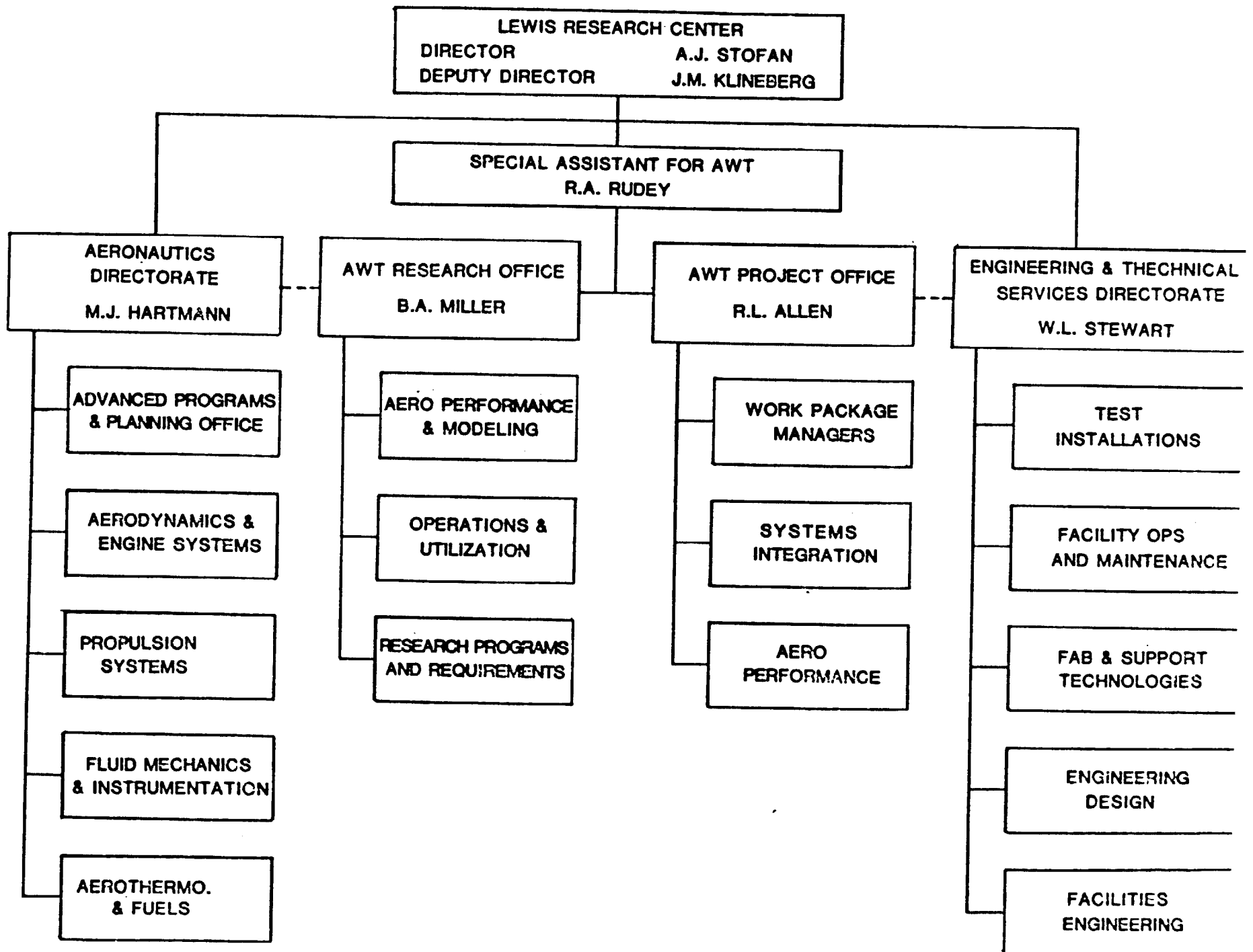
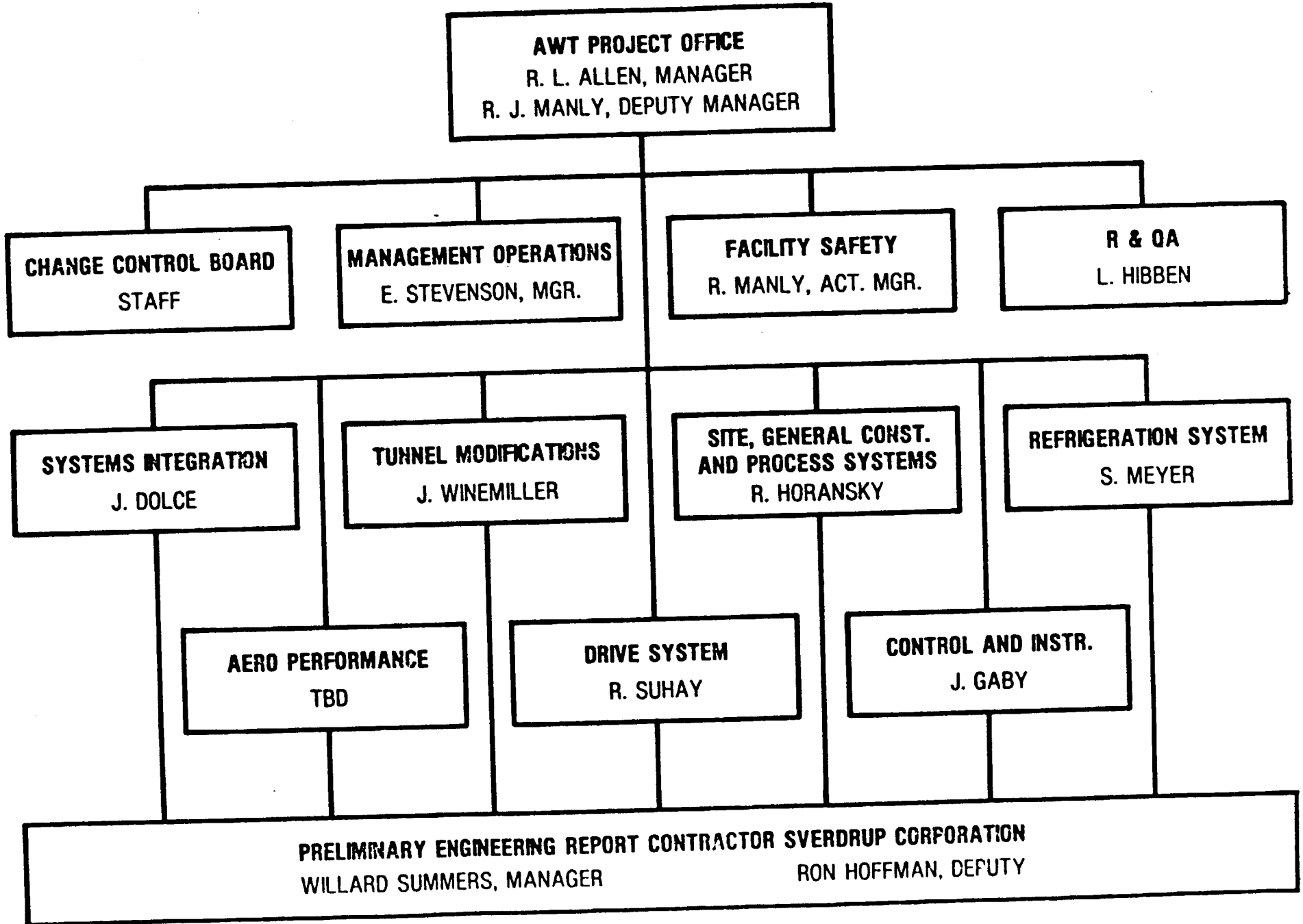


AWT PROJECT STATUS

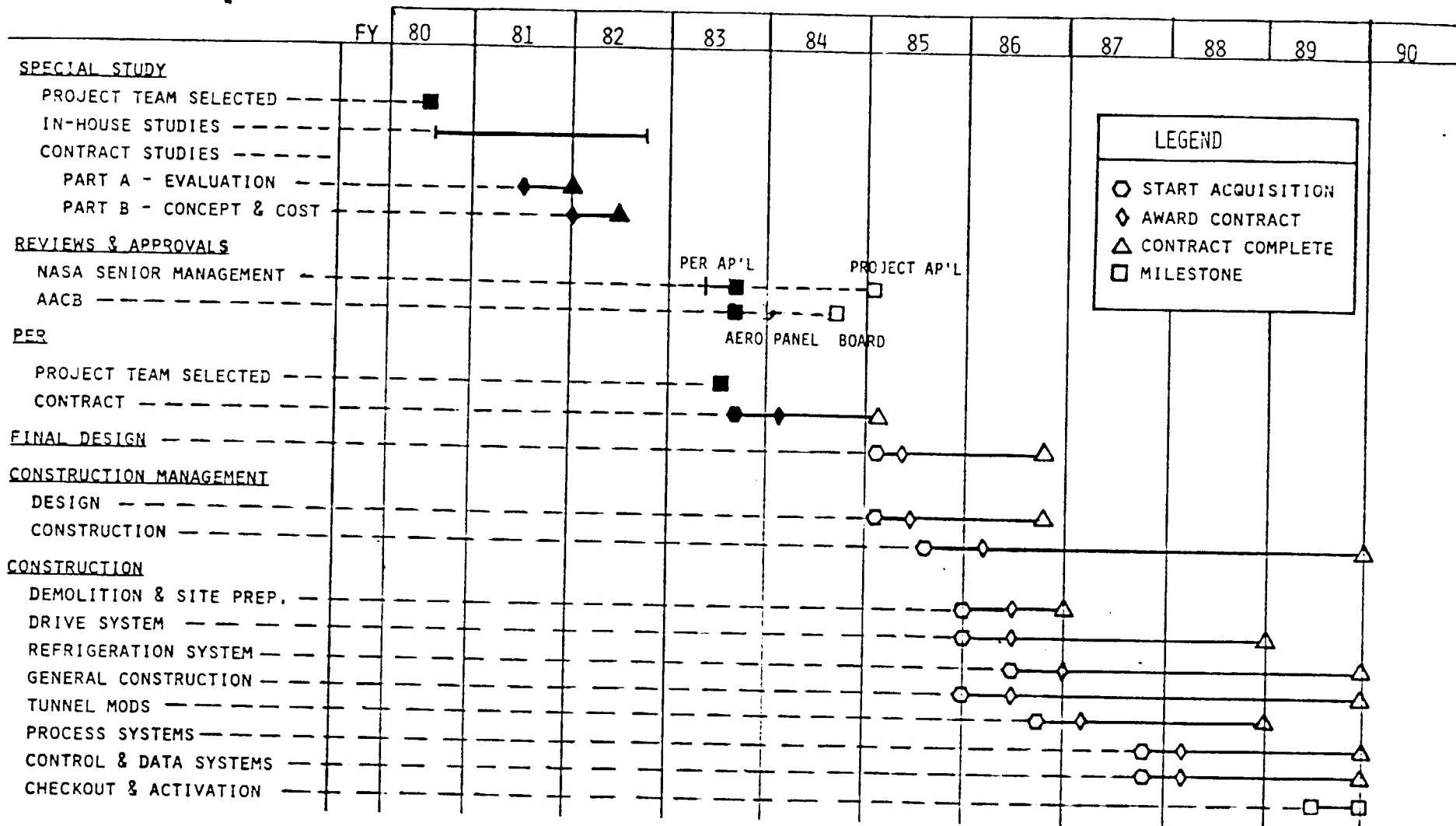
ROBERT L. ALLEN
MANAGER, AWT PROJECT OFFICE
NASA LEWIS RESEARCH CENTER

11/17/92
N92-70484
21-01
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AWT PROJECT MASTER SCHEDULE FY'86 BUDGET YEAR



ALTITUDE WIND TUNNEL PROJECT
STUDY PHASE LEVEL OF EFFORT

- o A/E CONTRACTOR \$200K
- o SUPPORT SERVICE CONTRACTOR \$115K
- o IN-HOUSE MANHOURS 27K

FINDINGS OF EVALUATION STUDY

o STRUCTURAL

- FOUNDATIONS ARE IN EXCELLENT SHAPE

- TUNNEL PRESSURE SHELL

o NO VISIBLE CRACKS OR FLAWS

o RADIOGRAPHS SHOW WELDS DO NOT COMPLY WITH CURRENT CODES

o FATIGUE/FRACTURE ANALYSIS VERIFIES SHELL INTEGRITY

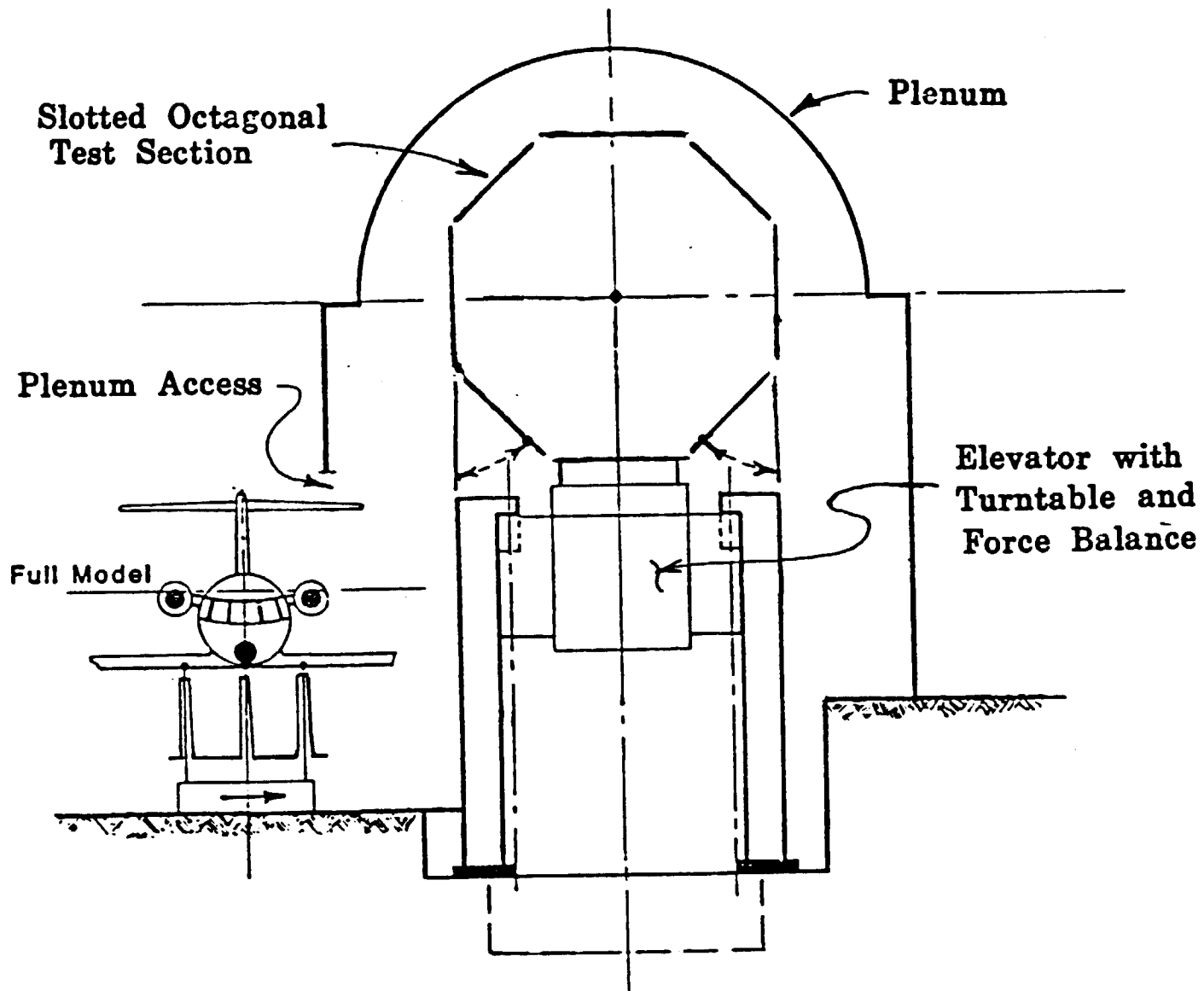
- TUNNEL INSULATION IS IN VERY GOOD CONDITION

o REFRIGERATION SYSTEM HAS 9 OF 14 COMPRESSORS OPERATIONAL

o PROCESS SYSTEMS (COMPRESSED AIR, EXHAUST, AND STEAM) ARE CURRENTLY IN USE

USE OF THE EXISTING AWT SYSTEMS AS THE NUCLEUS FOR A NEW RESEARCH FACILITY IS
TECHNICALLY AND ECONOMICALLY SOUND

AWT TEST SECTION BASELINE ALTERNATIVE



BOTTOM ACCESS ONLY

ALTITUDE WIND TUNNEL PROJECT
CONSTRUCTION COST ESTIMATE (FY 1986)

<u>WORK PACKAGE</u>	<u>BUDGET COST \$M</u>
o DRIVE SYSTEM	34.3/48.3
o REFRIGERATION EQUIPMENT AND BUILDING	30.0/34.0
o SITE WORK, GENERAL CONSTRUCTION, TUNNEL MODS.	21.7/25.7
o PROCESS SYSTEMS, IE.	~ 15.5
- COOLING TOWER	
- AIR, EXHAUST, STEAM AND CO ₂	
o FACILITY CONTROL AND RESEARCH DATA	~ 8.5
o RELOCATION OF VISITOR INFORMATION CENTER	TBD
FACILITY TOTAL	110/130

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LIST OF ATTENDEES FOR THE
PROJECT BRIEFING AND SITE SHOWING
JUNE 8, 1983 1:30 P.M.

OSBORNE ENGINEERING COMPANY
CLEVELAND, OHIO

R. E. WARNER & ASSOCIATE
LORAIN, OHIO

SVERDRUP & PARCEL & ASSOC. INC.
ST. LOUIS, MISSOURI

DSMA
ORLANDO, FLA.

FLUIDYNE
MINNEAPOLIS, MINNESOTA

BURNS & McDONNELL
KANSAS CITY, MISSOURI

NORMAN ENGINEERING
LOS ANGELES, CALIFORNIA

GENERAL ELECTRIC
CLEVELAND, OHIO

GEORGE S. RIDER CO.
ROCKY RIVER, OHIO

BURNS AND ROE
PARAMUS, NEW JERSEY

MRI METER RES. INC.
ALTADENA, CALIFORNIA

MIDDOUGH ASSOCIATES
CLEVELAND, OHIO

H. K. FERGUSON COMPANY
CLEVELAND, OHIO

A. M. KINNEY INC.
CINCINNATI, OHIO

HWH ASSOCIATES
CLEVELAND, OHIO

BOEING ENG. & CONST.
SEATTLE, WASHINGTON

SWINDELL RUST
PITTSBURG, PENNSYLVANIA

RALPH M. PARSONS
PASADENA, CALIFORNIA

**ALTITUDE WIND TUNNEL PROJECT
A/E SELECTION CONSIDERATIONS**

- o RECENT LARGE AEROFACILITY EXPERIENCE**
- o SYSTEMS INTEGRATION CAPABILITY**
- o SKILL DEPTH TO SUPPORT CONTRACTED PERIOD OF PERFORMANCE**
- o SKILL MIX FOR CRITICAL DESIGN AREAS**
 - A. AERODYNAMICS**
 - B. LARGE DRIVE SYSTEMS**
 - C. SLOTTED AND ADAPTIVE WALL TEST SECTIONS**
 - D. ICING**
- o ALL REQUIRED SKILLS CONTAINED WITHIN A SINGLE CONTRACTOR**

SOLICITATION RESPONSE

SANDERS & THOMAS

POTTSTOWN, PENNSYLVANIA

SVERDRUP CORPORATION

ST. LOUIS, MISSOURI

BE&C ENGINEERS, INC.

TUKWILA, WASHINGTON

METEOROLOGY RESEARCH, INC.

ALTADENA, CALIFORNIA

DSMA ENGINEERING CORP./DMJM

ORLANDO, FLORIDA

LOS ANGELES, CALIFORNIA

FLUIDYNE/PARSONS

MINNEAPOLIS, MINNESOTA

PASADENA, CALIFORNIA

NORMAN ENGINEERING CO.

LOS ANGELES, CALIFORNIA

O'DONNELL AND ASSOCIATES

PITTSBURGH, PENNSYLVANIA

AMT PER
JULY 29, 1983

THE ALTITUDE WIND TUNNEL INTERCENTER TECHNICAL OVERSIGHT COMMITTEE

<u>Center</u>	<u>Name</u>	<u>Position</u>
AEDC	Forrest B. Smith	Director for Engineering Development
ARC	Dale Compton, Chairman	Director of Engineering and Computer Systems
ARC	Frank Steinle	Assistant Chief, Experi. Investigation Branch
KSC	James Phillips	Chief, Mechanical Engineering Division
LaRC	Hugh Clark	Assistant Director, Office for Systems Engineering and Operations
LaRC	Wayne McKinney	Assistant Chief, Transonic Aerodynamics Division
LeRC	Bob Allen, Exec. Secy.	AWT Project Manager
HQs	D/Haggai Cohen	Deputy Chief Engineer for Safety, Reliability & Quality Assurance
	NX/Dick Irwin	Deputy Director, Facilities Management
	RF/Art Henderson	OAST Facilities Manager

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ALTITUDE WIND TUNNEL PROJECT
A/E MANHOUR SUMMARY

0 ESTIMATED
0 PROPOSED

WORK PACKAGE	MANHOURS				
	PHASE 1		PHASE	PHASE	TOTAL
	PART 1	PART 2	11	111	MH
1. DRIVE SYSTEM (A)	801	990	3250	169	5210
	<u>3030</u>	2560	3470	690	9750
2. REFRIGERATION (B)	<u>1668</u>	<u>1906</u>	<u>2380</u>	<u>256</u>	6210
	3920	3660	3280	240	11100
3. SITE WORK	<u>375</u>	<u>364</u>	<u>357</u>	84	1180
	850	880	970	120	2670
4. GENERAL CONSTR.	<u>662</u>	<u>1456</u>	<u>2128</u>	54	4300
	<u>1730</u>	<u>1730</u>	<u>1370</u>	160	4990
5. TUNNEL MOD'S	<u>3258</u>	<u>2615</u>	<u>6608</u>	<u>799</u>	12280
	3920	1050	2090	410	7470
6. PROCESS SYSTEMS	<u>1124</u>	<u>828</u>	<u>2492</u>	246	4690
	<u>2540</u>	<u>2380</u>	<u>2430</u>	260	7630
7. CONTROL & DATA (c) (d) TUNNEL VERIF.	<u>782</u>	<u>1446</u>	<u>3350</u>	72	5650
	280	280	7990	680	9230
AERODYNAMICS	<u>1598</u>	<u>1658</u>	<u>430</u>	<u>34</u>	3720
	<u>2080</u>	<u>1860</u>	<u>920</u>	80	4140
PHA	<u>1318</u>	<u>946</u>	<u>684</u>	<u>202</u>	3150
	<u>2210</u>	<u>1840</u>	4050
PROJECT MGT.	<u>130</u>	<u>130</u>	<u>260</u>	--	520
	1060	40	1100
CLERICAL	<u>1008</u>	<u>718</u>	<u>2016</u>	<u>330</u>	4072
	<u>1040</u>	<u>1040</u>	<u>1390</u>	690	4160
\$EST, SCH, PLAN	<u>320</u>	<u>320</u>	<u>600</u>	<u>100</u>	1340
	<u>1040</u>	<u>1040</u>	<u>1390</u>	690	4160
TOTALS	<u>680</u>	<u>690</u>	<u>1610</u>	<u>185</u>	3165
	Dist.	Dist.	Dist.	Dist.	Dist.
	12,724	14,067	26,165	2,531	55,487
	22,640	17,490	26,240	4,080	70,450

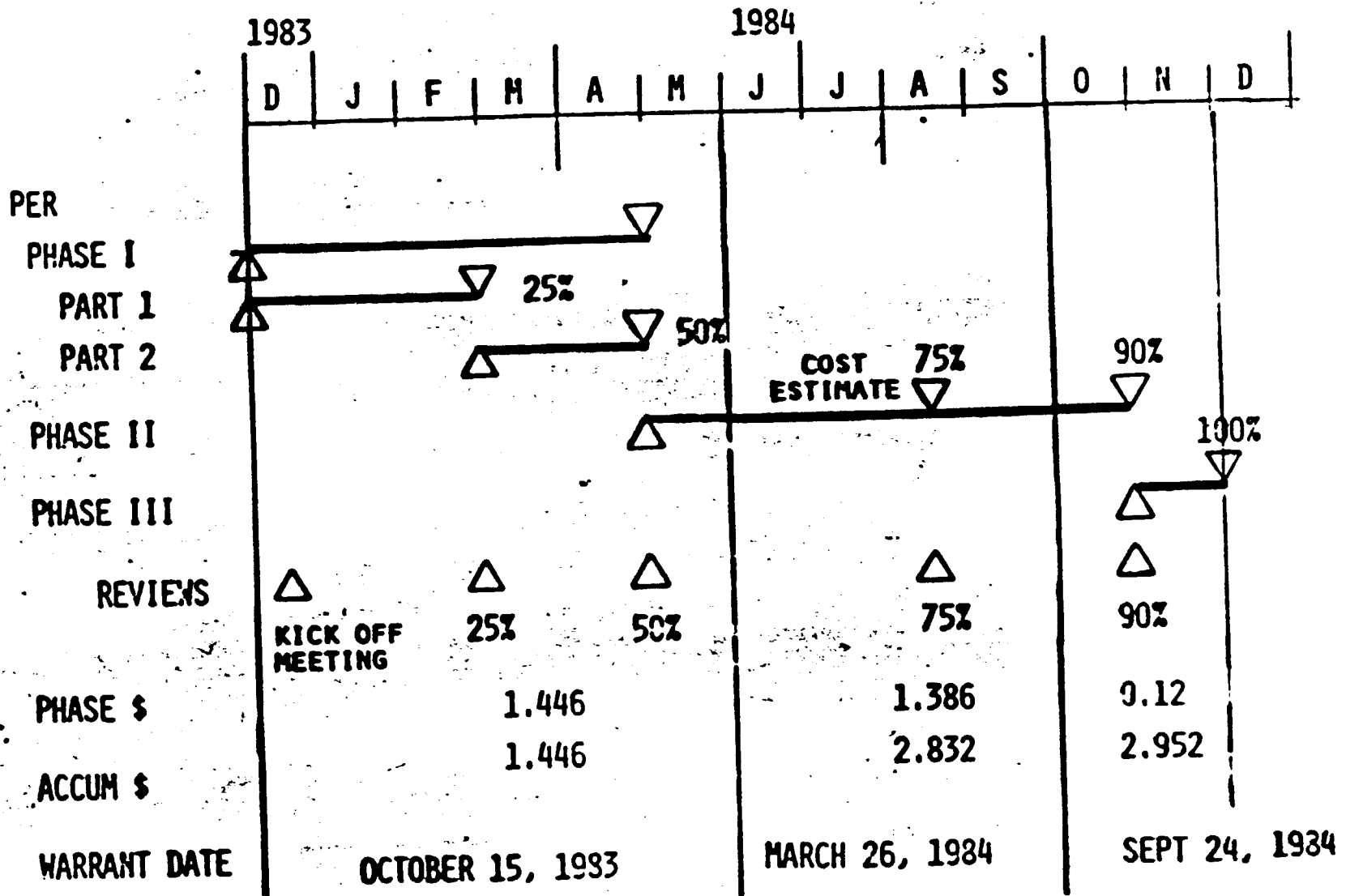
SUBCONTRACTORS (A) G.E. \$50K (C) PACKMAN \$7510
(B) DDN - MH'S INCL. (D) HERRON \$36K

ALTITUDE WIND TUNNEL PROJECT
PER CONTRACT PHASING

	TASK DEFINITION	% EFFORT	% TOTAL EFFORT
PHASE I			
PART I	EVALUATE BASELINE CONFIGURATION PROPOSE ALTERNATIVES IN SELECTED AREAS (COST-PERFORMANCE IMPROVE- MENT LIKELIHOOD IS HIGH)	25	25
PART 2	EVALUATE ALTERNATIVES AND SELECT AN UPGRADED BASELINE CONFIGURATION	25	50
PHASE II	DEVELOP BASELINE CONFIGURATION IN ADEQUATE DETAIL TO PRODUCE A 90 PERCENT CONFIDENCE LEVEL IN THE CONSTRUCTION COST ESTIMATE	40	75 ▼ COST ESTIMATE
PHASE III	DOCUMENTATION AND PUBLICATION OF THE PER (TECHNICAL RESULTS AND COST ESTIMATE)	10	90
			100

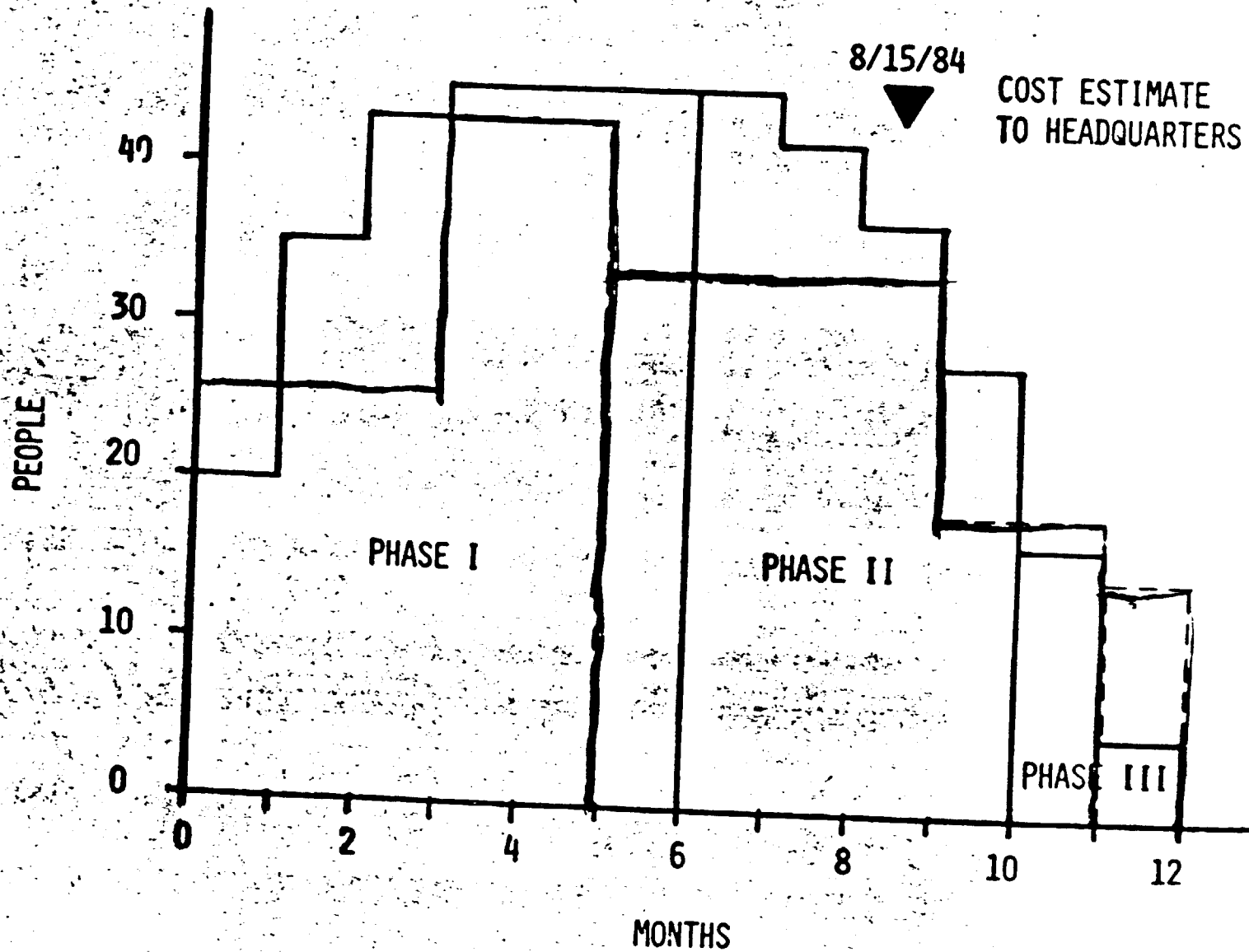
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ALTITUDE WIND TUNNEL PROJECT FINANCIAL PLAN



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MANHOUR PROFILE



AWT PROJECT
CURRENT COST ESTIMATE (FY 1986 START)

<u>WORK PACKAGE</u>	<u>BUDGET COST \$M</u>	<u>FACTOR</u>
o DRIVE SYSTEM	27	75%
o REFRIGERATION SYSTEM	29	50%
o SITE WORK, GENERAL CONSTRUCTION, TUNNEL MODS.	45	50%
o PROCESS SYSTEMS	14	50%
o CONTROL & DATA SYSTEM	9	50%
o RELOCATE VISITOR INFORMATION CENTER	TBD	
FACILITY TOTAL	\$124	54%

• CONFIDENCE FACTOR (Z) = $\frac{100 (\text{LEAST ESTIMATED COST})}{\text{AVERAGE ESTIMATED COST}}$

BUDGET COST = ENG'G COST + ESCALATION + SITE ADJUSTMENT + CONSTRUCTION CONTINGENCIES

ESCALATION @ ~5% PER YEAR TO CONSTRUCTION MID POINT

AWT PROJECT
PER CONTRACT 25 PERCENT SUMMARY

- o PRELIMINARY AERODYNAMIC DEFINITION
 - MAIN CONTRACTION
 - HIGH SPEED DIFFUSER AND FINGER FLAPS
 - EXHAUST SCOOP
 - FAN
- o AERODYNAMIC CIRCUIT LOSS ANALYSIS
- o PLENUM EXHAUST SYSTEM EVALUATION
- o BASELINE/OPTION EVALUATIONS
 - DRIVE SYSTEM
 - REFRIGERATION
 - 20' AND 45' TEST SECTIONS
 - COMPUTER CONTROL SYSTEMS
 - ICING AND DEICING SYSTEMS
- o FINITE ELEMENT MODELS OF TUNNEL STRUCTURE
- o BASELINE CONSTRUCTION SCHEDULE
- o BASELINE COST ESTIMATE

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
- OTHER PKG'S

