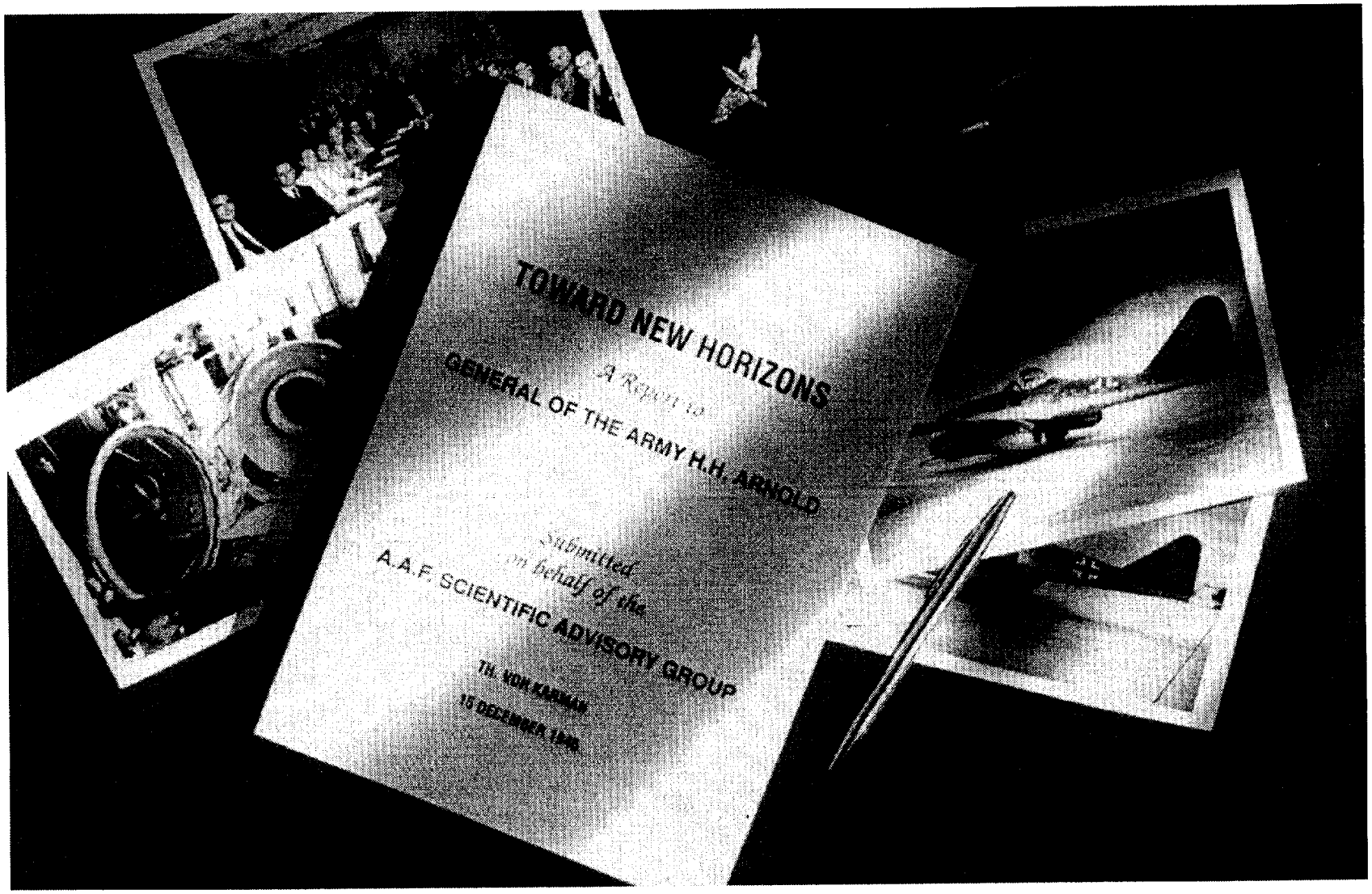
Arnold Engineering Development Center

SPACE-BASED LASER TECHNICAL EXCHANGE MTG

12 MARCH 1998

BOB SMITH
SPACE AND MISSILE TESTING


TOWARD NEW HORIZONS
A Report to
GENERAL OF THE ARMY H.H. ARNOLD
Submitted
on behalf of the
A.A.F. SCIENTIFIC ADVISORY GROUP
TH. VON KARMAN
15 DECEMBER 1945

AEDC: A NATIONAL TREASURE

2,973 People

$334M TOA

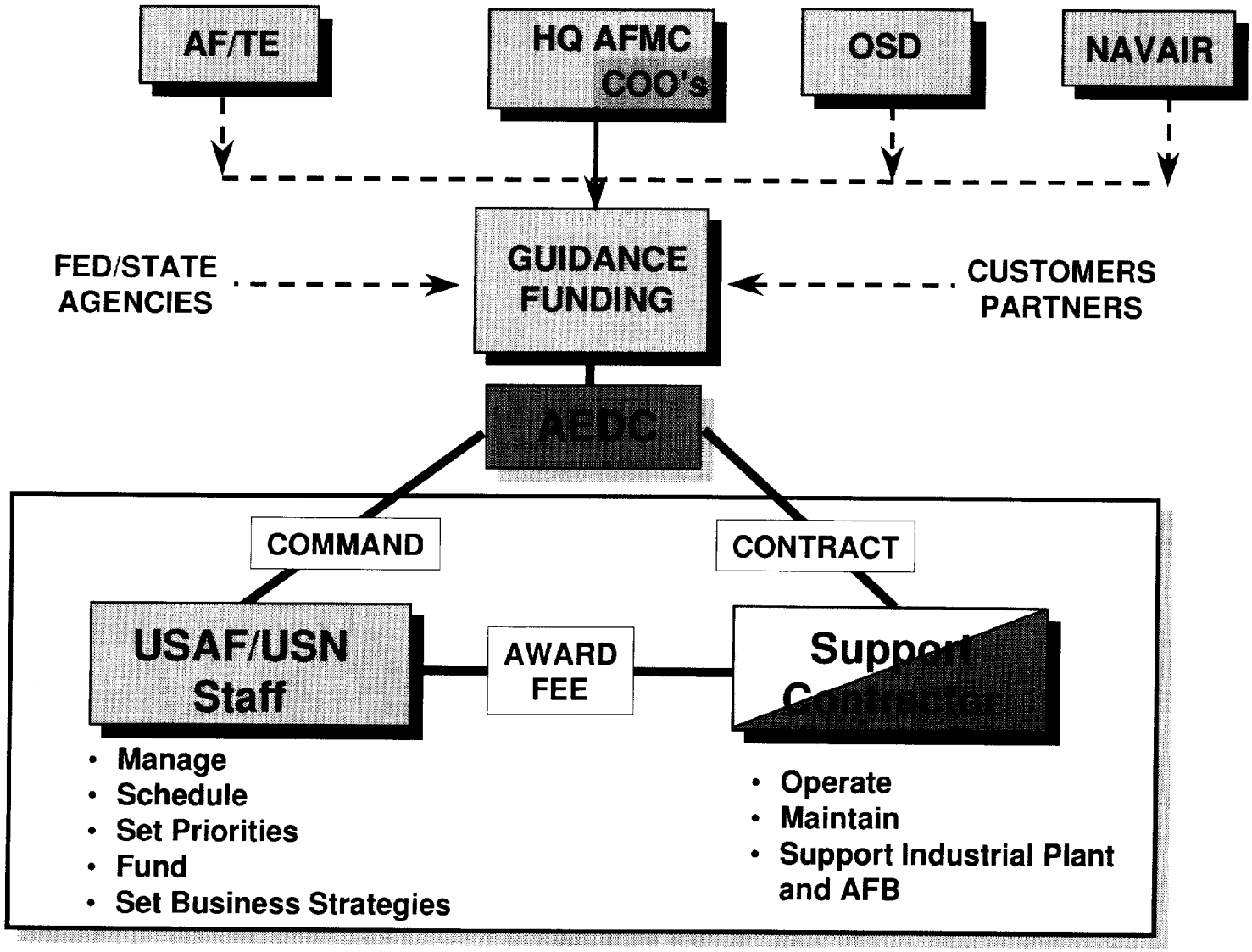
58/29/13
Test Cells

$6 Billion
Investment

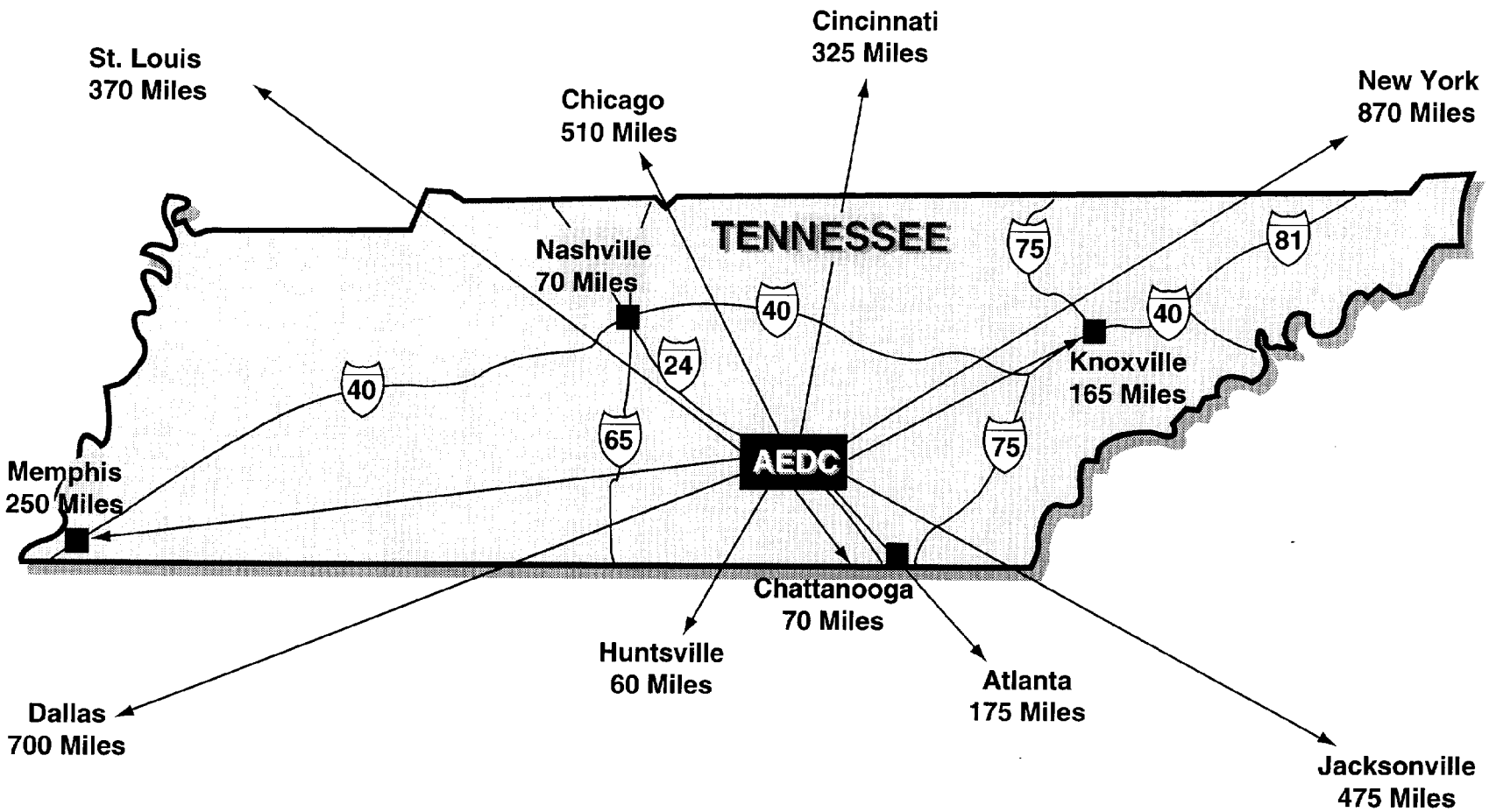
High Performance
Organization

CUSTOMERS
DoD, Industry,
Federal, International

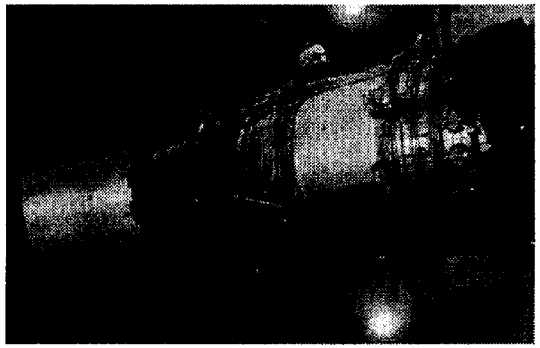
AEDC PARTNERSHIP: DoD OUTSOURCING MODEL



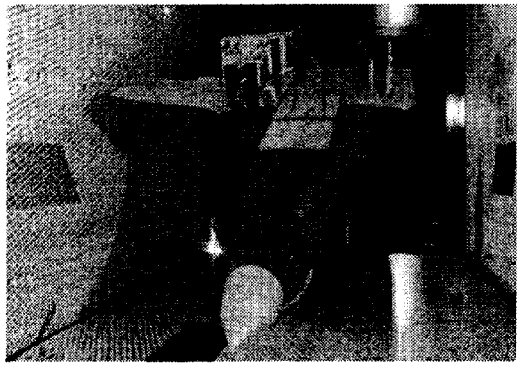
AF-97-296 REV A 2/20/98


St. Louis
370 Miles
Cincinnati
325 Miles
Chicago
510 Miles
New York
870 Miles
TENNESSEE
Nashville
70 Miles
75
81
40
40
24
40
Knoxville
165 Miles
65
75
AEDC
Memphis
250 Miles
Chattanooga
70 Miles
Huntsville
60 Miles
Atlanta
175 Miles
Dallas
700 Miles
Jacksonville
475 Miles

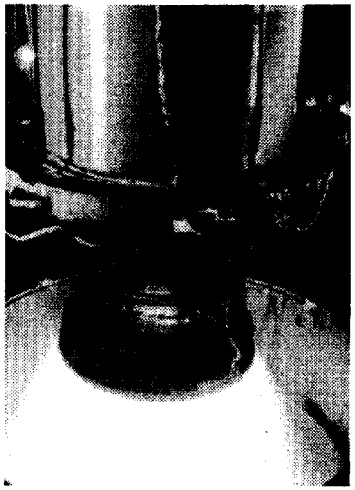
AEDC BUSINESS AREAS



TURBINES

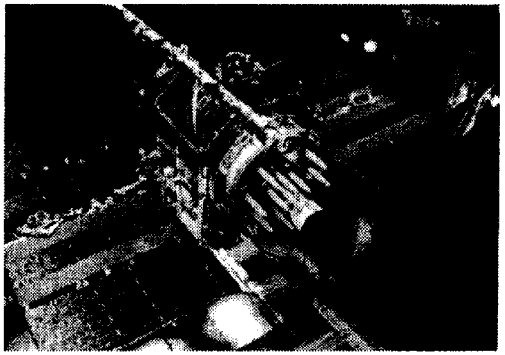


AERODYNAMICS



ROCKETS

HYPERSONICS



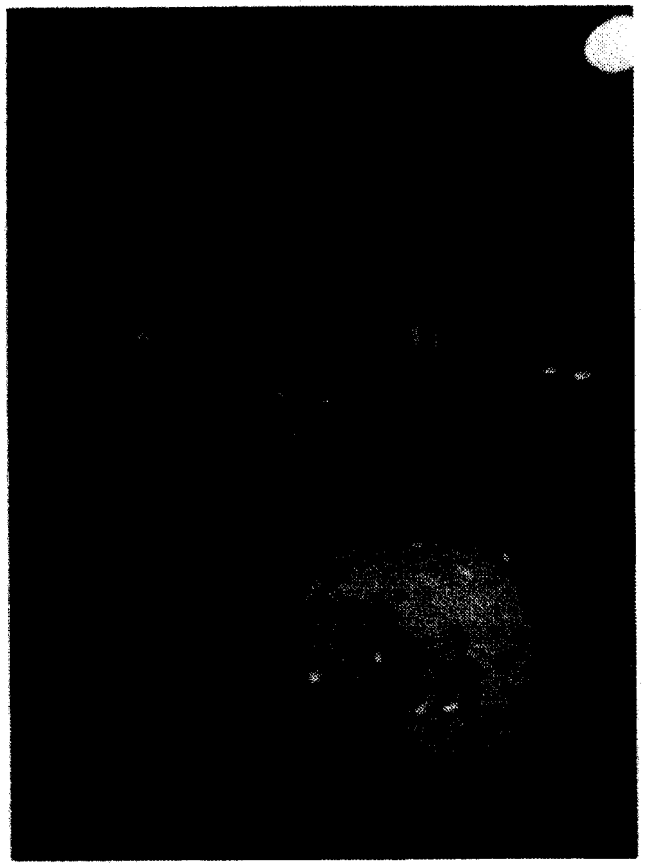
SPACE

AF-94-858

SPACE ENVIRONMENT SIMULATION FACILITIES

Business Area		Chamber Name	Size, ft	Temp	Capabilities/Uses
Radiation Effects		MBS	2x2	Amb	Component Radiation Effects
		DECADE	6x9	77K	Subsystem Radiation Effects
Sensors		10V	10X24	20K	Sensor Calibration & Mission Performance
		7V	7X21	20K	Sensor Calibration & Mission Performance
		FPATC	VAR	20K	FPA Calibration & Mission Performance
		FPCC	5X5	20K	FPA/Detector Calibration/Characterization
		TDWSG	1X1.5	20K	FPA Calibration & Mission Performance
Thermal/Vacuum Environment	Contamination	BRDF	3X5	20K	Scattering Properties of Contaminants
		COP	2X3	77K	Cryogenic Material Optical Properties
		SAM	2X1.5	77K	Solar Absorption Measurements
		SMOG	2X1	Amb	Space Material Outgassing Properties
		VUV	3X2	Amb	VUV Transmittance of Optical Surfaces
	Component Checkout	7A	3X5	20K	Component Checkout
		UHV	2X3	20K	Component Checkout & Blackbody Calibrations
		4X10	4X10	20K	Component Checkout and Plume Diagnostics
		CRYO	1.5X1	20K	QCM Calibrations
	System	Mark I	42X82	77K	Thermal-vac, Dyn Sep, Zero-G, Prop, Sensor Cal
		12V	12X35	10K	Solar Simulation, IR Signature, Thermal-Vac
		10V	10X24	20K	Thermal-vac, Elect. Propulsion, Vibration Isol.

AEROSPACE ENVIRONMENTAL CHAMBER 12V



Chamber Characteristics:

- 35ft x 12ft
- 77K LN_2 Liner
- 10K GHe Liner Option
- 10^{-8} torr
- Solar Simulator
  - Xenon Lamps
  - Collimated Uniform Beam
  - 8ft x 8ft Test Area
  - Variable Irradiance

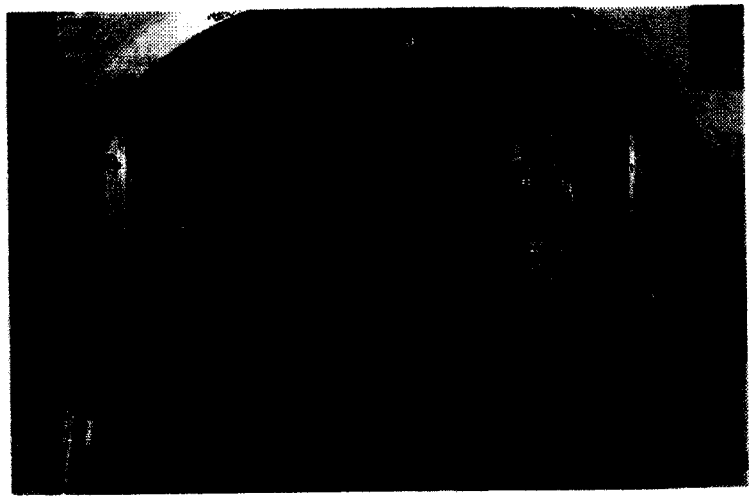
Test Types:

- IR Signatures
- Sensor Calibration
- Solar Balance/Cycling
- Thermal Vacuum

12V SUPPORT OF NASA SPACE STATION TESTING

Hatch Latch Mechanism

Common Berthing Module Mechanism



AEROSPACE ENVIRONMENTAL CHAMBER MARK I

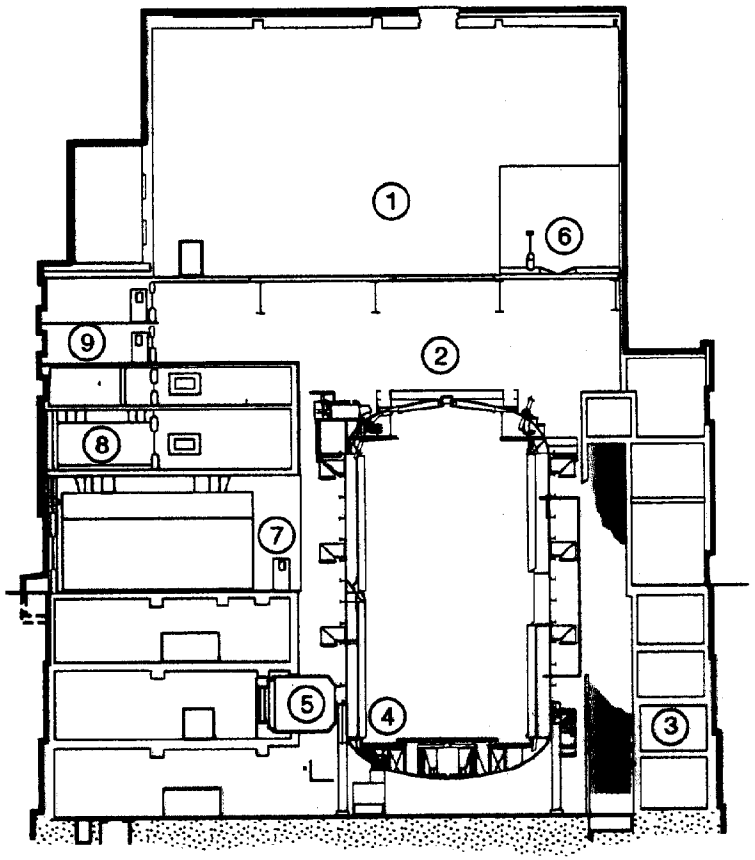
Chamber Characteristics:

- 82 ft x 42 ft
- 77K LN_2 Walls
- 1.4×10^{-7} torr
- 8 ft and 20 ft dia. Chamber Access
- Class 1000 Clean Room

Test Types:

- Thermal Vacuum
- Thermal Balance/Cycling
- Stage/Payload Separation Dynamics
- Zero Gravity (2 sec.)
- Electromagnetic Susceptibility

AEROSPACE ENVIRONMENTAL CHAMBER (MARK I)

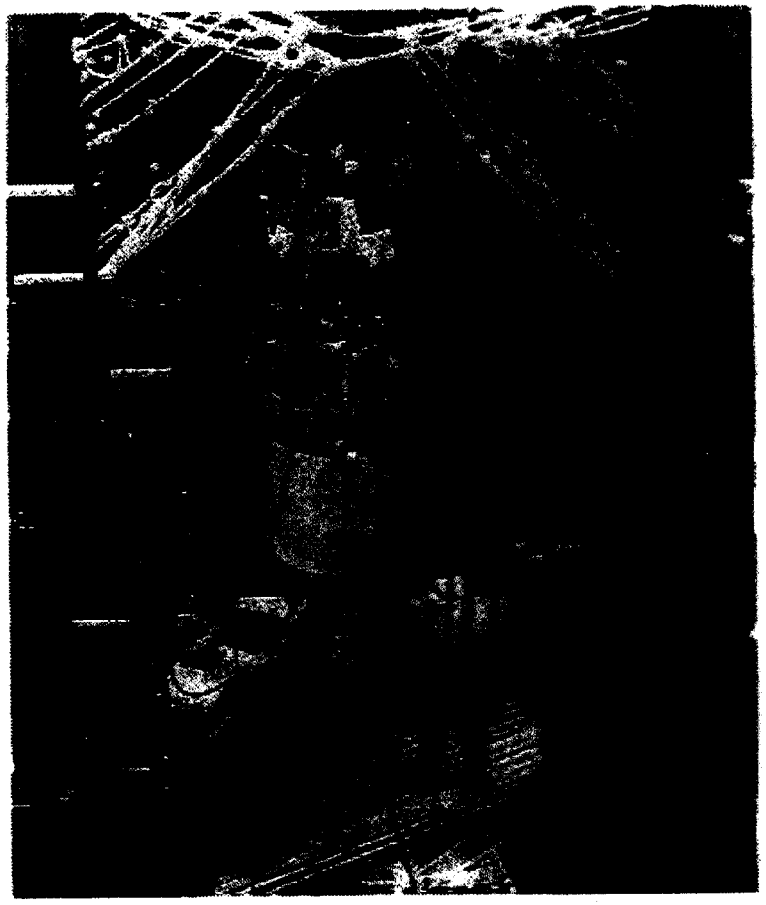


1. Buildup Area
2. Main Chamber
3. Research Labs
4. Cold Wall
5. Access Lock
6. Clean Room
7. Main Building Entrance
8. Control Room
9. Data Acquisition Room

- Vacuum Chamber size: 42 ft diam x 82 ft High (Outside), 36 ft diam x 65 ft High (Inside Cryoliner)
- 8-ft diam and 20-ft diam Chamber Access
- 1.4×10^{-7} torr Vacuum Level
- Wall Temperature; 77 K

AF-95-777 Rev 10/3/97

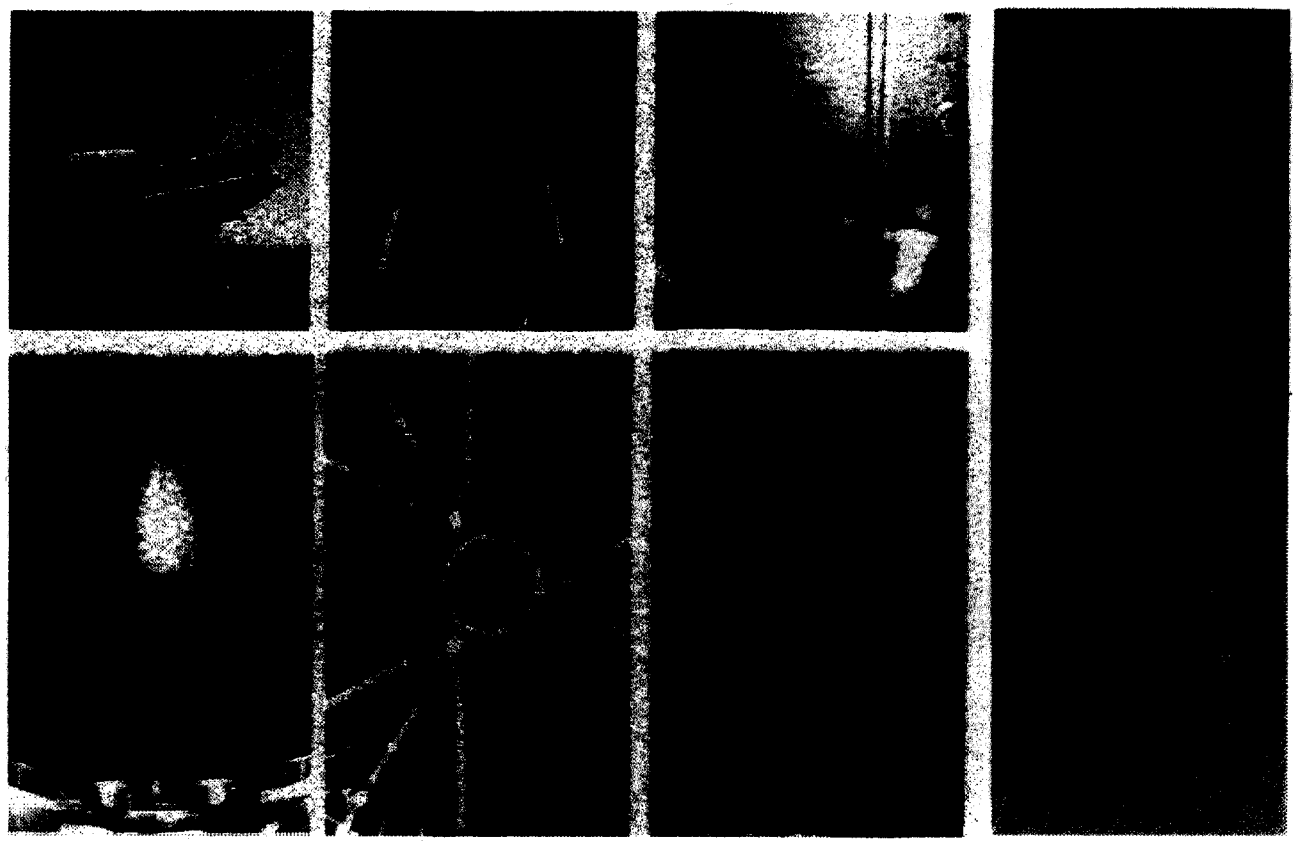
MARK I - SICBM STAGING (II/III) TEST



1/2 SCALE MODEL

MARK I - FAIRING SEPARATION TEST

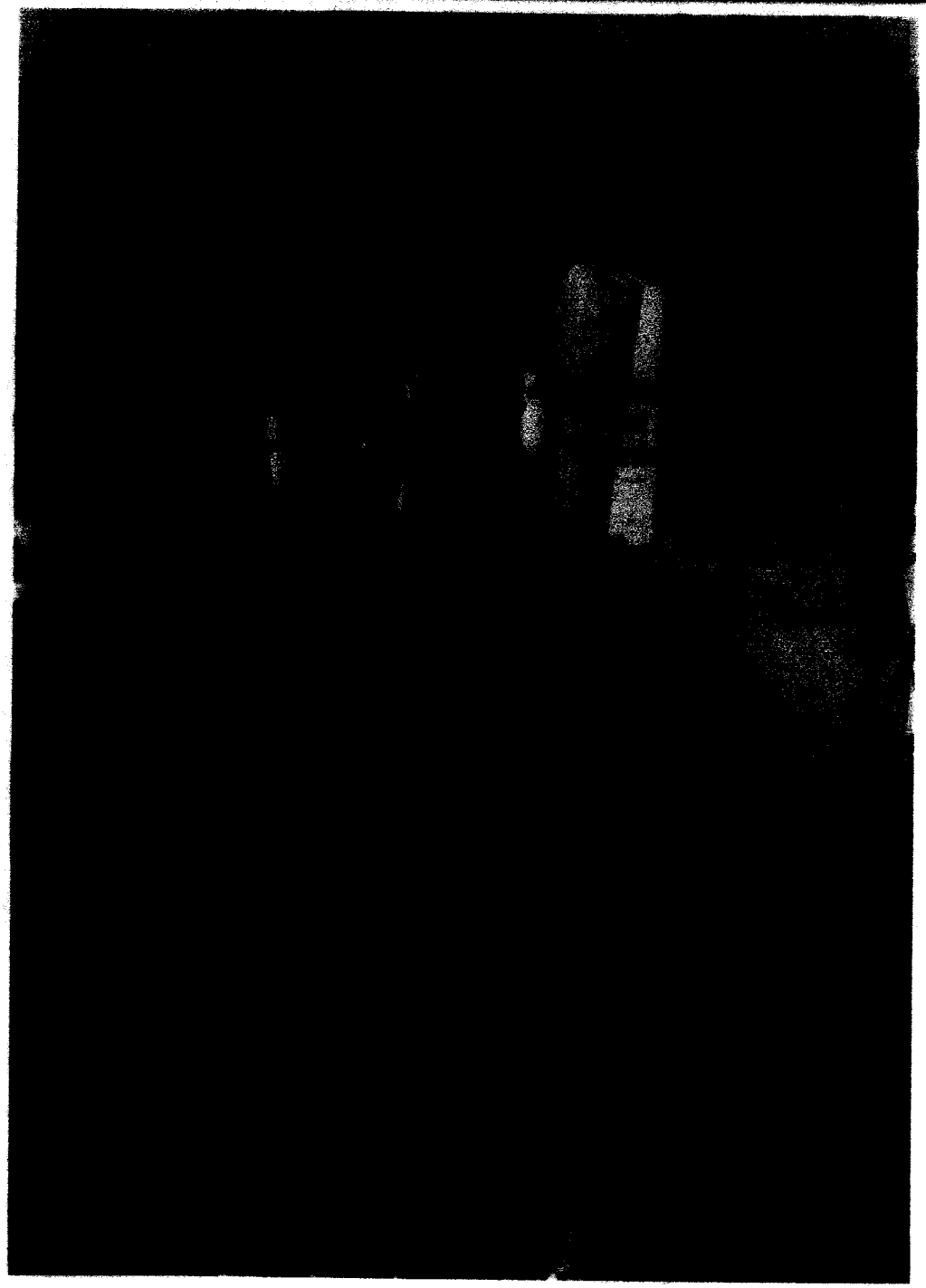
Titan IV Payload Fairing Separation Test



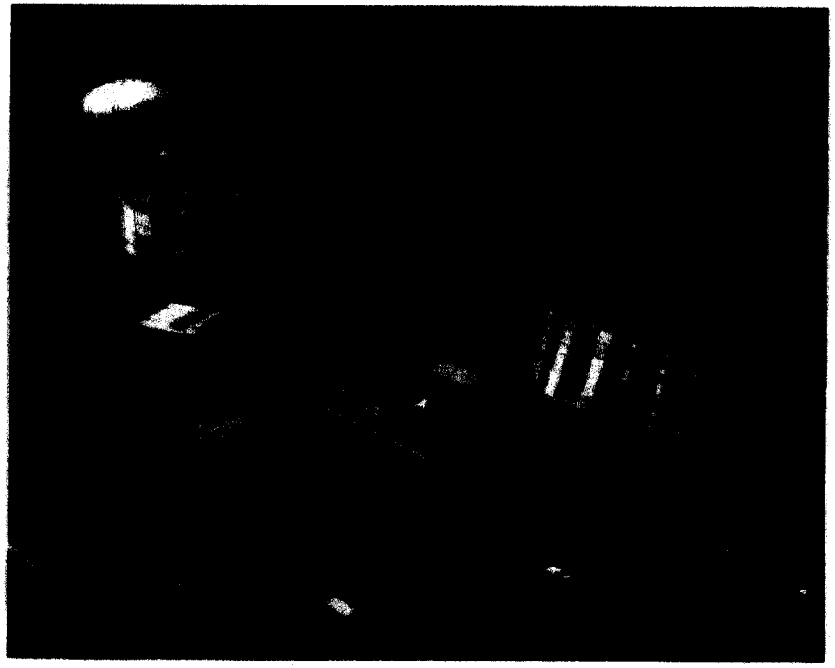
AEDC ROCKET TEST CELLS

	J-3	J-4	J-5	J-6
Primary Use	Liquids	Liquids	Solids	Solids
Max Thrust Rating, LBF	200K	1500K/500K	100K	500K
Test Chamber Size, FT	18D X 40	48D X 82	16D X 50	26D X 62
Altitude Capability, FT				
- Mech. Pumps Only	75K	75K	75K	75K
- Incl. Steam Injector	100K	100K	100K	100K
Altitude Duration, MIN				
- Mech. Pumps Only	Unlimited	Unlimited	Unlimited	Unlimited
- Incl. Steam Ejector	Unlimited	5	7	3
Status	Operational	Operational	Operational	Operational
Last Test	8/97	9/97	2/92	10/97

AEDC TEST CELL J-4
System Upgrades



ROCKET DEVELOPMENT TEST CELL J-6



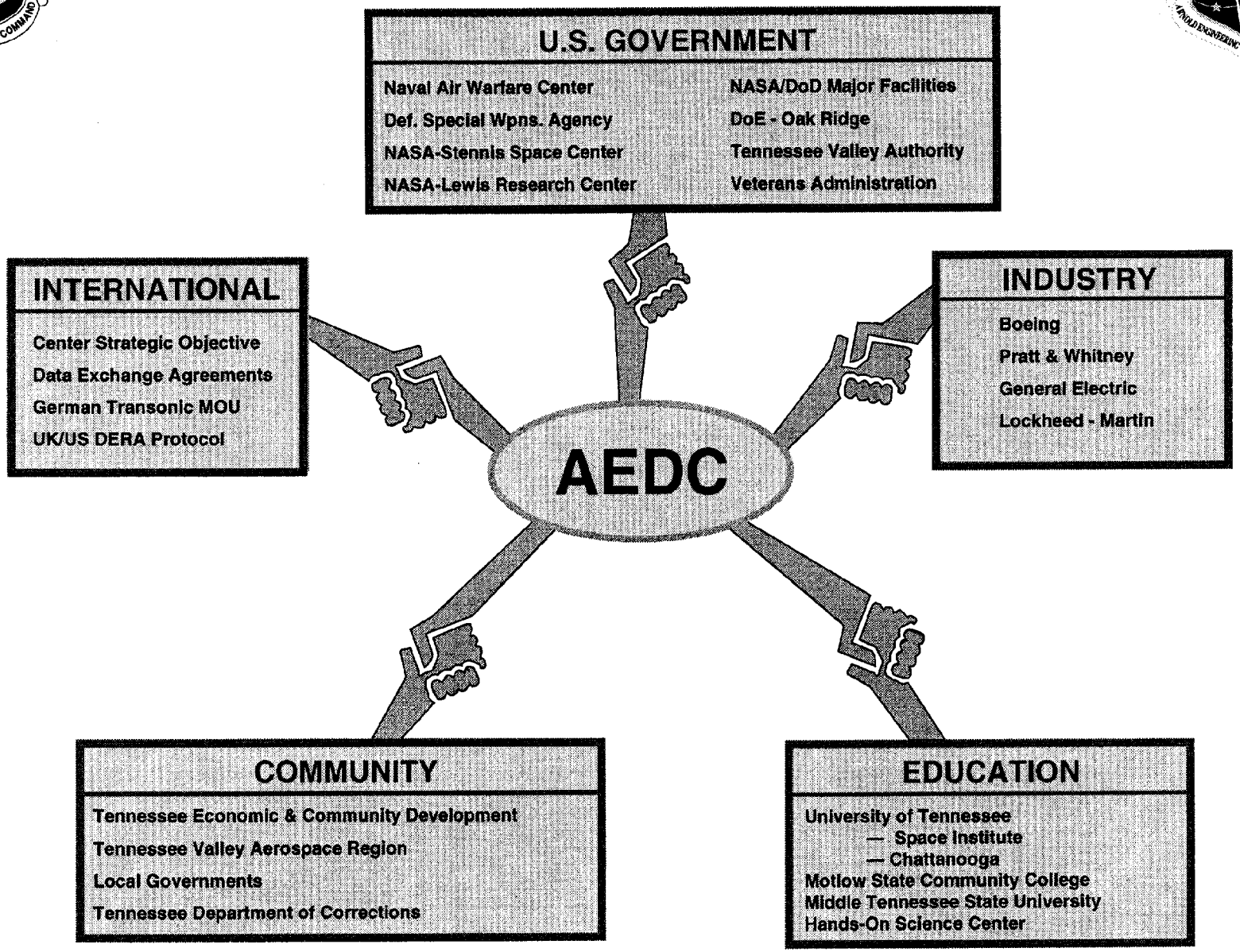
CHARACTERISTICS:

- HORIZONTAL ORIENTATION (26 FT DIAM. X 62 FT LONG)
- 500,000 LBF THRUST
- 100,000 FT ALTITUDE
- 200,000 LBF SIDE FORCE
- 15 TO 110 DEG F TEMP COND
- DEADWEIGHT THRUST CALIBRATOR

UNIQUE CAPABILITIES:

- LARGE DEHUMIDIFICATION CHAMBER (245 FT DIAM. X 100 FT HIGH)
- THREE INTERCHANGEABLE DIFFUSERS
- TWO INTERCHANGEABLE THRUST CRADLES
- LONG DURATION ALTITUDE (SEDC)
- HIGH A/A* NOZZLES
- ALTITUDE PERFORMANCE / STRUCTURAL INTEGRITY
- FAILURE ANALYSIS CAPABILITIES (PROPELLANT EXTINGUISHED)
- POST TEST HEAT SOAK

ALLIANCES AND PARTNERSHIPS



AF-96-271 Rev 10/9/97

Points of Contact

BOB SMITH
(931)454-6519
(DSN)340-6519
SMITHRW@HAP.ARNOLD.AF.MIL

BRENT BATES
(931)454-4943

AEDC WEBSITE:
WWW.INFO.ARNOLD.AF.MIL