[illegible] IMPELLER
[illegible] DIFFUSER
[illegible]

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Lewis Research Center
Contract NAS3-[illegible]

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BACKSWEPT IMPELLER AND VANE-ISLAND DIFFUSER AND SHROUD FOR NASA ADVANCED-CONCEPTS COMPRESSOR TEST RIG	March 1973
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15. Supplementary Notes

Program Monitor, Robert Y. Wong, NASA Lewis Research Center, Cleveland, Ohio

16. Abstract

A centrifugal impeller based on an existing backswept design was defined. In addition, a vaned diffuser was designed to match this impeller and also to be compatible with an existing 6:1 compressor test rig fabricated by AiResearch under Contract NAS3-14306. The mechanical integrity of this design was verified by analysis. Hardware was procured and inspected to insure conformity with design tolerances. An overspeed test was successfully conducted on one of the impellers fabricated under this program.

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Compressor/Impeller Diffuser Shroud	Unclassified-unlimited

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FOREWORD

This is the final report covering work performed under Contract No. NAS3-15328 during the period May 1, 1970 through November 30, 1972.

This contract with AiResearch Manufacturing Company, Phoenix, Arizona, was under the technical direction of Mr. R. Wong, Lewis Research Center, of the National Aeronautics and Space Administration.

Mr. G. L. Perrone is the principal investigator and Mr. K. W. Benn, the program director. The efforts of Mr. D. Edmonds, designer, Mr. M. R. Holbrook, aerodynamicist, Mr. J. M. McVaugh, stress engineer, and Mr. G. R. Metty and Mr. G. L. Reese, development engineers, are greatly appreciated in the conduct of the program.

TABLE OF CONTENTS

SUMMARY

This report presents a detailed description of the work performed under Contract NAS3-15328 for NASA-Lewis Research Center, Cleveland, Ohio.

The purpose of the program was to design, fabricate, and deliver a backswept impeller, a vaned island diffuser, and the components necessary to operate this compressor configuration in the NASA advanced-concepts compressor test rig developed by AiResearch under Contract NAS3-14306.

The utilization of this impeller in the NASA advanced-concepts compressor test rig will provide evaluation of two compressor-design approaches.

INTRODUCTION

The NASA-Lewis Research Center is currently engaged in a program to study small, advanced-concept, high-pressure-ratio centrifugal compressors. As part of this program, a backswept impeller, vane island diffuser and shroud were supplied under Contract NAS3-15328 with AiResearch Manufacturing Company of Arizona. These components are for use in the NASA advanced-concept compressor test rig developed by AiResearch under Contract NAS3-14306.

The impeller supplied was aerodynamically identical to an impeller being supplied to the Air Force as Part Number 976511, but without a notch at the exit. The diffuser used in the program is a conventional vane-island design.

This report discusses the requirements and design objectives in the development of the compressor. Results from preliminary and detailed analyses as well as concluding remarks are included.

TECHNICAL DISCUSSION

Task I, Aerodynamic Design

Impeller Design

The aerodynamic design of the impeller used for this program is the same as that for Part Number 976511 used in the U.S. Air Force advanced APU, which has an AiResearch designation GTCP305-1, being developed under AFSC Contract F33615-69-C-1100. Thus no additional aerodynamic design effort was required to define it. This impeller is a scaled version of the Model TSE36-10 Impeller.

In compliance with Article XII B of Schedule Attachment of Contract NAS3-15328, the following impeller data is submitted:

(a) Coordinates for shroud contour (R versus Z) are given in Table I.

(b) Coordinates for hub contour (R versus Z) are given in Table II.

(c) The polar coordinate angle theta versus meridional length is given for the shroud and hub in Tables I and II.

(d) The average exit flow angle is 45.19 degrees.

(e) The blade thickness distribution is given in Tables I and II.

Detail, instrumentation and assembly drawings were forwarded to NASA for approval. Hardware was ordered for all detail parts.

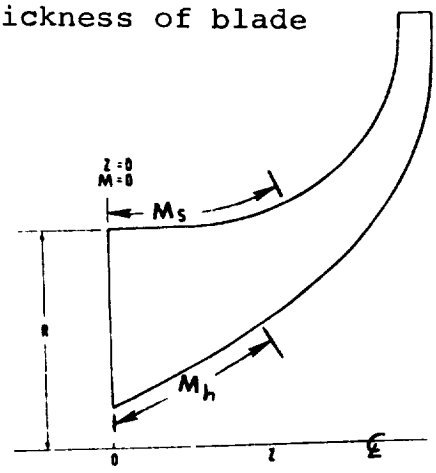
Diffuser Aerodynamic Design

Since neither the Air Force diffuser or a scaled version of the 36-10 diffuser could be used, it was necessary to design a new diffuser. Two diffuser concepts were investigated. One concept was a conventional design utilizing a vane with a blunt trailing edge of sufficient thickness to allow a bolt to pass through the airfoil shape to clamp two halves together. The second concept consisted of a thin airfoil section machined on one wall and brazed to the other wall. The second design has the advantage of better vane support to prevent vane flutter in the leading edge region.

TABLE I. IMPELLER CHARACTERISTICS ALONG SHROUD

R in.	Z in.	Theta Deg	M_s in.	t_n in.
1.922	0.000	-12.0	0.000	0.0137
1.922	0.124	- 5.48	0.124	0.0146
1.922	0.260	1.02	0.260	0.0160
1.922	0.395	6.74	0.395	0.0173
1.924	0.530	11.59	0.530	0.0185
1.936	0.664	15.59	0.665	0.0191
1.961	0.797	18.88	0.800	0.0193
1.999	0.927	21.57	0.935	0.0193
2.049	1.052	23.78	1.070	0.0193
2.112	1.172	25.61	1.205	0.0193
2.186	1.284	27.17	1.340	0.0193
2.272	1.388	28.56	1.475	0.0193
2.369	1.481	29.84	1.609	0.0193
2.476	1.562	31.09	1.744	0.0193
2.592	1.631	32.35	1.879	0.0193
2.717	1.684	33.68	2.015	0.0193
2.850	1.722	35.15	2.153	0.0193
2.989	1.741	36.80	2.293	0.0193
3.129	1.744	38.62	2.433	0.0193
3.264	1.744	40.51	3.316	0.0193

t_n = normal thickness of blade



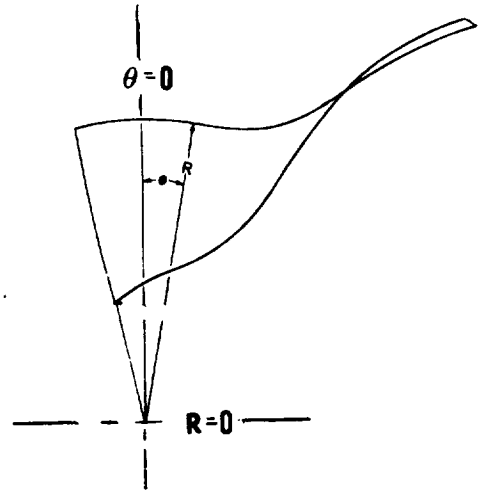


TABLE II. IMPELLER CHARACTERISTICS ALONG HUB

R in.	Z in.	Theta Deg	M_n in.	t_N in.
0.878	0.074	- 8.08	0.070	0.0448
0.944	0.196	0.53	0.224	0.0450
1.029	0.364	9.18	0.413	0.0469
1.115	0.526	15.61	0.596	0.0463
1.204	0.680	20.04	0.774	0.0440
1.294	0.827	22.99	0.947	0.0416
1.388	0.968	24.92	1.116	0.0397
1.486	1.103	26.15	1.282	0.0385
1.588	1.230	26.95	1.445	0.0376
1.695	1.351	27.50	1.607	0.0370
1.808	1.464	27.92	1.767	0.0370
1.929	1.568	28.31	1.926	0.0377
2.058	1.663	28.74	2.086	0.0393
2.196	1.746	29.27	2.248	0.0462
2.346	1.816	29.99	2.413	0.0462
2.506	1.871	30.95	2.582	0.0408
2.674	1.909	32.23	2.755	0.0367
2.845	1.929	33.83	2.927	0.0322
3.011	1.936	35.68	3.093	0.0277
3.169	1.937	37.71	3.251	0.0239

Note: Definition of coordinates is given in Table I.

Additional diffusion of the flow through the vaneless space was used to achieve a Mach Number of approximately 0.2 at the radius of 6.29 inches. The achievement of this Mach Number level at this radius permits direct comparison of performance maps for this compressor and the compressor designed under NASA Contract NAS3-14306, because the instrumentation can be common to both programs.

The initial diffuser design shown in figure 1 used vanes with a trailing edge thickness of 0.300-inch to allow for through-bolt clamping of the two diffuser halves. Analysis showed that this design would have high exit dump losses due to large vane-exit-wake vortices. A second design, shown in figure 2, was undertaken with a vane trailing edge thickness of 0.080 inch. The area distribution for these two designs is shown in figure 3. Comparative analysis shows an 8.4-percent higher static pressure recovery for the second design (figure 4).

The Mach Number at a radius of 6.29 is 0.17, compared with 0.22 for the initial design as shown in Table III. The design at the vane trailing edge thickness of 0.080 inch was employed for this program because of better predicted vaned-diffuser performance and resistance to mechanical failure.

Table IV lists the aerodynamic geometry parameters for the selected vaned section shown in figure 5. Figure 6 lists pertinent flow parameters along with vector diagrams for the vane leading and trailing edge locations and the gauging station location. Figure 7 shows the predicted flow meanline velocity profile for each vaned passage. Figure 8 shows a detailed drawing of the selected diffuser design.

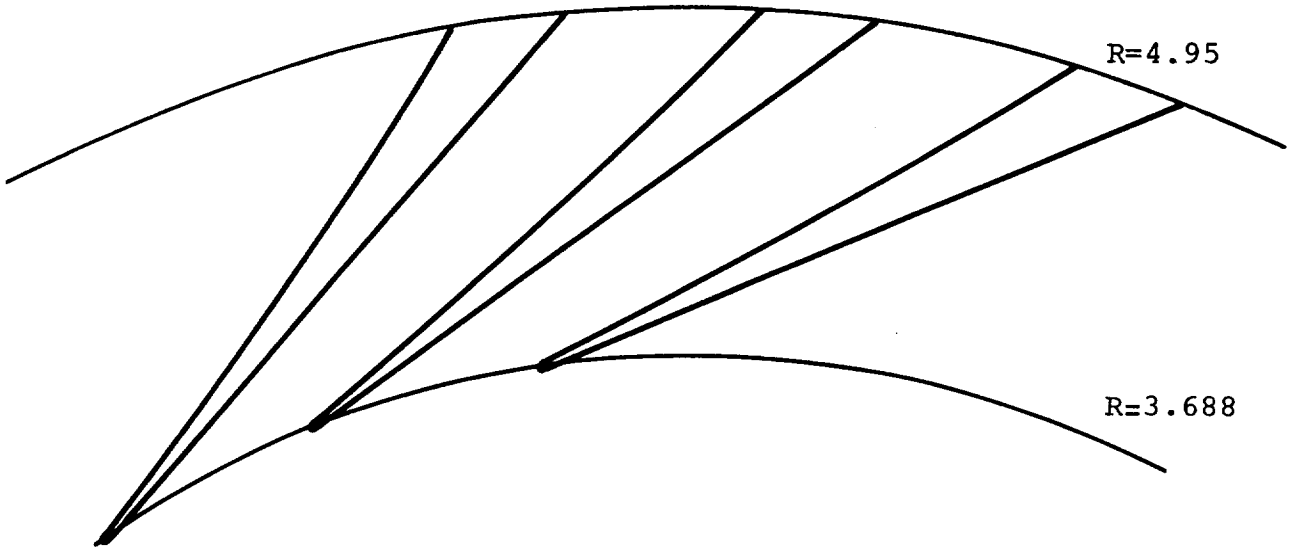


Figure 1. Initial design, 27 vanes, 0.300-inch trailing edge thickness.

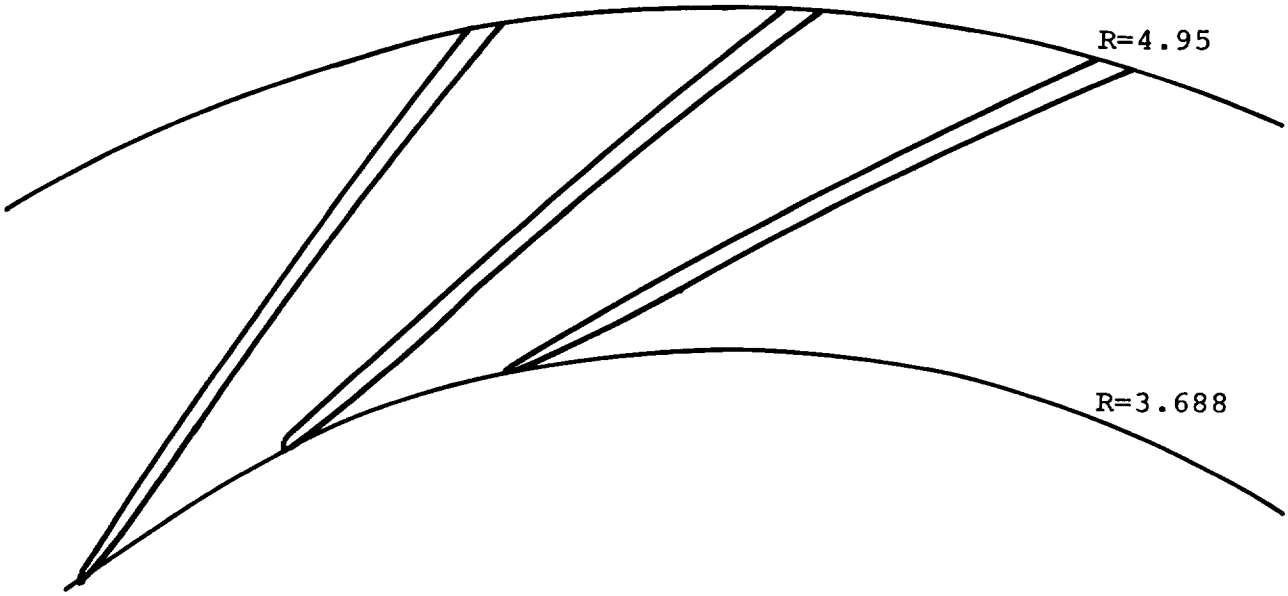


Figure 2. Second design, 27 vanes, 0.080-inch trailing edge thickness

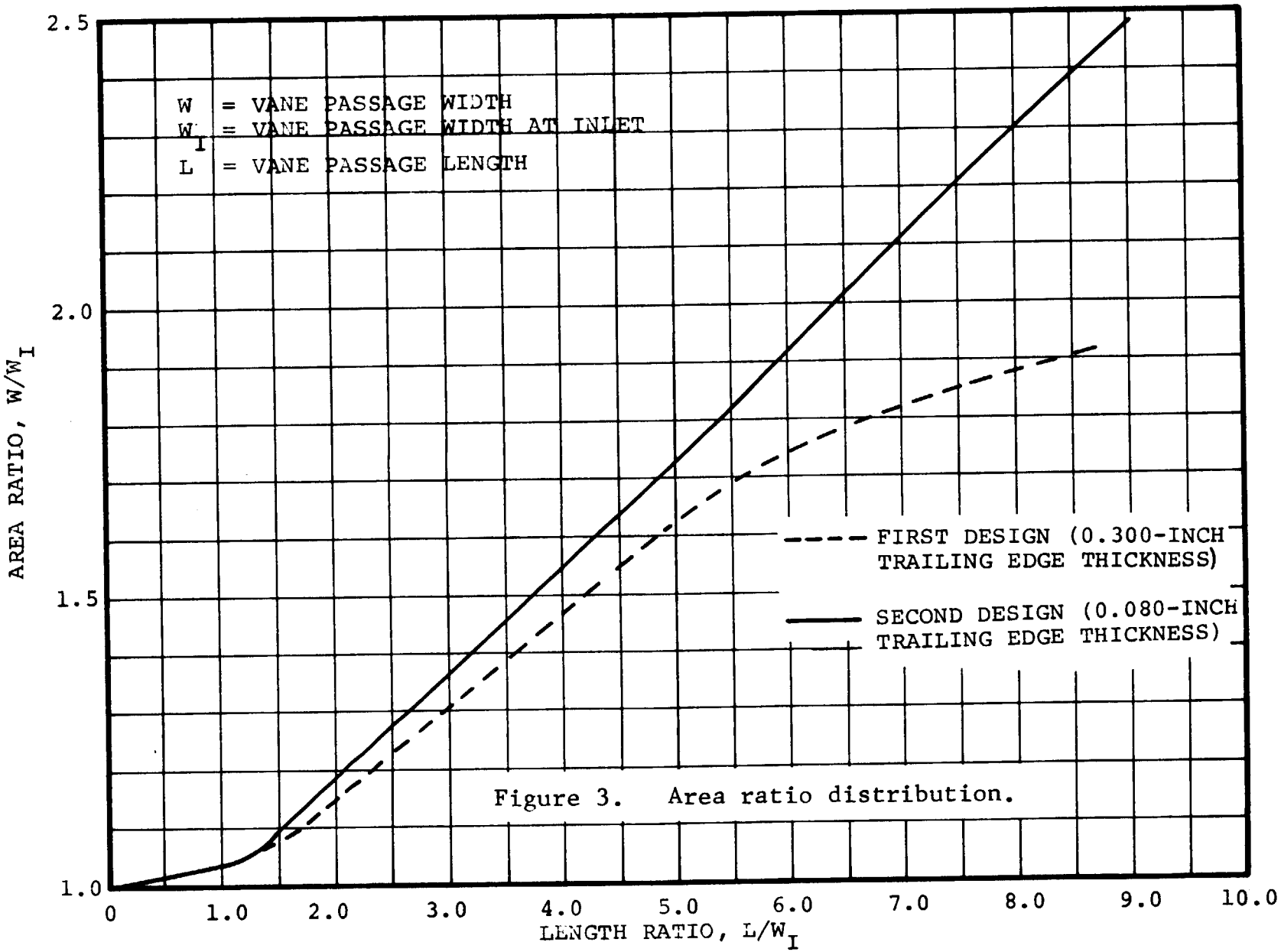


Figure 3. Area ratio distribution.

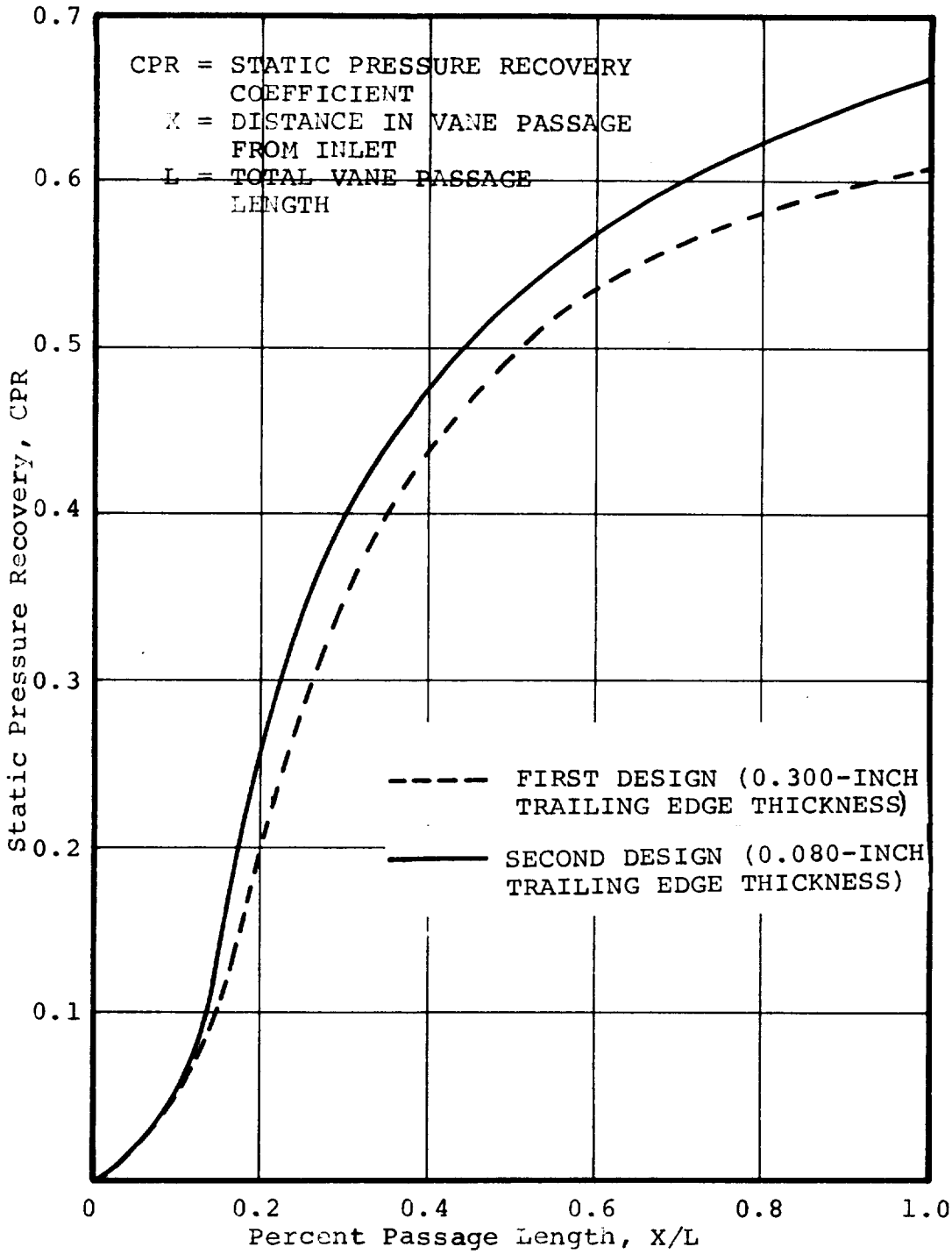


Figure 4. Pressure recovery in vaned diffuser.

TABLE III

PREDICTED DIFFUSER PERFORMANCE COMPARISON

FIRST DESIGN, 0.300-INCH TRAILING EDGE THICKNESS VANES

Location	Radius	Mach No.	P_t, Psi	P_s, Psi
Vane L.E.	3.688	0.855	96.406	60.049
Vane T.E.	4.95	0.298	87.4681	82.2375
Measuring Station	6.29	0.2193	86.8558	83.9645

SECOND DESIGN, 0.080-INCH TRAILING EDGE THICKNESS VANES

Location	Radius	Mach No.	P_t, Psi	P_s, Psi
Vane L.E.	3.688	0.855	96.406	60.049
Vane T.E.	4.95	0.226	87.1385	84.0974
Measuring Station	6.29	0.1704	86.8684	85.1150

TABLE IV

VANED DIFFUSER GEOMETRY (SELECTED DESIGN)

Number of vanes -	27
Radius at leading edge -	3.688 in.
Leading edge β angle -	74.4 deg
Leading edge thickness -	0.020 in.
Throat width -	0.295 in.
Radius at trailing edge -	4.95 in.
Trailing edge β angle -	46.2 deg
Trailing edge thickness -	0.080 in.
Diffuser meridional b width -	0.211
Area ratio -	2.48

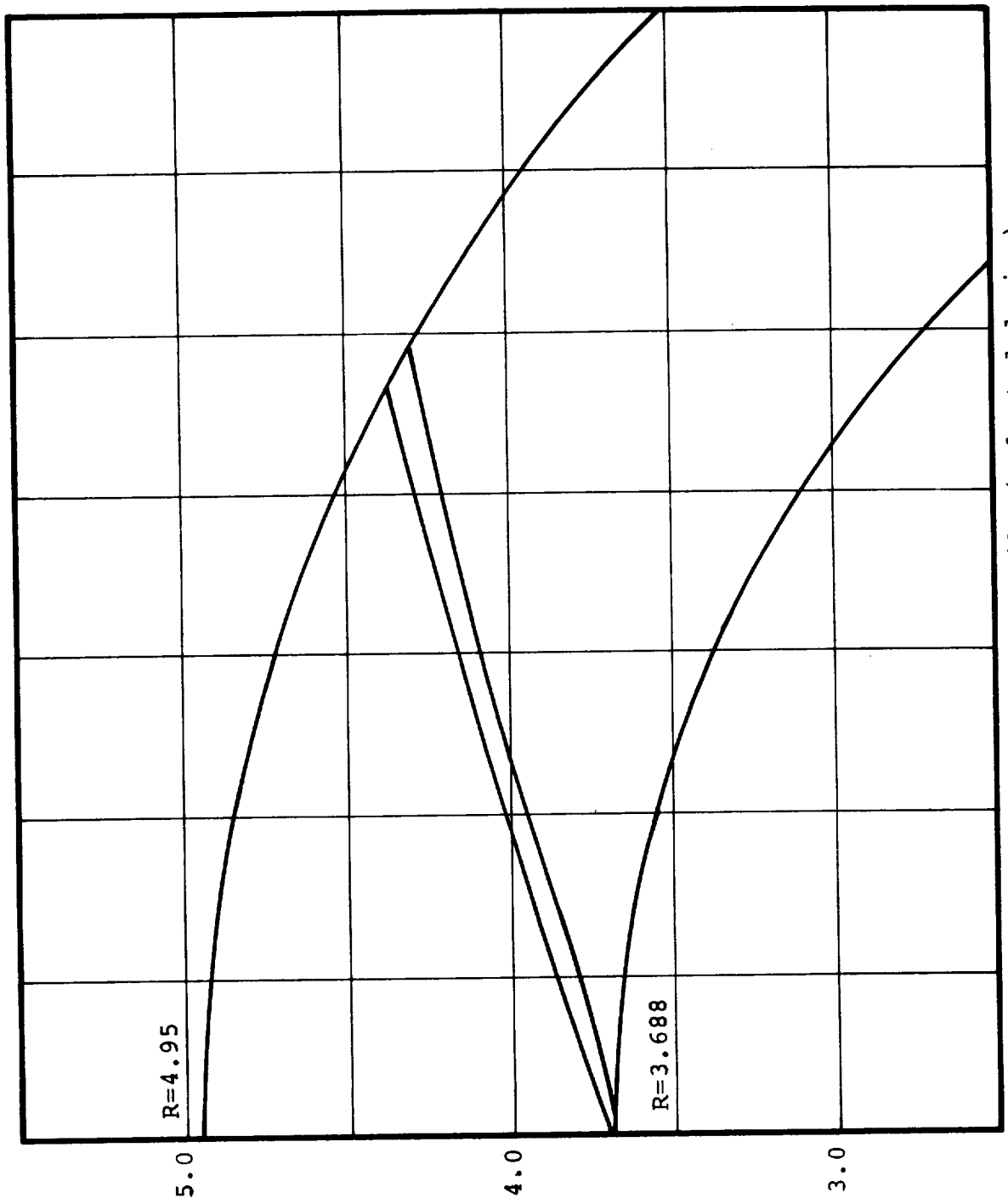


Figure 5. Diffuser vane profile (selected design).

Vane Leading Edge (Outside Vane Row)

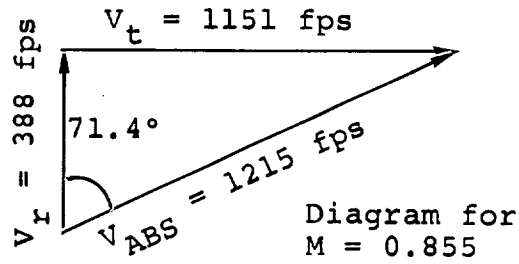
$R = 3.688$ in.

$P_o = 96.406$ psia

$T_o = 959.6°R$

$P_s = 60.049$ psia

$T_s = 837.193°R$



Vane Trailing Edge (Inside Vane Row)

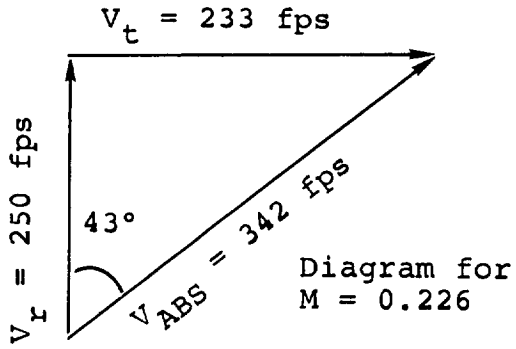
$R = 4.95$ in.

$P_o = 87.1385$ psia

$T_o = 959.6°R$

$P_s = 84.0974$ psia

$T_s = 949.898°R$



Vaneless Space Exit

$R = 6.29$ in.

$P_o = 86.9032$ psia

$T_o = 959.6°R$

$P_s = 85.1066$ psia

$T_s = 953.842°R$

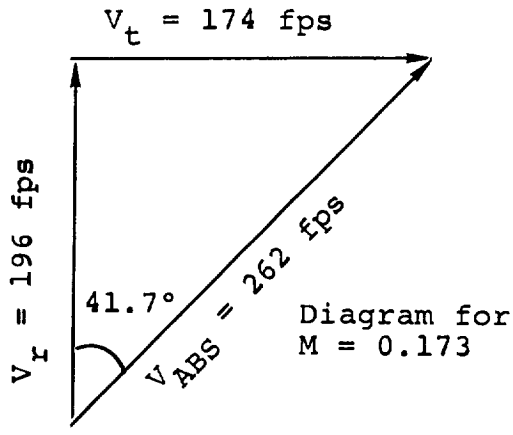


Figure 6. Vector diagrams and state conditions for selected diffuser.

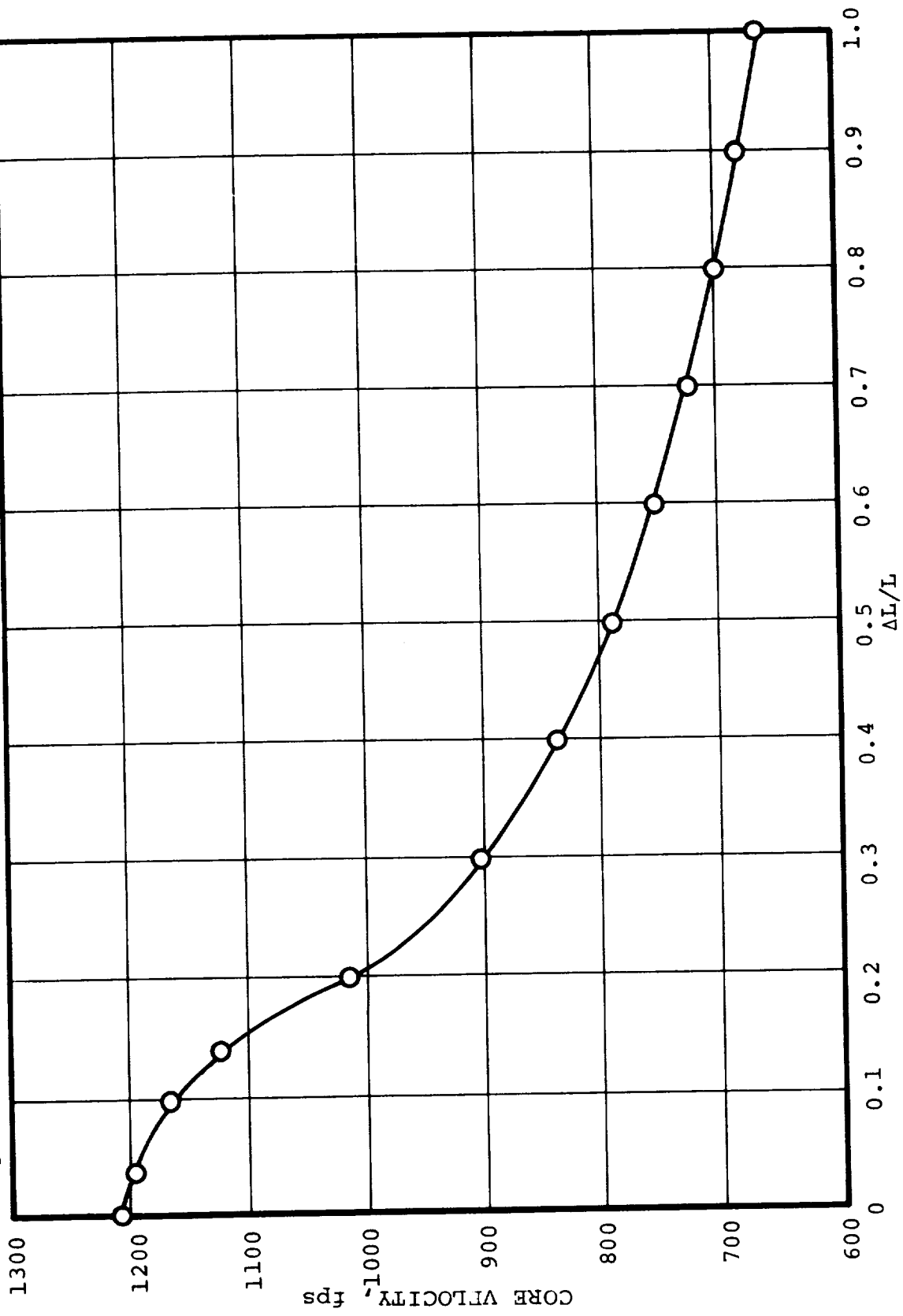


Figure 7. Diffuser vane passage core velocity distribution (selected diffuser).

Task II. Mechanical Design

Impeller

A stress analysis was conducted to determine thermal and centrifugal stresses of the compressor and shroud at the design operating speed, 68,384 rpm. The calculated values are shown in figure 9. A stress analysis of the impeller backface design was performed. The analysis showed stress levels to be highest at the backface near the root as shown in figures 10, 11, and 12. These stress levels, however, were well within the design stress tolerances of the impeller. The axial deflection at 80,000 rpm was 0.019 inch and the radial deflection was 0.012 inch.

Diffuser

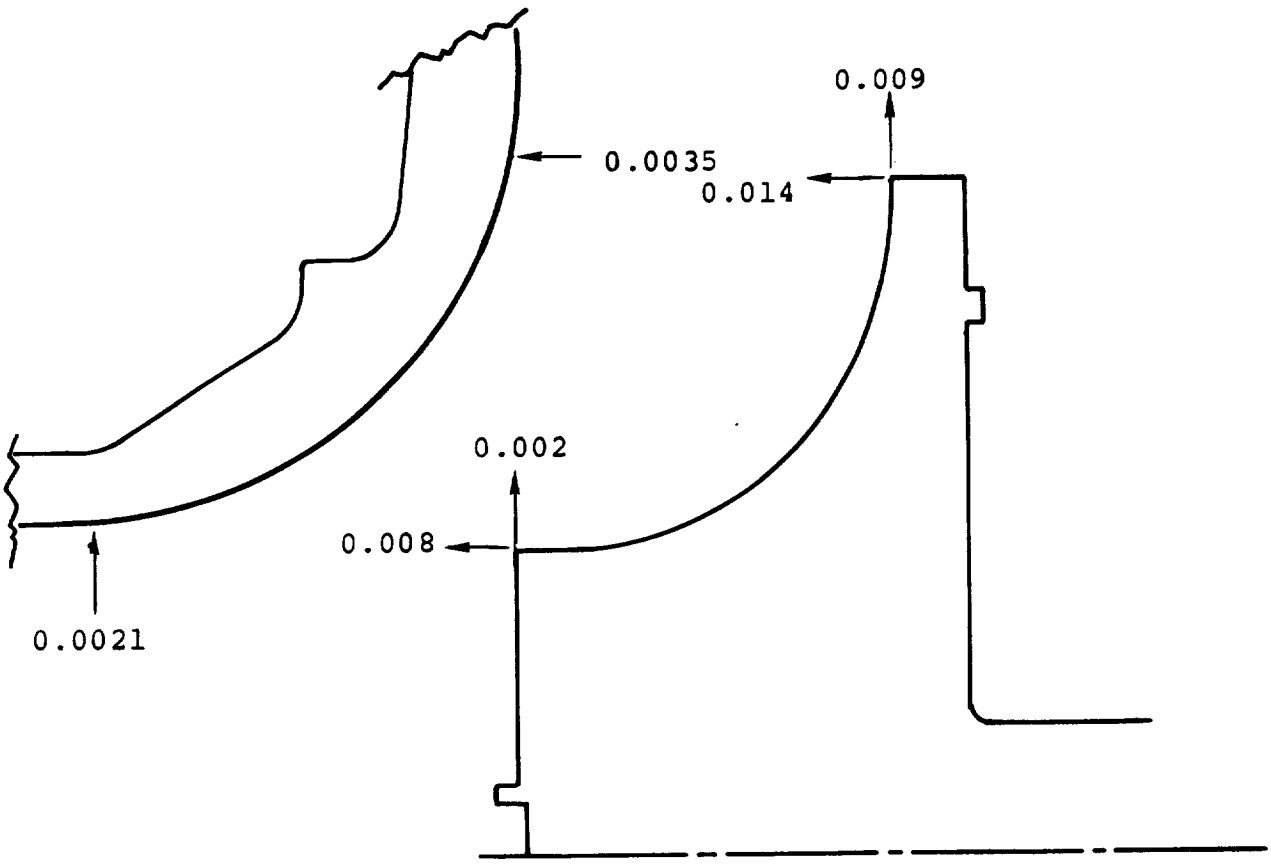
The diffuser vanes were machined as shown in figure 13. Figure 8 shows the location of the pressure taps. The two diffuser halves were brazed together and final machining was completed. Figure 14 shows the diffuser halves prior to brazing.

Instrumentation

The instrumentation probe requirements for the performance mapping of this configuration are identical to the requirements of Contract NAS3-14306. Figure 8 defines the locations of the static pressure taps on the two diffuser walls. The static pressure locations on the shroud are shown in figure 15 (SKP26261).

Thrust

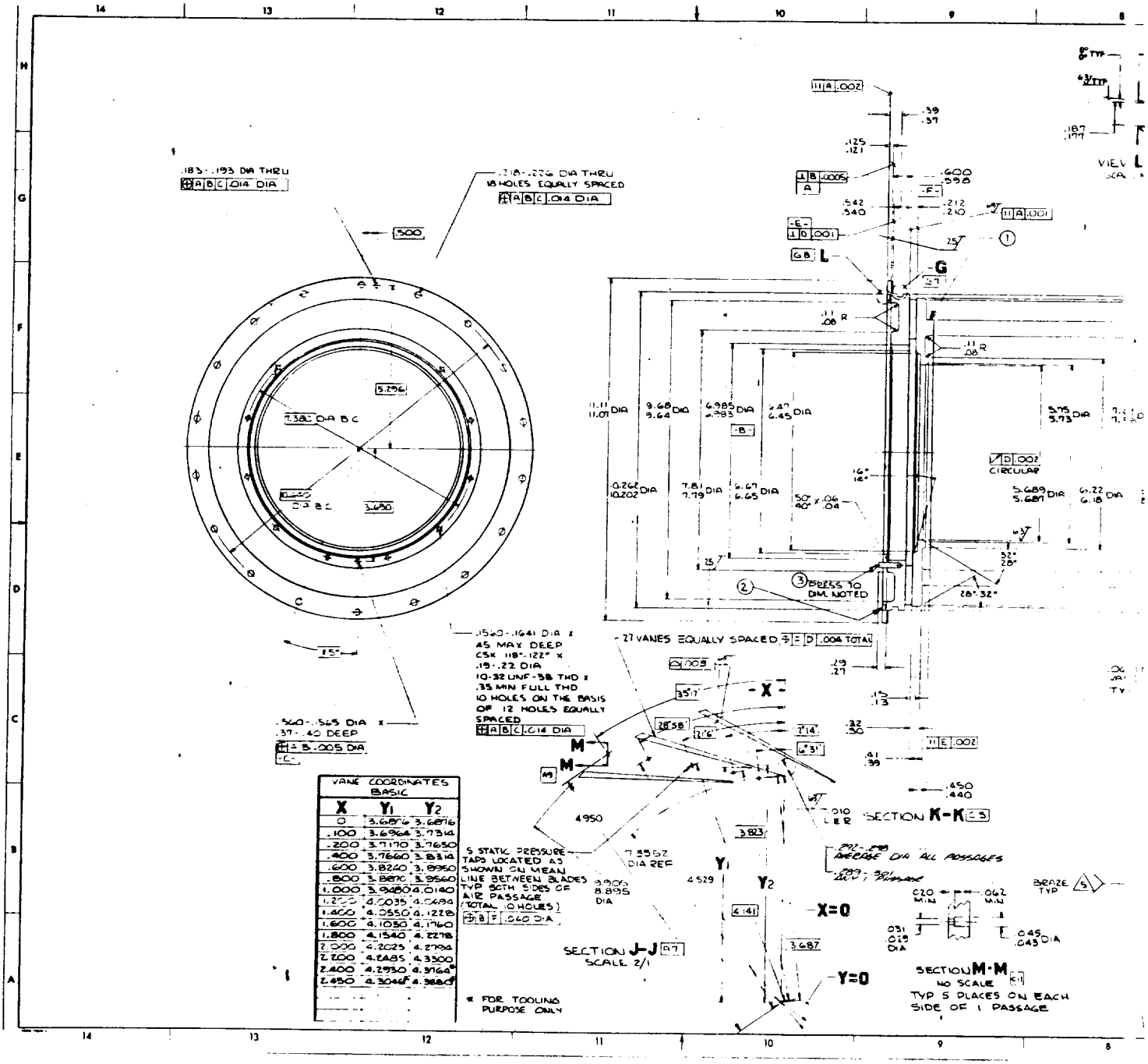
The estimated forward thrust for the compressor is 551.3 pounds. This takes into account momentum forces on the inlet, pressure forces over the inlet and shroud, and the pressure force on the back-face down to a hub diameter of 1.32 inches.



NOTES

1) Deflection in inches
2) Radial deflections with respect to centerline
3) Axial deflection with respect to compressor bearings
4) 68,384 rpm

Figure 9. Centrifugal and thermal deflections.



VANE COORDINATES BASIC		
X	Y1	Y2
0	3.6876	3.6816
.100	3.6964	3.7314
.200	3.7170	3.7650
.400	3.7660	3.8314
.600	3.8240	3.8960
.800	3.8870	3.9560
1.000	3.9480*	4.0140
1.200	4.0035	4.0694
1.400	4.0550	4.1218
1.600	4.1050	4.1760
1.800	4.1540	4.2278
2.000	4.2025	4.2794
2.200	4.2485	4.3300
2.400	4.2930	4.3764*
2.450	4.3046*	4.3884*

* FOR TOOLING PURPOSE ONLY

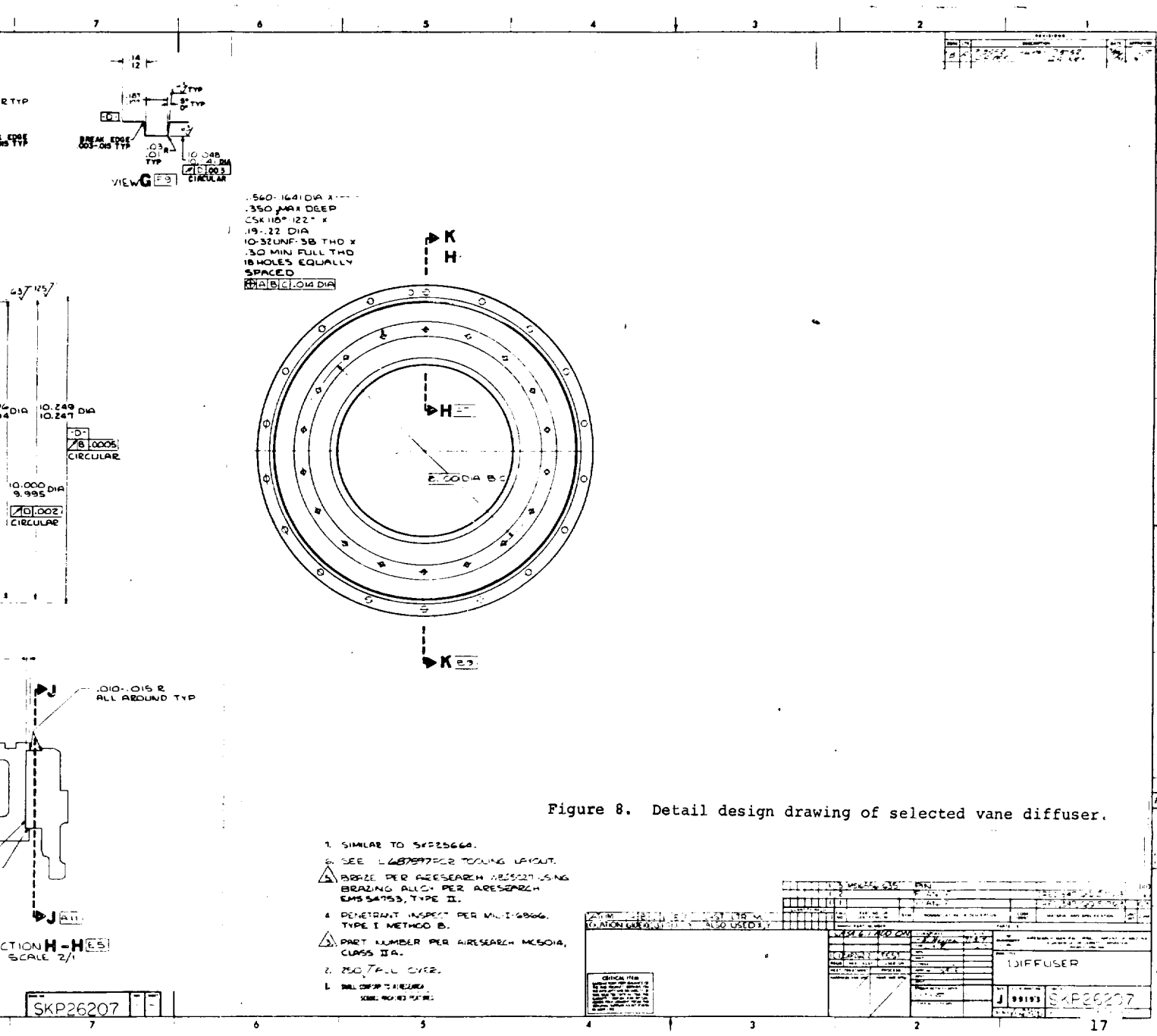


Figure 8. Detail design drawing of selected vane diffuser.

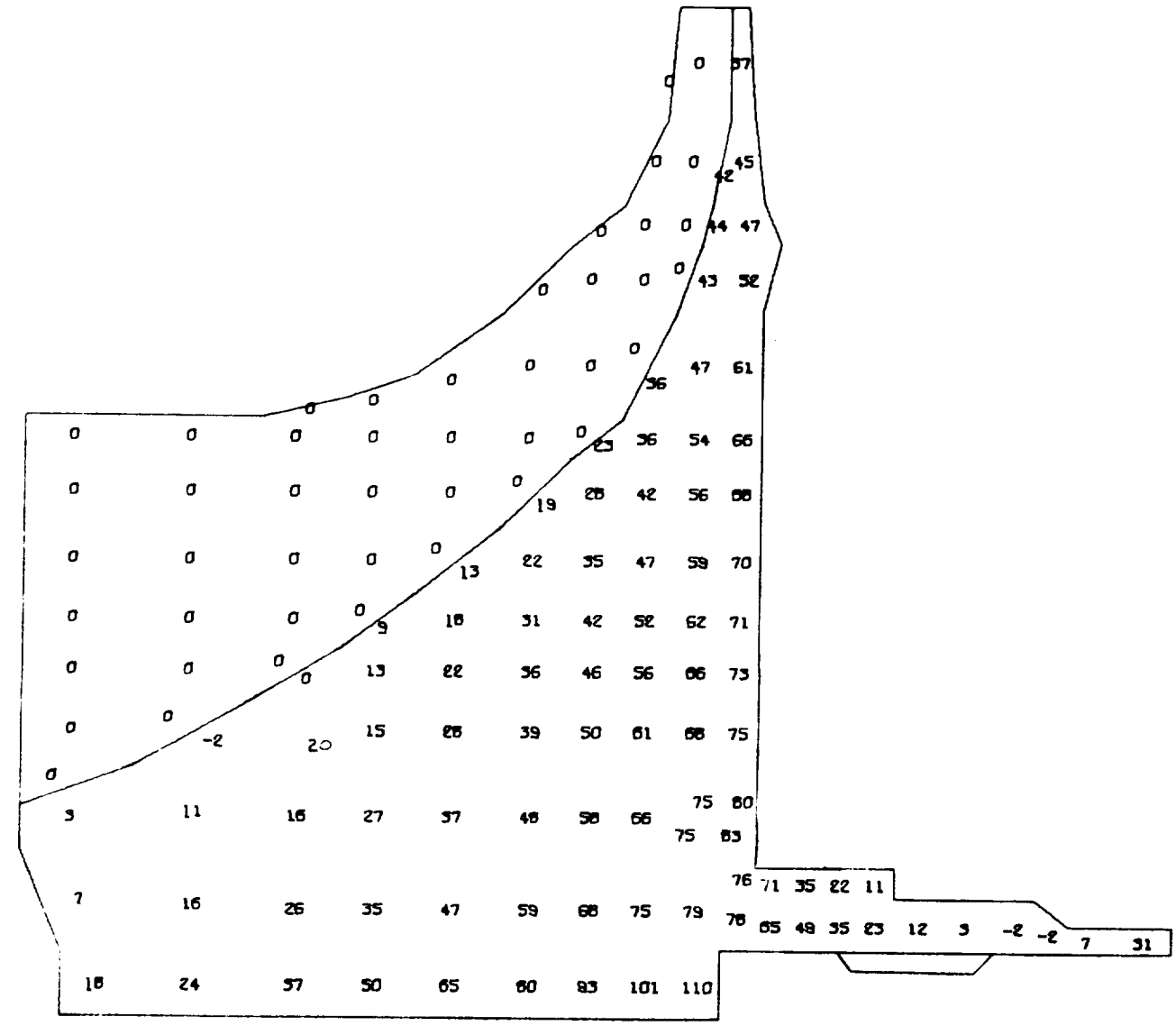


Figure 10. Impeller stress, tangential.

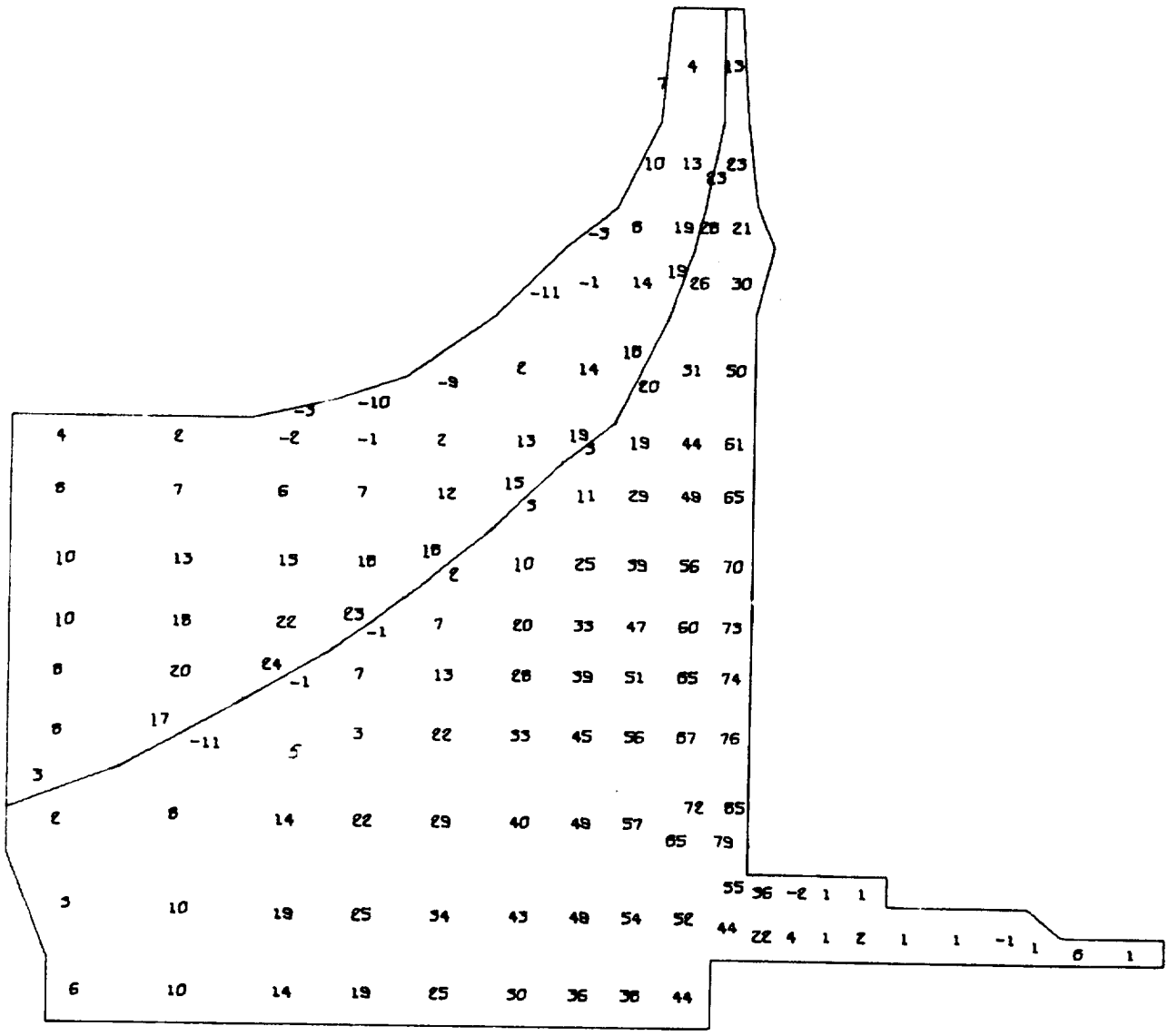


Figure 11. Impeller stress, radial.

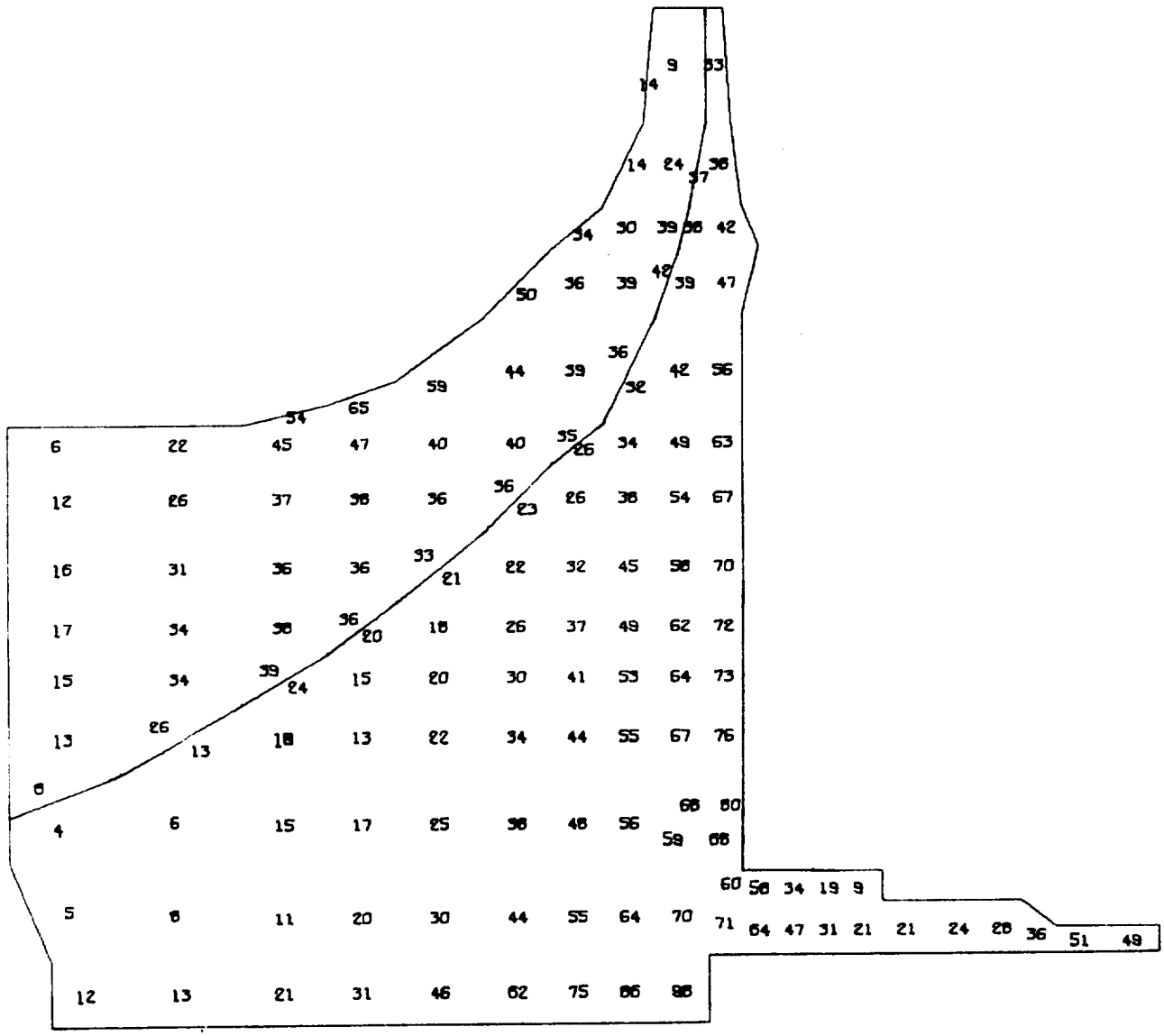


Figure 12. Impeller stress, equivalent.

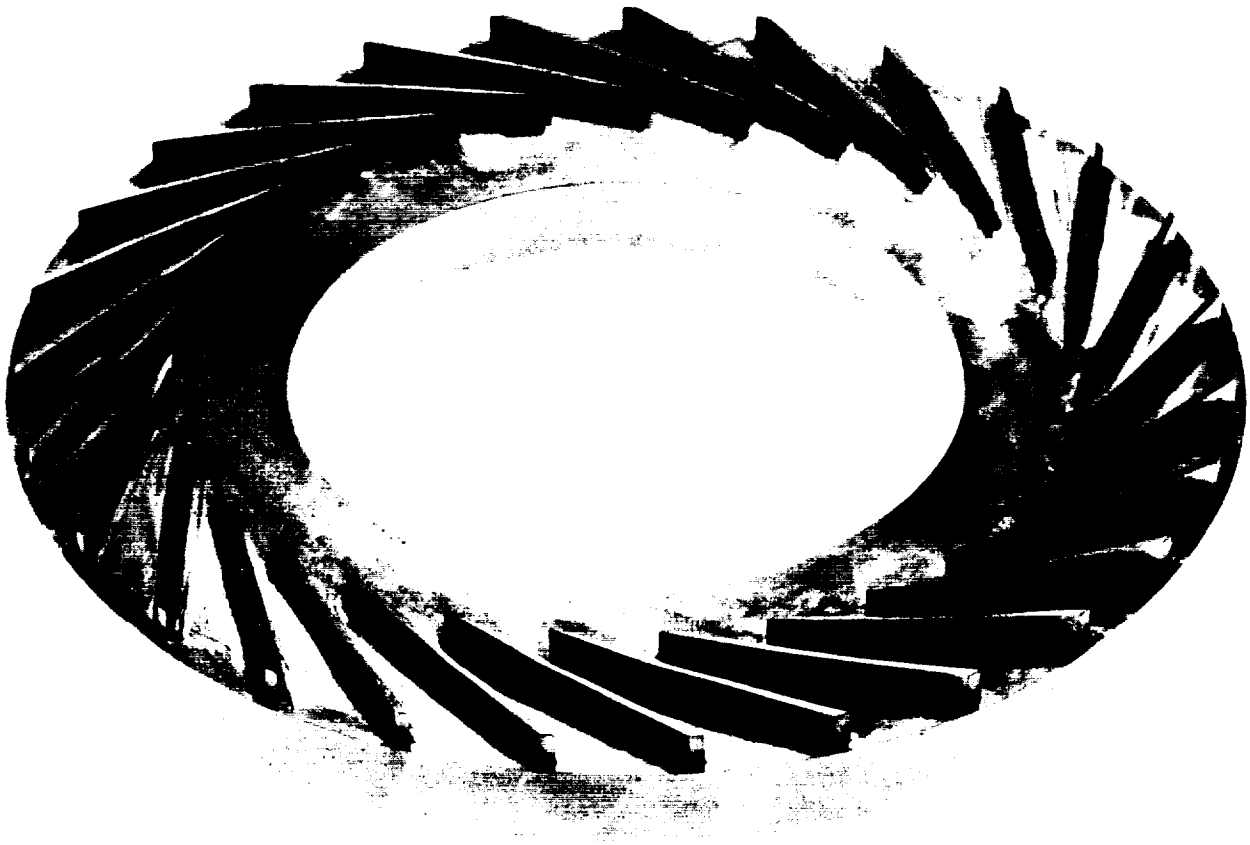


Figure 13. Diffuser machined vanes.

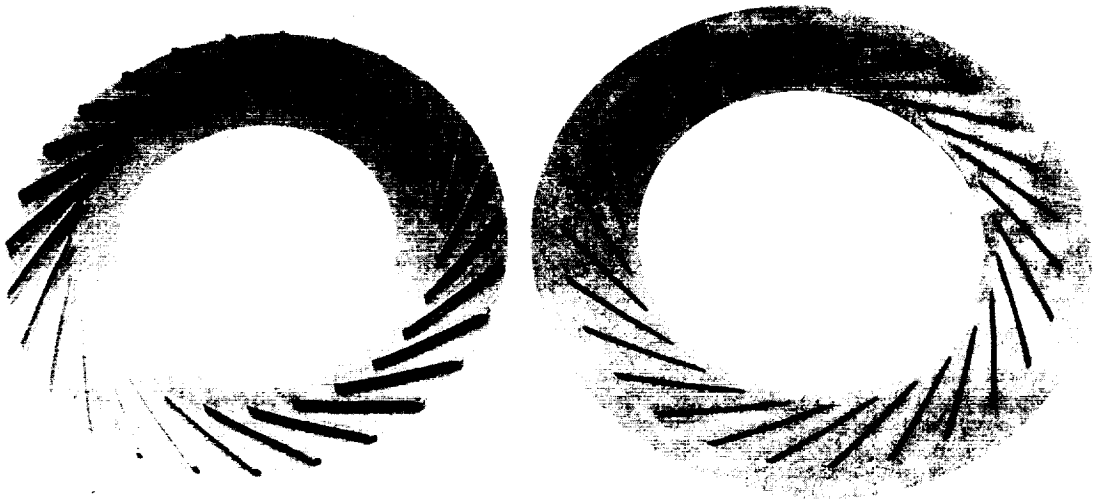
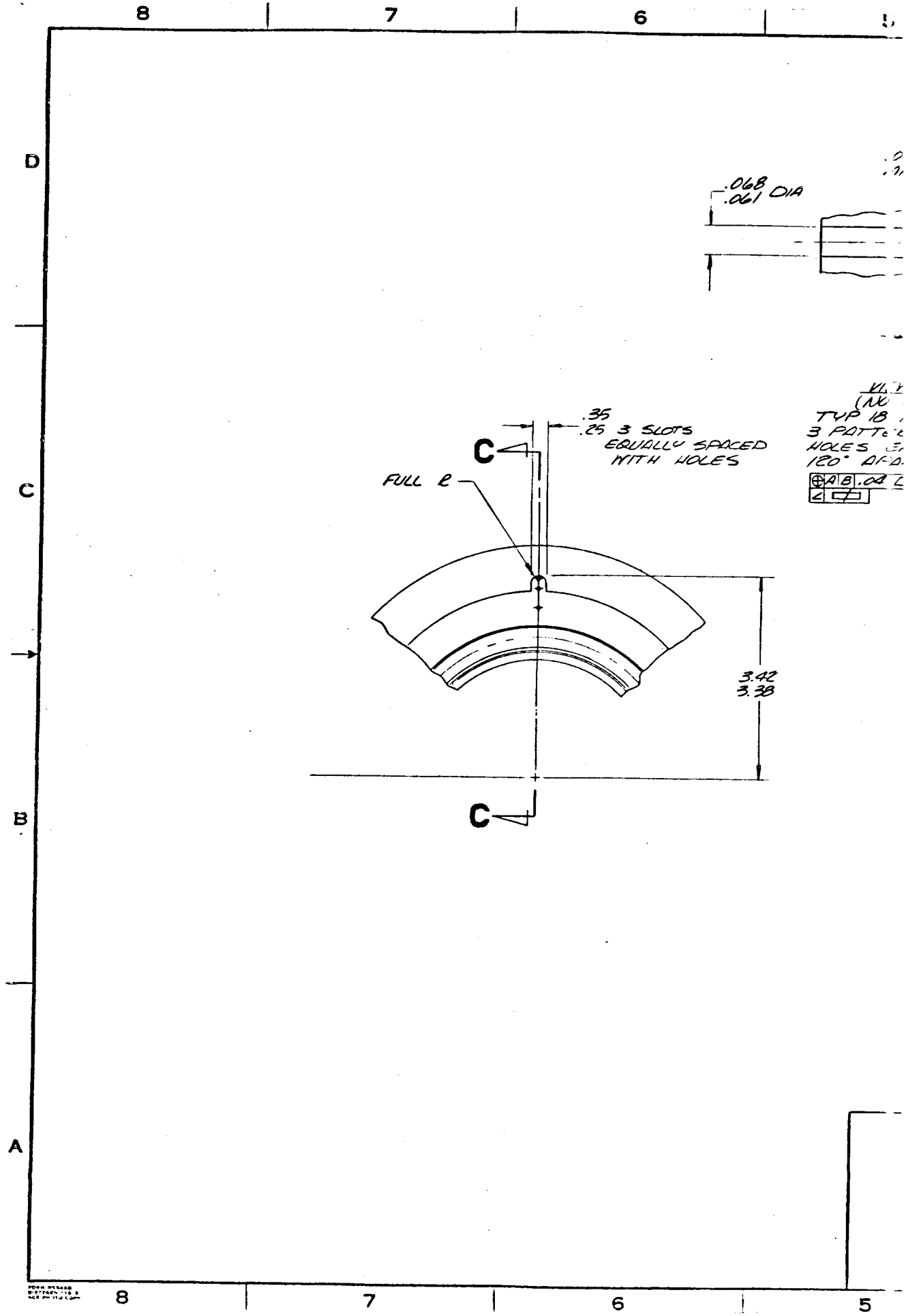


Figure 14. Test diffuser before brazing.

Task III. Fabrication

A group of specialists in the Development Fabrication department participated in the finalization of detail drawings and decisions relative to manufacturing, materials, and tolerances. A Development Fabrication specialist was assigned to the program to follow the manufacturing processes and assure the hardware received the required inspection. The drawings were reviewed and primary dimensions essential to assembly were established. Critical cards reflecting these dimensions were created and used by inspection to record the observed physical dimensions. The critical cards are given in figures 16 through 30.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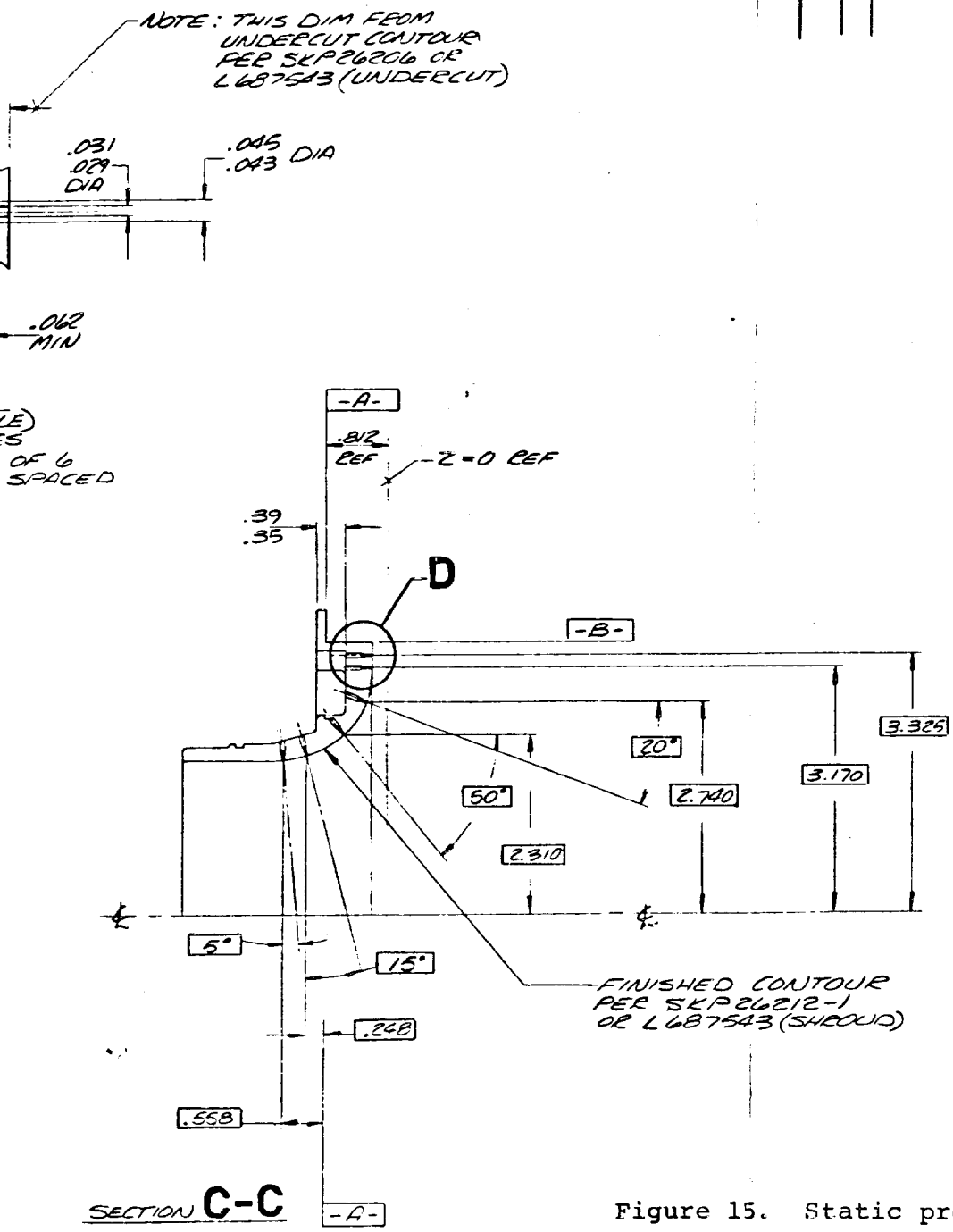


Figure 15. Static pressure taps on shroud.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

QUANTITY REQD	FIND NO	PART NO. OR IDENTIFYING NO.	SYM	NOMENCLATURE OR DESCRIPTION	CODE IDENT	MATERIAL AND SPECIFICATION	ZONE
← PART NUMBER				PARTS LIST			

SIGNATURES	DATES
DFT E. Smith	7-14-71
CHK	
MFG	
MATL	
STRESS	
AERO	
APVD	
APVD	
DESIGN ACTIVITY APVD	
OTHER ACTIVITY APVD	

AIRESEARCH MANUFACTURING COMPANY OF ARIZONA
A DIVISION OF THE GARRETT CORPORATION
PHOENIX ARIZONA

DWG TITLE: STATIC PRESSURE TAPS FOR SKP26206 SHROUD NASA 6:1 ADD ON

REQD	NEXT ASSY	USED ON
HEAT TREATMENT		PROCESS
HARDNESS AND SPEC		NAME AND SPEC

SIZE	CODE IDENT NO	DWG NO
D	99193	SKP26261
SCALE 1/1	WT	SHEET — OF —

SKP26261 REV LTR

Task IV. Spin Test

The impeller defined in SKP26205-1 was successfully operated to an overspeed of 112,000 rpm on 14 October 1971. Mr. Robert Wong, NASA Representative, witnessed the test. As shown on the critical card (figure 16), the dimensions before and after overspeed were:

	Before	After
Bore:	0.4117 inch	0.4145 inch
OD:	6.3388 inches	6.3418 inches

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER 3KP26205 C/L A
PART NAME IMPELLER COMP.

Next Assembly ____ C/L ____ Final Assembly 3KP26212-1 S/N 1

NO.	Dimension and Location		B P max. / min	Before	After	Remark
1	SHAFT TO IMP. TIP	3-C	1.526 / 1.522	1.524		
2	SEAL O.D.	3-G	2.008 / 2.004	2.006		Acceptable for use ITR 16109 10/14/71
3	SEAL O.D. ↗ L	3-G	.001 CIRCULAR	N/A		
4	BLADE LENGTH	4-F	1.942 / 1.932	1.937		
5	FLATNESS OF NOSE	4-C	.0005 ⊥ C	.0002		
6	BORE	5-C	.4043 / .4040	.4043 .4046		
7	↗ A-B	5-C	.0003	.0001		
8	PILOT	5-D	1.4030 / 1.4020	1.4027		
9	↗ C-B	5-D	.001	.0002		
10	BALANCE				T-2H730	NOTE 5

Inspection Before Joe Swingen Date 10-13-72 Quality Control ____ Date ____
After ____ Date ____ Engineering ____ Date ____

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER 3KP26205 C/L ____
PART NAME ____

Next Assembly ____ C/L ____ Final Assembly ____ S/N 1

NO.	Dimension and Location		B P max. / min	Before	After	Remark
1	O.D.	8-H	6.3400 / 6.3340	6.3385		TAKE DIM. TO FORTY PLACE FOR OVERSPEED
2	OVERSPEED			0.4117 6.3388	0.4145 6.3418	[redacted]14 112,000 RPM S
3						
4						
5						
6						
7						
8						
9						
10						

Inspection Before Joe Swingen Date 10-13-72 Quality Control ____ Date ____
After ____ Date ____ Engineering ____ Date ____

Figure 16. Inspection cards.

VENDOR NAME AND ADDRESS: BARAGON PRECISION PRODUCTS, 11035 SUTTER AVE., PACOIMA, CALIFORNIA 91331

☐ TRAVEL PARTS ☐ STOP PARTS

☐ DISPO. COPY TO ☐ AIR OPER.

AIRESEARCH MANUFACTURING COMPANY OF ARIZONA

INSPECTION TRANSFER REPORT

16109

PAGE 1 OF 1

PART LOCATION

BUYER: R.L. BECK LINE: 39 DATE 10-13-71

PROGRAM

I&T REQUIRED TYPE

RR/CMR

LOT NO.

P. O. NO.	ITEM	REC. REPORT NO.	RELEASE NO.	PART OR ASSEM. NO.	C/L
383051		204733	3409-249612-01-03	5KP-26205-1	A
PURCHASE REQ. NO. V999		P. W. O. SER. NO. 3409-249612-01-0300	TRANSFER TO RELEASE	NAME IMPELLER	

CORRECTIVE ACTION
C/A REQUESTED: ☐ YES ☐ NO
WRITTEN REPLY REQ'D: ☐ YES ☐ NO
C/A NOTED BELOW: ☐ YES ☐ NO
SIGN

INSP. DISPOSITION	CODE	QTY.	INSPECTED BY
TO MATERIAL REVIEW	1	-	
REJECTED FOR REWORK	4		
REJECTED - SCRAP	5		
RELEASED TO	6		
ENGR. DISPO.		1	L. Perez

TOTAL QTY. ON REC. REP./PWO: 1
MOV DATE
LAST OPER: OP NEXT OPER: BALANCE
OTHERWISE O.K. ☒ YES ☐ N.O.W.I.
INSP APPROVAL: L. Lopez
REPL'T REQ. NO.

PROD. ____ PRE PROD. ____ DEV. ____ RESEARCH ✓

OP	QTY.	ZONE	CODE	REASONS FOR REJECTION	DR.	D	R	NVR	ACC	RWK	SCP
1	1	3/G		B/P. 2.005-2.004 DIA. SEAL O.D. IS 2.006					1		
				S/N 1							
				OVERSPEED TEST IMPELLER							
				BEFORE SPIN TEST							

MATERIAL REVIEW SUMMARY OF DISPOSITION

Acceptable for use - No adverse effect

ATTACHMENTS YES ____ NO ____

ACPT. RELEASED TO STORES
RELEASED TO
RETURN FOR COMPLETION
REJ. REWORKABLE
SCRAP

	O.K.	REJ.	INSPECTOR
ROCKWELL			
MAGNAFLUX			
ZYGLO			

QUAL. CONT. REP. ENG. REP. 10/14/71 MIL. REP. DATE

DISPOSITION	RESPONSIBILITY AIR	VEND
SCRAP HERE		
REWORK HERE		
R.T.V. REWORK		
R.T.V. SCRAP		
TOTAL		
RWK. EST COST		
INSP EST COST		
TOTAL		

PURCHASING DISPOSITION / CORRECTIVE ACTION (SHOP)

TO:

VIA: SIGN. DATE

CONT. POINT RECOMMENDATIONS / MFG. ENGR. DISP.

SIGN. DATE

RECD.	QUANT.	RECEIVED BY	DATE	SHIPPER NO.	UNIT COST	AMOUNT	STAMP
87				DATE			
88							

MATERIAL REVIEW

FORM P 8249 A

Figure 17. Inspection report.

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER 5KP26205 C/L ___
PART NAME IMPELLER, COMP.

Next Assembly ___ C/L ___ Final Assembly 5KP26212-1 S/N 2

NO.	Dimension and Location		B P max / min	Before	After	Remark
1	SHAFT TO IMP. TIP	3-C	1.526 / 1.522	1.525		
2	SEAL OD	3-G	2.005 / 2.004	2.0046		
3	SEAL O.D. ⊿ L	3-G	.001 / CIRCULAR	.0005		
4	BLADE LENGTH	4-F	1.942 / 1.932	1.941		
5	FLATNESS OF NOSE	4-C	.0005 / ⊥ C	.0001		
6	BORE	5-C	.4043 / .4040	.4041		
7	⊿ AB	5-C	.0003	.0002		
8	PILOT	5-D	1.4030 / 1.4020	1.402		
9	⊿ C-B	5-D	.001	.0003		
10	BALANCE					NOTE 5

Inspection Before ___ Date 7-24-72 Quality Control ___ Date ___
After ___ Date ___ Engineering ___ Date ___

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER [illegible] C/L ___
PART NAME [illegible]

Next Assembly ___ C/L ___ Final Assembly [illegible] S/N 2

NO.	Dimension and Location		B P max / min	Before	After	Remark
1	O.D.	8-H	6.3400 / 6.3340	6.338		THICK WALL TO FIT [illegible]
2	.7882 - .7879 DIA	3-D	.7882 / .7879	.7883 / .7882		
3						
4						
5						
6						
7						
8						
9						
10						

Inspection Before ___ Date [illegible] Quality Control ___ Date ___
After ___ Date ___ Engineering ___ Date ___

Figure 18. Inspection cards.

VENDOR NAME AND ADDRESS: ACE IND. 8839 PIONEER BLVD. SANTA FE SPRINGS CA. 90670

☐ TRAVEL PARTS ☐ STOP PARTS

AIRESEARCH MANUFACTURING COMPANY OF ARIZONA

35463

INSPECTION TRANSFER REPORT

☐ DISPO. COPY TO

☐ AIR OPER.

PART LOCATION

BUYER: R BECK LINE: 39 DATE 7-24-72 PAGE 1 OF 1

PROGRAM	P. O. NO.	ITEM	REC. REPORT NO.	RELEASE NO.	PART OR ASSEM. NO.	C/L
NAS 3-15327	3900 72	C/A	154296	01-0320 3409-349612-	SKP 86205-1	C
	PURCHASE REQ. NO. N-899847.2519		P. W. O. & S.O. NO.	TRANSFER TO RELEASE	NAME IMPELLER	

I&T REQUIRED TYPE

RR/CMR

CORRECTIVE ACTION
C/A REQUESTED: ☐ YES ☒ NO
WRITTEN REPLY REQ'D: ☐ YES ☐ NO
C/A NOTED BELOW: ☐ YES ☐ NO
SIGN

INSP. DISPOSITION	CODE	QTY.	INSPECTED BY
TO MATERIAL REVIEW	1		
REJECTED FOR REWORK	4		c/c
REJECTED - SCRAP	5		
RELEASED TO E.D.	6	1	

TOTAL QTY. ON REC. REP./PWO 1

NEXT OPER 61-2

☐ N.O.W.I.

LOT NO.

PROD. PRE PROD. DEV. RESEARCH X

OP	QTY.	ZONE	CODE	REASONS FOR REJECTION (R 05 / 1 / 0)	NVR	ACC	RWK	SCR
1	1			A) TAB FILLET RAD .040-.025 IS TO .060 R		✓		
				DAMAGED BLADE AT TIP AT O.D. SEE CHART			✓	
		79		(HUB) IS TO ... FROM B/P NOMINAL CONTOUR		✓		
		85		... SEE CHART		✓		
		74		... IS TO +.006 FROM NOMINAL CONTOUR (SHROUD)			✓	
				S/N 2				

MATERIAL REVIEW SUMMARY OF DISPOSITION

Rework shroud contour to B/P limits. Part otherwise to be reworked to smooth damaged areas / blend with mating surfaces.

ATTACHMENTS YES ___ NO ___

ACPT. RELEASED TO STORES / RELEASED TO

RETURN FOR COMPLETION

REJ. REWORKABLE / SCRAP

	O.K.	REJ.	INSPECTOR
ROCKWELL	1		RGR
MAGNAFLUX			
ZYGLO			

QUAL. CONT. REP. ENG. REP. 7/28/72 MIL. REP. DATE

DISPOSITION	RESPONSIBILITY AIR	VEND
SCRAP HERE		
REWORK HERE		
R.T.V. REWORK		
... SCRAP		
TOTAL		

PURCHASING DISPOSITION / CORRECTIVE ACTION (SHOP)

TO:

VIA: SIGN. DATE

CONT. POINT RECOMMENDATIONS / MFG. ENGR. DISP.

SIGN. DATE

RWK. EST COST
INSP EST COST
TOTAL

RECD.	QUANT.	RECEIVED BY	DATE	SHIPPER NO. / DATE	UNIT COST	AMOUNT	STAMP

MATERIAL REVIEW

Figure 19. Inspection report.

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER 3KP26205 C/L C
PART NAME IMPELLER COMP.

Next Assembly _____ C/L ___ Final Assembly 3KP26213-1 S/N AC1-2

NO.	Dimension and Location		B P max. / min	Before	After	Remark
1	SHAFT TO IMP TIP	3-C	1.5[illegible]6 / 1.5[illegible]2	1.5[illegible]4 / 1.5[illegible]3		TWO USE GLASS.
2	SEAL O.D.	[illegible]	2.005 / 2.004	2.0045		
3	SEAL O.D. ⌖ L	3-A	.001 / CIRCULAR	.0005		
4	BLADE LENGTH	11-F	1.0[illegible] / 1.0[illegible]	1.941 / 1.938		CONCAVE
5	FLATNESS OF NOSE	4-C	.0005 / TIC	.0002		
6	[illegible]	5-C	.4042 / .4040	.4040		
7	[illegible] 12-B	5-C	.[illegible]	.0003		
8	[illegible]	[illegible]	1.4030 / 1.4020	1.4025		
9	[illegible]	[illegible]	.001 /	.0003		
10	[illegible]					[illegible]

Inspection Before [signature] Date 8-24-72 Quality Control _____ Date _____
After _____ Date _____ Engineering _____ Date _____

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER [illegible] C/L C
PART NAME [illegible]

Next Assembly _____ C/L ___ Final Assembly _____ S/N AC1-2

NO.	Dimension and Location		B P max. / min	Before	After	Remark
1	O.D.	[illegible]	[illegible] / [illegible]	6.338		THICK WHEN TAKEN [illegible]
2						
3						
4						
5						
6						
7						
8						
9						
10						

Inspection Before [signature] Date 8-24-72 Quality Control _____ Date _____
After _____ Date _____ Engineering _____ Date _____

Figure 20. Inspection cards.

VENDOR NAME AND ADDRESS: ACE INDUSTRIES, 8839 PIONEER BLVD, SANTA FE SPRINGS CA.

☐ DISPO. COPY TO

☐ AIR OPER.

PART LOCATION

☐ TRAVEL PARTS ☐ STOP PARTS

AIRESEARCH MANUFACTURING COMPANY OF ARIZONA

INSPECTION TRANSFER REPORT 35803

PAGE 1 OF 1

BUYER: R. Beck LINE: 39 DATE 8-18-72

PROGRAM	P.O. NO. / PURCHASE REQ. NO.	ITEM	REC. REPORT NO. / P.W.O. SER. NO.	RELEASE NO. / TRANSFER TO RELEASE	PART OR ASSEM. NO. / NAME	C/L
NAS-3-15328	390072 / MP-051542	01A	161198	3408-149612-1-0	SK P-26205-1 / IMPELLER	C

I&T REQUIRED TYPE

RR/CMR

CORRECTIVE ACTION
C/A REQUESTED: ☐ YES ☒ NO
WRITTEN REPLY REQ'D: ☐ YES ☐ NO
C/A NOTED BELOW: ☐ YES ☐ NO
SIGN

INSP. DISPOSITION	CODE	QTY.	INSPECTED BY
TO MATERIAL REVIEW	1		
REJECTED FOR REWORK	4		
REJECTED - SCRAP	5		
RELEASED TO E.D.	6	1	Willie

TOTAL QTY. ON REC. REP./PWO: 1
MOT DATE
LAST OPER / NEXT OPER 61-2
OTHERWISE O.K. ☒ YES ☐ N.O.W.I.
INSP APPROVAL
REPL'T REQ. NO.

LOT NO. PROD. ____ PRE PROD. ____ DEV. ____ RESEARCH X

GP	QTY.	ZONE	CODE	REASONS FOR REJECTION	NVR	ACC	RWK	SCP
1	1	5B		S/N ACI-2 [B/C] .007 out of B/F Tol. Blades have been damaged & RAD E higher at O.D. See chart II blade contour		X		
		6J		[B/.008] Hub contour is .003 outside B/F tolerance		X		
		3C		1.526 1.522 dia. varies from 1.529 to 1.518 & two blades bent		X		
		4F		1.942 1.932 dia. varies from 1.947 to 1.935 concaved		X		

disk flow-line

INSP. PRE.

MATERIAL REVIEW SUMMARY OF DISPOSITION

Acceptable for use. Concurrence of Aero (G. Persone) and Stress (E. Nelson) was achieved. W. Shoup 93-91

V-231 9-7-72

ATTACHMENTS YES ____ NO ____
ACPT.: RELEASED TO STORES / RELEASED TO
RETURN FOR COMPLETION
REJ.: REWORKABLE / SCRAP

	O.K.	REJ.	INSPECTOR
ROCKWELL	/		
MAGNAFLUX			
ZYGLO			

QUAL. CONT. REP. ENG. REP. MIL. REP. DATE

DISPOSITION	RESPONSIBILITY AIR	VEND
SCRAP HERE		
REWORK HERE		
R.T.V. REWORK		
R.T.V. SCRAP		
TOTAL		
RWK. EST COST		
INSP EST COST		
TOTAL		

PURCHASING DISPOSITION / CORRECTIVE ACTION (SHOP)
TO:
VIA: SIGN. DATE

CONT. POINT RECOMMENDATIONS / MFG. ENGR. DISP.
SIGN. DATE

RECD.	QUANT.	RECEIVED BY	DATE	SHIPPER NO. / DATE	UNIT COST	AMOUNT	STAMP
87							
88							

COPY No. 1A

Figure 21. Inspection report.

AiResearch Manufacturing Company of Arizona

P0389D

REQUEST FOR MATERIAL REVIEW ACTION

MR CASE P 35717

Material Review

Material Review disposition is requested on 1 pieces of this part with the discrepancies listed below.

M.O.T. Date No. C/L

REQUESTED BY (Vendor Name & Address)

DATE 7/31/72

PART NO. 26205-1

PART NAME Rev "C" Impeller

RELEASE NO. 3409

P.O. NO. 390072

BUYER Bob Beck

LINE 39

VENDOR SIGNATURE Earl Hagenwood

DEVELOPMENT ☐ PRODUCTION ☐

GROUP NO.	QTY.	ZONE	VIEW	DISCREPANCIES (Describe Fully)	NVR	ACP	RWK	SRP
	1	4E	Sec. D-D	1.29 - 1.31 dia. is U/S to 1.206 for a length of .175 See attached sketch.			/	
				Suggested repair: blend miscut dia to 1.244 - 1.254 Surface with a .18 - .20 radius. See sketch.				
				TOTAL				

MATERIAL REVIEW RECOMMENDATIONS AND DISPOSITION (DOES NOT WAIVE SUPPLIER'S CONTRACTURAL OBLIGATIONS.)

Rework per attached sketch acceptable

QUALITY CONTROL REP.	ENGINEERING REP. 8/4/72	MILITARY REP.	DATE

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

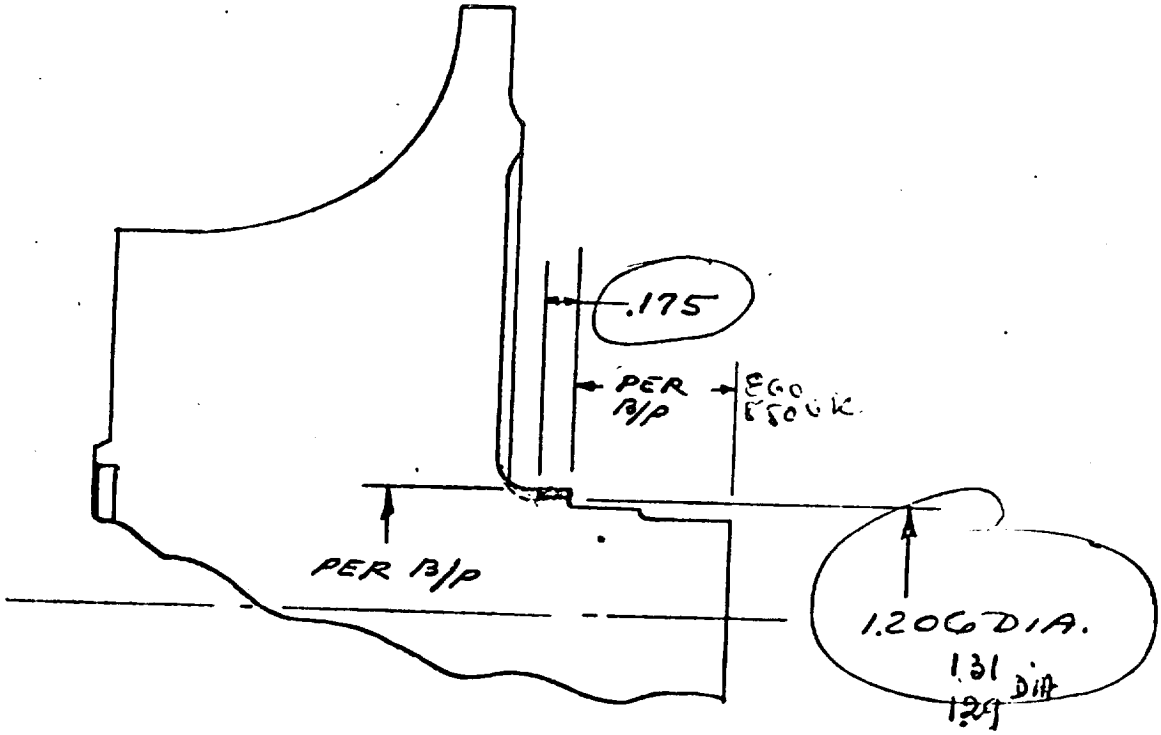
(FOR INFORMATION ONLY. THIS SPACE MAY ALSO BE USED TO SPECIFY ANY ACTION WHICH AIRESEARCH SHOULD TAKE TO ASSIST IN RESOLVING THE PROBLEM.)

Discrepancy is due to human error. Operator disciplined.

SIGNATURE:

Note to Vendor: MR Case No. must be shown on Packing List accompanying these parts, and no other parts are to be included on the same Packing List.

Figure 22. Request for material review action.



XXX ± 005	FINISH	CONCENTRICITY T.I.R.
DRAWN BY Ramsey	CHECKED BY	DATE 7-24-72
ACE INDUSTRIES SANTA FE SPRINGS, CA 90670		
SKP 26205-"C" ARS-PHOENIX		
SCALE FULL	MATERIAL	DRAWING NO. SK0724-72

Figure 23. Detail sketch of SKP 26205 Impeller.

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER 3K22207 C/L —
PART NAME DIFFUSER

Next Assembly ____ C/L ____ Final Assembly 3K22212-1 S/N ____

NO.	Dimension and Location		BP max/min	Before	After	Remark
1		7-E	10.249 / 10.248	10.249		
2		7E	10.000 / 9.995	9.998		
3	⌖ D (REF 2 ABOVE)	7.E	.003 / CIRCULAR	.0005		
4		9E	5.689 / 5.687	5.6882		
5	⌖ D (REF 4 ABOVE)	9.E	.002 / CIRCULAR	.0010		
6	11 A DIFFUSER INTERFACE (E)	9-G	.001	N/A		
7	⊥ D	10-F	.001	.0005		
8	11 A	10-H	.002	N/A		
9						
10						

Inspection Before B. Willard Date 9/9/21 Quality Control ____ Date ____
After ____ Date ____ Engineering ____ Date ____

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER 3K22620A C/L N/C
PART NAME INLET HOUSING

Next Assembly ____ C/L ____ Final Assembly 3K22212-1 S/N 1

NO.	Dimension and Location		BP max/min	Before	After	Remark
1		5-E	5.129 / 5.126	5.1266		
2	⌖ B (Ref 1 Above)	5-E	.001 / CIRCULAR	.0005		
3		5-E	4.360 / 4.355	4.378 / 4.377		
4	⌖ B (Ref. 3 Above)	5-D	.001 / CIRCULAR	.0005		
5	B DIA	5-E	4.281 / 4.2800	4.280		
6		5-E	4.000 / 3.995	3.9995		
7	⌖ B (Ref 6 Above)	5-E	.001 / CIRCULAR	.0008		
8	A SURFACE ▱	5-G	.001	.001		
9	A SURFACE ⊥ B	5-G	.001	.0005		
10		6-C	1.785 / 1.775	1.775		

Inspection Before N. Huffman Date 9-11-21 Quality Control ____ Date ____
After ____ Date ____ Engineering ____ Date ____

Figure 24. Inspection cards.

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AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER 3KP26202 C/L N/C
PART NAME BELLMOUTH

Next Assembly ____ C/L ____ Final Assembly 3KP26212 S/N ____

NO.	Dimension and Location		B P max. / min	Before	After	Remark
1	RADIUS	60	3.96 / 3.92	3.94		
2	O.D.	7C	12.20 / 12.16	12.190		
3	DIA.	5C	3.942 / 3.938	3.939 / 3.938		
4	LENGTH	60	6.52 / 6.48	6.484		
5	BOSS LOCATION	50	1.24 /	1.284		LABEL 1
6	" "	"	1.24 /	1.249		LABEL 2
7	" "	"	1.24 /	1.240		LABEL 3
8			/			MR#0866 E.O
9			/			
10			/			

Inspection Before M. Huffman Date 10-5-71 Quality Control ____ Date ____
After ____ Date ____ Engineering ____ Date ____

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER 3KP26477 C/L N/C
PART NAME BELL MOUTH

Next Assembly ____ C/L ____ Final Assembly 3KP25711-1 S/N ____

NO.	Dimension and Location		B P max. / min	Before	After	Remark
1	RADIUS OF BELL		3.7550 /	3.750		COX INST. DRWG.
2	OVERALL LENGTH		7.500 /	7.296		"
3	BORE DIA		3.750 /	3.753		"
4	BOSS LOCATION		1.270 /	1.273		LABEL 1
5			1.270 /	1.271		LABEL 2
6			1.270 /	1.266		LABEL 3
7	OUTSIDE DIA		11.25 /	11.240		COX INST DRWG
8			/			
9			/			
10			/			

Inspection Before M. Huffman Date 10-5-71 Quality Control ____ Date ____
After ____ Date ____ Engineering ____ Date ____

Figure 25. Inspection cards.

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER [illegible] C/L NC
PART NAME [illegible]

Next Assembly ____ C/L ____ Final Assembly [illegible] S/N ____

NO.	Dimension and Location		B P max/min	Before	After	Remark
1		3-C	[illegible]	16.343		
2	A SURFACE ⊥ B	4-D	[illegible]	.0005		
3	A	5-D	.0005	[illegible]		IR# 34340
4		5-C	[illegible]	15.953		
5	A A (REF ABOVE)	5-C	.002	.0005		
6						
7						
8						
9						
10						

Inspection Before [signature] Date 6-2-72 Quality Control ____ Date ____
After ____ Date ____ Engineering ____ Date ____

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER [illegible] C/L ____
PART NAME PLATE

Next Assembly ____ C/L ____ Final Assembly [illegible] S/N SN 101

NO.	Dimension and Location		B P max/min	Before	After	Remark
1		5-C	[illegible]	13.602		
2						
3						
4						
5						
6						
7						
8						
9						
10						

Inspection Before [signature] Date 8-2-71 Quality Control ____ Date ____
After ____ Date ____ Engineering ____ Date ____

Figure 26. Inspection cards.

VENDOR NAME AND ADDRESS

☐ DISPO. COPY TO

☐ AIR OPER.

PART LOCATION

AIRESEARCH MANUFACTURING COMPANY OF ARIZONA

INSPECTION TRANSFER REPORT

24340

BUYER: LINE:

PAGE 1 OF 1

DATE 6-5-72

PROGRAM	P. O. NO. / ITEM	REC. REPORT NO.	RELEASE NO.	PART OR ASSEM. NO.	C/L
NASA 6-1	PURCHASE REQ. NO.	RPR# 06608	737309-00-0100	SK1-36210-1	N/C
		F. W. O. BEA. NO.	TRANSFER TO RELEASE	NAME SPACER	

I&T REQUIRED TYPE

RR/CMR

LOT NO.

CORRECTIVE ACTION
C/A REQUESTED: ☐ YES ☐ NO
WRITTEN REPLY REQ'D: ☐ YES ☐ NO
C/A NOTED BELOW: ☐ YES ☐ NO
SIGN

INSP. DISPOSITION	CODE	QTY.	INSPECTED BY
TO MATERIAL REVIEW	1		
REJECTED FOR REWORK	4		
REJECTED - SCRAP	5		
RELEASED TO	6		n/c
ENG. DISP.		1	Huffman

TOTAL QTY. ON REC. REP./PWO 1

NOT DATE —

LAST OPER STORES | NEXT OPER 61-2

OTHERWISE O.K. ☒ YES ☐ N.O.W.I.

INSP APPROVAL

REPL'T REQ. NO.

PROD. ____ PRE PROD. ____ DEV. ____ RESEARCH —

GP	QTY.	ZONE	CODE	REASONS FOR REJECTION	DR. 07	D 1	R 0	NVR	ACC	RWK	SCP
1	1	5/6		11A 0005 IS .003"						X	

MATERIAL REVIEW SUMMARY OF DISPOSITION

Rework per B/P.

ATTACHMENTS YES ____ NO ____

ACPT. RELEASED TO STORES

ACPT. RELEASED TO

RETURN FOR COMPLETION

REJ. REWORKABLE

REJ. SCRAP

	O.K.	REJ.	INSPECTOR
ROCKWELL			
MAGNAFLUX			
ZYGLO			

QUAL. CONT. REP. ENG. REP. 6/8/72 MFG. REP. DATE

DISPOSITION	RESPONSIBILITY AIR	VEND
SCRAP HERE		
REWORK HERE		
R.T.V. REWORK		
R.T.V. SCRAP		
TOTAL		
RWK. EST COST		
INSP EST COST		
TOTAL		

PURCHASING DISPOSITION / CORRECTIVE ACTION (SHOP)

TO:

VIA: SIGN. DATE

CONT. POINT RECOMMENDATIONS / MFG. ENGR. DISP.

SIGN. DATE

RECD.	QUANT.	RECEIVED BY	DATE	SHIPPER NO.	UNIT COST	AMOUNT	STAMP
87				DATE			
88							

FORM P 8-10

MATERIAL REVIEW

Figure 27. Inspection report.

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AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER JKP 26212 C/L —
PART NAME TEST MFA ASSY

Next Assembly _____ C/L ___ Final Assembly FINAL S/N 1

NO.	Dimension and Location		B P max/min	Before	After	Remark
1		14D	4.7473 / 4.7463	4.746		
2	A B	14D	.0005	.0002		
3	CONTOUR CHARTS			-003		ITR 3511
4				"		
5						
6						
7						
8						
9						
10						

Inspection Before [illegible] Date 6-16-72 Quality Control _____ Date _____
After _____ Date _____ Engineering _____ Date _____

P5467

AiResearch Manufacturing Company of Arizona
QUALITY CONTROL
REINSPECTION RECORD

PART NUMBER JKP 26212 C/L —
PART NAME TEST MFA ASSY

Next Assembly _____ C/L ___ Final Assembly FINAL S/N _____

NO.	Dimension and Location		B P max/min	Before	After	Remark
1		14D	4.7473 / 4.7463	4.7463		
2	A B	14D	.0005	N/A		
3	CONTOUR CHARTS					ITR 3313 4
4						
5						
6						
7						
8						
9						
10						

Inspection Before [signature] Date 6/16/72 Quality Control _____ Date _____
After _____ Date _____ Engineering _____ Date _____

Figure 28. Inspection cards.

10M SETS 1-72 MESSENGER GRAPHICS 37182

AIRESEARCH MANUFACTURING COMPANY OF ARIZONA

INSPECTION TRANSFER REPORT 35410

VENDOR NAME AND ADDRESS	SHLINGER INDUSTRIES INC / PO BOX 6320 / PHOENIX ARIZ. 85005
☐ TRAVEL PARTS	☐ STOP PARTS
☐ DISPO. COPY TO	
☐ AIR OPER.	
PART LOCATION	
BUYER: L. KLOSTER	LINE: 39
PAGE 1 OF 1	DATE 7-21-72

PROGRAM	P. O. NO.	ITEM	REC. REPORT NO.	RELEASE NO.	PART OR ASSEM. NO.	C/L
NASA B1	374112	01A	154213	1509	SKP-262124	
	PURCHASE REQ. NO. 14.P.05943-3549		P. W. O. BLR. NO.	TRANSFER TO RELEASE	NAME: SHROUD ASSY	

I&T REQUIRED TYPE ____

RR/CMR ____

CORRECTIVE ACTION
C/A REQUESTED: ☐ YES ☒ NO
WRITTEN REPLY REQ'D: ☐ YES ☐ NO
C/A NOTED BELOW: ☐ YES ☐ NO
SIGN.____

DISP. DISPOSITION	CODE	QTY.	INSPECTED BY
TO MATERIAL REVIEW	1		
REJECTED FOR REWORK	4		
REJECTED - SCRAP	5		
RELEASED TO ED	6	1	Willie

TOTAL QTY. ON REC. REP./PWO: 1
NOT DATE ____
LAST OPER. ____ NEXT OPER. 61-2
☒ YES ☐ N.O.W.I.

LOT NO. ____ PROD. ____ PRE PROD. ____ DEV. ____ RESEARCH X

CP	QTY.	ZONE	CODE	REASONS FOR REJECTION		NVR	ACC	RWK	SCP
					CR. 05 / 1 / R 0				
1	1	E13		◻C/D/.002 IS TO -.003 UNDER B/P MIN. PER CHART			✓		

MATERIAL REVIEW SUMMARY OF DISPOSITION

Acceptable for use.

ATTACHMENTS	YES ___ NO ___
ACPT. RELEASED TO STORES	
RELEASED TO	
RETURN FOR COMPLETION	
REJ. REWORKABLE	
SCRAP	

	O.K.	REJ.	INSPECTOR
ROCKWELL			
MAGNAFLUX			
ZYGLO			

QUAL. CONT. REP. ____ ENG. REP. 7/25/72 ____ MIL. REP. ____ DATE ____

DISPOSITION	RESPONSIBILITY AIR	VEND
SCRAP HERE		
REWORK HERE		
R.T.V. REWORK		
R.T.V. SCRAP		
TOTAL		
RWK. EST COST		
SCRAP EST COST		
TOTAL		

PURCHASING DISPOSITION / CORRECTIVE ACTION (SHOP)

TO:

VIA: SIGN. DATE

CONT. POINT RECOMMENDATIONS / MFG. ENGR. DISP.

SIGN. DATE

RECD.	QUANT.	RECEIVED BY	DATE	SHIPPER NO.	UNIT COST	AMOUNT	STAMP
88				DATE			

Figure 29. Inspection report.

☐ TRAVEL PARTS ☐ STOP PARTS

AIRESEARCH MANUFACTURING COMPANY OF ARIZONA

INSPECTION TRANSFER REPORT

08844
R-31

VENDOR NAME AND ADDRESS: ... MFG. CO.

PURCH. COPY TO.

PART LOCATION

AIR OPER.

PAGE 1 OF 1

DATE

BUYER:

LINE:

PROGRAM	P. O. NO. / PURCHASE REQ. NO.	ITEM	REPORT NO.	RELEASED TO	PART OR ASSY. NO. / NAME
TEST RIG C.P.F.F.					

MAT REQUIRED TYPE

MR/CMR

CORRECTIVE ACTION
C/A REQUESTED: ☐ YES ☐ NO
WRITTEN REPLY REQ'D: ☐ YES ☐ NO
C/A NOTED BELOW: ☐ YES ☐ NO
SIGN

INSP. DISPOSITION	CODE	QTY.	INSPECTED BY
TO MATERIAL REVIEW	1		
REJECTED FOR REWORK	4		
REJECTED - SCRAP	5		
RELEASED TO ED	6	1	

TOTAL QTY. ON I.C. REPORT: 1

LAST OPER / NEXT OPER

SEE NOTE

LOT NO.

PROD. ____ PRE PROD. ____ DEV. ____ RESEARCH X

OP	QTY.	VEND	CODE	REASONS FOR REJECTION	RVR	ACC	RWK	SCR
1	1			(1) ... IS ... .003 OUTSIDE B/P TOLERANCE ...			1	
				ALSO METAL SPRAY HAS AREA THAT IS POROUS				
				(2) 71 E F .0005 IS .0040			✓	
				*NOTE: INSPECTED TO SKP 26212-1 M/P.				

MATERIAL REVIEW SUMMARY OF DISPOSITION

Item 1 - Rework at AiResearch by grinding surface of ... coat paint .003 thickness. Re-side screen.

Item 2 - Rework to B/P limits - Re-chrome plate may be required. Coordinate w/ Jerry ... x4311

ATTACHMENTS YES ____ NO ____

RELEASED TO STC
RETURN FOR COMPLETION
REWORKABLE
SCRAP

	O.K.	REJ.	INSPECTOR
ROCKWELL			
MAGNAFLUX			
ZYGLO			

QUAL. CONT. REP. ENG. REP. 4/6/72 MIL. REP. DATE

DISPOSITION	RESPONSIBILITY AIR	VEND
R.T.V. REWORK		
R.T.V. SCRAP		
TOTAL		

PURCHASING DISPOSITION / CORRECTIVE ACTION (SHOP)

TO:

VIA: DATE

CONT. POINT RECOMMENDATIONS / MFG. ENGR. DISP.

SIGN. DATE

REC. CO. | ... BY | DATE | SHIPPER NO. | UNIT COST

Figure 30. Inspection report.

DISCUSSION OF RESULTS AND CONCLUDING REMARKS

A four-task program culminating in the delivery of a high pressure ratio compressor stage has been completed by the AiResearch Manufacturing Company of Arizona.

In Task I, a centrifugal impeller based on an existing AiResearch design was defined. In addition a vaned diffuser was designed to match this impeller and also be compatible with an existing test rig previously delivered to NASA.

Task II consisted of the mechanical analysis of the design provided in Phase I to insure its mechanical integrity.

In Task III, all hardware was procured and inspected to insure conformity with design tolerances.

In accordance with contractual requirements, Task IV was an overspeed test of one of the impellers fabricated under this program. This successful test was witnessed by a NASA representative.