

DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION

P-603-11
HAMILTON STANDARD
23E

September 10, 1956

PROPELLER SPECIFICATION

Propellers of models described herein conforming with this specification and approved data on file with the Civil Aeronautics Administration are rated as airworthy for use in certificated aircraft in accordance with pertinent aircraft specifications and applicable portions of the Civil Air Regulations provided they are installed, operated and maintained as prescribed by the manufacturer.

Manufacturer	Hamilton Standard Division United Aircraft Corporation Windsor Locks, Connecticut					
Type	Constant speed; hydraulic (See NOTES 3 and 4)					
Engine shaft	SAE No. 50, SAE No. 51, SAR No. 40 or X (X indicates special shaft sizes for foreign engines are eligible.)					
Hub material	Steel					
Blade material	Aluminum alloy					
Number of blades	3					
Hub eligible	23E50, 23E51, 23E40 and 23E41 (See NOTE 1)					

Blades Eligible (See NOTE 2)	Maximum Continuous HP	Takeoff RPM	Takeoff HP	Takeoff RPM	Diameter Limits (See NOTE 2)	Hub and Blade Weight (Max. Diameter)	NOTES
6139-0 to 6139-18	1100	1700	1206	1870	11'6 $\frac{1}{2}$ "-10'4" (-0 to -18)	384 lbs.	6
6140 is the left hand version of 6139							5
6153-0 to 6153-30	1255	1790	1380	1970	13'1 $\frac{1}{2}$ "-10'6 $\frac{1}{2}$ " (-0 to -30) Telescoped to 10'3 $\frac{1}{2}$ " (-33T)	400 lbs.	6, 8
6153-12 to 6153-30	1500	1350	1700	1410	12'1 $\frac{1}{2}$ "-10'6 $\frac{1}{2}$ " (-12 to -30)	398 lbs.	6, 8
6154 is the left hand version of 6153							5, 8
6159-0 to 6159-36	1500	1435	1850	1535	11'1 $\frac{1}{2}$ "-11'1 $\frac{1}{2}$ " (-0 to -36)	461 lbs.	6
6160 is the left hand version of 6159							5
6179-0 to 6179-2h	1164	2100	1281	2310	10'6 $\frac{1}{2}$ "-8'6 $\frac{1}{2}$ " (-0 to -2h)	353 lbs.	6
6180 is the left hand version of 6179							5
6229-0 to 6229-30	1255	1790	1380	1970	13'1 $\frac{1}{2}$ "-10'6 $\frac{1}{2}$ " (-0 to -30) Telescoped to 10'3-1/4" (-33T)	400 lbs.	6, 8
6229-12 to 6229-2h	1500	1350	1700	1410	12'1 $\frac{1}{2}$ "-11'1 $\frac{1}{2}$ " (-12 to -2h)	398 lbs.	6, 8
6230 is the left hand version of 6229							5, 8
6243-0 to 6243-42	1350	1295	1600	1350	15'1 $\frac{1}{2}$ "-11'6 $\frac{1}{2}$ " (-0 to -42)	482 lbs.	6
6244 is the left hand version of 6243							5

Blades, Eligible (See NOTE 2)	Maximum Continuous HP	Takeoff HP	Diameter Limits (See NOTE 2)	Hub and Blade Weight (Max. Diameter)	NOTES		
	RPM	RPM					
6247-0 to 6247-24	1164	2100	1261	2310	10 ¹ 6 ¹ / ₂ "-8 ¹ 6 ¹ / ₂ " (-0 to -24)	353 lbs.	6
6248 is the left hand version of 6247							5
6261-0 to 6261-18	1255	1790	1380	1970	11 ¹ 6 ¹ / ₂ "-10 ¹ 1 ¹ / ₂ " (-0 to -18)	384 lbs.	6
6262 is the left hand version of 6261							5
6277-0 to 6277-12	1050	1434	1200	1519	11 ¹ 6 ¹ / ₂ "-10 ¹ 6 ¹ / ₂ " (-0 to -12)	446 lbs.	6
6277-12 to 6277-24	1625	1434	2000	1519	10 ¹ 6 ¹ / ₂ "-9 ¹ 6 ¹ / ₂ " (-12 to -24)	438 lbs.	6
6278 is the left hand version of 6277							5
6339-0 to 6339-18	1095	1700	1206	1870	11 ¹ 6 ¹ / ₂ "-10 ¹ 1 ¹ / ₂ " (-0 to -18)	384 lbs.	6
6340 is the left hand version of 6339							5
6353-0 to 6353-30	1255	1790	1380	1970	13 ¹ 1 ¹ / ₂ "-10 ¹ 6 ¹ / ₂ " (-0 to -30) Telescoped to 10 ¹ 3 ¹ / ₂ " (-33T)	400 lbs.	6,8
6353-12 to 6353-30	1500	1350	1700	1810	12 ¹ 1 ¹ / ₂ "-10 ¹ 6 ¹ / ₂ " (-12 to -30)	398 lbs.	6,8
6353-18 to 6353-30	1275	1435	1525	1575	11 ¹ 6 ¹ / ₂ "-10 ¹ 6 ¹ / ₂ " (-18 to -30)	397 lbs.	6,8
6354 is the left hand version of 6353							5,6
6359-0 to 6359-36	1500	1435	1650	1535	14 ¹ 1 ¹ / ₂ "-11 ¹ 1 ¹ / ₂ " (-0 to -36)	461 lbs.	6
6360 is the left hand version of 6359							5
6379-0 to 6379-24	1164	2100	1261	2310	10 ¹ 6 ¹ / ₂ "-8 ¹ 6 ¹ / ₂ " (-0 to -24)	353 lbs.	6
6380 is the left hand version of 6379							5
6429-0 to 6429-30	1255	1790	1380	1970	13 ¹ 1 ¹ / ₂ "-10 ¹ 6 ¹ / ₂ " (-0 to -30) Telescoped to 10 ¹ 3 ¹ / ₂ " (-33T)	400 lbs.	6,8
6429-12 to 6429-30	1500	1350	1700	1810	12 ¹ 1 ¹ / ₂ "-10 ¹ 6 ¹ / ₂ " (-12 to -30)	398 lbs.	6,8
6430 is the left hand version of 6429							5,6

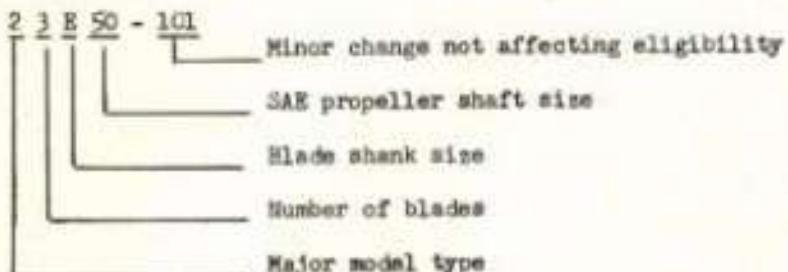
Blades Eligible (See NOTE 2)	Maximum Continuous HP	Continuous RPM	Takeoff		Diameter Limits (See NOTE 2)	Hub and Blade Weight (Max. Diameter)	NOTES
6443-0 to 6443-42 6443 is the left hand version of 6443	1350	1295	1600	1350	15 ¹ / ₄ "-11 ¹ / ₂ " (-0 to -42)	482 lbs.	6
6447-0 to 6447-24 6448 is the left hand version of 6447	1164	2100	1281	2310	10 ¹ / ₂ "-8 ¹ / ₂ " (-0 to -24)	353 lbs.	6
6461-0 to 6461-18 6462 is the left hand version of 6461	1255	1790	1380	1970	11 ¹ / ₂ "-10 ¹ / ₂ " (-0 to -18)	364 lbs.	6
6477-0 [to 6477-12	1200	1465	1350	1575	11 ¹ / ₂ "-10 ¹ / ₂ " (-0 to -12)	446 lbs.	6
6477-12 to 6477-24 6478 is the left hand version of 6477	1625	1434	2000	1550	10 ¹ / ₂ "-9 ¹ / ₂ " (-12 to -24)	438 lbs.	6
6491-0 to 6491-36 6492 is the left hand version of 6491	1750	1275	2100	1400	15 ¹ / ₂ "-12 ¹ / ₂ " (-0 to -36)	493 lbs.	6
6491-48 to 6491-54 6492 is the left hand version of 6491	1600	1350	2000	1520	11 ¹ / ₂ "-10 ¹ / ₂ " (-48 to -54)	461 lbs.	6
6501-0 to 6501-24 6502 is the left hand version of 6501	1600	1275	2000	1350	13 ¹ / ₂ "-11 ¹ / ₂ " (-0 to -24)	466 lbs.	6
6507-0 to 6507-24 6508 is the left hand version of 6507	1600	1275	2000	1350	13 ¹ / ₂ "-11 ¹ / ₂ " (-0 to -24)	468 lbs.	6
6519-0 to 6519-30 6520 is the left hand version of 6519	1275	1465	1425	1575	13 ¹ / ₂ "-10 ¹ / ₂ " (-0 to -30)	455 lbs.	6
6549-0 to 6549-30 6550 is the left hand version of 6549	1275	1465	1425	1575	13 ¹ / ₂ "-10 ¹ / ₂ " (-0 to -30)	455 lbs.	6
6565-12 to 6565-30 6566 is the left hand version of 6565	1255	1790	1380	1970	12 ¹ / ₂ "-10 ¹ / ₂ " (-12 to -30)	402 lbs.	6
6615-0 to 6615-18 6616 is the left hand version of 6615	1275	1435	1525	1575	11 ¹ / ₂ "-10 ¹ / ₂ " (-0 to -18)	431 lbs.	5

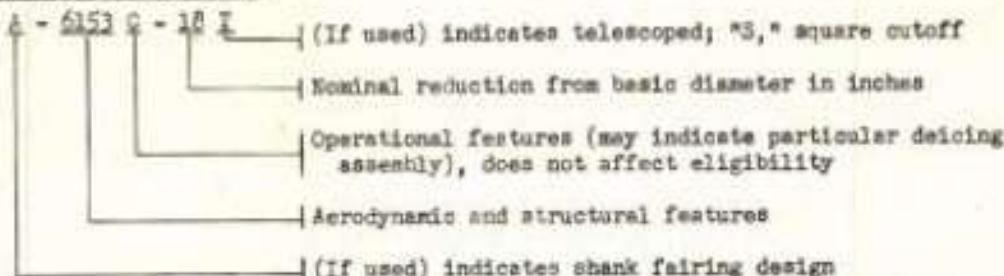
Blades Eligible (See NOTE 2)	Maximum Continuous HP RPM		Takeoff HP RPM		Diameter Limits (See NOTE 2)	Hub and Blade Weight (Max. Diameter)	NOTES
6801-0 to 6801-36	1750	1275	2100	1400	15 ¹ / ₄ "-12 ¹ / ₂ " (-0 to -30)	493 lbs.	6
6801-48 to 6801-60	1700	1465	2000	1520	11 ¹ / ₄ "-10 ¹ / ₂ " (-48 to 60)	461 lbs.	6
6802 is the left hand version of 6801							5
6937-0 to 6937-30	1275	1465	1425	1575	13 ¹ / ₄ "-10 ¹ / ₂ " (-0 to -30)	455 lbs.	6
6938 is the left hand version of 6937							5
6955-0 to 6955-30	1275	1465	1425	1575	13 ¹ / ₄ "-10 ¹ / ₂ " (-0 to -30)	455 lbs.	6
6956 is the left hand version of 6955							5
6965-0 to 6965-24	1600	1275	2000	1350	13 ¹ / ₄ "-11 ¹ / ₂ " (-0 to -24)	468 lbs.	6
6966 is the left hand version of 6965							5

Certification basis
Production basis

Type Certificate No. 603
Production Certificate No. 14

NOTE 1. Hub Model Designation.



NOTE 2. Blade Model Designation.

NOTE The blade model designation suffixed with "T" indicates a diameter reduction by telescoping. Blade models with square cutoffs in accordance with Hamilton Standard blade drawings are suffixed with "S." Telescoped blades and blades with a square cutoff are eligible at the same ratings and diameter limits as blades with standard cutoff. Diameter limits shown are nominal diameters of the assembled propeller and do not include the $\pm 1/8$ inch manufacturing tolerance permissible for propellers with basic diameter less than 14 feet or $\pm 1/4$ inch permissible for propellers with basic diameter 14 feet or larger.

NOTE 3. Pitch Control. Eligible with Hamilton Standard constant speed governor only.

NOTE 4. Feathering. Eligible with full feathering control installed in accordance with the propeller manufacturer's instructions.

NOTE 5. Left Hand Models. The left hand version of an approved model propeller is eligible at the same rating and diameter limitations as listed for the right hand model.

NOTE 6. Interchangeable Blades. Blades with an "S" or "T" suffix (See NOTE 2) are not interchangeable aerodynamically or vibrationwise with each other or with blades having normal round cutoffs. Only blades listed in the same group of the following groups are aerodynamically similar. Only blades listed under the same type in any one group are structurally similar. A higher type number implies a higher strength. This is due to differences in alloys and in cold working of the blade surface.

Type 1 includes standard alloy non-surface treated blades; Type 2, hard alloy non-surface treated blades; Type 3, hard alloy blades with cold worked shanks; Type 4, hard alloy blades with cold worked shanks and shot peened surfaces.

The following defines the degree to which these blades may be used interchangeably in the same diameter without a flight performance test and without a vibration survey:

Type 2 blades may replace Type 1 blades in the same group, but not vice-versa.

Type 3 blades may replace either Type 1 or Type 2 blades in the same group, but not vice-versa.

Type 4 blades may replace either Type 1, Type 2, or Type 3 blades in the same group, but not vice-versa.

Reference should always be made to the ratings of the blades, and blades with different model numbers cannot be incorporated in the same propeller unless the aircraft specification specifically permits this.

<u>Group</u>	<u>Type 1</u>	<u>Type 2</u>	<u>Type 3</u>	<u>Type 4</u>
(a)	6139, 6339			
(b)	6153, 6353	6229, 6429		
(c)	6159, 6359			
(d)	6179, 6379	6247, 6447		
(e)	6243	6443		
(f)	6261, 6461			
(g)	6277, 6477			
(h)	6907	6901	6965	
(i)		6491		6801
(j)*	6519	6549	6937	

*6955 is identical to 6519 except that 6955 has cold worked shanks. 6955 may replace 6519 but not vice-versa. Also 6937 is identical to 6955 except that 6937 is a hard alloy blade while 6955 is standard alloy (both have cold worked shanks). Therefore, 6937 may replace 6955, but not vice-versa. 6549 and 6955 are not structurally interchangeable.

NOTE 7. Accessories.

(a) Propeller Deicing

- (1) Eligible with Hamilton Standard deicing slinger ring assemblies only.
- (2) Eligible with Goodrich No. 37572 propeller deicer fluid feed strips.*
- (3) Eligible with Goodrich No. 36889 propeller deicer fluid feed strips.*

*When installed in accordance with Hamilton Standard instructions regarding the cement sequence for adhering rubber accessories to aluminum alloy blades.

(b) Propeller Spinner

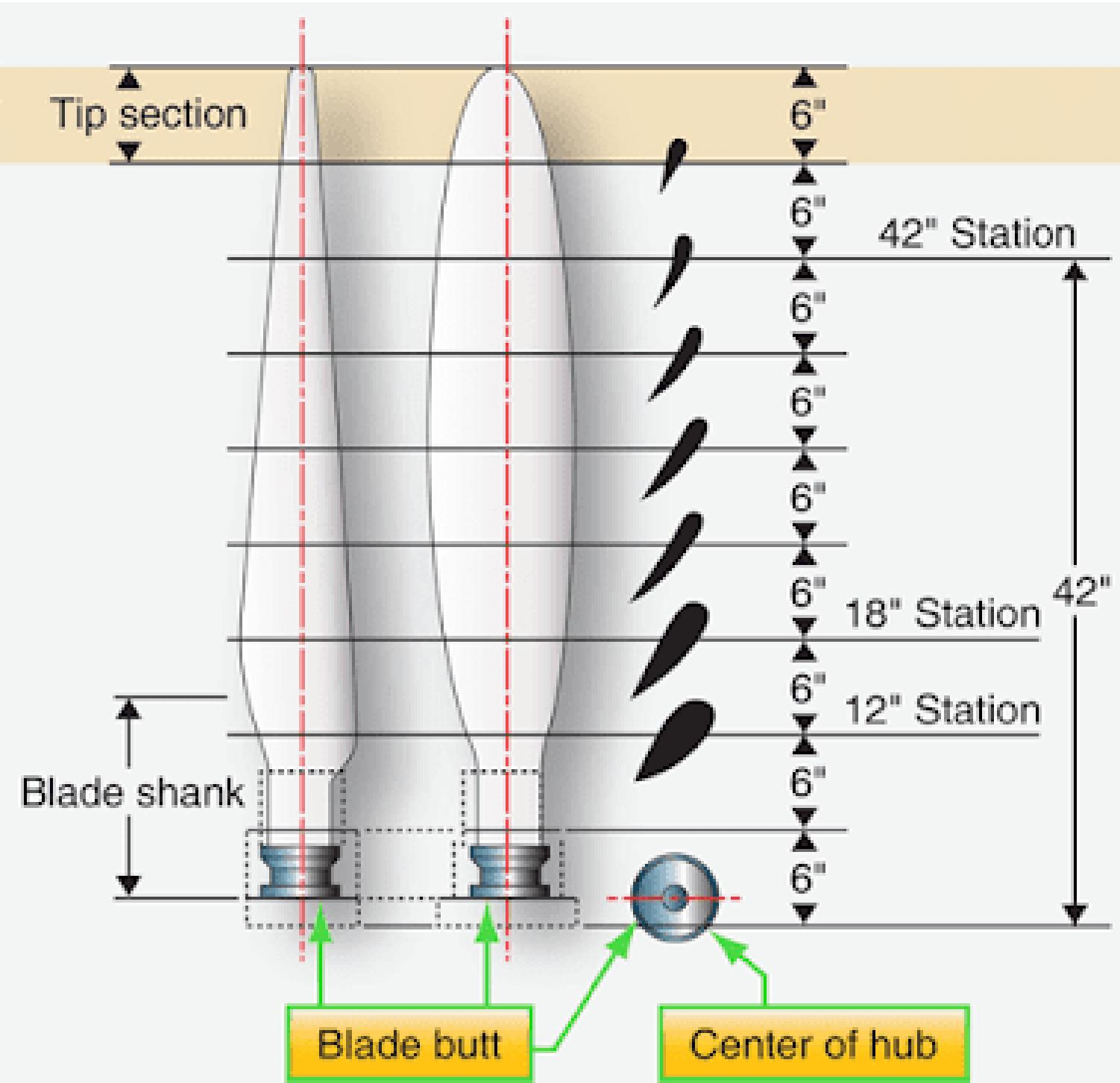
- (1) Eligible with spinner supplied by Hamilton Standard.

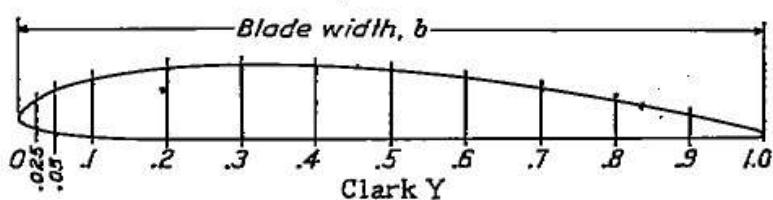
NOTE 8. Shank Fairings. A letter and a dash prefix included in the blade model designation (as A-6153) indicates that the blade assembly includes molded shank fairings. Fairings are eligible only on those model blades specifically designated. The following procedure should be followed when determining if blades with molded shank fairings are eligible on a model aircraft.

- (a) Refer to the pertinent propeller specification and determine whether an assembly of the blade model in question is eligible to incorporate a molded shank fairing.
- (b) Refer to the pertinent aircraft specification and determine whether the same model blade with incorporated molded shank fairing is eligible in the propellers of that model aircraft.

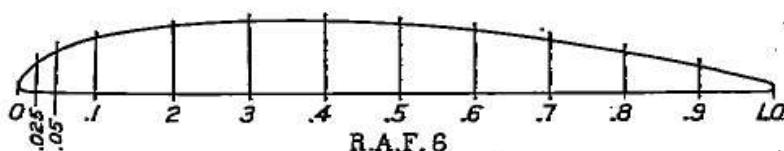
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END





Station	Upper ordinate	Lower ordinate
	Maximum ordinate	Maximum ordinate
0.025	0.55	0.13
.05	.57	.08
.1	.81	.04
.2	.36	.01
.3	1.00	0
.4	.99	0
.5	.93	0
.6	.83	0
.7	.69	0
.8	.52	0
.9	.34	0
L. E. radius		0.15
T. E. radius		.077



Station	Ordinate
	Maximum ordinate
0.025	0.41
.05	.59
.1	.79
.2	.95
.3	1.00
.4	.99
.5	.95
.6	.87
.7	.74
.8	.56
.9	.35
L. E. radius	0.10
T. E. radius	.077

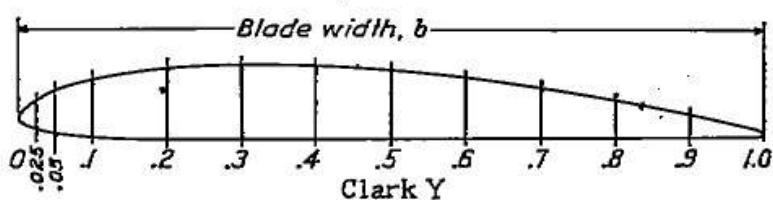
R. A. F. 6



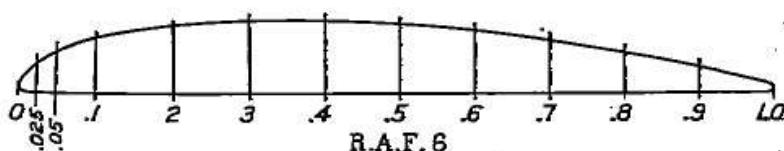
Station	a/b	$h_1/t = h_2/t$
0.025	0.00225	0.2160
.05	.00433	.2983
.1	.00855	.3845
.2	.0148	.4725
.3	.0185	.5000
.4	.0201	.4898
.5	.0198	.4538
.6	.0185	.4013
.7	.0161	.3363
.8	.0126	.2550
.9	.0085	.1633
L. E. radius		0.156
T. E. radius		.078

b , chord; t , thickness
N. A. C. A. 2400-34

FIGURE 9.—Basic propeller sections. Airfoil specifications taken from reference 6.



Station	Upper ordinate	Lower ordinate
	Maximum ordinate	Maximum ordinate
0.025	0.55	0.13
.05	.57	.08
.1	.81	.04
.2	.36	.01
.3	1.00	0
.4	.99	0
.5	.93	0
.6	.83	0
.7	.69	0
.8	.52	0
.9	.34	0
L. E. radius		0.15
T. E. radius		.077



Station	Ordinate
	Maximum ordinate
0.025	0.41
.05	.59
.1	.79
.2	.95
.3	1.00
.4	.99
.5	.95
.6	.87
.7	.74
.8	.56
.9	.35
L. E. radius	0.10
T. E. radius	.077

R. A. F. 6

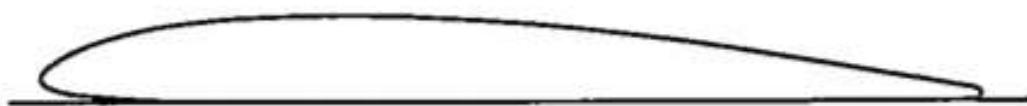


Station	a/b	$h_1/t = h_2/t$
0.025	0.00225	0.2160
.05	.00433	.2983
.1	.00855	.3845
.2	.0148	.4725
.3	.0185	.5000
.4	.0201	.4898
.5	.0198	.4538
.6	.0185	.4013
.7	.0161	.3363
.8	.0126	.2550
.9	.0085	.1633
L. E. radius		0.156
T. E. radius		.078

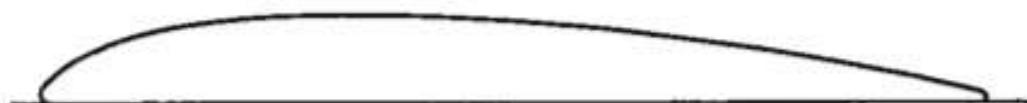
b , chord; t , thickness
N. A. C. A. 2400-34

FIGURE 9.—Basic propeller sections. Airfoil specifications taken from reference 6.

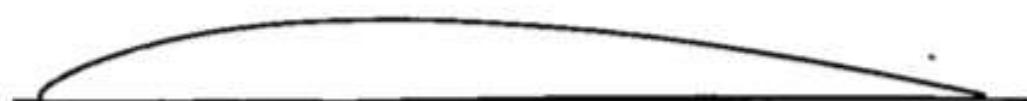
T , is tension in propeller shaft, pounds.
 ΔD , increase in body drag due to slipstream, pounds.
 ρ , mass density of the air, slugs per cubic foot.
 n , propeller rotational speed, revolutions per second.
 D , propeller diameter, feet.



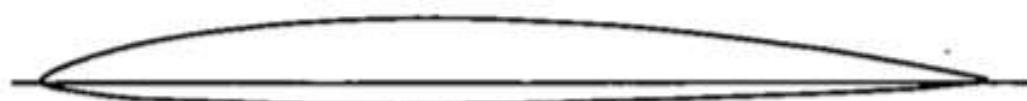
Clark Y section, propeller 5868-9.



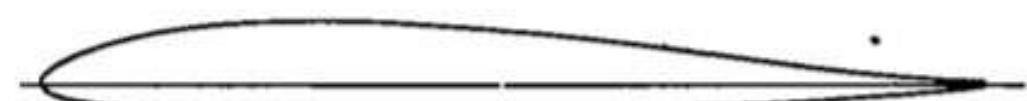
R.A.F. section, propeller 5868-R6.



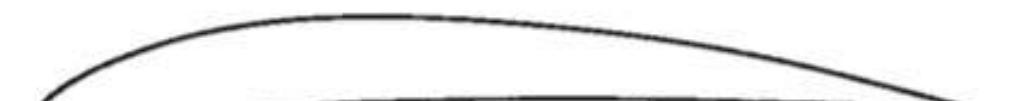
N.A.C.A. 4400 series, propeller 6623-A, also
inner half of propeller 6623-B.



N.A.C.A. 2400-34 series, outer half of
propeller 6623-B.



N.A.C.A. 2R00 series, propeller 6623-C.



N.A.C.A. 6400 series, propeller 6623-D.

FIGURE 4.—Blade sections drawn to scale for the 0.70 radius.