

# EXPLANATION OF PRATT & WHITNEY AIRCRAFT ENGINE DESIGNATIONS

1. The method of presenting and interpreting Pratt & Whitney Aircraft engine designations has undergone several revisions; therefore, it is our aim to explain the original and subsequent methods of engine designation presentations based on the factors explained in paragraphs 2 and 3 which have remained stable.

2. The designation Wasp Jr., Wasp, Twin Wasp Jr., Hornet, Twin Wasp, Twin Hornet, Double Wasp and Wasp Major are Pratt & Whitney Aircraft trade names and identifies the engine model. The Turbo Wasp is likewise a trade name and indicates a reaction type engine. Invariably, the symbols "JT" and "PT" for turbo jet and turbo prop, respectively, are used to identify this model engine.

3. The letter designation "A", "B", "C", "CA", "CB", "CE", "D", "H", etc., following the Pratt & Whitney Aircraft model designation identifies the series.

4. The designations R-985, R-1340, R-1535, R-1690, R-1830, R-1860, R-2000, R-2180, R-2800, R-4360, "J" and "T" are used by the U.S. Military Services to identify the military engine model. The prefix before the

numerals indicates the engine type, i.e., "R" indicates radial aircooled and the number describes the displacement; "J" indicates a turbo jet and "T" a turbo prop. engine.

5. Subsequent to World War II, surplus military engines have been certificated by CAA for commercial applications. A suffix M1, M2, M3, etc., is assigned to the military engine model by the CAA to denote a specific modification; eg., R-2000-9 M1.

6. Using the Wasp "H" series as an example, the early designations are as follows:

(a) Basic designation	Wasp H
(b) Design change affecting interchangeability	<u>H1</u>
(c) Altitude rated	<u>SH1</u>
(d) Sea level rated	<u>TH1</u>
(e) Change in rating	<u>S1H1</u>
(f) Propeller reduction gear	<u>S1H1-G</u>

7. As engine incorporated various types of supercharger designs for varied applications, a new set of designations was introduced. Using the Double Wasp "C" series as an example, the designations are as follows:

CONFIGURATION	PREFIX	SUFFIX	DESIGNATION
(a) Basic designation			Double Wasp C
(b) Design change affecting interchangeability			<u>C1</u>
(c) Supercharger			
Single stage, single speed	S	1 through 9	<u>SC1</u>
Single stage, single speed, suitable for exhaust turbine	TS	1 through 9	<u>TSC1</u>
Single stage, variable speed	VS	1 through 9	<u>VSC1</u>
Single stage, variable speed, with exhaust turbine	TVS	1 through 9	<u>TVSC1</u>
Single stage, two speed	2S	11 through 19	<u>2SC11</u>
Two stage, two speed	SS	21 through 29	<u>SSC21</u>
Two stage, variable speed	VSS	21 through 29	<u>VSSC21</u>
(d) Pusher installation	P	as applicable	<u>VSSC21P</u>
(e) Change in rating			<u>SS1C21</u>
(f) Propeller reduction gear			

Single rotation, single speed	G	SC1-G
Single rotation, two speed	G2	SC1-G2
Dual rotation, single speed	GD	SC1-GD
Dual rotation, two speed	G2D	SC1-G2D
Remote drive, single speed (extension shaft)	RG	SC1-RG
Remote drive, two speed (extension shaft)	RG2	SC1-RG2

7. In the interest of simplicity, the engine designations on all future piston engine models and modifications will incorporate

a condensed engine designation. Using the Double Wasp E series as an example, the new designations will be as follows:

		DESIGNATION
(a) Basic designation		Double Wasp E
(b) Design change affecting interchangeability		<u>EA</u>
(c) Supercharger and minor modification combination:		
	CONFIGURATION	SUFFIX
	Single stage, single speed	1 through 9 <u>E1</u>
	Single stage, two or variable speeds	11 through 19 <u>E11</u>
	Multi-stage	21 through 29 <u>E21</u>

8. The designation system for the Turbo Wasp engine model is somewhat similar to the simplified system explained above. In this group a letter rather than number identifies the specific engine model. The "JT" symbol

applies to the Turbo Jet (without propeller) model; "PT" to the Turbo Prop. (with propeller). Using the Turbo Wasp JT as an example, the designating procedure will be as follows:

		DESIGNATION
(a) Basic designation		Turbo Wasp JT 6
(b) Change in rating or components		<u>JT 6A</u>
(c) Design change affecting interchangeability		JT 7

GENERAL PRATT & WHITNEY ENGINE SPECIFICATIONS

Speaker -- L. B. Clark, Supervisor -- Service School

Note: The following explanation of Pratt & Whitney Engine designations has been taken from a restricted publication entitled "Pratt & Whitney Engine Model Designations and Characteristics".

Pratt & Whitney Aircraft (Commercial) Engine Designations

Pratt & Whitney Aircraft engines are classified according to take-off horsepower and/or type variations by a letter designation used in conjunction with the engine trade name. This letter designation indicating engine series is modified to facilitate spare parts identification and to indicate model variations as follows:

## A. Service engines up to and including the following letter designation:

Trade Name	Series Designation	Military Designation	Trade Name	Series Designation	Military Designation
Wasp Jr.	B	R-985	Twin Wasp Jr.	B	R-1535
Wasp	H	R-1340	Twin Wasp	D	R-2000
Hornet	E	R-1690	Twin Hornet	A	R-2180
			Double Wasp	B	R-2800

Example:

Wasp H

## B. Series

1. Unmodified	Letter Designation	H
2. Propeller reduction gearing	-G	H-G
3. Variations in major parts	Numerical suffix to letter designation	HI-G

## C. Model:

1. Sea level normal rating	Prefix T	THI-G
2. Altitude normal rating	Prefix S	SHI-G
3. Variations in ratings	Prefix modified	SIHI-G
4. Propeller gear ratio	Suffix	SIHI-G3:2

## D. Complete model designation

During the year 1940, in order to clarify the identification of engines equipped with various types of superchargers, the following symbols were

adopted as the Model Prefix of all engines not already designated as in A above:

S for single stage - single speed  
 2S for single stage - two speed  
 SS for two stage - two speed  
 TS for single stage - single speed with turbo

Engines having letter designations subsequent to those described in IA:

Example:

Double Wasp C

A. Series:

1. Unmodified	Letter Designation	C
2. Propeller reduction gearing	G	C-G
3. Supercharger - Numerical suffix to letter designation:		
Single stage - single speed	1 through 9	CI-G
Single stage - two speed	11 through 19	CII-G
Two stage - two speed	21 through 29	C2I-G
4. Variations in major parts	Change in numerical suffix to letter designation	C12-G

B. Model:

1. Single stage - single speed rating	Prefix S	SC2-G
2. Single stage - two speed rating	Prefix 2S	2SC12-G
3. Two stage - two speed rating	Prefix SS	SSC22-G
4. Single stage - single speed rating with turbo	Prefix TS	TSC2-G
5. Variations in ratings	Prefix modified	2SIC12-G
6. Propeller gear ratio	Suffix	2SIC12-G20:9

C. Complete model designation      Double Wasp 2SIC12-G20:9

Pratt & Whitney Aircraft engine designations have been further amplified as follows:

A. Basic Engine Series      Series Designation

2800 hp	A
3000 hp	B

B. Model Prefix

Single stage - single speed supercharging	S
Single stage - variable speed supercharging	VS
Two stage or multi-stage supercharging	SS
Single stage - single speed & turbo supercharging	TS

Single stage - variable speed & turbo supercharging TVS

\*Variations - S1, S2, etc.

C. Supercharger

Power & Rear Section

Single stage - single speed	A1 through A9*
Single stage - variable speed	A11 " A19
Two stage - variable speed	A21 " A29
Multi-stage - variable speed	A31 " A39

Pusher - AlP, AllP, etc.

D. Propeller Reduction Gearing

Series Designation Suffix (Nose Section)

Single rotation - single speed	-G
Single rotation - two speed	-G2
Dual rotation - single speed	-GD
Dual rotation - two speed	-G2D
Remote Drive	-RG, -RG2, etc.

As an example of how these would be used for the Double Wasp two-stage engine, the following are outlined:

Single rotation - single speed	Double Wasp SSC22-G
Single rotation - two speed	" " SSC22-G2
Dual rotation - single speed	" " SSC22-GD
Dual rotation - two speed	" " SSC22-G2D
Remote Drives (extension shafts)	" " SSC22-RG

E. Sample Designations:

1. Series A1-G

Model Wasp TSA1-G

TS - Single stage, single speed & turbo supercharging  
 A1-G-A - (2800 hp) power section with single stage, single speed supercharger - single rotation, single speed reduction gear.

2. Series A22-G2

Model Wasp Major SSA22-G2

SS - Two stage, two speed supercharger  
 A22-G2-A - (2800 hp) power section with two-stage supercharger - single rotation two-speed reduction gear (assembly specifications modified).

\* Such as might result from changes in fuel specifications, etc., not affecting spare parts interchangeability in basic model.  
 \* Range of numbers to provide for changes in assembly specifications for any given engine-supercharger-reduction gear combination affecting spare parts interchangeability.

## 3. Series B11P-RG2D

## Model Wasp Major VSB11P-RG2D

VS - Single stage, variable speed supercharger

B11P-RG2D-B - (3000 hp) power section with single stage variable speed supercharger - pusher - remote dual rotation two-speed reduction gear.

Comparison with U. S. Military Designations

The U. S. Army and Navy employ a numerical suffix to the Military type designation (i.e. R-1830-43, R-1830-92 etc.) to identify the complete engine model in accordance with the applicable model specification as amended by contract change orders thereto.

In the past, the Army and Navy adhered strictly to the rule of using odd dash numbers for the Army and even for the Navy. This, however, is no longer strictly the case. In the interests of standardization, wherever an identical engine is used by both the Army and the Navy, the same dash number is used according to which of the services first procured the basic Pratt & Whitney Aircraft model engine.

The designation of an engine is changed whenever an engine modification is made which affects either performance or installation in an airplane, or any other modification which requires identification.

Pratt & Whitney Aircraft designations identify (1), the engine series and (2), the performance characteristics of the particular model thereof, as defined above, and are applied for that purpose to development or stock engines. Pratt & Whitney Aircraft specifications which may permit a choice of alternate equipment. Thus individual customer requirements define the equipment schedules covering such items as reduction gear ratio accessory equipment, etc.

Pratt & Whitney Aircraft designations are also currently used to facilitate the identification of military designated engines (i.e., R-1830-43 is TSC4-G16:9), and in such cases, the specifications applicable to the military dash numbers define the guarantees and equipment schedules.

Pratt & Whitney Aircraft Specification Forms

Prefix	Indicating	Example
PW	Standard Commercial (PW) form	PW-1000
A-	AN form - Coordination with Army	A-1000
N-	AN form - Coordinating with Navy	N-1000
AN-	AN form - Joint coordination with Army & Navy	AN-1000
None	Army form prior to AN specifications (1939)	1000

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GENERAL PRAIT & WHITNEY SPECIFICATIONS

April, 1945

PWA Designation	Displacement & Military Designation	Number of Cylinders	Bores	Stroke	Military or Take-off B.H.P.	Take-off R.P.M.	Normal B.H.P.	Normal R.P.M.	Rated Altitude	Dry Weight	(A) Supercharger Ratio (B) Supercharger Ratio	Prop. Ratio	Popular Installations	Remarks
Wasp Jr. T1H4	R-985 -AN-5	9	5.1875"	5.1875"	450	2500	450	2500	Sea Level	684	(A) 1 Stage, 1 Speed (B) 10:1	1:1	R-5 Helicopter	
Wasp	T6H1-G R-1340 -AN-2	9	5.75"	5.75"	550	2200	550	2200	2000'	938	(A) 1 Stage, 1 Speed (B) 10:1	3:2	ZNPK Goodyear Blimp	
Twin Wasp	T5C4-G R-1830 -43	14	5.50"	5.50"	1200	2700	1100	2550	Sea Level	1500	(A) 1 Stage, 1 Speed (T) (B) 7.15:1	16:9	B-24 Liberator C-87 Liberator Express	(T) = Turbosupercharged
	T5C4-G R-1830 -65	14	5.50"	5.50"	1200	2700	1100	2550	6200' - 25000' (T)	1500	(A) 1 Stage, 1 Speed (T) (B) 7.15:1	16:9	B-24 Liberator (B-24D to M) PB4Y-1	
	T5C9-G R-1830 -75	14	5.50"	5.50"	1350	2800	1100	2600	7500' - 30000' (T)	1555	(A) 1 Stage, 1 Speed (T) (B) 7.15:1	16:9	B-24N Liberator	
	SSC7-G R-1830 -86	14	5.50"	5.50"	1200	2700	1100	2550	500' (M) 3500' (A) 11000' (ALB) 19000' (AHB)	1572	(A) 2 Stages, 2 Speed (B) 8.08:1, 6.43:1, 6.48:1	3:2	F4F-4 Wildcat	(M) Main Stage Blower (ALB) Auxiliary Low Blower (AHB) Auxiliary High Blower
	S5C4-G R-1830 -90B	14	5.50"	5.50"	1200	2700	1100	2550	9000' (LB) 6100' (LB) 12500' (LB) 14500' (HB)	1490	(A) 1 Stage, 2 Speed (B) 7.15:1, 8.47:1	16:9	C-47B Skytrain (Commercial DC-3) R4D-6	(LB) Low Blower (HB) High Blower
	S1C3-G R-1830 -92	14	5.50"	5.50"	1200	2700	1050	2550	4800'	1465	(A) 1 Stage, 1 Speed (B) 7.15:1	16:9	PBY3A Catalina C-53 Skyrooper	Decoupled Nose
	25C9-G R-1830 -94	14	5.50"	5.50"	1350	2800	1100	2600	Sea Level 7500' (LB) 14700' (HB)	1573	(A) 1 Stage, 2 Speed (B) 7.15:1, 8.47:1	16:9	PBY42 Privateer	Automatic Spark Advance 25° Normal 32° Cruising
	25D-G R-2000 -7	14	5.75"	5.50"	1350	2700	1100	2550	2000' (LB) 7000' (LB) 14000' (HB)	1570	(A) 1 Stage, 2 Speed (B) 7.15:1, 8.47:1	2:1	C-54 Skymaster R3D-2	
	25D12-G R-2000 -11	14	5.75"	5.50"	1450	2800	1200	2550	5000' (LB) 13500' (HB)	1590	(A) 1 Stage, 2 Speed (B) 7.15:1, 9.52:1	2:1	C-54 Skymaster R5D-2	
Double Wasp "B" Series	R-2800 -43 -27	18	5.75"	6.00"	2000	2700	1600	2400	1500' (LB) 5700' (LB) 13000' (HB)	2300	(A) 1 Stage, 2 Speed (B) 7.6:1, 9.89:1	2:1	B-26G Marauder JME-1 C-46 Commando	-27 is used in A-26C Invader
	SSB2-G R-2800 -10 -10W	18	5.75"	6.00"	2000	2700	1675	2350	1000' (M) 5500' (M) 17400' (ALB) 21500' (AHB)	2480	(A) 2 Stages, 2 Speed (B) 7.8:1, 6.46:1, 7.93:1	2:1	P-61 Black Widow F6R-5 Helicat	W = Water Injection
Double Wasp "C" Series	SSC22-G R-2800 -18 -18W	18	5.75"	6.00"	2100	2800	1700	2600	Sea Level (M) 7000' (M) 18400' (ALB) 26000' (AHB)	2560	(A) 2 Stages, 2 Speed (B) 7.50:1, 6.50:1, 7.80:1	20:9	F4U-4 Corsair	
	25C14-G R-2800 -34 -34W	18	5.75"	6.00"	2100	2800	1700	2600	Sea Level 7000' (LB) 18500' (HB)	2359	(A) 1 Stage, 2 Speed (B) 7.29:1, 9.45:1	20:9	F7E-1 F7F-1 C-82 Packet	Grooved Diffuser
	T5C2-G R-2800 -57	18	5.75"	6.00"	2100	2800	1700	2600	Sea Level 7000' (LB) 30000' (T)	2385	(A) 1 Stage, 1 Speed (T) (B) 7.29:1	20:9	P-47N Thunderbolt	
Wasp Major	VSB11-G R-4360 -4	28	5.75"	6.00"	3000	2700	2500	2550	5000' - 14500'	3404	(A) 1 Stage, Variable Speed (B) Low Speed Max. - 6.08:1 High Speed Max. - 7.52:1	40:17	F2G-1 Corsair (Goodyear) H1K-1 Hughes Cargo	

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