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F-1

ARMY AIR FORCES
AIR TECHNICAL SERVICE COMMAND

MEMORANDUM REPORT ON

SUBJECT: Menasco XJ37 Turbo-Jet Engine Development

TSEPP-S/EAW/hds
Date 25 September 1947

OFFICE TSEPP

Contract or Order No. W-33-038-AC-15310

SERIAL No. TSEPP-506-228

Expenditure Order No. 506-18

A. PURPOSE:

1. To outline the position of the Government with respect to the XJ37 turbo-jet engine development.

B. FACTUAL DATA:

1. Memorandum Report TSEPP-506-220 dated 10 September 1947 reports on a conference with Menasco personnel wherein the financial position of the Menasco Manufacturing Company and its ability to continue the XJ37 was discussed.

2. Memorandum Report TSEPP-506-226 dated 24 September 1947 reports on a conference with representatives of Lockheed Aircraft Corporation wherein the attitude of Lockheed with regards to disposition of the XJ37 is set forth.

3. Memorandum Report TSEPP-506-223 dated 18 September 1947 reports on a conference with representatives of Menasco Manufacturing Company on the disposition of the XJ37 engines resulting in a recommendation that action be taken to investigate an established engine company with proper facilities taking over the XJ37 engine project.

4. Memorandum Report TSEPP-506-224 dated 22 September 1947 reports on a conference held at Wright Field with representatives of Lockheed, Menasco, and of major engine manufacturers wherein the engine companies were presented opportunity to consider assuming the development and production of the Menasco XJ37 turbo-jet engine, the turbo-prop version of the XJ37, and possibly the ram jet development under way at Menasco.

C. CONCLUSIONS:

1. As a result of the above-listed conferences it is concluded that:

a. The Army Air Forces is definitely interested in continuing the development of the XJ37 turbo-jet and turbo-prop versions of this engine. (M.R. TSEPP-506-223 dated 18 September 1947)

WF-L-8-28-45-15M

b. Menasco Manufacturing Company does not have facilities or necessary financing to continue the XJ37 engine project. (M.R. TSEPP-506-220 dated 10 September 1947)

c. Lockheed Aircraft Corporation does not have necessary facilities for development of the XJ37 engine provided they were to assume the project obligation. Financing of necessary facilities would be difficult for Lockheed to attempt and Lockheed is not interested in carrying on the XJ37 project. (M.R. TSEPP-506-226 dated 24 September 1947)

d. The engine development can best be furthered by transferring the project and Menasco's key personnel to an established engine company possessing the necessary facilities. (M.R. TSEPP-506-223 dated 18 September 1947)

e. In the event no established engine manufacturer is interested, the development should be cancelled since the present West Coast facilities would not permit further development of the engine.

D. RECOMMENDATIONS:

1. It is recommended that every effort be made to permit an established engine manufacturer to take over the XJ37 turbo-jet and turbo-prop development.

2. It is recommended that in the event no established engine manufacturer having the proper facilities can be interested in carrying on the XJ37 engine development that the engine project be cancelled, present contracts closed out with delivery of currently due reports and equipment, and that these reports and equipment be made available to all established engine manufacturers on an equal basis in order that the Army Air Forces would benefit to the fullest extent from the knowledge and designs already paid for.

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Approved by E. A. WOLFE
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Distribution:

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TSENG - Brig.Gen. Crawford
TSBPS - Lt.Col.J.R.Martin
Lockheed Airc. Corp
Menasco Mfg. Co.

TSEPF-518-374
1 December 1947

APPENDIX III

SUMMARY OF MAJOR TEST FACILITIES AVAILABLE FOR J57 ENGINE DEVELOPMENT

PACKARD

See Packard Report PD 2513 7/2/47

Compressor Drive - 1400 HP + 1100 HP Aircraft Engine =
Total 2500 HP
Speed Increasing Gear Required
Limited to Altitude Tests Only
113#/sec air at -70°F Refrigeration Capacity
19#/sec air at -4.7°F Refrigeration Capacity

Turbine - 8000 HP Absorption Dynamometer 1 ea.
2700 HP " " 1 ea.
600 HP " " 2 ea.
Cold Test and Simulated Hot Test at Altitude. 48" Duct Dia. Max.
Air flow 90-110#/sec at 60" hg.

Combustion Chamber
90-110# at 60" Hg.

Spin Test Pit - Handle 54" dia. 72" long up to 10000 and 25,000 RPM

Cells - 2 - 24' x 24' x 100'
4 - 20' x 20' x 40'

Schlerein Photographic Equipment

RANGER

Compressor Drive - 1 ea. - 1500 HP Engine.
Additional 1500 HP Marine Engine in February 1948
Test Only Four Stages of Front Compressor.

Turbine - None

Require NACA or other Government Facilities

Combustion Chamber - Require Outside Facilities

Intercooler - Require Outside Facilities

Spin Pit - No Statement

Cells - 1 cell, Size Not Stated

WRIGHT

Compressor Drive - 12,000 RPM 15,000 HP

Air Flow 64#/sec at 160" Hg
No Refrigeration

Turbine - 2 ea 8000 HP Absorption Dynamometers 5 - 12,000 RPM
2 ea 4,000 HP Dynamometers
64#/sec at 700° F

Combustion Chamber Test
60 psia 13.5#/sec

Spin Test Pit
24" dia x 82" long 25,000 RPM
Hot Test, 11-1/2" dia. 30,000 RPM

Cells - 2 - 30' x 30'

Schlieren Photographic Equipment
Electric Analogue Equipment for Control Analysis

APPENDIX IV

COST AND TIME SUMMARIES INCLUDED IN J57 DEVELOPMENT PROPOSALS

PACKARD MOTOR CAR COMPANY

Notes: A. Type of Contract - Cost Plus Fixed Fee

B. Following are minimum cost estimates.

C. Phases I and II cover the immediate proposal. Phases III, IV, V, VI and the Turbo-prop items cover subsequent programs based on completion of Phases I and II.

D. The proposal is based on completion of four (4) sets of parts as now on contract by Menasco.

E. Costs include transfer costs of key personnel from Menasco to Packard.

F. Costs do not include payments to Lockheed for Patent Rights ($85,000.00)

Item	Description	Cost	Delivery Date
PHASE I			
1	Movement and Establishment of Project at Packard	$54,000.00	3-1-48
2	Reports Covering Tests of Components as Received		
	Rear Compressor	$119,000.00	
	Combustion Chamber (Low Pressure)	55,000.00	
	Turbine Nozzle Flow (2 Sections)	137,000.00	
	Cascade Tests of 1 Stage Turbine Blades	16,000.00	
	Fixed Fee	22,890.00	
		$349,890.00	10-1-48
3	Preparation and Fabrication of Test Equipment Covering Front Compressor, High Pressure Test of Combustion Chamber Segment, Cascade of 4 Turbine or Compressor Blades, Cold Air Test of Complete Turbine	293,280.00	10-1-48
4	Preparation and Fabrication of Test Equipment and Set-up of Full Scale Engine	88,810.00	10-1-48
5	Tests under Item 3 (Actual Bench Test Work)	98,440.00	2-1-49
6	Tests under Item 4 (Actual Test Work)	14,980.00	2-1-49
PHASE II			
7	Testing of Mechanical Auxiliaries as Received. Gear Trains and Bearings, Fuel, Starting and Control Systems, Afterburner and Variable Area Exhaust Nozzle	331,700.00	6-1-49
	TOTAL PHASES I AND II	$1,231,000.00	
PHASE III			
	Redesign and Development Testing (Assumes 4 Completed Sets of Parts as Now on Contract with Menasco)	675,000.00	4-1-49
PHASE IV			
	Manufacture of 5 Complete Engines	1,250,000.00	10-1-49
PHASE V			
	Final Development of Components and Development Testing of Engines	700,000.00	12-1-49
PHASE VI			
	150 Hour Qualification Test	200,000.00	4-1-50
		$2,825,000.00	
	Fixed Fee	197,750.00	
	TOTAL - ALL PHASES	$3,022,750.00	
	TOTAL - ALL PHASES	$4,253,750.00	

RANGER AIRCRAFT ENGINE DIVISION

Notes: A. Type of Contract - Cost Plus Fixed Fee

B. Two engines will be available for delivery upon completion of Phase I.

C. Costs include transfer costs of 40 people from Menasco to Ranger.

D. Changes in procuring modifying end equipment are considered allowable charges against contract costs.

E. Costs for further fabrication of parts by Menasco or patent right payments to Lockheed are not specifically mentioned, but it is implied that they are not included.

Item	Description	Cost	Delivery Date
PHASE I			
1	Component and Full Scale Testing		
	a. Front Compressor		
	b. Variable Speed Section of Front Compressor		
	c. Compressor Gearing		
	d. Rear Compressor		
	e. Combustion Chamber (NACA facilities required)		
	f. Intercooler " " "		
	g. Turbine " " "		
	h. Interstage Burner (Two Dimensional Testing)		
	i. Operation of Complete Engine, not Including Reheat or Afterburning and Using Menasco-Allison Starting System.		
	j. Includes Completion of Manufacturing of Last Three of Five Engines.	$2,250,000.00	1-1-49
2	Redesign of Component Testing. Includes 4 Additional Engines, Component and Full Scale and 50 Hour Test.	2,625,000.00	2-1-50
3	Fabricate 3 Engines, Development Testing, Including 150 Hour Qualification Test.	2,625,000.00	1-1-52
		$7,500,000.00	

WRIGHT AERONAUTICAL CORPORATION

Notes: A. Type of Contract - Fixed Price

B. Costs do not include transfer of personnel from Menasco to Wright (Estimate $5,000.00 per individual)

C. Costs do not include payments to Lockheed for patent rights ($85,000.00)

D. Costs are not predicated upon completion or further fabrication of J57 parts by Menasco

Item	Description	Cost	Delivery Date
PHASE I			
1	Analytical Studies of Design and Installation	$ 155,168.00	11-[illegible]
2	Design and Fabrication of Test Equipment Modification for Components Testing	1,003,493.00	1-1-49
3	300 Hours Components Bench Testing	570,438.00	1-1-49
4	Design and Fabricate Adapters for Components - Compressor Burner and Turbine	729,109.00	1-1-49
5	Fabricate and Development Testing of Major Components. 200 Hours Testing	850,000.00	9-1-49
6	Design and Fabricate Full Scale Engine Test Modifications	150,000.00	9-1-49
		$3,458,208.00	
7	Full Scale Engine Testing	Not Specified	Not Specified

TEXPP-518-374
1 December 1947

APPENDIX V

Point Grading of Proposals

Maximum Attainable - 1000 Points

	Maximum Value	Grade Value		
		Wright	Packard	Ranger
Test Facilities	400	300	150	25
Manufacturing Facilities	200	150	50	100
Effect on Government Contracts at Contractor's Plant	100	75	75	50
Method of Attacking This Problem	100	75	90	60
Menasco Personnel	200	100	150	175
Total	1000	700	515	410