

S A E

AERONAUTICAL INFORMATION

REPORT

NO. 26

NUMBER 70-90, 70L-90, 80-100 AND 80L-100 PROPELLER SHAFT ENDS
DUAL ROTATION (PROPELLER SUPPLIED BEARING)



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May 1, 1949

REAFFIRMED

5/95-

PREPARED BY

Committee E-21, Standard Components for Aircraft Engines
and
Committee P-6, Propeller Standards

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NUMBER 70-90, 70L-90, 80-100 AND 80L-100 PROPELLER SHAFT ENDS

DUAL ROTATION (PROPELLER SUPPLIED BEARING)

INTRODUCTION

1. PURPOSE:

- 1.1 The purpose of this report is to preserve for record purposes the dimensions for the No. 70-90, 70L-90, 80-100 and 80L-100 dual rotation propeller shaft ends, which have been deleted from Aeronautical Recommended Practice ARP 375.

2. BACKGROUND:

- 2.1 Aeronautical Recommended Practice ARP 375, initially issued November 1, 1948, included dimensions and data for No. 70-90, 70L-90, 80-100 and 80L-100 dual rotation shafts. The 70-90 and 70L-90 shafts were intended for use with engines of 8,000 to 12,000 HP. However, at about this time it became apparent that the 70 and 70L shafts in these combinations were critically loaded due to gyroscopic and LXP continuous bending moments being encountered in modern high-speed high wing-loading aircraft. Therefore, dimensions for the 80-90 shafts were developed for inclusion in the revised ARP 375. Since it appeared that the 70-90, 70L-90, 80-100 and 80L-100 shafts would not be used, it was decided to delete them from ARP 375 and include them in an Aeronautical Information Report.
- 2.2 Although SAE Committees E-21 and P-6 had established the designations 70-90 for the shafts having a P dimension of 23.250 and 70L-90 for the shafts having a P dimension of 29.250, the Air Force and Navy in issuing AND10152, Shaft Ends - Propeller, revision 1, chose to show only the combination with the P dimension of 29.250 and to designate this as 70-90. In view of the previous correspondence, layouts, etc., which showed this combination as the 70L-90, the tables included herein do not agree with AND10152 in this regard, but retain the original designation from ARP 375. The above is noted to prevent future confusion concerning these particular shaft designations.

THIS REPORT WAS PREPARED BY

Committee E-21, Standard Components for Aircraft Engines
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Pratt & Whitney Aircraft

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C. C. DePew Ranger Aircraft Engines	E. M. Phillips General Electric Company Aircraft Gas Turbine Div.
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J. B. Johnson USAF Air Materiel Command	C. E. Mines
R. D. Kelly United Air Lines, Inc.	Wright A. Parkins Pratt & Whitney Aircraft
W. C. Lawrence American Airlines System	

ENGINE PARTS, AND ENGINE MOUNTED ACCESSORIES OR SAE ACCESSORY CLEARANCE ENVELOPES IF AVAILABLE, NOT TO EXTEND OUTBOARD OF THIS LINE

SURFACE MUST BE SQUARE WITH DIA H OF INBOARD SHAFT WITHIN .015 FIR, AND FREE FROM HOLES OR SLOTS OTHER THAN THOSE SPECIFIED

ENCLOSED SPACE EXCEPT FOR THAT SHOWN ON FIG.3 RESERVED FOR ENGINE NOSE MFR, BOLTS, CAP SCREWS OR STUDS OPTIONAL WITH MFR

SURFACE MUST BE SQUARE WITH DIA H OF INBOARD SHAFT WITHIN .005 FIR, AND FREE FROM HOLES OR SLOTS

CONCENTRICITY NOTES:
WITH EITHER SHAFT MOUNTED ON DIA G AND REAR BEARING SURFACE, DIA H, KK (APPLIES TO OUTBOARD SHAFTS ONLY) AND OTHER BEARING SURFACES, SHALL BE CONCENTRIC WITHIN .001 FIR, THREAD T- PITCH DIA S SHALL BE CONCENTRIC WITHIN .005 FIR, AND DIA Z ON INVOLUTE SPLINES SHALL BE CONCENTRIC WITHIN .002 FIR.
WITH SHAFTS UNSUPPORTED BY PROPELLER BEARING, DIA KK ON OUTBOARD SHAFT AND DIA G ON INBOARD SHAFT SHALL BE CONCENTRIC WITHIN .048 FIR.
DIA H ON INBOARD SHAFT AND DIA HH SHALL BE CONCENTRIC WITHIN .007 FIR.

TAPER NOTE:
SURFACE AT DIA G AND H NOT TO TAPER MORE THAN .0005 PER INCH OF LENGTH

ENGINE MANUFACTURER TO PLUG SHAFT TO PREVENT LEAKAGE IN EITHER DIRECTION UNDER 12 INCH HEAD OF SAE NO.10 OIL. FRONT SURFACES OF PLUG TO BE WITHIN THIS LENGTH

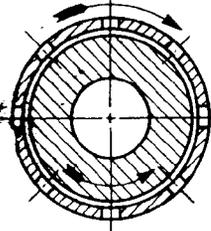
8 SLOTS EQUALLY SPACED CIRCUMFERENTIALLY WITHIN .010 OF TRUE LOCATION.

THREAD T NS, PITCH DIA S SEE ALSO FIG.2

CENTER OPTIONAL WITH MFR
DRILL W THRU 8 HOLES EQUALLY SPACED CIRCUMFERENTIALLY WITHIN .010 OF TRUE LOCATION

ENGINE MFR TO PROVIDE OIL SEAL BETWEEN SHAFTS, AND BETWEEN INBOARD SHAFT AND ENGINE NOSE
SURFACE MUST BE FREE FROM HOLES OR SLOTS.
SHOULDER NEED NOT BE INTEGRAL WITH SHAFT.
SURFACE MUST BE SQUARE WITH DIA KK WITHIN .002 FIR. SELF ALIGNING NON-INTEGRAL SHOULDERS SHALL BE CHECKED WHEN HELD RIGIDLY IN PLACE. FOR INSPECTION PURPOSES IT IS PERMISSIBLE TO ADJUST PARTS BY THE APPLICATION OF NORMAL ALIGNING FORCES TO MEET THIS REQUIREMENT

INCOMPLETE THD MUST NOT GO BEYOND THIS SHOULDER
END OF LAST FULL THD MEASURED AT BOTTOM OF PERFECT THD
CHAMFER 30°



SECTION AA
ARROWS INDICATE REQUIRED DIRECTION OF ROTATION. SHAFT GEAR RATIOS ARE TO BE IDENTICAL.

THREAD UNDERCUT OPTIONAL
THREADING METHOD OPTIONAL

BREAK SHARP EDGES .016

UNLESS OTHERWISE SPECIFIED
ALLOWABLE TOLERANCE ON: -
LINEAR DIMENSIONS ±.01
ANGULAR DIMENSIONS ±2°

ENGINE PARTS, AND ENGINE MOUNTED ACCESSORIES OR SAE ACCESSORY CLEARANCE ENVELOPES IF AVAILABLE, NOT TO EXTEND OUTBOARD OF THIS LINE

SURFACE MUST BE SQUARE WITH DIA H OF INBOARD SHAFT WITHIN .015 FIR, AND FREE FROM HOLES OR SLOTS OTHER THAN THOSE SPECIFIED

ENCLOSED SPACE EXCEPT FOR THAT SHOWN ON FIG.3 RESERVED FOR ENGINE NOSE MFR, BOLTS, CAP SCREWS OR STUDS OPTIONAL WITH MFR

SURFACE MUST BE SQUARE WITH DIA H OF INBOARD SHAFT WITHIN .005 FIR, AND FREE FROM HOLES OR SLOTS

SEE FIG.3 DIM. ZZ
RELATIVE RADIAL CLEARANCE BETWEEN SHAFTS → B

SEE FIG.3 DIM. ZZ
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RELATIVE RADIAL CLEARANCE BETWEEN SHAFTS → B

SEE FIG.3 DIM. ZZ
RELATIVE RADIAL CLEARANCE BETWEEN SHAFTS → B

FIG. 1 * DIMENSIONS, DIMENSION LETTERS AND NOTES ARE FOR BOTH SHAFTS AS APPLICABLE

LET	TOLERANCE		70 — 90		70L — 90		80 — 100		80L — 100	
	OUT-BOARD SHAFT	IN-BOARD SHAFT	INVOLUTE SPLINES	INVOLUTE SPLINES						
A	+0.000	-.005	5.539	7.554	5.539	7.554	6.411	8.667	6.411	8.667
B	MAX		5.294	7.294	5.294	7.294	6.151	8.313	6.151	8.313
C	+0.000	-.020	—	—	—	—	—	—	—	—
	+0.010	-.020	5.179	7.179	5.179	7.179	6.036	8.199	6.036	8.199
D	+0.000	-.0030	.2233	.2234	.2233	.2234	.2233	.2607	.2233	.2607
E	+0.000	-.004	5.120	7.120	5.120	7.120	5.995	8.120	5.995	8.120
F	+0.000	-.005	4.938	6.938	4.938	6.938	5.812	7.938	5.812	7.938
G	+0.000	-.002	5.156	7.156	5.156	7.156	6.011	8.174	6.011	8.174
H	+0.000	-.002	5.562	7.570	5.562	7.570	6.426	8.682	6.426	8.682
I	±.020	±.025	14.188	3.312	20.188	3.312	15.875	3.500	23.875	3.500
J	±.030	±.040	14.688	3.812	20.688	3.812	16.375	4.000	24.375	4.000
K	±.020		19.062	8.000	25.062	8.000	21.500	9.000	29.500	9.000
L	±.020		—	—	—	—	—	—	—	—
M	+0.000	+0.010*	21.235	11.610	27.235	11.610	24.485	13.735	32.485	13.735
N	+0.010	-.030	22.610	13.110	28.610	13.110	25.860	15.235	33.860	15.235
O	±.015	—	23.000	—	29.000	—	26.312	—	34.312	—
P	±.020		23.250	14.062	29.250	14.062	26.562	15.875	34.562	15.875
Q	±.020		21.125	11.500	27.125	11.500	24.375	13.625	32.375	13.625
R	MAX		2.030	3.030	2.030	3.030	2.030	3.030	2.030	3.030
	MIN		1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
r	+0.030	-.000	.062	.062	.062	.062	.062	.062	.062	.062
S	+0.000	-.0030	—	—	—	—	—	—	—	—
	+0.000	-.0050	5.0418	—	5.0418	—	5.9168	—	5.9168	—
	+0.000	-.0080	—	7.0418	—	7.0418	—	8.0418	—	8.0418
T	—		5.125-8	7.125-8	5.125-8	7.125-8	6.000-8	8.125-8	6.000-8	8.125-8
U	±.030		.250	.250	.250	.250	.250	.250	.250	.250
V	APPROX		.068	.068	.068	.068	.068	.080	.068	.080
W	—		.2656	—	.2656	—	.2656	—	.2656	—
X	—		38	52	38	52	44	51	44	51
Y	—		7/16	7/16	7/16	7/16	7/16	6/16	7/16	6/12
Z	THEO		5.4286	7.4286	5.4286	7.4286	6.2857	8.5000	6.2857	8.5000
AA	±.030		14.125	—	14.125	—	15.938	—	15.938	—
BB	MAX		.094	—	.094	—	.094	—	.094	—
CC	±.020		6.000	—	6.000	—	6.000	—	6.000	—
DD	—		8.750	—	8.750	—	10.000	—	10.000	—
EE	MAX		1.000	—	1.000	—	1.000	—	1.000	—
FF	—		.312	—	.312	—	.375	—	.375	—
GG	MIN		11.375	—	11.375	—	13.000	—	13.000	—
HH	±.001		14.373	—	14.373	—	15.248	—	15.248	—
JJ	+0.005	—	4.375	—	4.375	—	5.156	—	5.156	—
KK	+0.0000	—	5.5908 (142MM BRG)	—	5.5908 (142MM BRG)	—	6.4567 (164MM BRG)	—	6.4567 (164MM BRG)	—
LL	MIN		4.000	—	4.000	—	4.000	—	4.000	—
MM	MAX		9.125	—	9.125	—	10.875	—	10.875	—
NN	MIN		6.250	—	6.250	—	7.125	—	7.125	—
PP	MIN		45°	—	45°	—	45°	—	45°	—
QQ	±.025		.938	—	.938	—	1.062	—	1.062	—
RR	—		—	6.750	—	6.750	—	7.750	—	7.750
SS	MIN		.500	—	.500	—	.500	—	.500	—
TT	±.030		3.000	—	3.000	—	3.000	—	3.000	—
UU	—		—	6.875	—	6.875	—	7.875	—	7.875
VV	MAX		14.250	—	14.250	—	15.125	—	15.125	—

INBOARD AXIAL DIMENSIONS ARE FROM THRUST NUT

M DIM. MAX LIMIT GIVES MIN FULL THREAD

* MINUS VALUE DEPENDS ON METHOD OF THREADING AND THD RUNOUT RELATION TO SHOULDER Q TO OBTAIN DIM. FOR FULL NUMBER OF PITCHES, WHEN DESIRED, DEDUCT BASIC M FROM BASIC N

M DIM. DOES NOT APPLY WHEN UNDERCUT IS USED

UNLESS OTHERWISE SPECIFIED
ALLOWABLE TOLERANCE ON:-
LINEAR DIMENSIONS ±.01
ANGULAR DIMENSIONS ±.2°

TABLE FOR FIG. 1 AND 2