
Chrysler Engines

1922–1998

Other SAE titles of interest:

Hall-Scott

The Untold Story of a Great American Engine Maker

Francis H. Bradford and Ric A. Dias

(Order No. R-368)

Pioneers, Engineers, and Scoundrels

The Dawn of the Automobile in America

Beverly Rae Kimes

(Order No. R-358)

The SAE Story: One Hundred Years of Mobility

Robert Post

(Order No. R-360)

For more information or to order a book, contact SAE International at
400 Commonwealth Drive, Warrendale, PA 15096-0001;
phone (724) 776-4970; fax (724) 776-0790;
e-mail CustomerService@sae.org;
website <http://store.sae.org>.

Chrysler Engines 1922–1998

Willem L. Weertman

SAE *International*[™]
Warrendale, Pa.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

For permission and licensing requests, contact:

SAE Permissions
400 Commonwealth Drive
Warrendale, PA 15096-0001 USA
E-mail: permissions@sae.org
Tel: 724-772-4028
Fax: 724-772-4891

Library of Congress Cataloging-in-Publication Data

Weertman, Willem L.
Chrysler engines 1922-1998 / Willem L. Weertman.
p. cm.
Includes bibliographical references and index.
ISBN 978-0-7680-1642-0
1. Chrysler automobile--Motors--History. I. Title.

TL215.C55W39 2007
629.25'04--dc22

2006039361

SAE International
400 Commonwealth Drive
Warrendale, PA 15096-0001 USA
E-mail: CustomerService@sae.org
Tel: 877-606-7323 (inside USA and Canada)
724-776-4970 (outside USA)
Fax: 724-776-1615

Copyright © 2007 SAE International

ISBN 978-0-7680-1642-0

SAE Order No. R-365

Printed in the United States of America.



SAE International is committed to preserving ancient forests and natural resources. We elected to print *R-365 Chrysler Engines* on 30% post consumer recycled paper, processed chlorine free. As a result, for this printing, we have saved:

12 Trees (40' tall and 6-8" diameter)
4,900 Gallons of Wastewater
1,971 Kilowatt Hours of Electricity
540 Pounds of Solid Waste
1,061 Pounds of Greenhouse Gases

SAE International made this paper choice because our printer, Thomson-Shore, Inc., is a member of Green Press Initiative, a nonprofit program dedicated to supporting authors, publishers, and suppliers in their efforts to reduce their use of fiber obtained from endangered forests.

For more information, visit www.greenpressinitiative.org

Contents

Credits	vii
Acknowledgments.....	ix
Foreword	xi
List of Engines by Type	xiii
List of A-Programs.....	xvii
Chapter 1 Chrysler-Willys—The First “Chrysler” Cars and Engines	1
Chapter 2 Zeder, Skelton, and Breer’s Engines A, B, C, and D.....	7
Chapter 3 Zeder, Skelton, and Breer’s Three Engineering Masterpieces—Engines B, E, and H	21
Chapter 4 Maxwell, Chrysler, and Plymouth Four-Cylinder Engines.....	47
Chapter 5 Dodge Power Joins Chrysler	63
Chapter 6 A New L-Head Six-Cylinder Design Takes Over	81
Chapter 7 Engines of Luxury—The Straight-Eights	107
Chapter 8 Hemispheres and Polyspheres—The First Generation of V-8s.....	123
Chapter 9 Wedge-Head V-8s—B, RB, and LA Engines.....	159
Chapter 10 Power Personified—The 426 Hemi® Engine.....	193
Chapter 11 Overhead Valve In-Line Sixes.....	207
Chapter 12 A New Era—Driving the Front Wheels with Four-Cylinder Engines	233
Chapter 13 V-6 Engines—More Power for Front-Wheel-Drive Cars.....	279
Chapter 14 A Big, Powerful, All-Aluminum V-10—The Viper Engine	297
Chapter 15 Truck Engines—Hauling the Load	305
Chapter 16 Marine and Industrial Engines—Chrysler Power Afloat and Ashore	341
Chapter 17 Chrysler Power Goes to War—Chrysler Engines During World War II	349
Chapter 18 A Different Type of Engine—The Chrysler Gas Turbine	365
Chapter 19 American Motors Engines Join the Chrysler Power Lineup.....	371
Epilogue	383
Addendum—Chrysler Emission Control Systems 1961 to 1976	385
References.....	387
Sources.....	395

Abbreviations and Definitions	397
Conversion Factors.....	403
Index	405
About the Author.....	419

Credits

Except as specifically noted otherwise in the figure captions, all images presented in this book are copyrighted by Chrysler Holding LLC and are used with permission.

The word “Hemi,” when used as a proper adjective as in “Hemi engine” or “Hemi head,” is a trademark of Chrysler Holding LLC, indicated as “Hemi®.”

Acknowledgments

I wish to recognize all those who were involved in the design, development, and manufacture of Chrysler engines during the span of this history. The satisfaction of creation, the long hours of design and testing, the challenge of problem resolution, and the elation of success are part of the engineering process, shared by many. I feel privileged to be among the people who did the work.

I want to thank all the people who assisted me on this project, including the active Chrysler LLC employees, retirees, members of supplier companies, and others who provided information. Among these valued and knowledgeable advisors and encouragers are the following: Floyd Allen, Elton Amsden, Tom Asmus, Mark Boratto, Al Bosley, Burke Brown, Charlie Brown III, Bob Cahill, L.X. Chapin, Bill Chapman, Mary Chappell, Jack Conners, Kraig Courtney, Jim Dean, Lou DeSimone, Barry Dressel, Bob Eccles, Eric Emmer, Dean Engle, Debbie Fornal, Barbara Fronczak, Roger Gaskill, Bob Graham, Pete Hagenbuch, Bill Hancock, Mark Hanna, Tom Hoover, John Hurst, Fred Kaehler, Doug Keyes, Sean Keyes, Mike Krag, Rod Kurowski, Bob Lee, Bob Lees, Bob Lewis, Kim Lyon, Ken Mack, Ev Moeller, Al Mukomel, Bob Pauley, Art Ponder, Ed Poplawski, Marv Raguse, Bob Rarey, Larry Rathgeb, Bruce Raymond, Bill Ridenour, Gordon Rinschler, Bernard Robertson, Brandt Rosenbusch, Michael Royce, Larry Shephard, Fred Shrimpton, Troy Simonsen, Lee Sorenson, Daniel Stern, Syd Terry, Bruce Thomas, Clay Thompson, Jeff Warner, John Wehrly, Gene Weiss, Harold Welch, Bill Westervelt, Kenneth Wilson, Dick Winkles, Paul Wise, and Keith Wright. Sadly, some of these people are no longer with us but certainly continue in spirit.

Among these people, special thanks go to Barry Dressel, manager of the Walter P. Chrysler Museum, who gave impetus to the idea of my writing this book when he requested a short summary of Chrysler engines to accompany a possible Chrysler history project. Putting together the short summary, which amounted to a few pages containing one small picture, brief specifications, and a time line for each engine, kindled for me an interest in the engines of long ago. This interest was fanned by Barry's lifting the hoods of the cars on display at the museum, including the original Chrysler B-model phaeton, so I could take measurements and photos of the engines. With much information uncovered, writing a book about the history of Chrysler engines became a logical expansion of the original

request. Although the original project was shelved, the brief summaries emerged to become part of the Walter P. Chrysler Museum's website and can be viewed in the Engine Chronology section of the Chrysler Corporation Historical Products.

My special thanks also go to Brandt Rosenbusch, manager of the Chrysler Historical Collection, who provided access and guidance to all the archival records, vehicles, and engines in the care of the historical collection, without which this book simply could not have been written. With few exceptions, the hundreds of images of Chrysler vehicles and engines displayed in this book came from the well-cataloged files under Brandt's management. Brandt's maintenance and guardianship of Chrysler's, now that of Chrysler LLC, heritage is to be highly commended.

Fellow Chrysler retiree Bruce Thomas's hospitality in making the vehicles of his private collection available for engine measurements and photos was much appreciated assistance, as well as his sharing of information and memories about Chrysler Engineering people and programs.

Slant Six engine enthusiast Daniel Stern's careful review of the Slant Six engine material, which provided both corrections and excellent suggestions, was a valued contribution to the information presented in the chapter on in-line six-cylinder overhead valves engines.

My thanks also go to the staff members of the National Automotive History Collection of the Detroit Public Library, who were most helpful in supplying vitally needed information from their extensive, in-depth wealth of automotive source material. In addition, the Lawrence Technological University Library staff provided valuable assistance in locating useful reference material in their excellent book and microfilm files.

Finally, I want to thank Jeff Worsinger of SAE International and his reviewers, including James Wagner, for their guidance on how to turn my original draft into the final and much improved form presented in this book.

Willem L. Weertman
Former Chief Engineer—Engine Engineering (retired)
Engineering Division, Chrysler Corporation
February 2006

Foreword

Those familiar with the history of Chrysler will recognize that the starting date of 1922 shown in the title of this book is obviously prior to the June 6, 1925 date when Chrysler Corporation was incorporated and even prior to the January 1924 date when the first production Chrysler car was shown to the public. The reason for this is that there were two serious efforts, described in the text, to build and market a Chrysler-named car that preceded these events. Had either effort been successful, the car would have emerged around the 1922 model year. Although unsuccessful, these efforts did play a key role in bringing the right people together at the right time to lay the foundation for the successful entry of Chrysler Corporation into the automotive arena.

The 1998 final date shown in the title reflects the November 17, 1998 date when Chrysler Corporation merged with Daimler Benz AG (Aktiengesellschaft) to form DaimlerChrysler AG, marking the end of Chrysler Corporation.

The main text of this book attempts to provide general information about every production engine built by Chrysler, in the form of descriptions, images, specifications, and time lines. Each engine is defined in terms of its basic structure (e.g., cylinder bore spacing, number of main bearings, valve operation) because once the production machine tools are in place, these elements usually remain constant for the life of the engine. The specifications displayed have been selected as the most pertinent to each engine during its lifetime.

A number of engines that were manufactured by other companies and were installed in Chrysler passenger cars are included, in all cases Chrysler having had a participatory role in their being qualified for use. Engines in cars that were completely engineered and built by other companies and badged as Chrysler models have not been included. Also not included are any purchased diesels or purchased gasoline engines used by Dodge trucks, or any alternative fuel engines.

On August 5, 1987, American Motors Corporation (AMC) was merged into Chrysler Corporation. Chapter 19 describes the five AMC engines that were in production at the time. Largely omitted are the numerous engines built by AMC and its predecessor companies prior to the merger.

Also, with a few notable exceptions that include the Chrysler gas turbine described in Chapter 18, there is little mention of the multitude of experimental engines designed by the Engine Design and Research Engineering departments, many of them built and tested. Among the excluded experimental engines are two all-aluminum V-8s: one coded A612 and based on the LB engine, and a smaller V-8 coded A771. Both of these engines preceded the aluminum-block Slant Six engine that went into production in 1961. Another experimental engine, a turbo-diesel version of the Slant Six engine, coded A513, was tested extensively in the early 1980s but never became a production reality. Many other engines never achieved production status, but all made a contribution in one way or another to Chrysler's base of engine knowledge.

Engineering A-program codes, already referred to in the preceding paragraphs, were started in 1935 to identify major programs. The first designator issued, A1, was for a complete car including its engine that appears to be an L-head V-8 based on the surviving record—a parts list. In 1964, after A999 was assigned, a second series was started, beginning with A100, recycling the numbers. There were enough years separating the two series that Engineering had no problem with this situation, but care is needed by anyone delving into these programs to differentiate between an earlier program and a later program, both with the identical A-program number.

Regarding orientations, the terms “left,” “right,” “front,” and “rear” as mentioned in this book refer to directions as viewed from the driver's position.

Until the 1950s, the use of fractions of an inch was common on engineering drawings. Rather than repeat the original fractions for historical fidelity, with few exceptions such as thread sizes, the dimensions presented in the book are shown as decimals.

With these qualifications, the story of Chrysler engines can be told.

List of Engines by Type

L-Head Engines

DeSoto/Chrysler 1937 shallow-skirt six-cylinder engine.....	95
DeSoto/Dodge/Chrysler 1929 deep-skirt six-cylinder engine.....	81
Dodge Brothers Model 124 five-main-bearing four-cylinder engine.....	67
Dodge Brothers original four-cylinder engine	63
Dodge Brothers Senior six-cylinder engine	68
Dodge Brothers Victory six-cylinder engine	74
Dodge/Desoto/Chrysler five-main-bearing straight-eight engine	107
Imperial nine-main-bearing straight-eight engine	113
Maxwell two-main-bearing four-cylinder engine	47
Maxwell/Chrysler/Plymouth three-main-bearing four-cylinder engine.....	47
Plymouth U four-cylinder engine.....	53
Plymouth/Dodge 1933 six-cylinder engine.....	88
Willys-designed Chrysler six-cylinder engine	1
Zeder, Skelton, and Breer-designed A-model four-cylinder engine.....	7
Zeder, Skelton, and Breer-designed Chrysler B-model six-cylinder engine.....	7, 21
Zeder, Skelton, and Breer-designed Chrysler H-model six-cylinder engine.....	38
Zeder, Skelton, and Breer-designed Chrysler Imperial E-model six-cylinder engine.....	31
Zeder, Skelton, and Breer-designed Chrysler-Willys replacement six-cylinder engine.....	2
Zeder, Skelton, and Breer-designed C-model six-cylinder engine.....	9
Zeder, Skelton, and Breer-designed D-model six-cylinder engine.....	10

V-8 Engines

B/LB wedge-head engine	160
Chrysler Hemi® head engine.....	125
Chrysler polysphere head engine	141
DeSoto Hemi® head engine	132
Dodge Hemi® head engine.....	135
Dodge poly-head engine.....	143
LA wedge-head engine.....	172
Plymouth poly-head A-engine.....	150
RB Hemi® head engine	193
RB wedge-head engine.....	166

In-Line Six-Cylinder Overhead Valve Engines

Australian six-cylinder engine.....	220
LG Slant Six engine	207
RG Slant Six engine	207

Front-Wheel-Drive Four-Cylinder Engines

2.0-L single overhead camshaft 16-valve engine	265
2.0- and 2.4-L double overhead camshaft 16-valve engines	270
2.2-L double overhead camshaft 16-valve Turbo III engine	257
2.2-L single overhead camshaft engine	238
2.2-L single overhead camshaft Turbo engine	246
2.2-L single overhead camshaft Turbo II engine	252
2.2-L single overhead camshaft Turbo IV variable nozzle turbocharger engine	255
2.5-L single overhead camshaft engine	243
2.5-L single overhead camshaft Turbo engine	251
Maserati 2.2-L double overhead camshaft 16-valve turbo engine	259
Mitsubishi Motors Corporation 2.6-L single overhead camshaft engine	262
Peugeot Societe Anonyme 1.6-L overhead valve engine	236
Volkswagen 1.7-L single overhead camshaft engine	233

Front-Wheel-Drive V-6 Engines

2.7-L double overhead camshaft 24-valve engine	293
3.2- and 3.5-L single overhead camshaft 24-valve engines	286, 290
3.3- and 3.8-L overhead valve engines	282
Mitsubishi Motors Corporation 2.5-L single overhead camshaft 24-valve engine	292
Mitsubishi Motors Corporation 3.0-L single overhead camshaft engine	279

Viper V-10 Engine

8.0-L overhead valve V-10 engine	297
--	-----

Truck-Only Engines

2.2- and 2.5-L single overhead camshaft Dakota four-cylinder engines	326
3.9-L overhead valve 90-degree V-6 engine	329
8.0-L overhead valve V-10 engine	333
Big-Six L-head six-cylinder engine	316
Dodge Diesel overhead valve six-cylinder engine	319
LB and RB heavy-duty V-8 engines	322

Marine and Industrial Engines

Industrial engines	346
Marine engines	341

World War II Military Engines

Five-bank tank engine	350
Inverted V-16 aircraft engine	352
Wright 18-cylinder radial aircraft engine	363

Gas Turbine Engines

Chrysler gas turbine engine365
Engineering Research/Navy turboprop engine.....365

American Motors Corporation Engines

2.5-L overhead valve four-cylinder engine374
4.0-L overhead valve six-cylinder engine376
4.2-L overhead valve six-cylinder engine372
5.9-L overhead valve V-8 engine373
PRV [Peugeot Renault Volvo] 3.0-L single overhead camshaft V-6 engine.....378

List of A-Programs

Information on the sequencing of A-program numbers can be found in the Foreword of this book.

A26	1940 experimental L-head V-8 engine	123
A45	1942 XIV-2220 inverted V-16 aircraft engine	123
A57	1942 five-bank tank engine	350
A86	1944 Engineering Research/Navy turboprop gas turbine engine.....	365
A102	1966 426 Street Hemi® V-8 engine.....	198
A105	1968 340 LA high-performance V-8 engine	172
A120	1967 improved performance 440 RB V-8 engine	166, 171
A134	1967 440 RB high-performance V-8 engine	171, 172
A139	1968 383 LB high-performance V-8 engine	172
A167	1970 Chrysler-Australia 245 overhead valve six-cylinder engine	220
A173	Experimental double overhead camshaft Hemi® head six-cylinder engine.....	124
A182	Experimental overhead valve Hemi® head V-8 engine.....	125
A221	Experimental overhead valve Hemi® head six-cylinder engine	125
A239	1951 Chrysler Hemi® head V-8 engine.....	125
A249	Engineering Research automotive gas turbine engine	365
A274	1953 Dodge Hemi® head V-8 engine.....	135
A275	1952 DeSoto Hemi® head V-8 engine	132
A279	Experimental overhead valve “Ball Stud Hemi” V-8 engine	200, 203, 204
A311	Ram-tuned, fuel injected race version of the 1951 Chrysler Hemi® V-8 engine.....	129,168
A340	1970 six-barrel high-performance version of the 340 LA V-8 engine	180
A388	1955 Dodge polysphere head V-8 engine	143
A389	1955 Chrysler polysphere head V-8 engine	141
A404	Automatic transmission for front-wheel-drive four-cylinder engines.....	233
A405	1975 design of the 2.0-L single overhead camshaft four-cylinder engine for the L-body with an iron block and cylinder head	233
A409	Volkswagen 1.7-L single overhead camshaft four-cylinder engine for 1978 L-body cars	233
A452	1981 2.2-L single overhead camshaft four-cylinder engine for front-wheel-drive cars	239
A472	Turbocharged version of the A452 2.2-L engine	246
A479	1956 276 Plymouth polysphere head V-8 A-engine.....	150
A487	1983 1.6-L Peugeot System Anonyme four-cylinder engine.....	236
A512	1986 2.5-L version of the A452 engine with balance shafts.....	243
A514	1956 303 V-8 A-engine built at the Windsor Engine plant	150
A519	1989 2.5-L single overhead camshaft Turbo I four-cylinder engine.....	251
A522	1991 2.2-L double overhead camshaft Turbo III four-cylinder engine.....	257
A538	1990 2.2-L single overhead camshaft Turbo IV four-cylinder engine.....	255
A561	1958 350 LB wedge-head V-8 engine.....	160
A597	1995 2.0-L single overhead camshaft 16-valve four-cylinder engine	265
A652	1958 361 LB wedge-head V-8 engine.....	160
A694	1959 413 RB wedge-head V-8 engine.....	163
A695	1960 361 LB heavy-duty truck V-8 engine	322

A696	1960 413 RB heavy-duty truck V-8 engine.....	322
A734	1960 225 RG Slant Six engine.....	210
A785	1960 170 LG Slant Six Hyper-Pak engine.....	216
A826	1960 225 RG Slant Six engine with aluminum cylinder block	217
A828	1964 273 LA V-8 engine.....	172
A861	1965 273 LA V-8 high-performance engine with four-barrel carburetor.....	179
A864	1964 426 RB Hemi® head V-8 race engine	195
A901	1960 Valiant car program.....	207
A907	1960 170 LG Slant Six engine.....	210
A925	1964 426 RB double overhead camshaft/overhead valve 32-valve V-8 race engine	198
A941	1962 upright six-cylinder engine design study with various cylinder heads	220
A982	1966 440 RB V-8 engine.....	166