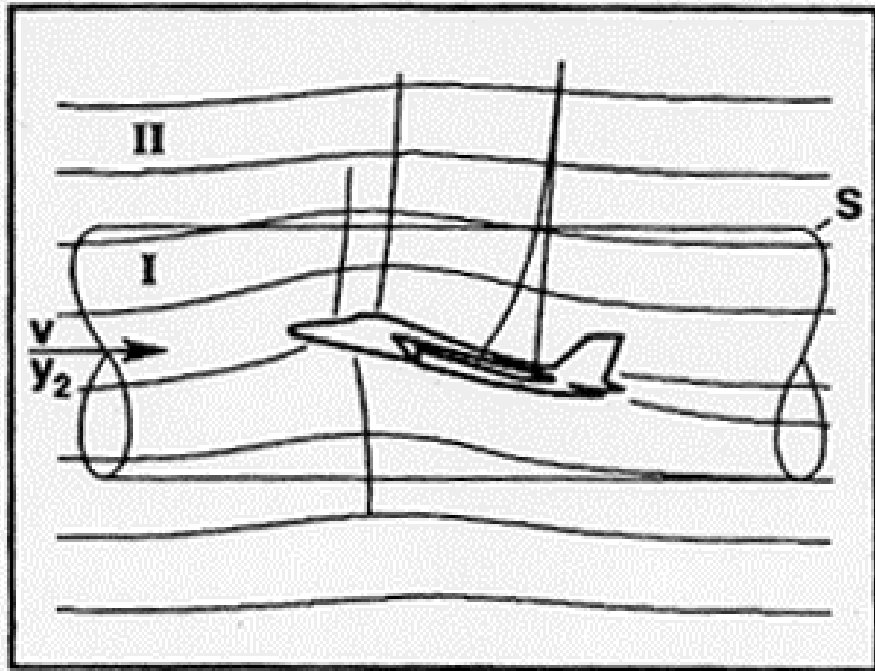
W. R. SEARS



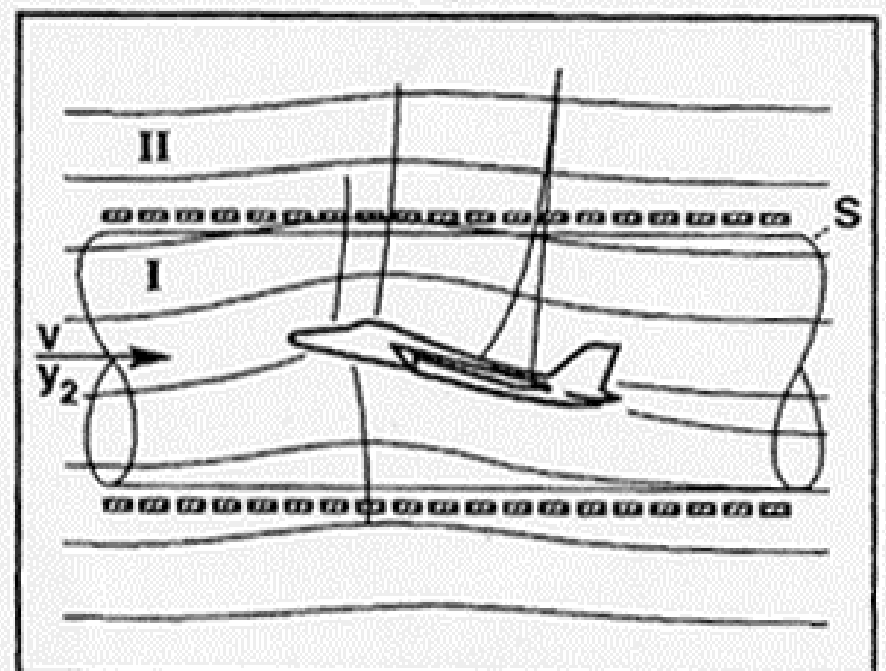
(a)



(c)



(b)



(d)

AERODYNAMIC RESEARCH:

ALEXANDER H. FLAX

FRANKLIN K. MOORE

ABRAHAM HERTZBERG

J. GORDON HALL

CHARLES E. TREANOR

ALFRED RITTER

PAUL V. MARRONE

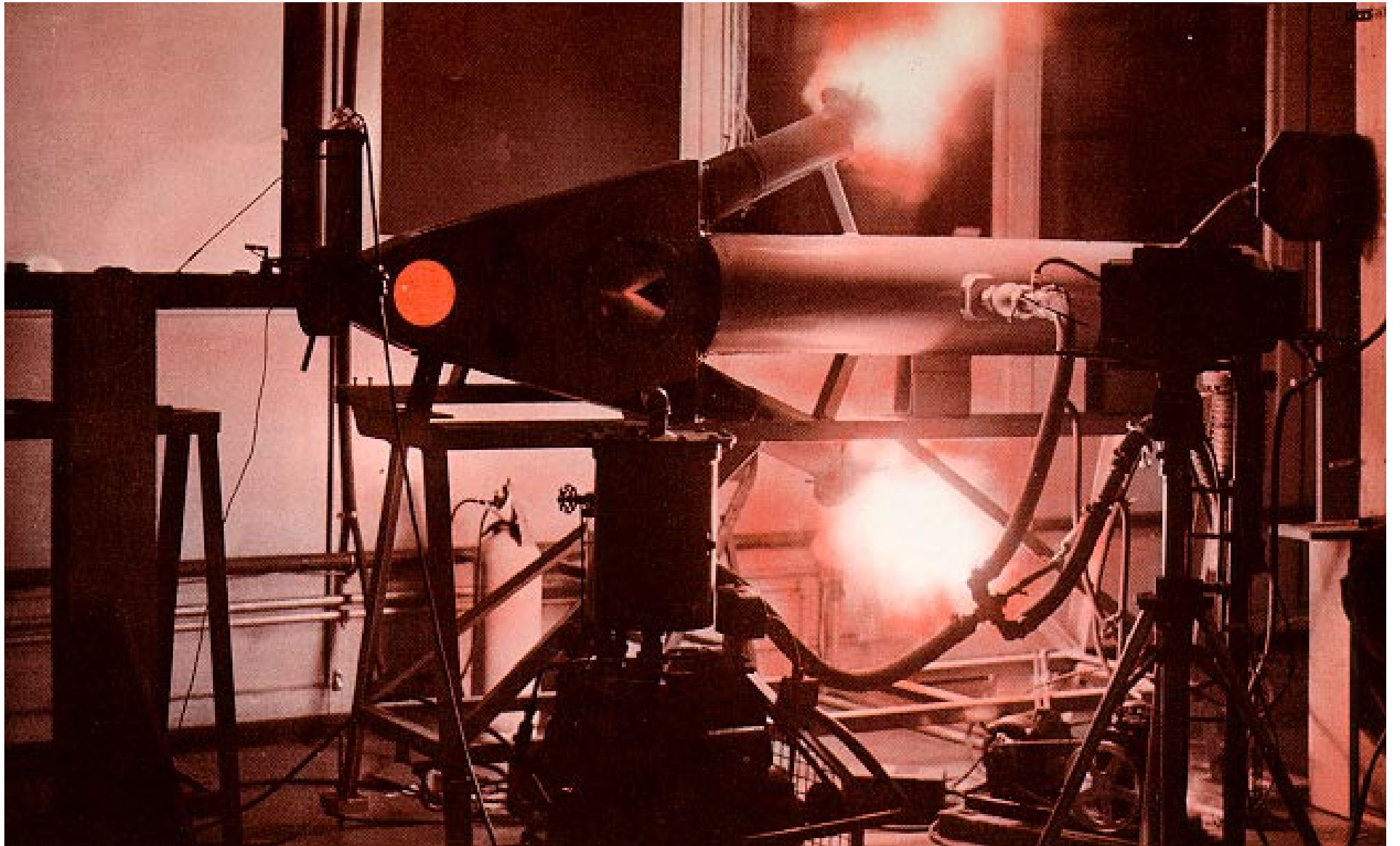
JOHN M. GRACE

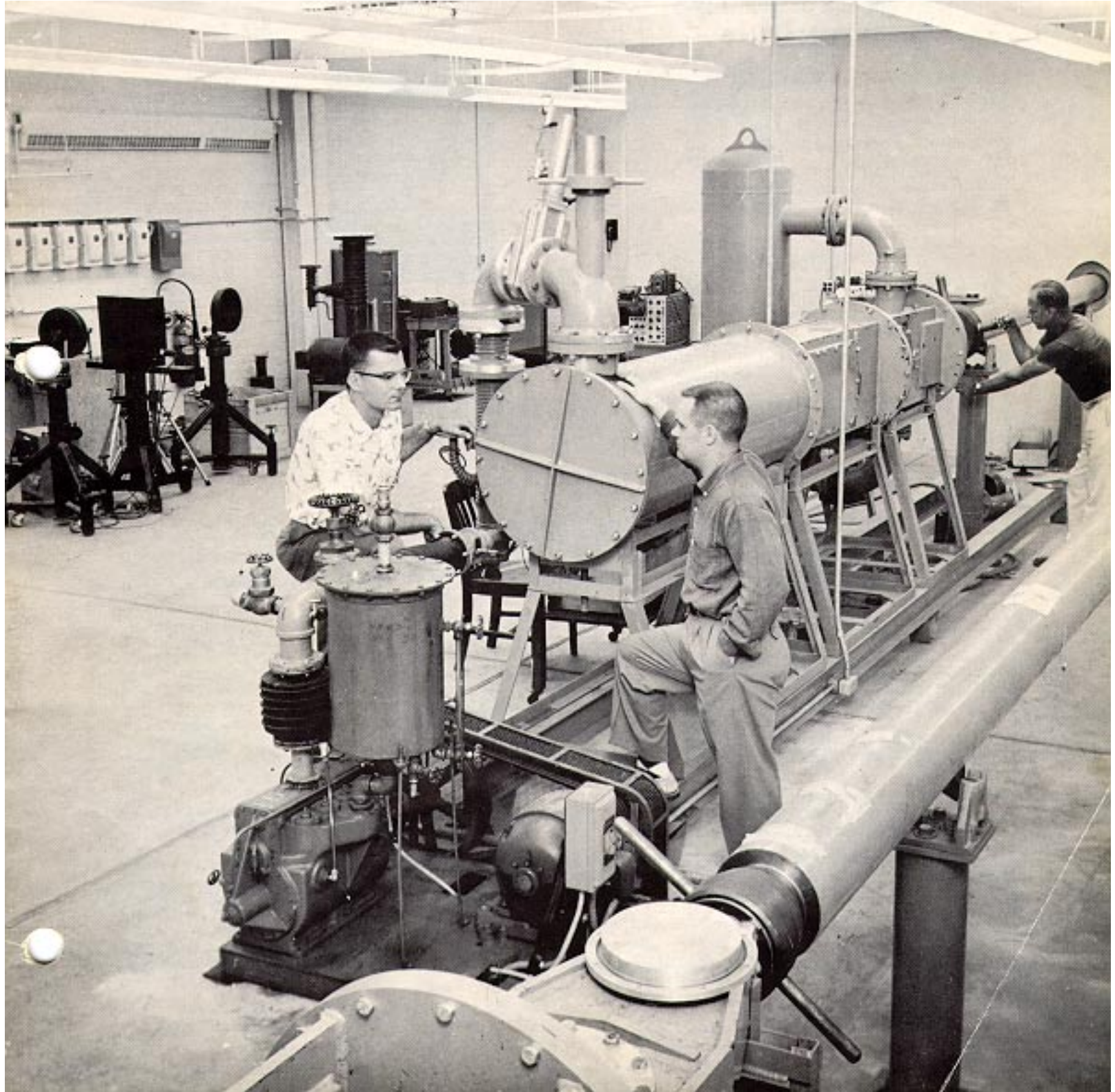
JOHN A. LORDI

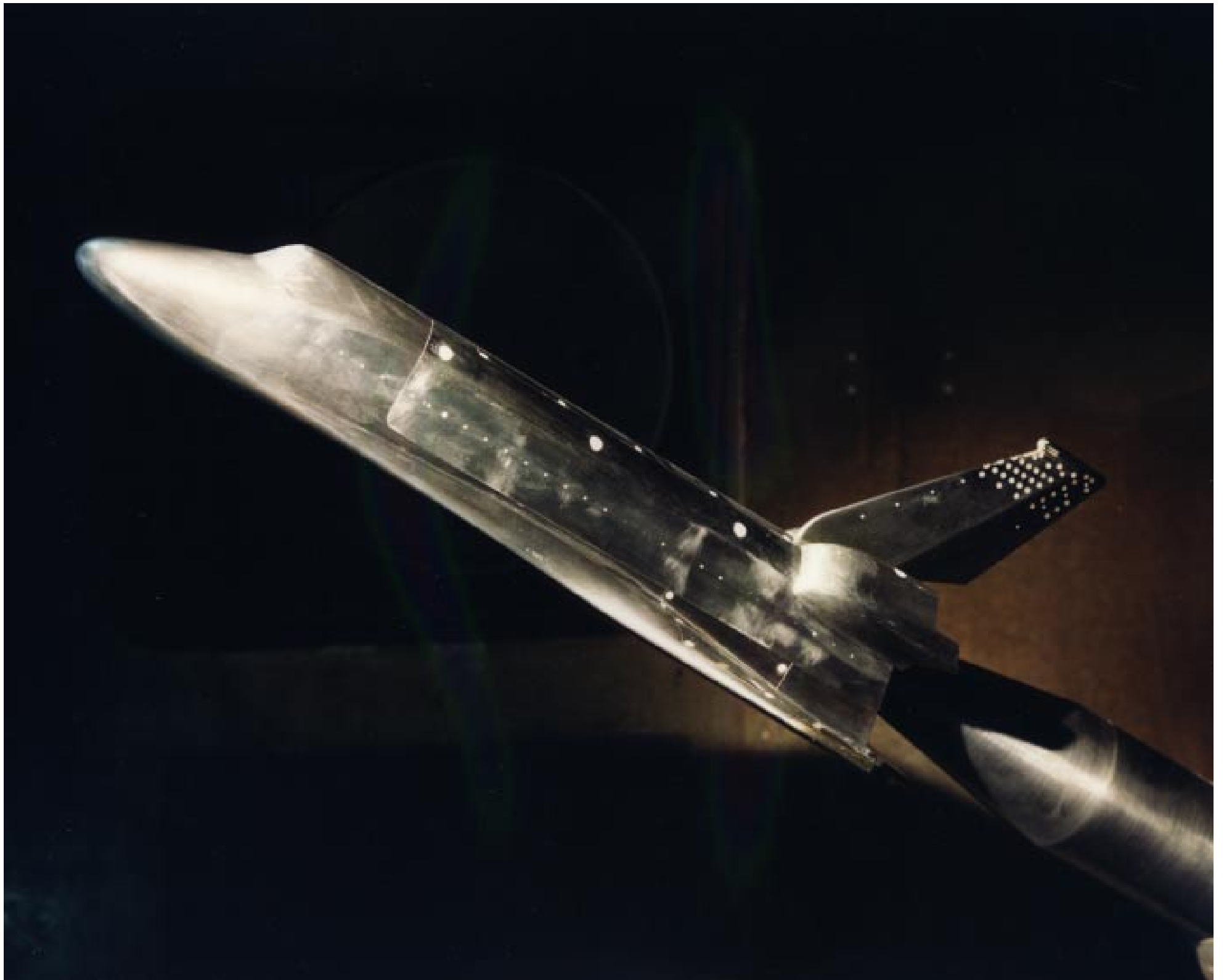
THOMAS M. ALBRECHCINSKI



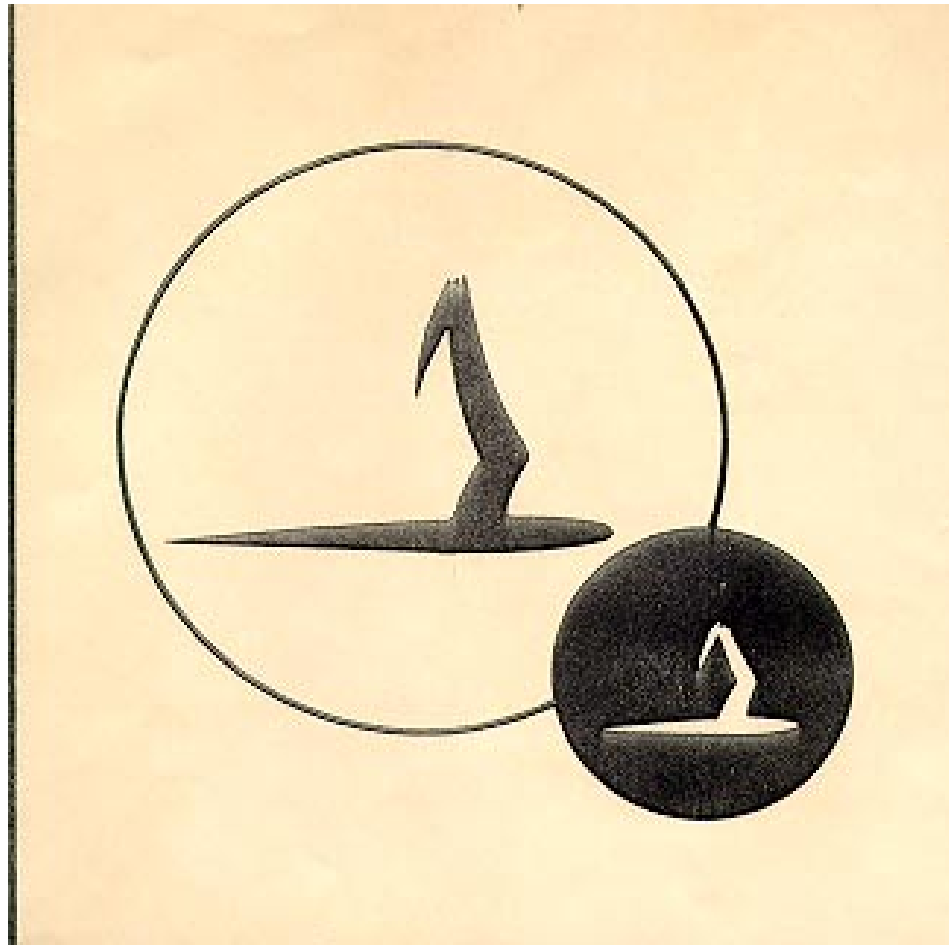
FRANK MOORE, GEORGE BARTLETT, ABE
HERTZBERG











1949 - 1999:

TRANSISTORS

DIGITAL COMPUTERS, INTERNET

DIGITAL EVERYTHING

SATELLITES: COMMUNICATIONS, GPS, . . .

LASERS, OPTO - ELECTRONICS

SUPERSONIC FLIGHT

'SMART' EVERYTHING

2000 - 2049:

SUPER BOWL 60: BILLS FIRST WIN ?

MARS LANDING & RETURN

SETI SUCCESS ?

SOLAR POWER ?

DESALINATION ?

TURBULENCE PROBLEM SOLVED !

HEARTFELT THANKS TO:

CHRISTINA BLOEBAUM F. K. LEE

JOE MOLLENDORF

FRED MINTER JACK HALLORAN
NYSSCHEN

MARTIN de

SCOTT WOODWARD DEBRA HANDLEY

DEAN MILLAR

IKE BAKER DAREN KAISER

PAUL MARRONE

TONY RUSSO KEVIN BURNS

BILL SWENSON

MAX BENNETT BILL GEORGE