

CURTISS-WRIGHT
ENGINE FAMILY TREE (PRIOR 1920)
AND
WORLD WAR ONE
AIRPLANE AND ENGINE PRODUCTION
OF CURTISS AND WRIGHT
INTERESTS

Prepared by R. E. Johnson
July 1964

The Curtiss-Wright Engine Family Tree goes to Glenn Curtiss' interest in motorcycles in 1900 and the Wright Brothers' need for an engine in 1903. Curtiss had a well established motorcycle business before he had any connection with aviation -- and Wright built their first engine because they needed one to power their first flight on December 17, 1903. The original Wright Brothers' connection with engines was very short-lived and not a major endeavor as shown on Page 3. Curtiss was personally associated with engines from his start in motorcycles until he died. His original effort is shown on Page 4. The Kirkham association was strong and is shown on Page 5. Charlie Lawrence was credited with the beginning of the modern air-cooled radial engine and this is shown on Page 6. The long line of Curtiss engines is shown on Pages 7 and 8.

The Wright production was influenced greatly by the Hispano Suiza Engine Production of World War II. The Wright Martin Co. obtained the rights on those engines which became the property of Wright Aeronautical Corporation at New Brunswick. The war time production is shown on Pages 9, 10 and 11.

WRIGHT ENGINES WRIGHT BROTHERS
SOURCE AEROSPHERE 1939

- (1) 1903 4 cyl. water-cooled 4" bore x 4" stroke
16 BHP @ 1200 RPM 200# wt.
- (2) 1904 Same as (1) but overbored to 4.125 x 4
24 BHP @ 1500 RPM. 240# wt.
This was used through 1905 and they did not fly
06, 07.
- (3) 4 cyl. in line water-cooled bore 4.375 x 4
30 BHP @ 1200, wt. 180# disp. 240.52 39 BHP @ 1600
- (4) 6 cyl. in line water-cooled bore 4.375 x 4
50 BHP @ 1150
- (5) 8 cyl. "V" water-cooled 4.375 x 4
60 BHP @ 1200 disp. 481.04
- (6) 6 cyl. line water-cooled 4.375 x 4.5
60 BHP @ 1400 300# wt. disp. 405.9
This was the last engine directly related to
the Wright Brothers.

ORIGINAL CURTISS ENGINE MODEL DATA

SOURCE: "SKY STORMING YANKEE"

- (1) 1900 Ordered set of castings from E. R. Thomas of Buffalo for single cyl. air-cooled. Too small to drive a motorcycle.
- (2) 1901 Ordered set of castings for larger air-cooled engine 2" bore 2.5" stroke -- still too small for motorcycle in Hammondsport area.
- (3) Third set of castings ordered 3½ x 5" @ 190# wt. assembled. It was air-cooled but unsatisfactory for some reason.
- (4) 1902 Settled on single cylinder 3" bore x 3" stroke air-cooled for early racers. *Win race in Brooklyn + sold 5 motorcycles*
- (5) 1903 The first engine listed in 1939 Aerosphere (C1) was a single cylinder air-cooled 3.25 x 3.25.
- 1904 Curtiss made his first motorcycle official record at Ormond Beach, Florida 10 miles in 8 min. 54 2/5 sec.
- 1904 Curtiss engine made its first flight in a dirigible "California Arrow" 2 cyl. air-cooled 5 HP at the St. Louis World's Fair.
- The second Curtiss engine to fly was in the City of Portland dirigible - 2 cyl. 7 HP air-cooled.
- The third Curtiss engine to fly was a 4 cylinder air-cooled 18 HP for the City of Los Angeles dirigible.
- The fourth Curtiss engine to fly in 6/27/07 was an air-cooled twinshafting - 2 opposite rotating propellers. This was also the vehicle Curtiss took his first flight of any kind.
- By 1907 Curtiss was building 500 - 600 motorcycles (and engines) per year.

KIRKHAM ENGINESSOURCE AEROSPHERE 1939

Charles Kirkham from Hammondsport had the original water driven shop that did the machining of the original Curtiss engines in 1900. He continued working closely with Curtiss on engine design and development. He was largely responsible for the OX5, the K6 and K12 engines of Curtiss. He was Chief Engineer of Aeromarine Plane and Motor Co. and Chief Engineer of Curtiss through the World War one period at Garden City.

The following engines carried his name:

- B4 4 cyl. vert. water bore 4.125 x 4.75 stroke
35/40 HP @ 1400 RPM 180# displacement 253.92
- B6 6 cyl. (Same as B4)
50 HP @ 1300 235# displacement 380.88
- BG6 6 cyl. vert. water bore 4.312 x 5.125
70 HP @ 1680 RPM (geared) displacement 449.16

During 1929, 1930, he experimented with a 6 cylinder, opposed, with 6 crank throws. He was not connected with Curtiss after about 1919.

CHARLES LAWRENCE - ENGINES
SOURCE AERO SPHERE 1939

- Model A Lawrence - Moulton engine was built in France
in 1913 water-cooled.
- Model B Built in U. S. 1916 8 cyl. water-cooled bore 4.75 x 6.5
200 HP @ 1800 RPM 876# disp. 921.5
- Model A3 Designed 1916 Air-cooled horizontally opposed 2 cyl.
29 HP @ 1400 used in "Penguin" Training Planes that
did not fly.
- Model N2 2 cyl. opposed air-cooled USN b 4.25 x 4.25
40 BHP @ 1900 Wt. 79# disp. 120.58
later abandoned for "L"
- Model B Designed 1916 3 cyl. radial air-cooled 60 HP
- Model L2 Air-cooled 3 cyl. radial 4.25 x 5.25
56.5 HP @ 1600 disp. 223.44
- L3 Improved L2 wt. 147#
- L4 Became Wright "Gale" after Lawrence joined Wright
in 1923.
- L5 L3 with a magneto
- J1 1920 9 cyl. radial USA contract with "L" cylinders 140
(Ex) BHP then overbored by 0.25" and became JI.
- J1 9 cyl. air-cooled radial b 4.5 x 5.5
200 HP @ 1800 disp. 787.23
- J11 Like J1 except overbored to 4.875 x 5.5
Then Lawrence Co. absorbed by Wright 1923 and he
became President.

CURTISS ENGINE MODEL DATASOURCE AEROSPHERE 1939

Model	Year	Type	Cyl.	HP	RPM	Weight	Bore	Stroke	Displacement
C1		air-cooled	1	3	1800	40	3.25	3.25	26.96
A2		air-cooled v	2	7	1500	50	3.25	3.625	60.14
A4		air-cooled	4	15	1800	90	3.25	3.25	107.84
B4		air-cooled	4	20	1800	100	3.625	3.25	134.16
C4		air-cooled	4	25	1800	110	3.625	4.0	165.12
A8	1908	air-cooled 90°v	8	30	1800	140	3.25	3.25	215.64
B8*	1908	First heavier than air flight air-cooled 90°v	8	40	1800	150	3.625	3.25	268.32
E4**	1908	First dirigible flight for US Army first water- cooled line	4	50	1500	250	5.0	5.0	392.70
E8		Water 98°v	8	100	1500	350	5.0	5.0	785.40
H&K		Water line	4	40	1500	175	4.0	5.0	251.32
S	1912	Water line	6	60	1600	-	4.0	5.0	
L		Water V	8	80	1500	285	4.0	5.0	502.64
O Improved V		Water V	8	75	1100		4.0	5.0	502.64
OX	1913	Water V	8	90	1200	390	4.0	5.0	502.64
OXX	1916	Water V	8	100	1400		4.25	5.0	567.44
V	1914	Water V	8	160	1100		5.0	7.0	1099.56
VX		Water V	8	180	1400		5.0	7.0	1099.56
V2	1914	Water V	8	200	1400		5.0	7.0	1099.56
V4		Water V	12	300	1400	1086	5.0	7.0	1649.34
V3	1914 (in America)	Water V	8	160	1400		5.0	7.0	1099.56

Model	Year	Type	Cyl.	HP	RPM	Weight	Bore	Stroke	Displacement
K12 AB	1917	Water 60°V	12	Exp.			4.0	5.0	
K12	1918	Water 60°V	12	375	2250		4.5	6.0	1145.09
K6	1918	Vertical	6	150	1700		4.5	6.0	572.54
C12	1919	Redesign K	12	400	2250				
CD12		Direct Drive C	12	325	1800	723	4.5	6	1145.09
R6	1921	Water Vertical	6	400	1450		7.0	8.0	1846.26
D12	1922	From CD12 V	12				4.5	6	1145.09
D12A	1923		V 12	507	2300		4.625	6.0	1209.6
D12D	1926	(TC #10)	V 12	435	2300	680	4.5	6.0	1145.09
V1400		From D12V	12	510	2100	660	4.875	6.25	1399.8
V1550		(ATC #6)		600	2400	770	5.125	6.25	1569
V1570 A, B, C, . . . F						Same as V1550 with detail mods.			
R1454	1924	First Curtiss Radial	9	400	1750	790	5.625	6.5	1453.72
H1640		(ATC #8) air radial	12	600	2200		5.625	5.5	1640.1
R600		(ATC #5) air radial	6	170	1800		5.125	4.875	603
Crusader	1929	air-cooled	6	line (never produced)					

WORLD WAR I PRODUCTION

CONSOLIDATED LIST OF AIRCRAFT CONTRACTS AND DELIVERIES IN U. S.
APRIL 6, 1917 -- NOVEMBER 1, 1919.

Rearranged from corrected copy of "Aircraft Survey," House Document No. 621, 66th Congress, 2nd Session, on file in Office, Chief of Air Service, to show the amounts paid to each contractor, divided between the Aeronautical, Automobile and Kindred, and Miscellaneous industries. Only disbursements to November 1, 1919, are shown: consequently, settlements in liquidation of suspended contracts are not included. The above document is public and for all practical purposes shows the amounts expended for flying material.

AIRPLANES

Aeronautical Industry

Number Received	Amount
4014 Curtiss	\$ 29,366,397.24
1033 Standard	15,589,694.63
1 Sturtevant	11,250.00
51 Wright	329,250.00
131 L. W. F.	1,649,377.50
10 Glenn Martin	822,575.27
599 Thomas-Morse	3,106,103.27
7 Lewis & Vought	61,676.00
2 Heinrich	11,328.00
4 Gallaudet	140,013.02
300 Breese	591,325.85
1 Burgess	26,009.50
0 Aeromarine	
50 Fowler	323,166.90
3506 Dayton-Wright	31,446,575.88
25 Packard	1,084,670.12
8 Ordnance	144,742.98
9742	\$ 84,704,155.16

Automobile and Kindred Industries

2000 Fisher	19,643,837.39
0 Brewster	200,000.00
2000	\$ 19,843,837.39

Miscellaneous (Emergency War Organizations, New Concerns, Missions, etc.)

Number Received	Amount
0 Empire	\$ 15,000.00
3 Pigeon-Fraser	19,075.00
200 Liberty Iron Works	1,002,366.28
1 Italian War Mission	49,227.79
2 Equipment Holding	10,000.00
588 Springfield Aircraft Co.	3,457,229.52
450 St. Louis	2,137,500.00
50 U. S. Aircraft Co.	326,170.10
75 Howell & Lesser	394,121.41
1 Schiefer	11,720.00
100 Various mfrs. for Handley-Page Parts	1,733,136.00
680 Canadian Aero Co.	17,504.74
<u>2 Pacific</u>	<u>17,504.74</u>
2152	\$ 9,173,050.84

Recapitulation of Airplanes

9742 Aeronautical Industry	\$ 84,704,155.16
2000 Automobile and Kindred Industry	19,843,837.39
<u>2152 Miscellaneous</u>	<u>9,173,050.84</u>
13894	\$113,721,043.39

ENGINES

Aeronautical Industry

2 Ordnance	\$ 21,000.00 *
1 Lawrence	2,944,631.03
1255 Hall-Scott. (Trainer)	634,547.23
750 Curtiss (Curtiss (Ox Trainer)	215,093.14
41 Standard	*302,000.00 *
94 J. W. F.	133,500.00
73 Sturtevant	54,372,268.68
30 Burgess	321,990.08
5816 Wright (Wright (Hisso)	42,780,339.50 *
69 Thomas-Morse	<u>42,780,339.50</u>
4 Gallaudet (Liberty)	14765
<u>6630 Packard</u>	\$101,725,369.64

*Amounts wholly or partly included in same contracts covering airplanes.

Automobile and Kindred Industries

Number Received		Amount
4	Van Blerck	\$ 8,913.04
4	Sterling	11,680.59
2	Wisconsin	2,878.00
40	Duesenberg	4,934,798.62
0	Pierce Arrow	1,584,164.81
2543	General Motors	9,766,499.68
8500	Willys-Overland. (Curtiss Ox Trainer)	21,030,871.60
61	General Vehicle	43,700.00
451	Excelsior Motor	295,000.00
2000	Nordyke & Marmon	18,015,240.38
1	Winton	1,485.00
1	Trego	1,145,008.11
6500	Lincoln (Liberty)	45,859,985.18
3950	Ford (Liberty)	29,401,393.62
1	Willys-Morrow	400.00
24058		<u>\$132,102,018.63</u>

Miscellaneous

400	Canadian Aero	\$ 252,000.00
121	Aero Engineering	523,723.14
1	Schiefer *
4	Italian War Mission
8	British War Mission
2585	Union Switch	10,131,298.89
6	Murray & Tregurtha	103,752.00
3	Equipment Holding *
2	Pacific *
3130		<u>\$ 11,010,774.03</u>

Recapitulation of Engines

14765	Aeronautical Industry	\$101,725,369.64
24058	Automobile Kindred Industry	132,102,018.63
3130	Miscellaneous	<u>11,010,774.03</u>
41953		\$244,838,162.30

*Amounts wholly or partly included in same contracts covering airplanes.

Reference: Aircraft Yearbook 1922, Pages 186 ~ 189.