GERMAN TRUCKS & CARS IN WORLD WAR II VOL. VII

VW AT WAR

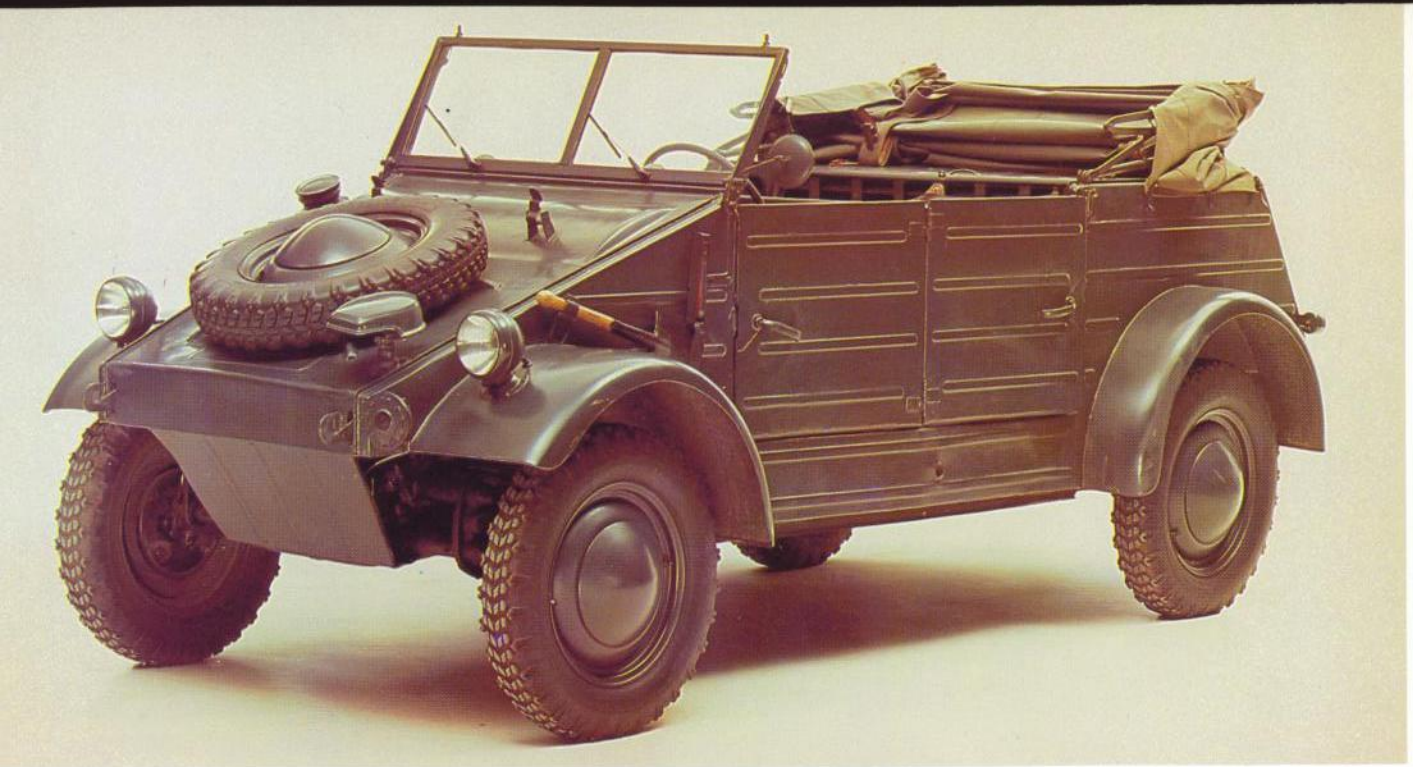
KÜBELWAGEN SCHWIMMWAGEN Book 2

Schiffer Military History VOL. 55

Development
Testing
Production

Dr. Bernd Wiersch

KÜBELWAGEN & SCHWIMMWAGEN BOOK II



Volkswagen Kübelwagen Type 82, museum piece of the Volkswagen AG — Chassis number 2-047 471, built 1944 — because of material shortages, the fenders of this vehicle were welded on and the windshield divided.

VW AT WAR

KÜBELWAGEN, SCHWIMMWAGEN

Book 2

Development • Testing • Production

Dr. Bernd Wiersch

Schiffer Military History
West Chester, PA

Foreword

We thank the Volkswagen Aktiengesellschaft for the material they made available to us, as well as for all their additional assistance in preparing this volume.

Unlike the earlier VW AT WAR volume in this series (No.31), which presented chiefly war front photos, this new volume puts emphasis on areas of development, testing and production of the world-famous Kübel- and Schwimmwagen vehicles.

Translated from the German by Edward Force.

Printed in the United States of America.
ISBN: 0-88740-409-X

This title was originally published under the title,
VW-Kübelwagen und VW-Schwimmwagen, WA Band 105,
by Podzun-Pallas Verlag, Friedberg.

We are interested in hearing from authors with book ideas on related topics. We are also looking for good photographs in the military history area. We will copy your photos and credit you should your materials be used in a future Schiffer project.

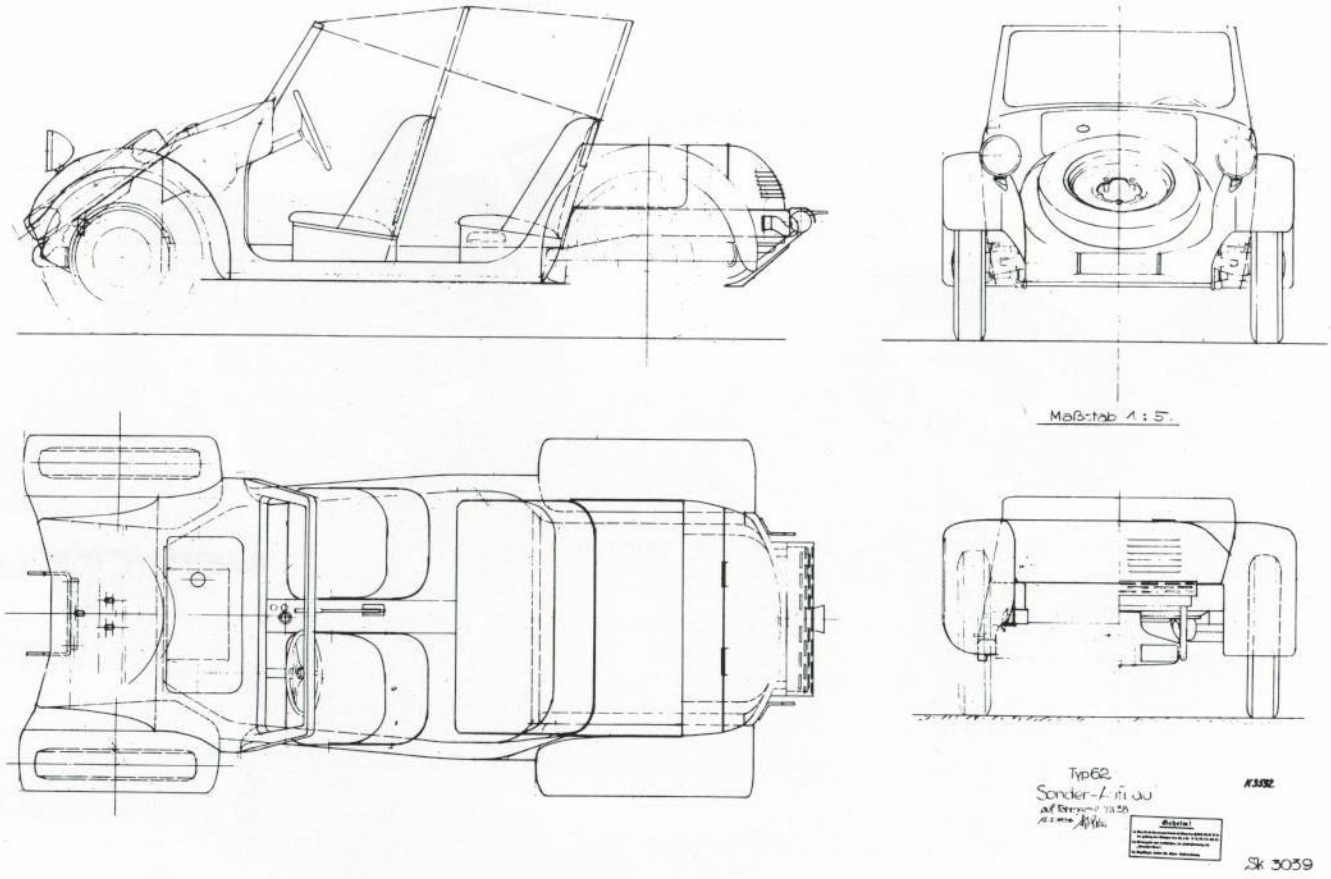
Published by Schiffer Publishing, Ltd.
1469 Morstein Road
West Chester, Pennsylvania 19380
Please write for a free catalog.
This book may be purchased from the publisher.
Please include $2.95 postage.
Try your bookstore first.

Development of the VW Kübelwagen

On January 17, 1938 a consultation took place between the director of the SS-Fahrbereitschaft VW, Dipl.Ing. Liese, the chief of the Army Weapons Office (HWA), *General der Infanterie* Liese, and other officials of the HWA. The purpose of this talk was to examine the possibilities of putting a different body on the Volkswagen chassis and thus making the vehicle militarily useful. The total weight of the car was set at 950 kg, divided as follows:

— 3-man crew and light machine gun with ammo	**400 kg**
— Chassis weight	**390-400 kg**
— Body	**150-160 kg**

These weight limits were to be kept by using aluminum as much as possible. The HWA, in a further consultation on January 26, gave the Porsche firm a completely free hand in attaining this goal. Detailed drawings of the seats, wheel spare, and windshield were requested, and an alternative design was commissioned from the Trutz firm in Coburg.



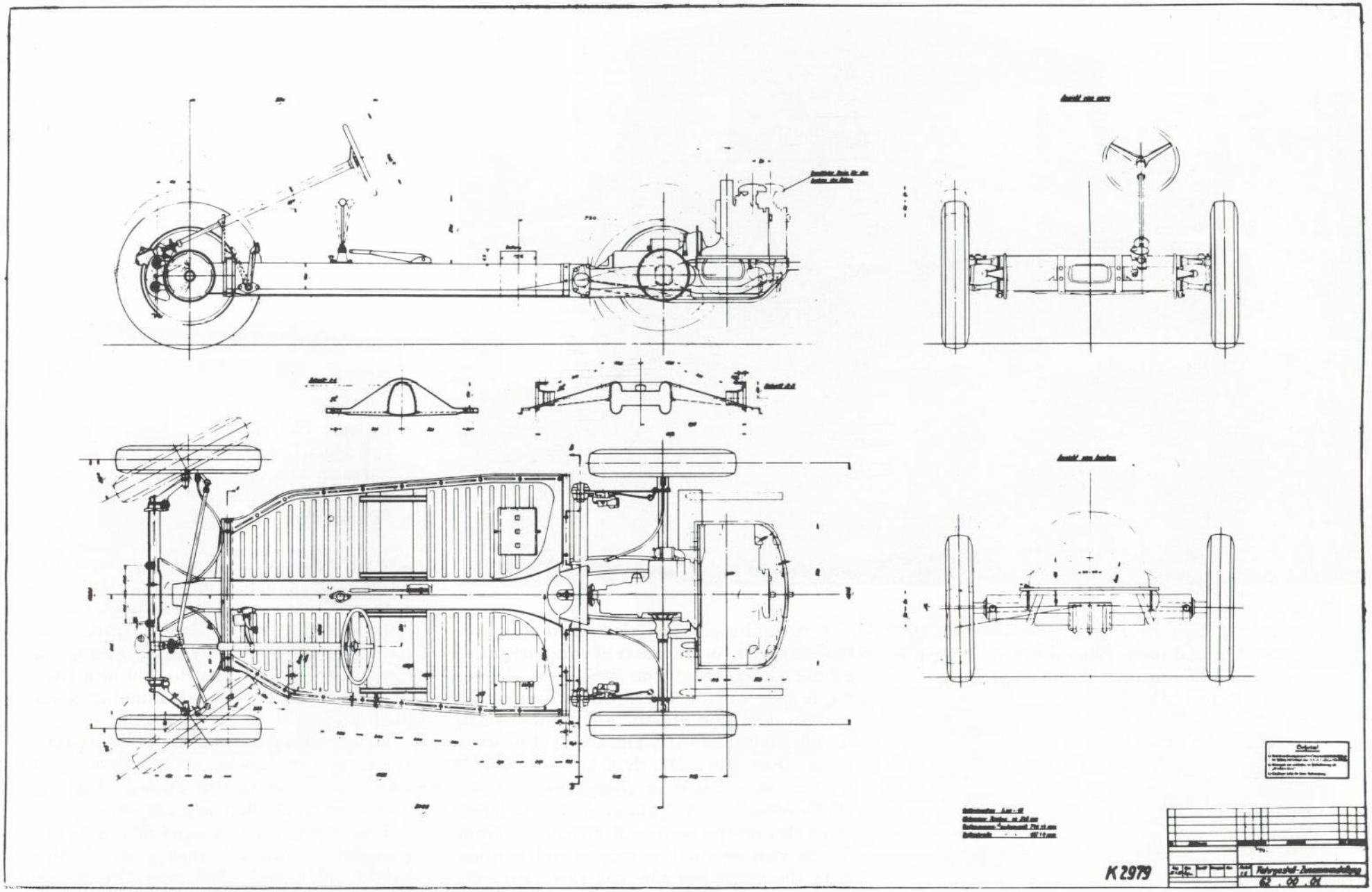
The oldest surviving design drawing for a VW Kübelwagen, dated May 15, 1938. This model is the so-called small Kübelwagen, Type 62, that went no further than the prototype stage. The design was made by Karl Rabe, chief designer of the Porsche GmbH.

The first model of the VW Kübelwagen Type 62. The body still resembles that of the Beetle or its convertible version. This styling did not suit the military, as it looked too civilian.

The 1st SS "Leibstandarte Adolf Hitler" Panzer Division also showed an interest in such a vehicle, and SS *Obergruppenführer* Dietrich saw the significance of this car particularly in the following points:
— low body height,
— light weight,
— large numbers,
— low-cost rebuilding of normal cars into army vehicles,
— ever-lower total cost compared the vehicle previously designed by the Wehrmacht.

On May 17, 1938 the Stuttgart coachbuilding firm of Reutter was commissioned to design a box-like passenger body on the Volkswagen chassis. An all-steel body was suggested. On the basis of work involved until a prototype could be delivered, Reutter set a development time of six weeks. The costs were set at 1500 to 2000 Reichsmark.

At least in terms of the length of the development time, they were too optimistic. Only on November 3, 1938 was the first prototype of the VW Kübelwagen shown to *General* Becker and the auto-body experts at the Army Weapons Office. The first impression was positive and it was decided to conduct off-road tests as soon as possible. The Kübelwagen was to be compared with the customary uniform personnel car with four-wheel drive and four-wheel steering. The date of this test was set as November 14, the locale was the training facility in Münsingen. No documents have been found stating the results of this test. On the basis of the ensuing changes to the body, though, it must be assumed that the HWA men were pleased by the technology but not by the body shape. Here the coachbuilders had used too few "military elements."



Chassis design of Type 62, January 21, 1939.

Early in 1939 the Type 62 took on its angular final form. Now it was no longer a question of appearance, but of proving itself technically.

A normal sedan was also taken along on this test drive for purposes of comparison. A month later came the next test drives; equipped with shovels and chains, the Kübelwagen was driven into snow-covered terrain in the Schwarzwald, and at almost the same time, from March 6-12, two Kübelwagens were tested in comparison to two HWA vehicles at St. Johann in Tirol. There were also several technical differences from the normal sedan. The engine and gearbox were the same, but the rear axle ratio was lowered to 5:31 instead of 7:31, so that the top speeds in the individual gears were somewhat lower than those of the sedan:

1st gear: 18.4 kph
2nd gear: 32.4 kph
3rd gear: 54.2 kph
4th gear: 83.6 kph
Reverse gear: 10.1 kph

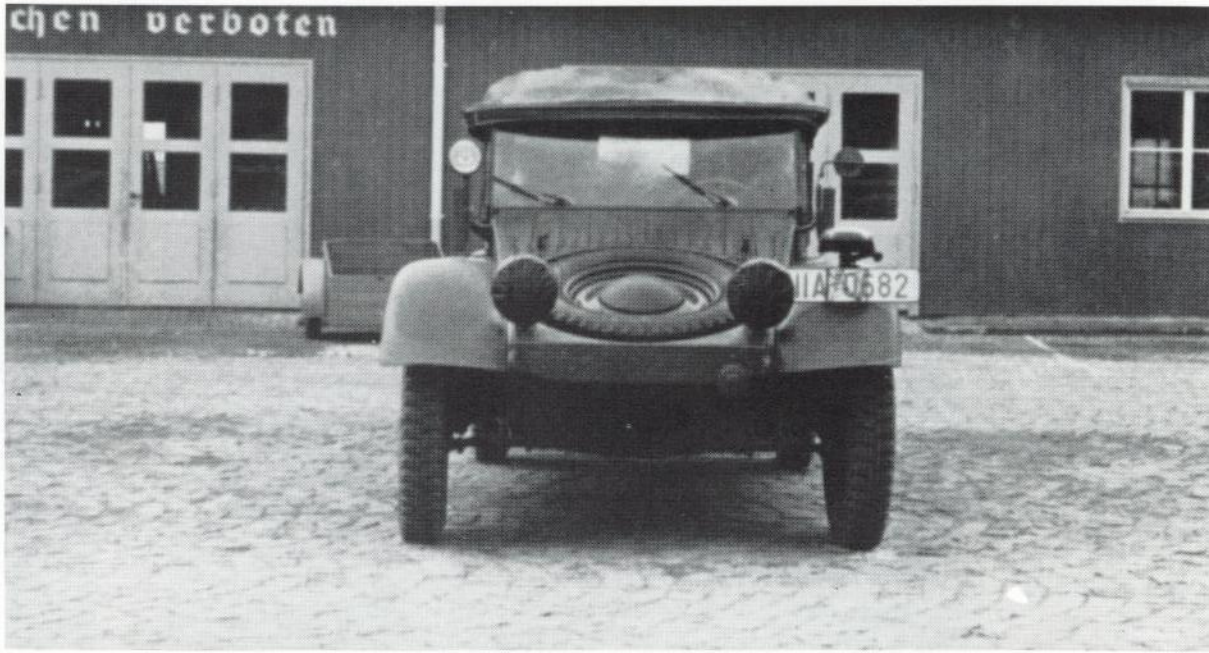
The wheels had also been changed from those of the sedan, from 3.00 D-16 to 3.25 E-18, and fitted with off-road tires. The rear track was widened to 1316 mm, quite understandably for such a vehicle. The ground clearance was increased to 260 mm for an unladen vehicle and 240 mm for a fully loaded one.

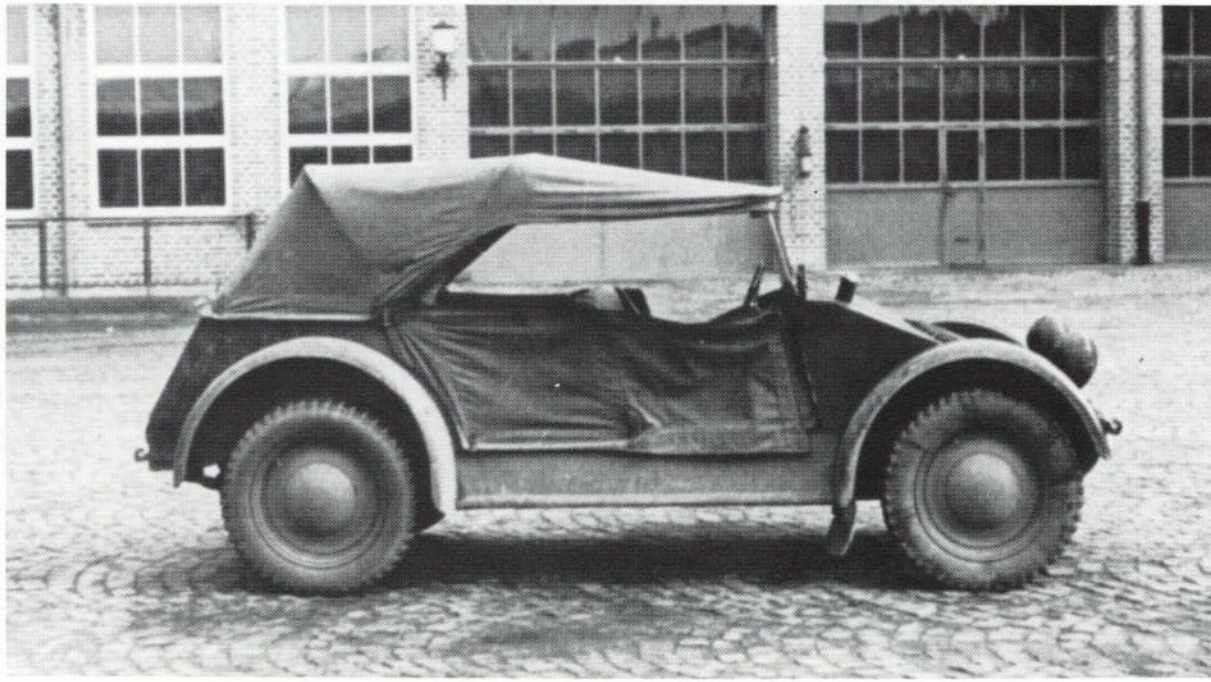
As a result of the modifications described above as well as by an aerodynamically unfavorable body, the average fuel consumption was 9 liters per 100 km.

The external dimensions of the Type 62 were set at: length 2750 mm, width 1550 mm, height with roof 1550 mm; the weights: chassis with engine 392 kg, body 170 kg, equipment 80 kg, for a total weight of 642 kg empty but ready to drive with 40 liters of fuel.

This version with canvas doors was a special design meant to facilitate quick entry and exit. In its final version, though, this model was not so equipped, as it would have been too drafty in the car.

These photos were taken at the Porsche factory in Stuttgart.





Technische Angaben: Typ 62

Motor

Bauart	liegend, gegenläufig
Zylinderzahl	4
Bohrung	70 mm
Hub	64 mm
Hubraum	984, 704 cm³
Verdichtung	1 : 5,8
Leistung max	24 PS
Drehzahl max	3200 n/min
Drehzahl normal	3000 n/min
Zylinder Werkstoff	Grauguss
Zylinderkopf Werkstoff	Silumin
Steuerung	hängende Ventile
Anzahl der Ventile je Zylinder	Einlass = 1, Auslass = 1
Lage der Nockenwelle	unten
Kurbelwelle	4 Gleitlager
Kolben	Leichtmetall
Zündung	Batterie
Zündfolge	1 - 4 - 3 - 2
Zündkerzen	14 mm Typ : W 145 T 7 Bosch
Untersetzung d.Verteilerwelle - Verteiler	2 : 1
	Bosch VE 4 J S 276
Lichtmaschine	Bosch RED 130/6/2600 A1 8P
Anlasser	Bosch RED 0,4/6 L 3 (1)
Vergaser	Fallstrom 26 Ø
Kühlung	Luftgebläse
Drehzahl des Gebläses	6000 n/min
Luftmenge	500 Ltr/min
Schmierung	Umlauf
Ölpumpe	Zahnrad
Ölkühler	Röhrenkühler
Kupplung	Einscheiben, trocken, Größe 10 F.u.S.

Getriebe

Gangzahl	vorwärts 4; rückwärts 1
Untersetzung	1.Gang = 1 : 3,60
	2. " = 1 : 2,07
	3. " = 1 : 1,25
	4. " = 1 : 0,80
	R. " = 1 : 6,6
3. und 4. Gang Zahnradausführung	geräuschlos 1. u. 2. Gg. u.R.Gg. gerade verzahnt Schubschaltung 3.u.4 Gg. schräg verzahnt Stirnradschaltung
Wagengeschwindigkeit bei Motor n = 3200 U/min.	1.Gang = 18,4 km/Std
	2. " = 32,4 "
	3. " = 54,2 "
	4. " = 83,6 "
	R. " = 10,1 "
Art der Schaltung	Kugel, Mitte Wagen

-/-

Geheim!

1.) Dies Werk Staatsgeheimnis im Sinne des § 88 R. St. G. B. in der Fassung des Gesetzes vom 24.4.34. (R. G. Bl. I S. 341 ff.)
2.) Weitergabe nur verschlossen, bei Postbeförderung als „Einschreiben".
3.) Empfänger haftet für sichere Aufbewahrung.

Sk 3772 Bl. 1

Fahrgestell Typ 62

Rahmen	Drehungssteifer Mittelrohrrahmen mit Gabelung hinten zur Aufnahme des Motors.
Antrieb	Hinterachse, Triebling u.Tellerrad 5 : 31 (1 : 6,2)
Motorlage	Heckmotor, 3 Punkte gelagert
Triebachsausgleich	Kegelräder, Z.F. oder Rheinmetall selbstsperrend
Schubübertragung	Strebe-Federhebel

Lenkung

Lenkung	Sonderspindellenkung Konstruktion Dr.Porsche
Übersetzung	2,4 Umdr. am Lenkrad = 49° = voller Einschlag der Vorderräder 1 Umdr. am Lenkrad = 20,5° = 42 %
Lenkrad	Ø 400 mm
Lenkungslage	links (rechts)
Spurstange, geteilt, oberhalb des Rahmens	
Wendekreis	10 m Ø
Radeinschlag	äusseres Rad = 28°; inneres Rad = 35°

Federung

Vorderradaufhängung	unabhängig gefederte Räder (Dr.P)
Vorderradfederung	2 Stabfedern
Hinterradaufhängung	Schwingachse m.Strebenabstützung
Hinterradfederung	1 Federstab, Nonius, einstellbar
Stossdämpfer	hydraulisch, vorne und hinten.

Schmierung

Dauerschmierung, an 7 Schmierstellen Druckschmierung 4 Vorderachsschwinghebel
2 Vorderachsbolzen
1 Lenkung

Bremsen

Bremsen	Wirkungsweise mechanisch durch Seile, Konstruktion Dr.Porsche Durchmesser: 230 mm Breite: 30 mm
Fussbremse	wirkt auf 4 Räder
Handbremse	wirkt auf 4 Räder
Räder	5 Scheibenräder, je 5 Bolzen
Felgen	3,25 E x 18)
Reifen	Geländereifen 5,00 - 18)
Aktiver Radius	normal = 345 mm
Spurweite vorne	1356 mm
Spurweite hinten	1356 mm
Radstand	2400 mm
Kleinster Bodenabstand bei mit 460 kg.	unbelastet = 260 mm = 240 mm

-3-

Sk 3772 Bl. 2

Sk 3772. Blatt 3

Bodenfreiheit

Fussboden Oberkante über Boden	unbel. 280 mm bel. 260 mm

Betriebsstoffe

Kraftstoff	Benzin
Kraftstoffverbrauch	9 L./100 km
Kraftstoffbehälter	Fassungsvermögen : 40 Ltr. mit Reserveh. (10 Ltr.) Lage vorne Zuleitung: Pumpe
Motoröl	Verbrauch 0,12 L/100 km Fassungsverm. : 3 Ltr.
Getriebeöl	Fassungsverm. : 2,5 Ltr

Reserverad

Anzahl: 1, Lage vorne im Aufbau

Batterie

Spannung 6 Volt; 75 Amp., Typ DIN Kr 2311.

Aufbau: 3-sitzig oder 4-sitzig offen

Ganzstahlaufbau
Gerätekasten (für 3-sitzigen Aufbau) abnehmbar
Windschutzscheibe umlegbar, Sicherheitsglas
Klappverdeck abnehmbar
Fußboden am Fahrgestell befestigt
Instrumentenbrett: Geschwindigkeitsmesser mit Km-Zähler
Öldruckanzeiger
Fernlicht- und Ladekontrollampe
Winker am Vorderteil, Winkerschalter
Scheinwerfer am Vorderteil
2 Einzelscheibenwischer
4 (3) Sitze; Breite vorn etwa 1060 mm
" hinten " 1120 mm (560 links)

Gepäckraum hinter den Hintersitzen L:B:H etwa 1150:380:450 mm

Wagenabmessungen:

Größte Länge etwa	3750 mm	
" Breite "	1550 mm	
" Höhe "	1550 mm	(mit Verdeck)

SK.3772 Bl.3.

Sk 3772. Blatt 4

Wagengewichte: (gerechnet mit Öl)

Fahrgestell mit Motor	etwa 392 kg
Aufbau	" 170 kg
Ausrüstung	" 80 kg
Gesamtgewicht leer, fahrbereit (mit 40 Liter Kraftstoff)	642 kg

Zuffh., 30.8.1939

Dr.ing.h.c.F.Porsche K.G.

Verteiler:

Wa Prüf 6 1b	1-fach
Generalbevollmächtigter für das Kraftfahrwesen	1-fach
Inspektion 6 1a	1-fach
Wa Prüf 7/II	2-fach
Wa Prüf 7/III	1-fach
Wa Prüf 8	1-fach
Dr.Porsche K.G.	2-fach

(pausfähiges Original bei Dr.Porsche K.G.)

SK.3772 Bl.4

Technical specifications for the VW Kübelwagen Type 62. While the data for the engine, gearbox, steering, suspension and brakes were already set, approximations had to suffice for the body dimensions.

November 10, 1939: The Type 62 driving through mud.

November 10, 1939: The Type 62 with a six-wheel comparison version also known as "Stuka."

Despite the larger tires — 5.00-18 off-road tires were fitted — the OKH was not satisfied with the off-road capability of the car. Porsche was given a completion contract, which he carried out as Type 82. While the engine and gearbox were identical to those of the 62 version, the rear axle ratio — crown wheel and pinion — was changed to 7:31. In addition, a reduction gear was added to the rear wheels. These measures resulted in reduced speeds in the individual gears with a simultaneous increase in the torque that could be used on the road.

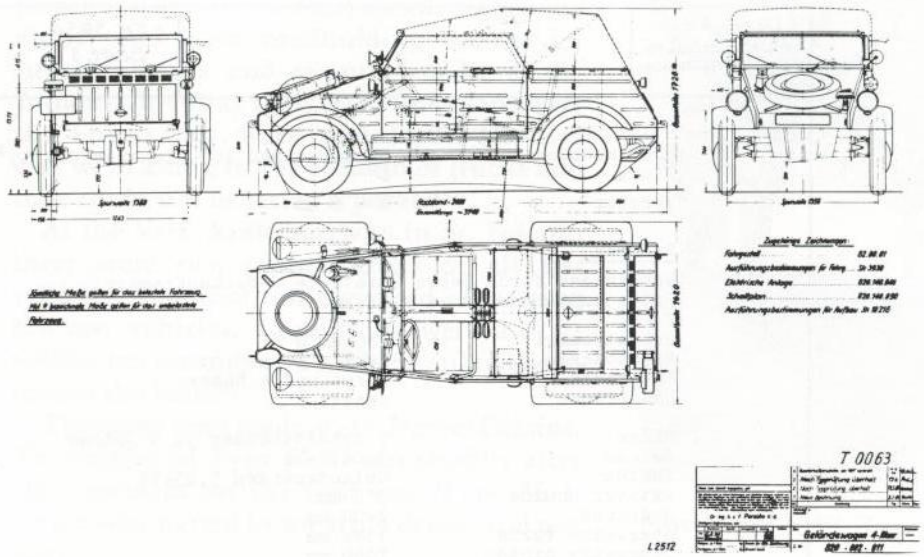
Further important changes were the reduced rear track and the increased ground clearance of 50mm in an unladen condition.

The first two vehicles of this new type were completed with bodies from Ambi-Budd in Berlin in December of 1939, and were accepted by the OKH. The VW Kübelwagen thus became typified and received the official designation of Le (light) PKW-Kl Type 82.

The Type 86 was developed parallel to the Type 82 and was the same Kübelwagen model with optional four-wheel drive. In January of 1940 the comparative testing of the two types took place in Eisenach.

From February 11-24, two specimens of the Type 86 were then tested by the Vers. Kraft Kummersdorf. The test and the evaluation of the vehicles was the responsibility of Engineer Major Henze and Engineer Schütte of the Vers. Kraft Kummersdorf. Types 86/I and 86/II drove as individual vehicles in a column from Kummersdorf to St. Johann in Tirol and back. The other vehicles in the column were Lkw (truck) A and S types made by the following firms: Borgward, Horch, Henschel, M.A.N., Mercedes, Magirus, Opel, and the Army Uniform Truck.

The two Type 86 vehicles attracted much interest from all the factory and army drivers



Complete drawings of the Type 82 Kübelwagen.

Right: Technical specifications of the VW Kübelwagen Type 82.

Dr. ing. h.c. F. PORSCHE K.-G. Stuttg.-Zuffenhausen	Technische Angaben für Kfz. Typ 82.	SK 3930 Blatt 1 82

Motor:

Allgemeine Angaben

luftgekühlter 4-takt Ottovergasermotor mit Batteriezündung, liegende Bauart, gegenläufig, obengesteuert.

Technische Angaben

Bohrung	70 mm
Hub	64 mm
Hubraum	984,704 cm^3
Verdichtung	1 : 5,8
Leistung	23,5 PS
Höchstdrehzahl	3300 n/min mit Drehschieber
Normaldrehzahl	3000 n/min
Höchstdrehmoment	645 cmkg bei 2000 n/min

Ausführung

Kurbelgehäuse	Leichtmetall
Zylinder	Grauguss
Zylinderkopf	Silumin mit eingezogenem Ventilsitz
Ventile je Zyl.	1 Einlaß - 1 Auslaß
Steuerung	Stoßstangen - Kipphebel, Nockenwelle untenliegend
Kurbelwelle	4 Gleitlager (Bleibronce)
Kolben	Leichtmetall
Gebläseantrieb über	
Lichtmaschine	durch Keilriemen
Drehzahl des Gebläses	6000 n/min
Luftmenge	500 l/min
Schmierung	Umlaufschmierung durch Zahnradpumpe
Ölkühler	Röhrenkühler
Zündspule	s.Bl.4
Zündfolge	1-4-3-2
Verteiler	s.Bl.4
Verteilerantrieb	Schraubenräder Übersetzung 2 : 1
Zündkerzen	s.Bl.4
Lichtmaschine	s.Bl.4
Anlasser	s.Bl.4
Vergaser	Fallstromvergaser 26 Ø Typ 26 VFJ (Deutsche Vergasergesellschaft)

Kupplung

Einscheiben	Trockenkupplung Grösse K 10 (Fichtel und Sachs)

-2-

Getriebe:

Gangzahl	vorwärts 4; rückwärts 1
Untersetzung	1.Gang = 1 : 3,60 2.Gang = 1 : 2,07 3.Gang = 1 : 1,25 4.Gang = 1 : 0,8 R.Gang = 1 : 6,6
3. und 4.Gang	geräuschlos
Zahnradausführung	1. u.2.Gg. u.R.Gg. gerade verzahnt Schubschaltung 3. u.4.Gg. schräg verzahnt Stiftschaltung
Art der Schaltung	Kugel, Mitte Wagen

Hinterachse:

Antrieb	Kegelräder 7 : 31
Untersetzungsgetriebe	Stirnräder außen bei den Rädern 15 : 21
Ausgleich	Z.F. selbsthemmend
Wagengeschwindigkeit b.Motor n = 3300 U/min	1.Gang = 17 km/Std. 2.Gang = 31 km/Std. 3.Gang = 51 km/Std. 4.Gang = 80 km/Std. R.Gang = 9 km/Std.

Fahrgestell:

Rahmen

drehungssteifer Mittelrahmen mit Gabelung hinten zur Aufnahme von Motor mit Getriebe, Fussboden mit dem Rahmen fest verbunden.

Antriebsaggregat

Motor, Getriebe und Achsantrieb zu einem Block verflanscht und in 3 Punkten am Rahmen gummigelagert.

Federung

vorne unabhängig gefederte Räder über 2 Stabfedern. Hinterräder, Schwingachse mit Strebenabstützung, einstellbarer Federstab (Kerbzahnprofil, Nonieteilung) Dämpfung über hydraulische Stoßdämpfer.

Lenkung

Sonderspindellenkung Konstruktion Dr.Porsche. Lage der Lenkung links, Spurstange geteilt.

Übersetzung	2,4 Umdr. am Lenkrad = 49° = voller Einschlag der Vorderräder 1 Umdr. am Lenkrad = 20,5°=42%
Lenkrad	400 mm Ø
Wendekreis	10 m Ø gemessen über Kotflügel

-3-

Radeinschlag	äusseres Rad 28°, inneres Rad 35°
Sturz	0°
Vorspur	4 - 6 mm

Bremsen

mechanisch durch Seile betätigte 2-Backenbremsen, Seile im Rahmen innen verlegt.

Bremstrommel	230 mm Ø
Bremsbacken	Breite 30 mm
Fußbremse	wirkt auf 4 Räder
Handbremse	desgl.

Räder	5 Scheibenräder je 5 Bolzen
Felgen	3,00 D-16
Reifen	Geländereifen 5,25-16
Aktiver Radius	319 mm
Radstand	2400 mm
Spurweite vorne	1356 mm
Spurweite hinten	1360 mm
Bodenfreiheit unbel.	310 mm
Bodenfreiheit belast.	290 mm
Rahmenhöhe unbelastet	330 mm
Rahmenhöhe belastet	310 mm

Betriebsstoffe

Kraftstoff	OZ 74
Kraftstoffverbrauch	9 1/100 km
Kraftstoffbehälter	Fassungsvermögen 40 l einschl. 10 l Vorrat
Lage	vorne im Aufbau
Zuleitung	Pumpe
Motoröl	Verbrauch 0,12 1/100 km Fassungsvermögen 3 l
Getriebeöl	Fassungsvermögen 2 1/2 l

Stgt.-Zuffhn.,30.11.39
Rei/St.

present on account of their speed, maneuverability and good roadholding on the icy superhighways and country roads. At St. Johann, three day trips, each one going over the Thurn Pass, were carried out. The two cars went along in the column of trucks and thus could not be tested separately.

At the Vers. Kraft barracks in St. Johann there were two examinations of all test vehicles. The first test consisted of starting the test vehicles. Conditions were a start within ten seconds and a 20-second pause to restore the battery.

The starts were made at -14 degrees Celsius. The engine of Type 86/II ran steadily after eight seconds on the first test. Type 86/I, which was started by an army driver, did not start.

The starting tests were followed by testing of all the A and S trucks in 1.2 meters of snow on the drill field in St. Johann. The S types drove some 50 meters, all the A types and the two Type 86 vehicles got stuck in the snow and dug themselves in after about 100 meters.

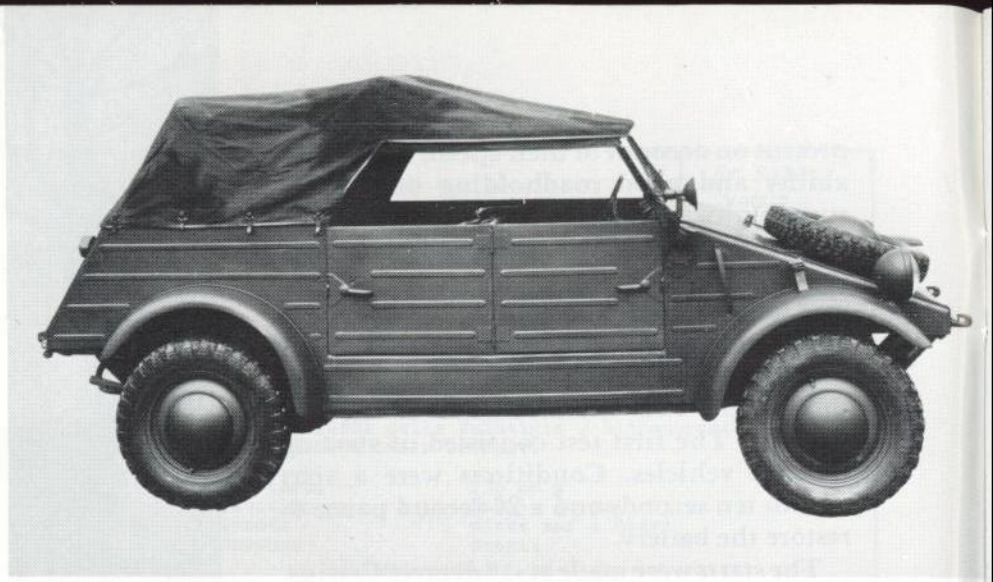
The tests were repeated the next day, with snow chains and other aids. One Type 86 ran with snow drums and chains. This car came through the trackless country splendidly, under the same snow conditions as the previous day, to the astonishment of the men of the Army Weapons Office who were present. The snow drums on the front wheels meant great stress for the material of the axle shanks and steering.

In all, 148 kilometers were covered in Test 2,257 liters of fuel consumed per car, plus 3 liters of oil.

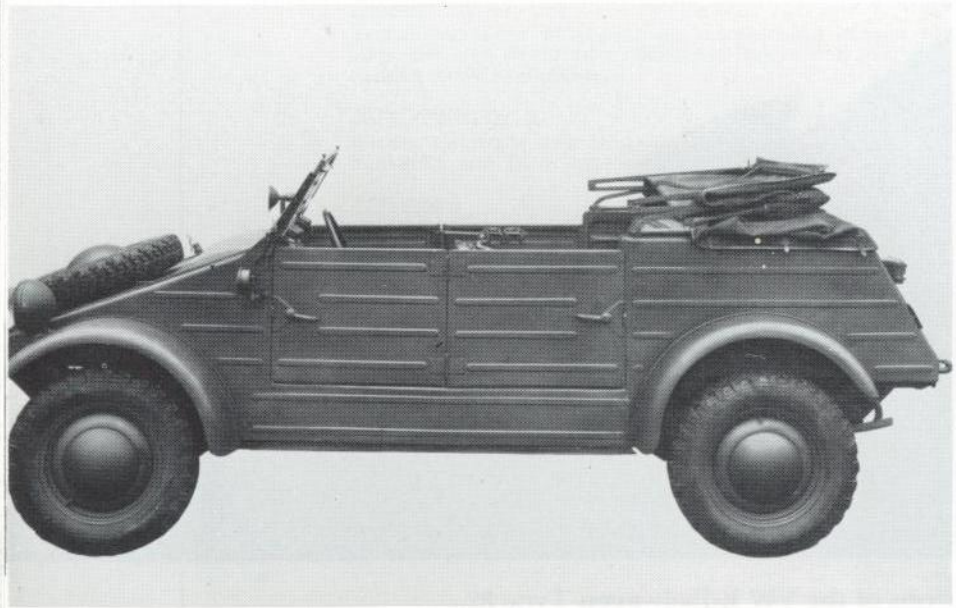
In further tests too, the good results attained at St. Johann were confirmed. On April 5, 1940 it could be stated in a report:

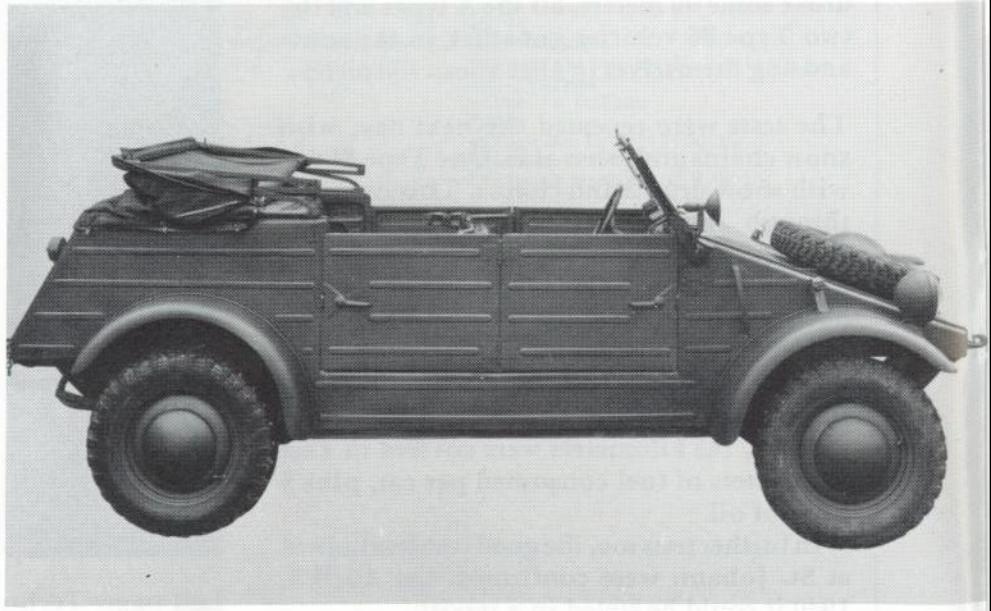
November 1939. Type 62 in the country.

Left page: Technical specifications of the VW Kübelwagen Type 82.



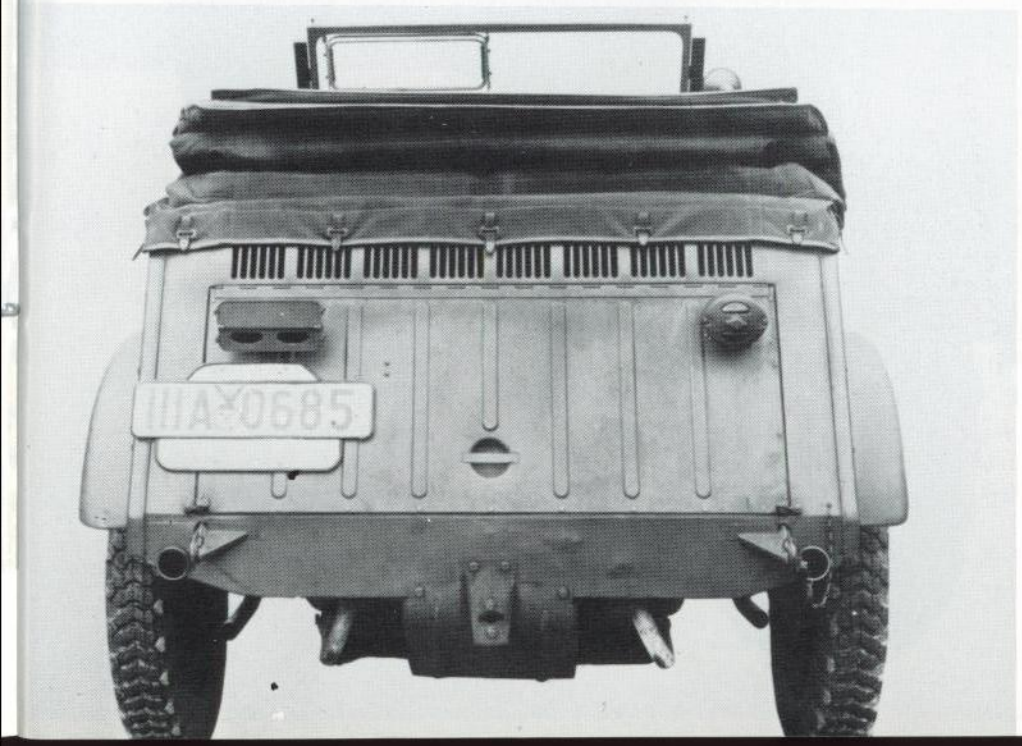
KUBELWAGEN TYPE 82

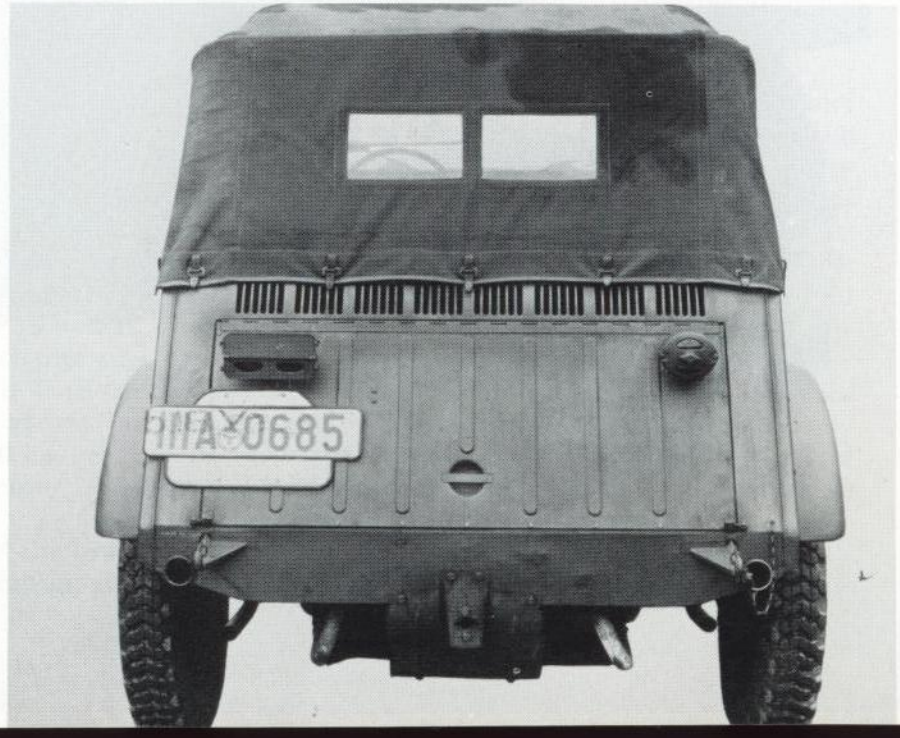




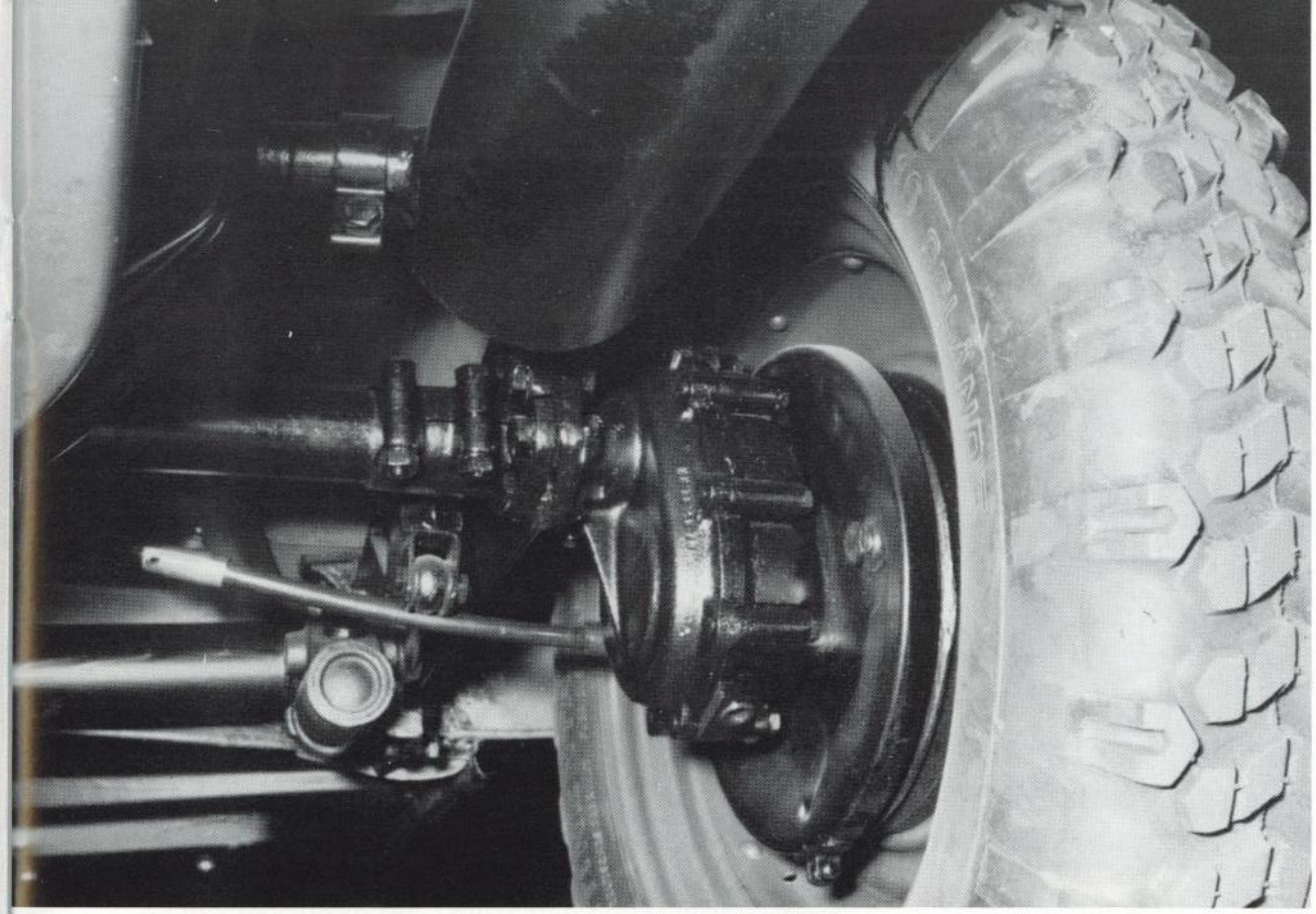

IIIA 0685


IIIA 0685


IIIA 0685


IIIA 0685


IIIA 0685



Reduction gears on the rear wheel of the Type 82 Kübelwagen. Crown wheels with a ratio of 15:21. These reduction gears provided two advantages: better off-road traction and increased ground clearance.

"The Wünsdorf Test Center (*Oberstleutnant* König and *Oberstleutnant* Mühlenfels) is in general very enthusiastic about our vehicles. In the prevailing slippery ground conditions in the mountains, for example, our four-wheel-drive Types 86 and 87 cars without snow chains were vastly superior to the Army Uniform Personnel Car. For example, our Type 87 climbed the approximately 25-degree slope of the Hungerberg without trouble, while the wheels of the Uniform Car began to skid after a stretch of about 30 meters. Even our Type 82 with snow chains was considerably better than the Uniform Car without chains, since the Uniform Car, with its inherent weight of 1700 kg, reached its wheel limits too quickly despite its off-road gears.

"In addition, the body of the low-bodied military vehicle that was mounted on our Type 87/1, was very pleasing in principle, and the Wünsdorf Test Center will try to have *Generalmajor* von Schell authorize the design of such a type."

Faults were naturally found, but they were minor: V-belt wear, bent shift levers, too-small rear-view mirror, too-short fenders, thus too much dirtying of the body, door handles too weak, lack of heat, etc.

The stress to materials during such comparison testing was documented in a further report on a comparison run of 11 Type 82 Kübelwagen, two Type 86, and the LE Pkw (Light Uniform Personnel Car) from March 4 to April 11, 1940. On page 18 is an excerpt on the, "replaced parts and major work on the Kübelwagen":

"With these tests, the testing of the basic types 82 and 86 is essentially completed. Now it is a matter of further development for special uses with the troops, as well as series production and actual use."

As early as December 3, 1940 a conference took place between the Berlin Waffen-SS and the Porsche firm, concerning the development of a new light armored scout car. In this new model, as many Type 87 Kübelwagen parts as possible were to be used. It was assumed that a light armored scout car did not have to be fully armored, and that bow armor would therefore be sufficient.

In the ensuing demonstration, the Type 82 and 87 Kübelwagen proved to be decisively superior to a BMW R12 motorcycle and sidecar. The result: The possibility of using the small off-road car began only where the off-road suitability of the motorcycle with sidecar ended. This result gave rise to con-

Ausgewechselte Teile und grössere Arbeiten .

Motor :

Fahrgest.Nr.	Tacho.km-Stand	Teile	Grund
111	3 500	Keilriemen	gerissen
115	2 600	"	zerfranst
117	4 000	"	gerissen
118	3 000	"	"
118	4 500	"	"
119	4 500	"	"
120	4 000	"	"
121	5 000	"	"
122	4 000	"	zerfranst
123	3 000	"	gerissen
123	5 500	"	zerfranst
124	5 000	"	gerissen
118	6 000	Zündspule	defekt
120	4 500	Ölkontrollschalter	defekt
121	5 000	"	"
121	3 000	kompl.Zündkabelstrang	schlägt durch
120	4 300	Austausch-Motor	Keilriemen gerissen Kolben angerieben

Getriebe-Hinterachse-Schaltung:

123	5 900	kompl.Rückwärtsgang	(Büchse v.Rückwärts (gang auf Welle (festgefressen.
117	5 000	(Gehäuse für	Poröse Stellen
121	4 500	(Stirnräder gelötet	

An allen Fahrzeugen Innenschalthebel bei ~5000 km ausgewechselt.

Vord. Achse :

Fahrgest.Nr.	Tacho.km-Stand	Teile	Grund
118	4 500	kompl.Tragrohr und Traghebel	Unfall
111	2 000	kompl.rechter Achsschenkel	"
111	4 000	Tragrohre gerade gerichtet (kein Ersatz)	"

Fusshebelwerk :

123	3 000	Gasfußhebel	Kunstharzrolle gefressen
120	5 200	Kupplungsseil	Drähte gerissen

An allen Fahrzeugen mussten die Kunstharzrollen vom Gasfusshebel gangbar gemacht werden.

Handhebelwerk :

123	5 000	kompl.Handbremshebel	Druckstange u.Sperrklinke verbogen
111	5 500	"	"
119	6 000	"	"

An Wagen 120 wurde der Handbremshebel repariert.

Bremse :

An allen Fahrzeugen wurden die Bremsen bei etwa 5 000 km Stand geprüft und teilweise nachgestellt. (höchstens 3 Zähne.)

Tachometerantrieb:

121	3 500	kompl.Antrieb (neue Verzahnung)	Zahnräder-Übersprung
119	4 500	"	"
117	5 000	"	"

Fahrgeste.Nr.	Tacho.km-Stand	Teile	Grund
111	4 000	kompl.Antrieb (neue Verzahnung)	Achse gebrochen
115	2 500	"	"
121	4 500	Tacho-Wellen	gerissen
118	7 000	"	"
120	4 500	"	"
111	3 000	"	"
115	2 500	"	"

Bei den ersten Vergleichsfahrten mit Kummersdorf mussten schon an 5 Wagen neue Tachowellen eingebaut werden.

Rahmen:

11	111	2 000	kompl.Rahmen	Unfall

Aufbau:

Fast sämtliche Fahrzeuge sind durch Unfälle am Aufbau beschädigt und wurden soweit möglich instandgesetzt.

Stgt.-Zuffenhausen, den 22.5.40
Ks/Ep- Klay H.

List of replaced parts and major work during the test runs of March 4-April 11, 1940.

On a test run in the Thuringian Forest near Eisenach, January 1940: the Kübel doesn't make it through everywhere.

Test run at the Wünsdorf Test Center, March 25-April 15, 1940. The test included the LE PKW, 11 Type 82 and 2 Type 86.

siderations of replacing the motorcycle for troop use later — particularly for motorcycle rifle units (Kradschützen). What was wanted was a four-seat vehicle. It could be based on either the Type 82 or Type 87.

The two Messrs. Porsche, on the other hand, suggested that the new vehicle used instead of the motorcycle with sidecar also be planned with three seats, because this gave the possibility of shortening the wheelbase by some 70 to 80 cm and also narrowing the front and rear track, attaining better off-road suitability. Mr. Porsche Jr. was of the opinion that the off-road ability would not be inferior to that of a tracked vehicle, as the off-road ability, and above all the maneuverability, were essential for motorcycle riflemen.

Not least for these reasons was the idea of using the Volkswagen engine in a motorcycle frame was dropped, since a motorcycle with sidecar, in Porsche's eyes, would always remain a technically incomplete vehicle.

On December 22, the contract to develop a small armored scout car was awarded. On January 14, 1941, though, the armor was eliminated. Off-road mobility, speed and good armament were now the high-priority goals. The weaponry suggested was two twin machine guns, which would be mounted on two circular tracks in a turretlike superstructure.

At the same time it was decided that this vehicle was to be developed as Radio Car Type 821. If possible, the same body should be used for the radio car. Instead of the twin machine guns, a 50-Watt radio set (trans-

Test runs at the Wünsdorf Test Center, March 25-April 15, 1940.

mitter and receiver) should be installed. Just one light machine gun was planned as armament.

Other new model variations grew out of a conference with the OKH on March 21, 1941, followed on April 10 by a written statement from the OKH, WaPrüf 6/I b. Under the type designation of 822, the Kübelwagen was to be rebuilt as an ambulance with a roof. The siren was moved inside the vehicle to make grasping the operating handles easier. A model of the siren mount was delivered and accepted without change by the Reich Office of Air Protection.

The type number for an armored vehicle rebuilding is 823. The further development of this vehicle was to be done by Ambi-Budd in Berlin. The Type 87 was to have been the basis of this vehicle's production.

Further models that were developed were a surveying car, a two-barrel carrier and an ambulance. The Type 82 formed the basis of them all. These developments extended into the spring of 1943.

According to official Volkswagen factory statistics, as of April 10, 1945 the following numbers had been produced:

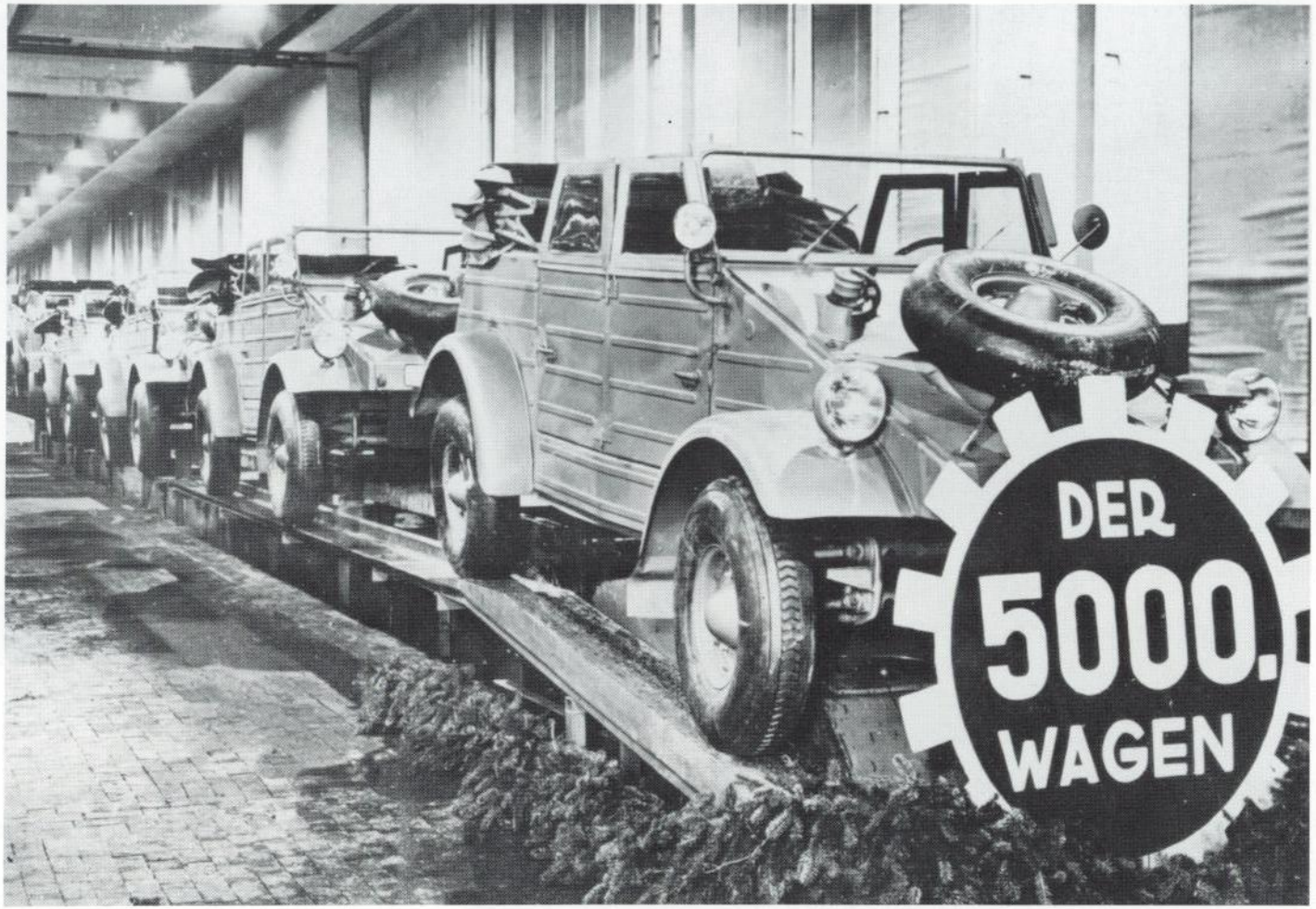
Type 82 - Kübelwagen/4-seat	37,320
Type 82 - Radio car	3,326
Type 82 - Intelligence car	7,545
Type 82 - Repair shop car	2,324
Type 82 - Kfz	3273
Type 82/92 - Off-road sedan	546

These numbers also include the models with various track drives or rail wheels, which were already shown in the first section of this volume.

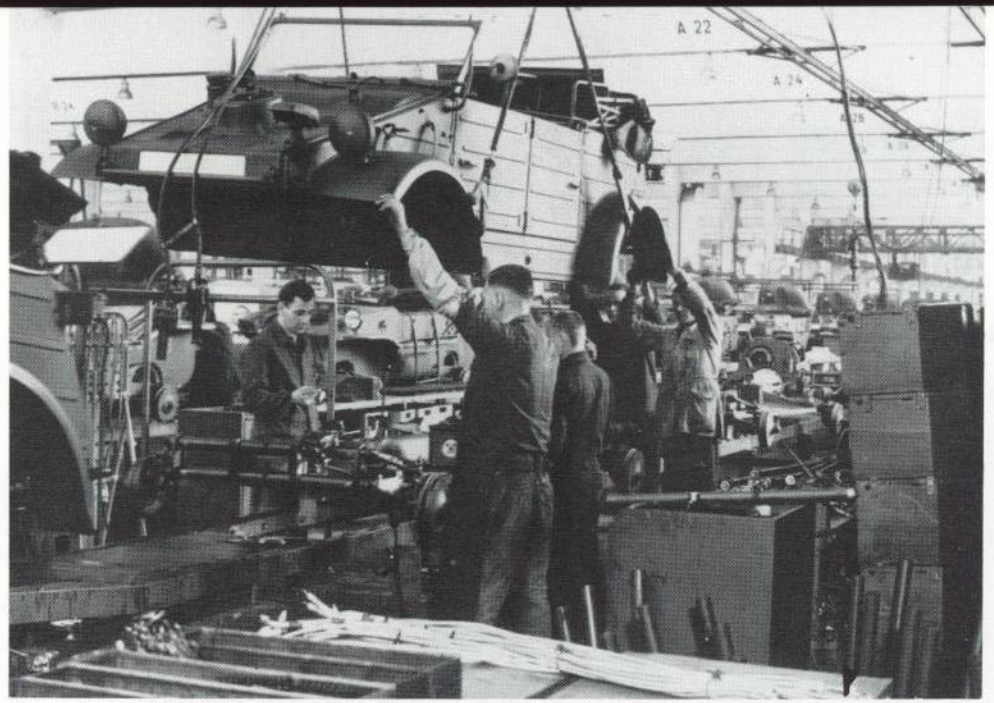
Testing the Type 82 Kübelwagen on the factory grounds in Wolfsburg (City of the KdF Car).

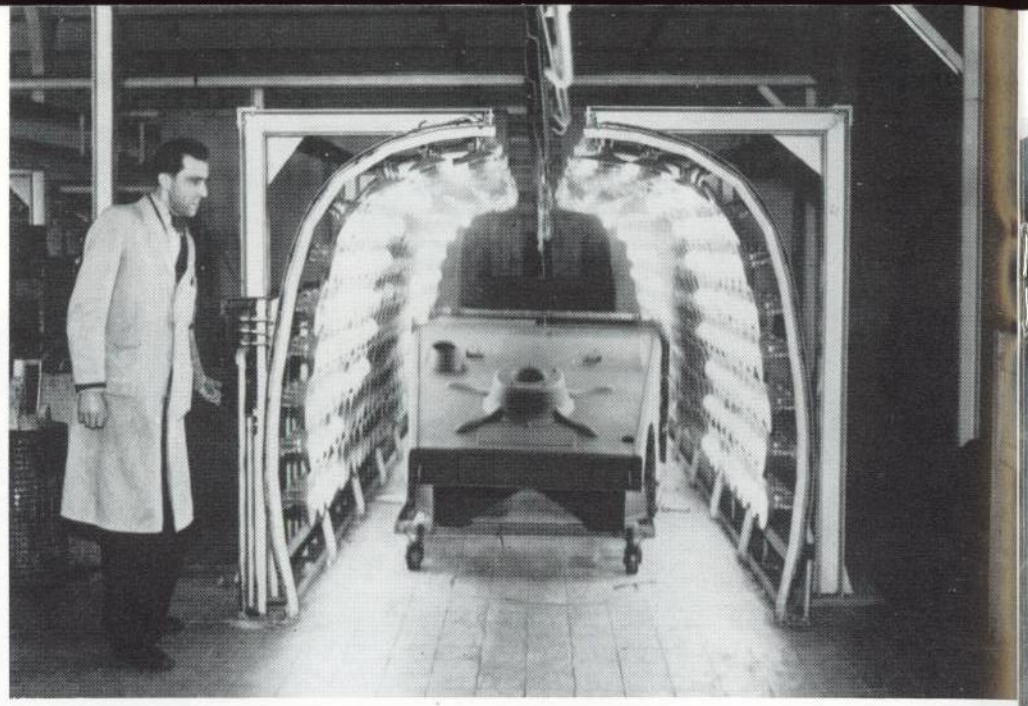
Ambulance. This photo shows the first version, for transport of two patients.

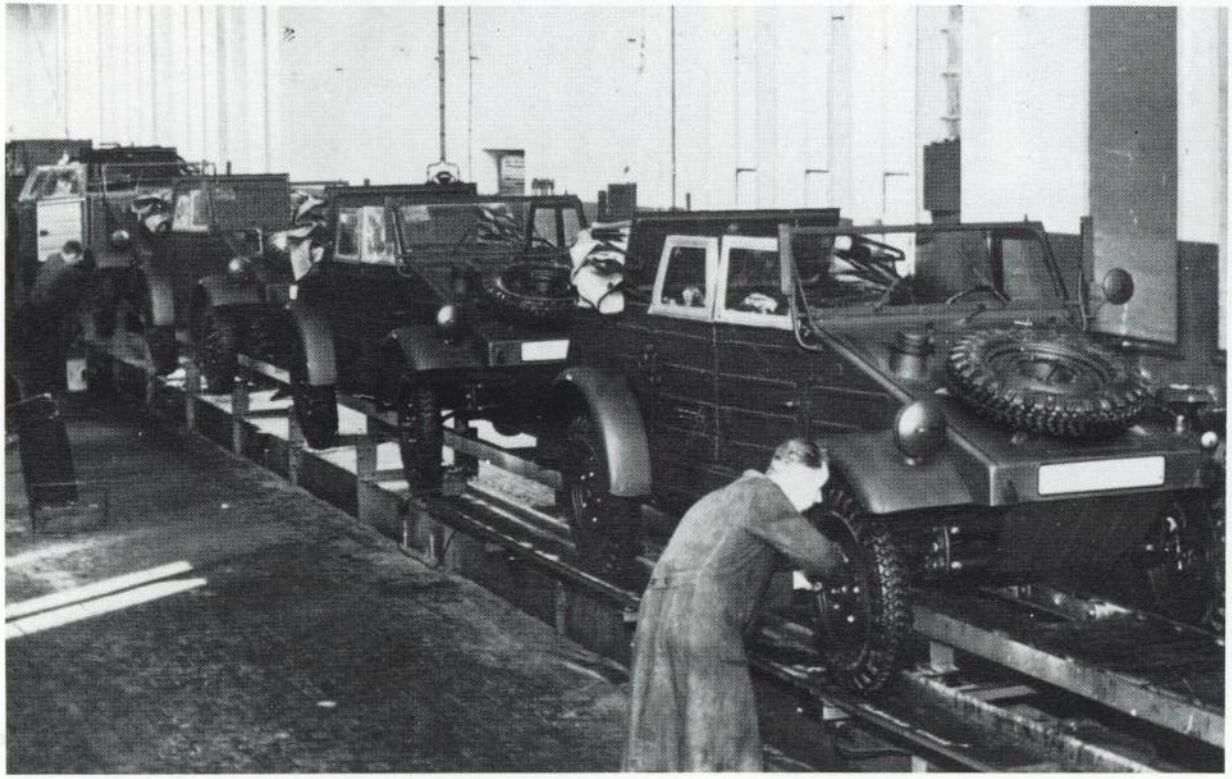
Type 822 with mounted siren.



The 5000th Kübelwagen comes
off the assembly line in 1942.



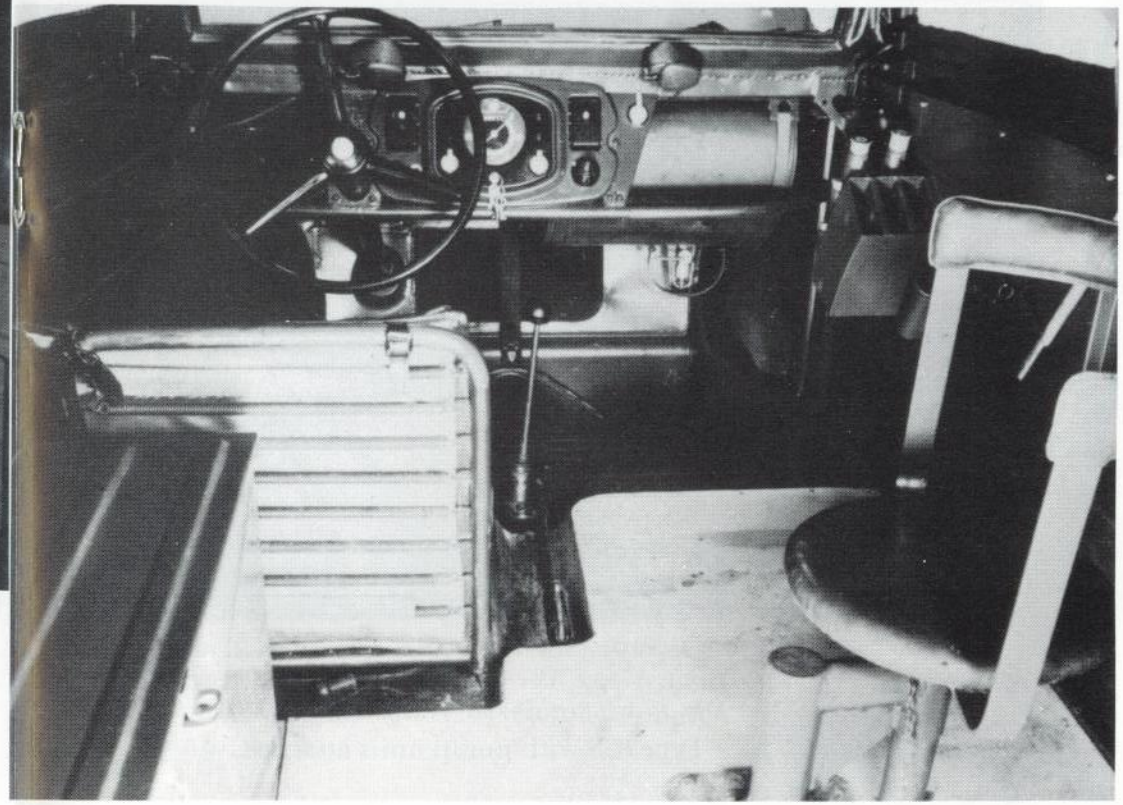




Above: Kübelwagen in the paint drying oven.

Kübelwagen assembly at the Volkswagen works: the photo at upper left shows the so-called "marriage", the union of the pre-assembled body with the likewise completed chassis. The Schwimmwagen is being assembled on the parallel line in the background.

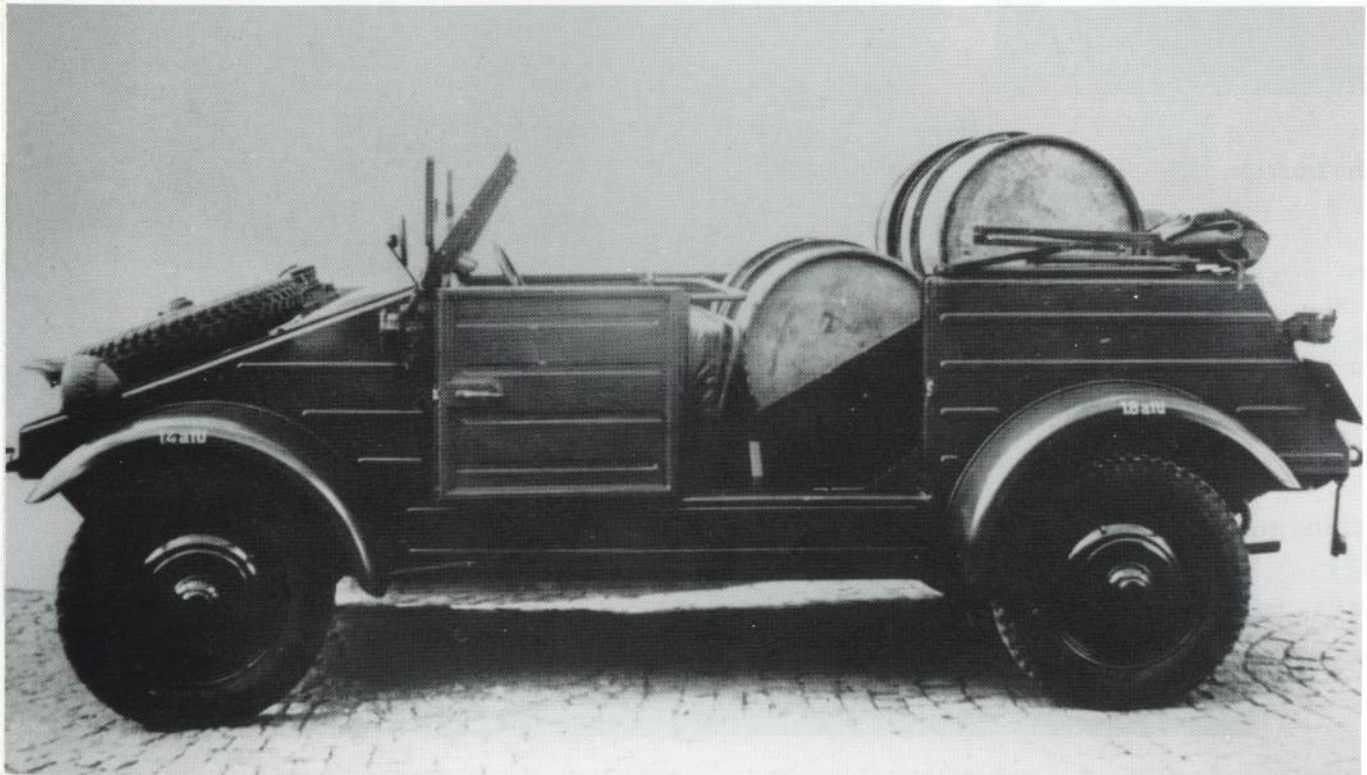
Left: Final inspection of the finished Kübelwagen.



Above: Mockup of the Type 823 armored car: the interior, as seen from the right rear.

Right: Type 823 armored car mockup with machine gun turret, without road-wheel covering. Photographed May 17, 1941.

Above:
Type 825 with pump units attached.



Left:
Type 82 two-seat, two-barrel vehicle, tropical version.

Development of the Schwimmwagen

On July 1, 1940 the F. Porsche KG was given a contract to design an amphibious cross-country vehicle. On July 5 the contract was extended to cover three examples. This was the same day on which work on the Type 128 Schwimmwagen began. The contracts were issued by the Army Weapons Office. The stipulated payment was the sum of 200,000 Reichsmark. The first prototype, which was finished on September 21, 1940, still bore a strong external resemblance to the Type 82 Kübelwagen with is doors welded shut. The power unit was the Type 87 powerplant which was also under development at the time.

The main differences between the Type 128 and the Type 87 were:

1. Front axle with front-wheel drive
2. Locking differential
3. Front wheel bearings made doubly water-tight
4. Screws on the front axle carrier covered with rubber rings
5. Passage of the speedometer cable through the body made watertight with rubber sleeves and metal protective caps
6. Two three-leaf spring bars

Transmission:
Different attachment to the frame.

The first prototype of the VW Schwimmwagen during testing in Stuttgart. The bodywork is that of the Type 82 Kübelwagen with its doors welded shut. The chains on the front and rear tires — which afforded better exit from the water — indicate that the Type 87's four-wheel drive has been installed.

Above: Driving out of the water. It looks as if the four-wheel drive with tracks will not quite suffice in these conditions.

Upper left: Testing the wading depth and supporting traction over the wheels.

Left: This photo shows the wading depth of the car with a load of five persons. The housing for the propeller while driving on land is easy to see.

Rear axle:

Divided driveshafts (for easier assembly).

Doubled sealing of half-shafts (crown wheels).

Bonding of rear axle to body by sleeves.

Changed attachment and sealing of rear shock absorbers.

Spring bars.

Brakes:

Brake cables covered with watertight material,

Covered with rust-resistant tubes where they come out and made watertight with rubber seals.

Cables packed with grease (no lubricating nipples).

For water travel, a steerable screw propeller was linked to an extension of the driveshaft by a hooked coupling. For overland driving, this propeller was folded up and protected in a housing.

On November 1 this first prototype was delivered to the Army Weapons Office WA Prüf 6 (Ia), and on the very same day, tests began that lasted until December 6. Testing took place on the Autobahn, secondary roads, cross-country and in water.

For comparison, the Trippel Schwimmwagen and a light uniform personnel car with a watertight linen covering (designed by Grögler of Vienna) went along — when they were running properly.

Schwimmwagen Type 128 being tested at the H.V.A. Test Center in Wünsdorf. The photo shows the first prototype with its Kübelwagen-like body.

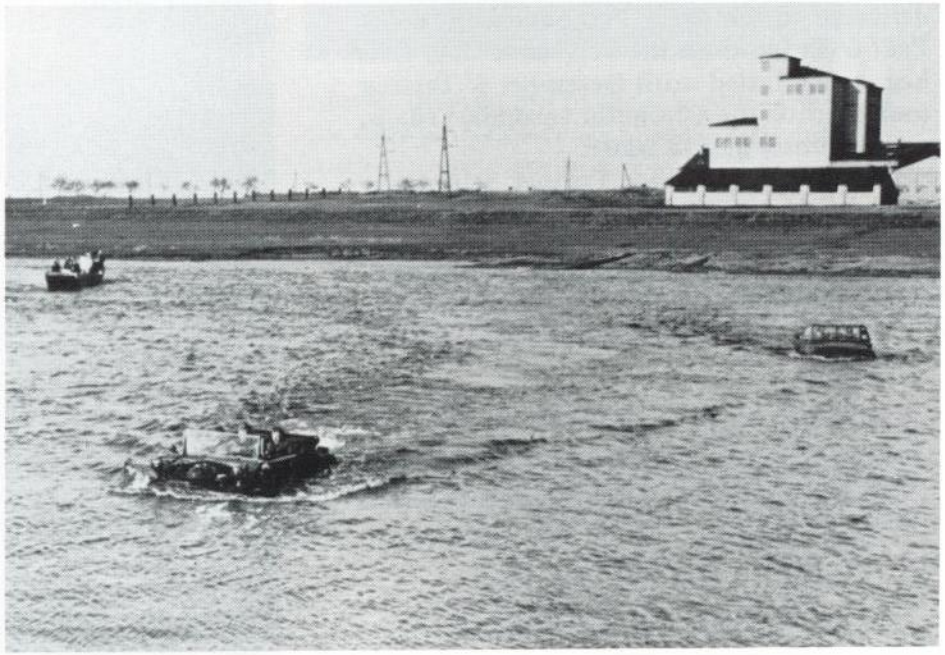
Below: Type 128, Vehicle No.3, being tested at Wünstorf.

The Trippel comparison vehicle is pulled onto land with engine trouble resulting from overheating.

The Type 128/I "scrambles" onto land under its own power.

Below: The Type 128/3 in very heavy country.

Below: Type 128/3 in the center and the Trippel at right during comparison testing in the Danube near Ingolstadt.



Three Type 128 vehicles took part in the further tests that began on November 6. The test schedule was as follows:

11/7/40: First driving and amphibious testing for the test crew at Wünsdorf Lake.

11/8/40: Entry and exit tests in the Notte Canal.

11/9/40: Vehicles examined and serviced.

11/11/40: Amphibious testing in Wünsdorf Lake and Notte Canal and review by *Oberstleutnant* König, Director of the Test Center at Wünsdorf.

11/12/40: Amphibious and land testing in strong current in the Elbe near Magdeburg.

11/13/40: Vehicles examined and serviced.

11/14/40: Amphibious testing in Notte Canal and off-road driving on the Wünsdorf test grounds, review by *Oberst* Fichtner, Army Weapons Office, *Oberstleutnant* Esser, Director of the Kummersdorf Test Center, and representatives of WA Prüf 5 (Engineer and Naval Sections).

11/15/40: Amphibious testing in Notte Canal and Wünsdorf Lake.

11/16/40: Examination of vehicles for major test drive.

11/18/40: Beginning of major trip: Car 128/3 odometer: 1036 km. Car 128/4: 1599 km. Route: Wünsdorf to Ingolstadt by Autobahn.

11/19/40: Entry and exit tests in the Danube near Ingolstadt with current up to 2.8 m/sec, before *Oberst* Fichtner, *Oberstleutnant* König, the chief of the engineer battalion there and their staffs.

11/20/40: Trip from Ingolstadt to Münsingen.

11/21/40: Off-road driving at Münsingen training facility.

11/22/40: Trip from Münsingen to Ulm and back. Amphibious and land testing in the Danube near Ulm. Current up to 2.4 m/sec. Review at the Danube and on the testing grounds at the Münsingen base before *Oberstleutnant* König, *Major* Liebel (Wünsdorf Test Center), *Major* Schmidt and Dipl.Ing. Stabe (HWA, Wa Prüf 6/Ia). Propeller lowering mechanism, operated from the driver's seat.

11/23/40: Off-road drives at the Münsingen training camp.

11/25/40: Route: Münsingen-Schwäbisch Hall-Bad Mergentheim-Würzburg-Eisenach-Berka training camp near Eisenach.

11/26-28/40: Off-road drives at the Berka training camp.

11/29/40: Route: Berka-Eisenach (Autobahn)-Dresden-Pirna.

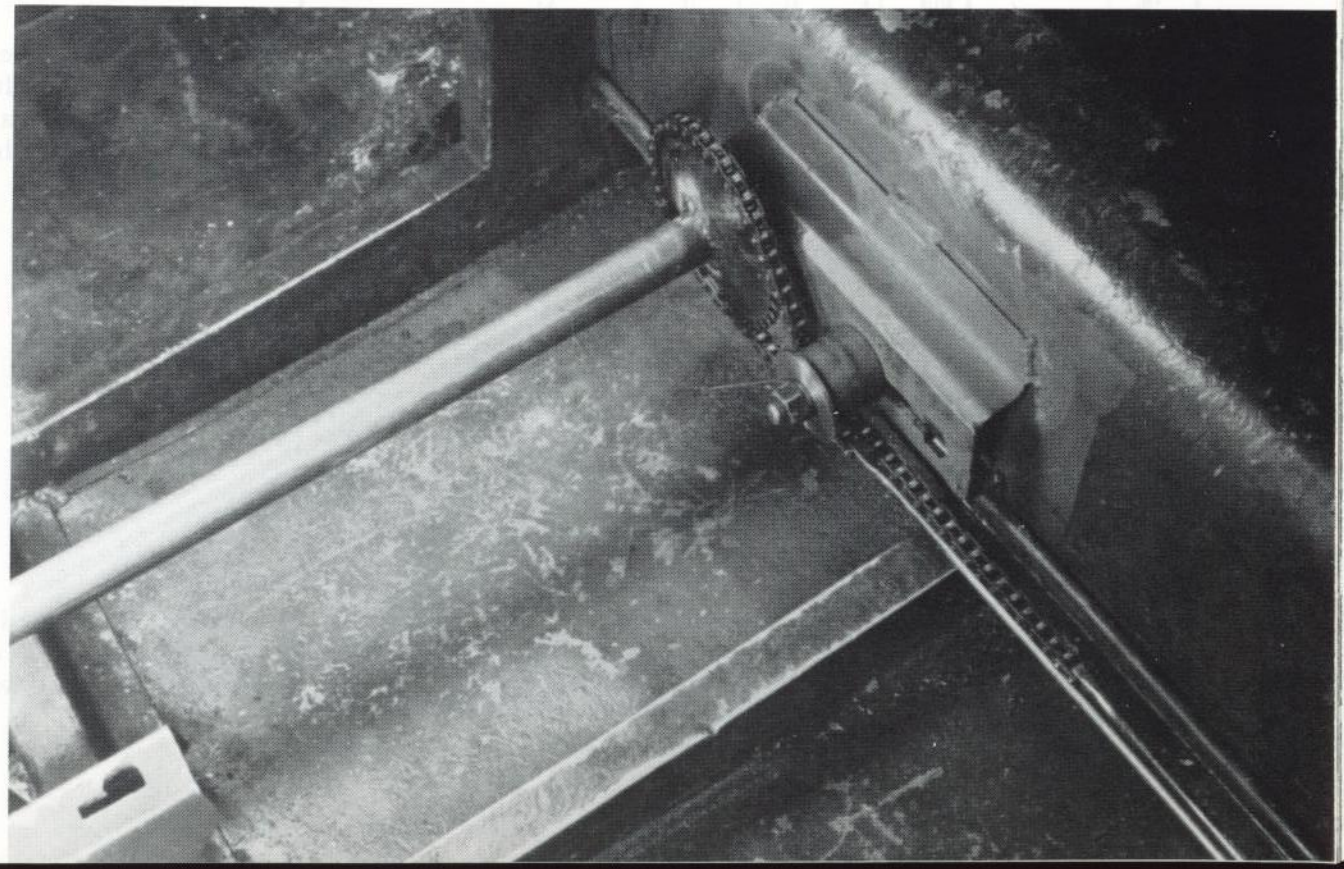
11/30/40: Amphibious testing in the Elbe near Pirna, then on to Tetschen.

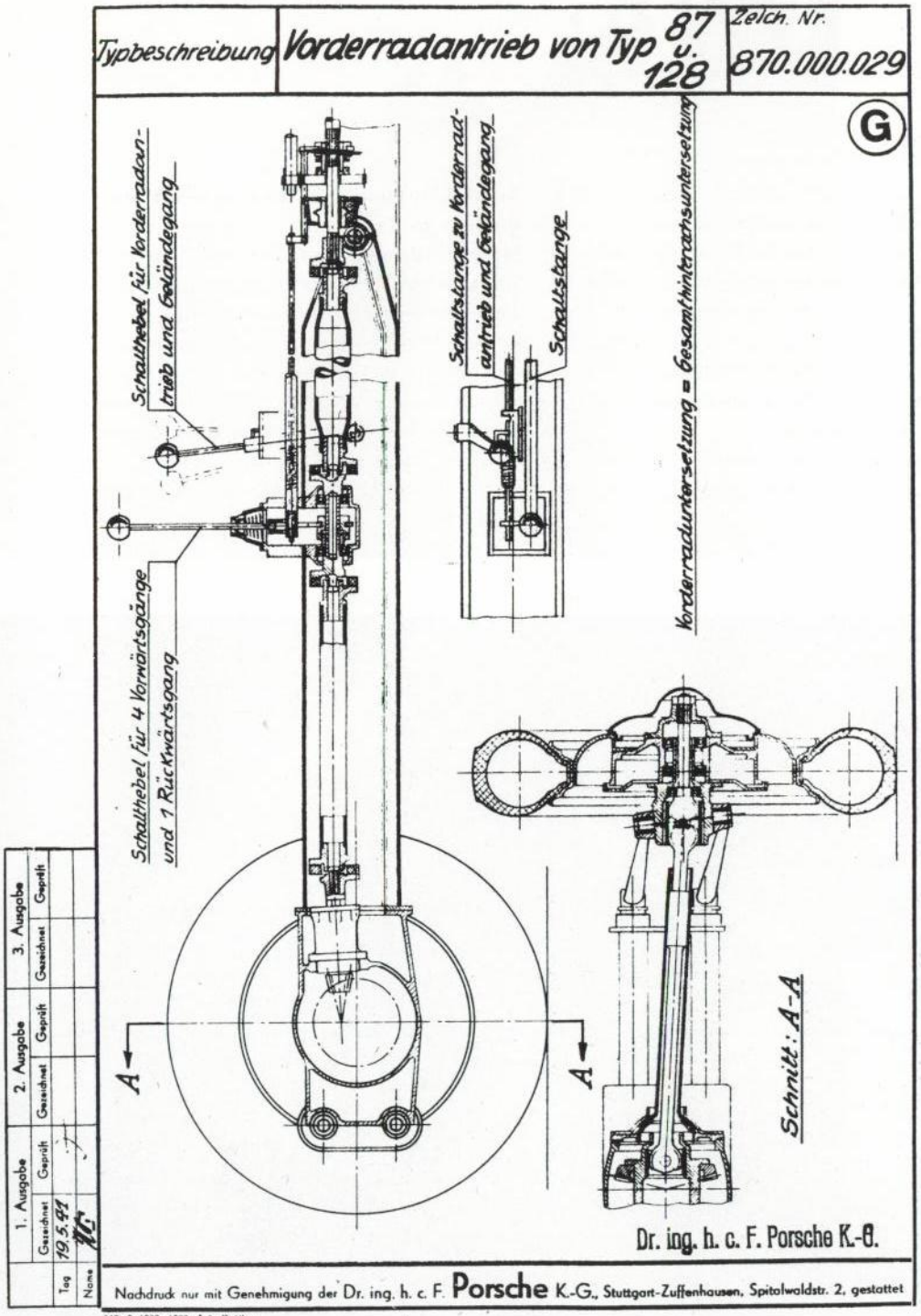
12/2-3/40: Mountain drives on bad roads near Tetschen.

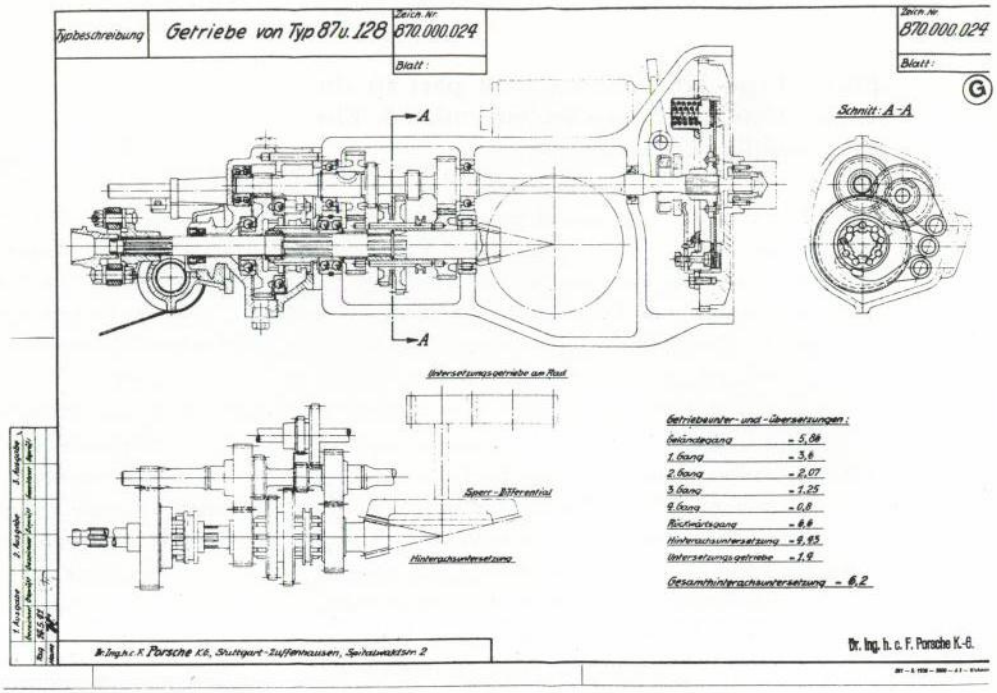
12/4/40: Reviewed in the Sudeten mountains near Tetschen by *Oberstleutnant* König.

12/5/40: Route: Tetschen-Pirna. Amphibious and land testing in the Elbe near Pirna; water current to 2.2 m/sec, before *Oberstleutnant* König and the chief and staff of the engineer battalion there.

12/6/40: Route: Pirna (Autobahn)-Dresden-Leipzig-Wünsdorf.







Gearbox of the Type 128 Schwimmwagen, which is identical, with the exception of the frame attachment, to the gearbox of the four-wheel-drive Type 87.

Front-wheel drive of Type 128. Identical to Type 87 except for particular means of making it watertight because of the vehicle's ability to travel in water.

During this testing the vehicles covered between 3207 and 3496 km, 1400 km on the Autobahn, 1270 on roads, 180 km in rough country, 200 km in very rough country, and 300 km on very rough mountain roads. Every vehicle spent 18 hours in the water. Fuel consumption of the Type 128 in the water was 6 liters per hour, for the Trippel Schwimmwagen close to 18 liters per hour, both while fully laden.

Further test results:
Comparisons:

Driving characteristics:
Top speed on the Autobahn:
Type 128 = 75-80 kph
Trippel = 80-85 kph

Sustained speed on the Autobahn:
Type 128 = 75-80 kph
Trippel = 70-75 kph (engine became hot)

Off-road capability:
The Type 128 showed a slightly lesser climbing capability than the Trippel, but our car was superior to the latter in that the Trippel car is considerably heavier, and its cooling water comes to a boil under hard off-road use.

The installation of the off-road gear (5th speed down) in the Type 128 will also improve this vehicle's climbing capability considerably and thus eliminate this one shortcoming in comparison to the Trippel.

During the exiting tests in the Notte Canal, on the Elbe and Danube, the Type 128 was superior to the Trippel car, especially on soft ground, where the Trippel sank in because of its weight (front engine) and its wheels spun.

Top speed in the water:
Type 128 = ca. 10 kph
Trippel = ca. 8.5 kph

Sustained speed in the water:
Type 128: Driven 1 hour at top speed without damage.
Trippel: Could not drive 1 hour at top speed, engine overheated.

Fuel consumption on the road:
Type 128: Fuel capacity 50 liters.
Trippel: Fuel capacity 70 liters.
Type 128: 9.5 liters/100 km
Trippel: 18 liters/100 km

The vehicles' range of action was therefore, per filled tank:
Type 128: 520 km
Trippel: 380 km

Below:
Alpine drive, August 6-16, 1941.

As already noted, the Type 128 began its life on the drawing board three months before its test drives began; the Trippel comparison car had been developed for six years.

The Grögler comparison car could not be tested, as it was constantly defective and dropped out as unusable in the first water and off-road tests.

On the basis of the good results of these tests, there were talks in December of 1940 between the Porsche KG and the HWA about having another 100 Type 128 vehicles built. In terms of bodywork, the project could be handled by the firm of Drauz. Up to this point, a total of four vehicles had been built.

From May 28 to June 27, 1941 these vehicles were again subjected to tests, this time by the Instructional Department for Army Motorization in Wünsdorf. The results attained here were also satisfactory. A further test of three Type 128 vehicles was an Alpine drive from August 6-16, 1941.

The purpose of the run was to test the vehicle under the most stringent demands in the country, on roads and mountain passes, with special concern for the effects of heat and dust. The total length of the run was 2580 kilometers. Here is what was learned from this Alpine run:

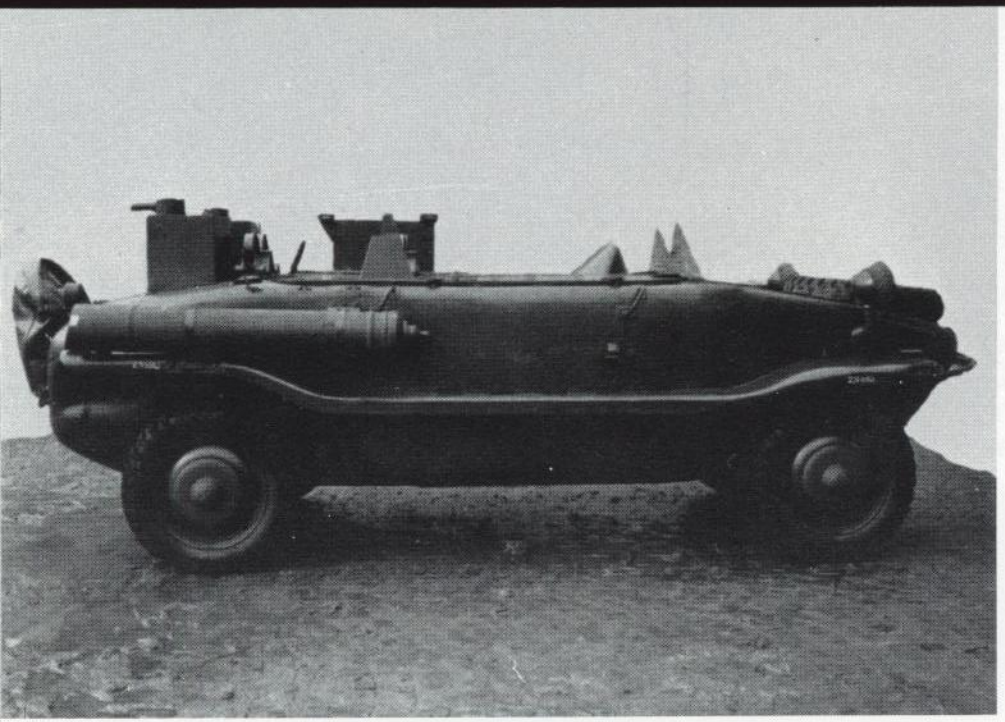
"Driving mountain paths in the high mountains under difficult conditions, as at the Kitzbühler Horn or under the very worst conditions at the Rudnicker Alm near Watsching, sometimes muddy, rocky, very narrow and steep, demonstrated to us as never before the Type 128's extraordinary off-road capability when driven sensibly. We drove on paths that had never before seen a motor vehicle, and the total weight always amounted to almost half a ton. The vehicle's water capability did not fall short after its great off-road runs, as it performed faultlessly in rivers at a higher speed than that of the (other) vehicle."

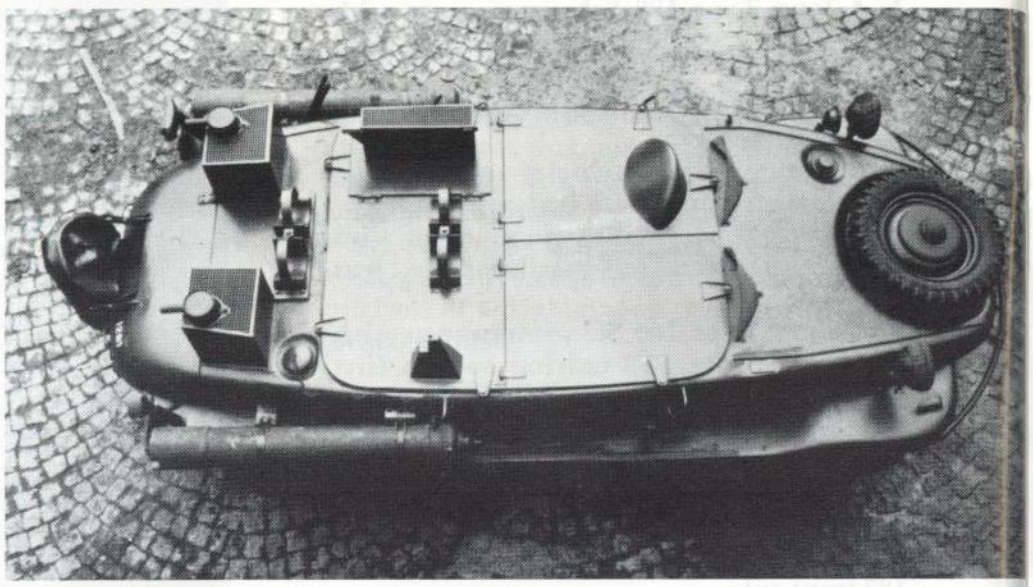
On February 18, 1942 a new off-road vehicle program was introduced by the Porsche firm; it promised the following for amphibious off-road vehicles:

Left: Only in 1942 did the VW Schwimmwagen reach the troops. They are seen here on parade in Paris.

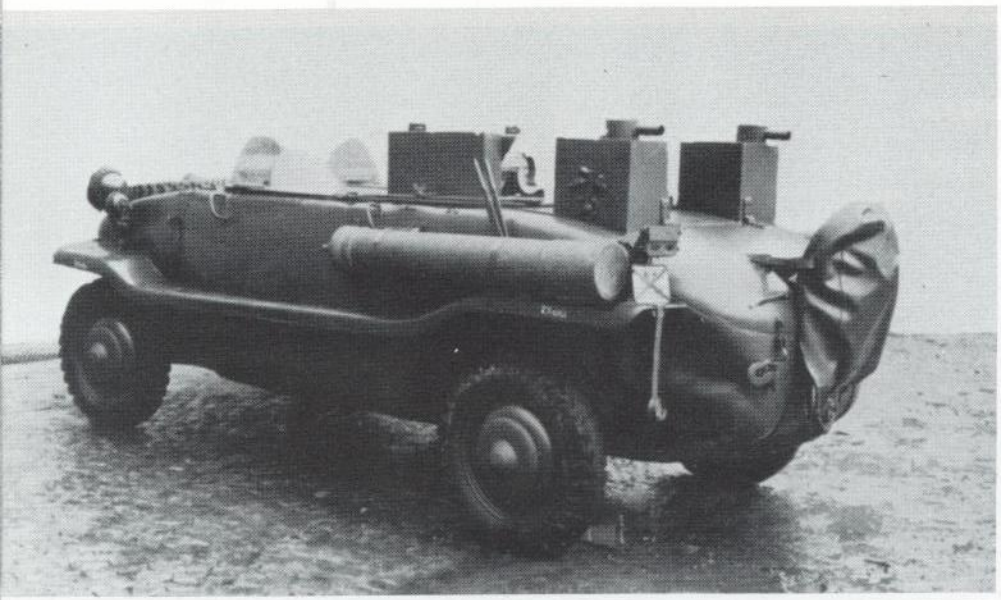
1. A long Type 128 Schwimmwagen with four-wheel drive, not in self-bearing form (with chassis).
a. A pre-series of 30 vehicles made in Stuttgart, with body by Dranz.
b. A series of 200 vehicles made at the Volkswagen works, with body by Franz.
2. A long Type 138 Schwimmwagen with four-wheel drive, self-bearing body, was dropped.
3. A short Type 166 Schwimmwagen with four-wheel drive, self-bearing body; a first pre-series of 175 cars, 125 built in Stuttgart, the rest to be decided later; body by Ambi-Budd of Berlin, and a further series of about 4000 cars, made in Fallersleben. These vehicles were to have the new Type 177 five-speed gearbox and the new improved Type 187 front axle.

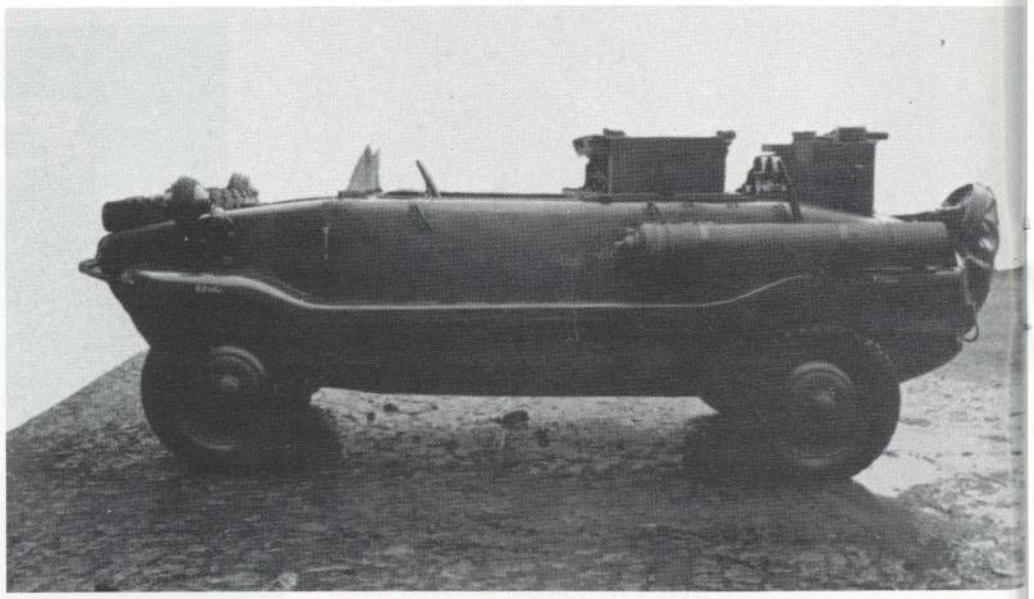
Testing the Type 128/7 by the 2nd Instructional Department H. Mot., from September 28 to November 12, 1941.





These pictures were taken on November 12, 1941.





The special Type 129, which had also been planned, was no longer in the program at this point, and the plans for series production of the Type 128 had been shelved for the time being too, as the choice had been made in favor of the Type 166. On April 28, 1942 construction specifications for this new type had been determined:

Raw Construction

Body: All-steel construction. Moving parts of the drive system are made watertight by using rubber cuffs against the body. Since there are no doors and the step is very small, the upper edge of the body is lowered. The step is made integrally with the fender and attached at about the level of the vehicle's waterline. One forward and two rear eyes for towing hooks are made jointed, so as to prevent tearing out the outer skin.

Hood: The engine hood is attached to the body at the rear, its weight when open balanced by springs, closable by quickly tightened clasps. Inside the car, the hood is attached to the body under the rear seats.

Fender flaps: Welded to the body. Their shape, open to the rear, is determined by amphibious capability and thus unfavorable for driving in column.

Bumpers: In front as a bumper from fender to fender, and on the sides between the front and rear fenders as a step and bumper, none in the rear.

Twenty of the 125 Type 166 first-series Schwimmwagen.

Equipment

Windshield: Made of laminated safety glass, folds down forward, protective cover for folded windshield.

Top: Easily removable, with tension belt and cover of impregnated canvas with rear-view flap.

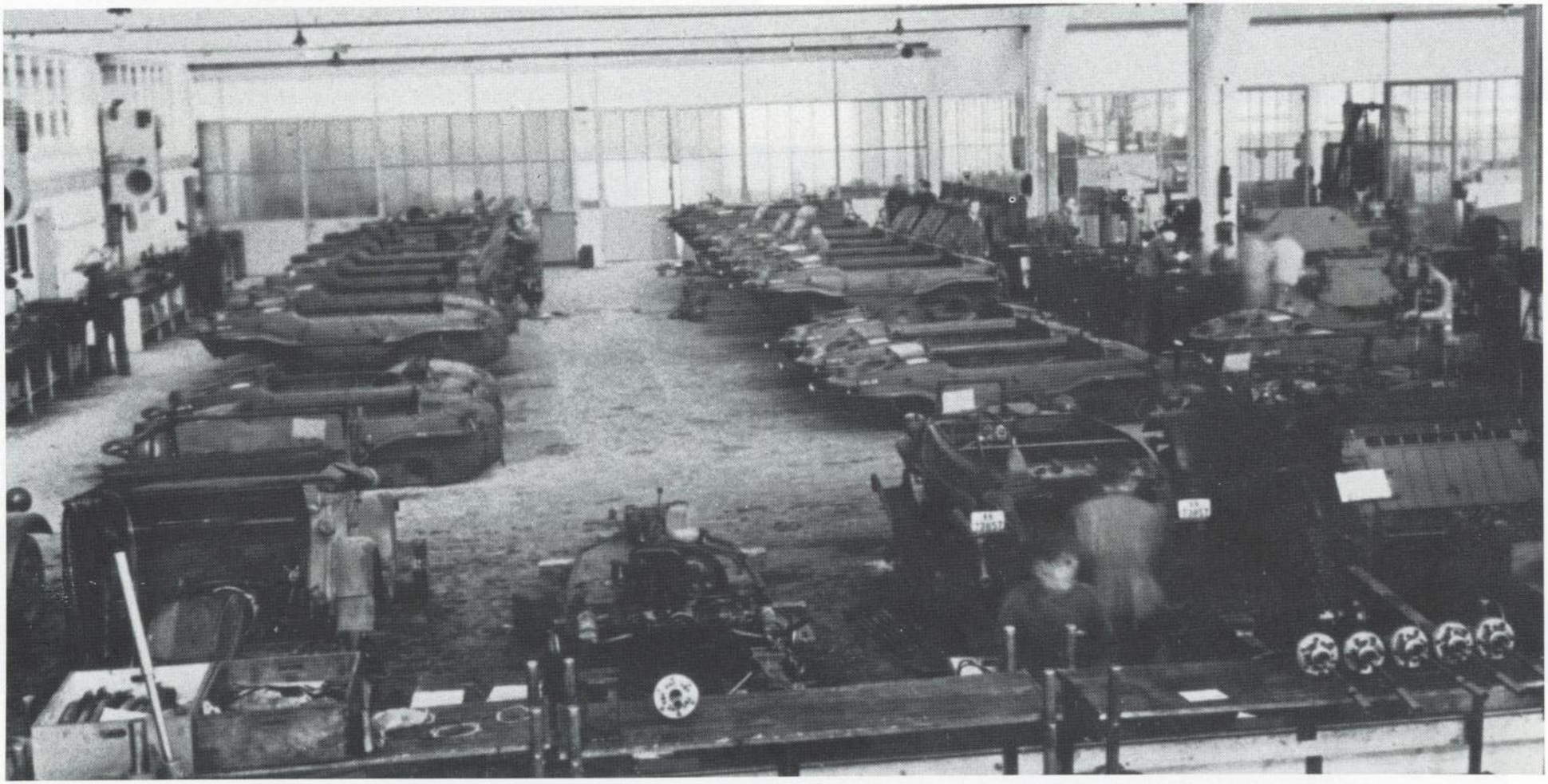
Snap-on windows: none.

Seats: 3-4 individual seats with fixed backrests, seats not adjustable but quickly removed. The seats have one-piece seat and back cushions. The passenger seat folds up for use as a machine-gun seat.

Handholds: Over the backrests of the front seats is a full-width handhold, attached to the top frame. The outside bumpers and steps also serve as handholds for crewmen when driving on land. All handholds are without rubber covers.

Interior: Container for documents (travel papers) at left front. Wooden bars on floor.

The first bodies have been delivered by Ambi-Budd. The Type 166 is being assembled at the Porsche works in Stuttgart.



Equipment

General Equipment:
In the front of the vehicle are two fuel containers with a capacity of about 25 liters each, controlled by a three-way valve so that one serves as the fuel tank. Each fuel container has a filler cap with a hinged cover.

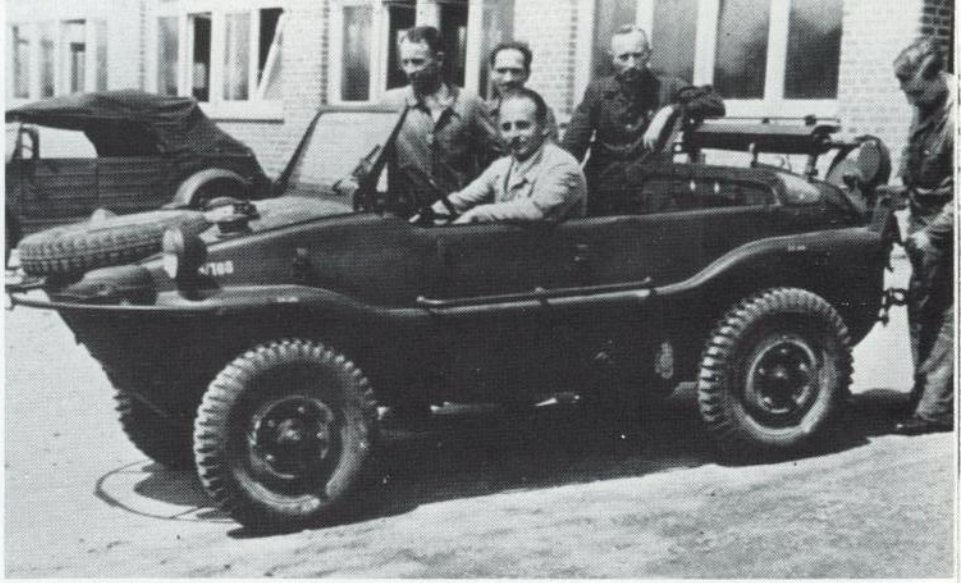
Central pressure lubrication: Only for the front axle and steering, a pump with attached container is located in the front of the car, supply control on the front of the car, sliding panel attached to the body.

Traffic Equipment:
Front license plate holder on the bumper,
2 headlights,
1 windshield wiper on the windshield,
1 rear-view mirror,
1 horn,
1 rear license plate holder,
1 brake light at left rear.

Instrument panel includes: Lock-up compartment, starter switch (on steering block), light switch, ignition switch and indicator light. Plug for reading light, speedometer, switch for dashboard lighting.

Military equipment: Flagpole mount in front of passenger seat, tool kit in special container under the windshield mount.

The 100th Type 166 is finished, June 6, 1942.



Below: The first 125 of the small Schwimmwagen series are finished.

Machine gun mount: Machine gun mounts in front of the passenger seat and behind the right rear seat, tripod mount behind the rear seats. If need be, a rack to hold 6 machine-gun ammunition containers can be mounted in place of the rear seat and attached to the machine-gun mount.

Rifle holders: Left and right with rifle brackets on the transverse bar, butt holders below.

Shovel rack: Shovel rack on the left forward body side.

Paddles: Paddle racks on the left rear body side.

Equipment space: Equipment space in front of the passenger seat.

Special: Screw propeller at rear, at 45-degree angle, automatically deployable and hooked into place. Propeller activated by driveshaft from inside vehicle.

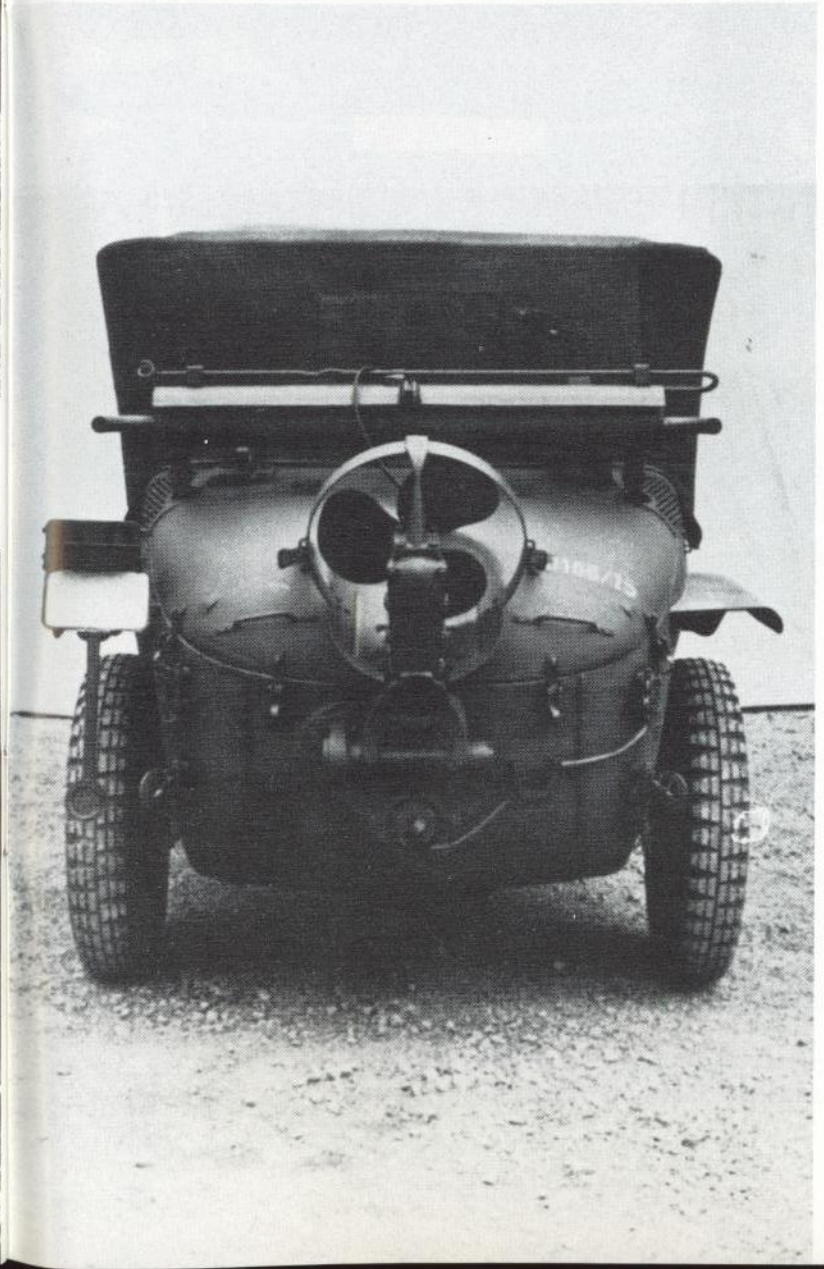
Steering: Steering with angle indicator, indicator for middle position painted on body (white or luminous color).

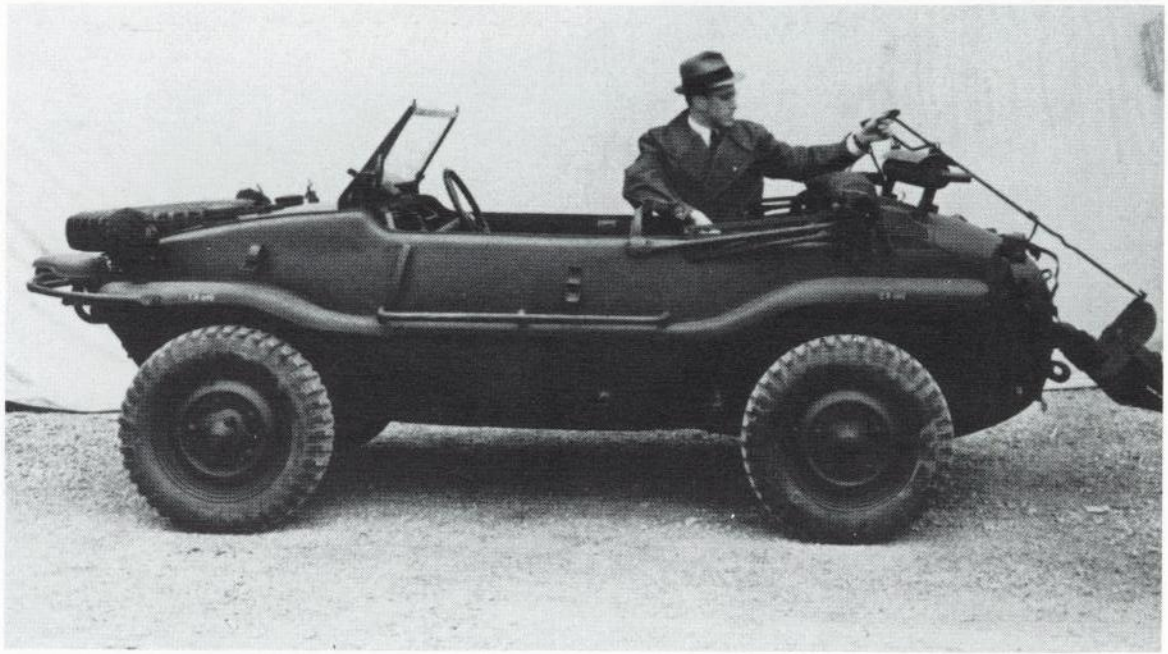
In March of 1942 the first prototype was tested on the Max Eyth Reservoir near Stuttgart; the Army accepted this model on May 29, on June 6 the 100th Type 166 was finished.

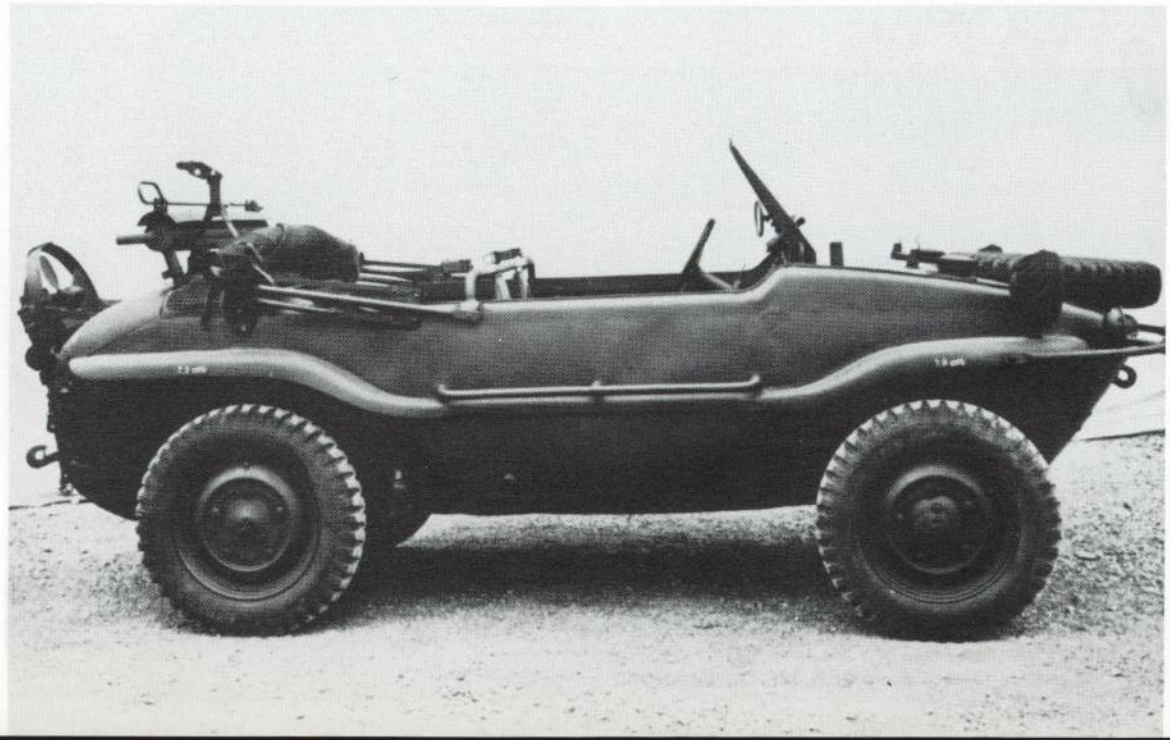
From July 21 to 24, snow testing of the Type 166 was carried out at the Grossglockner.

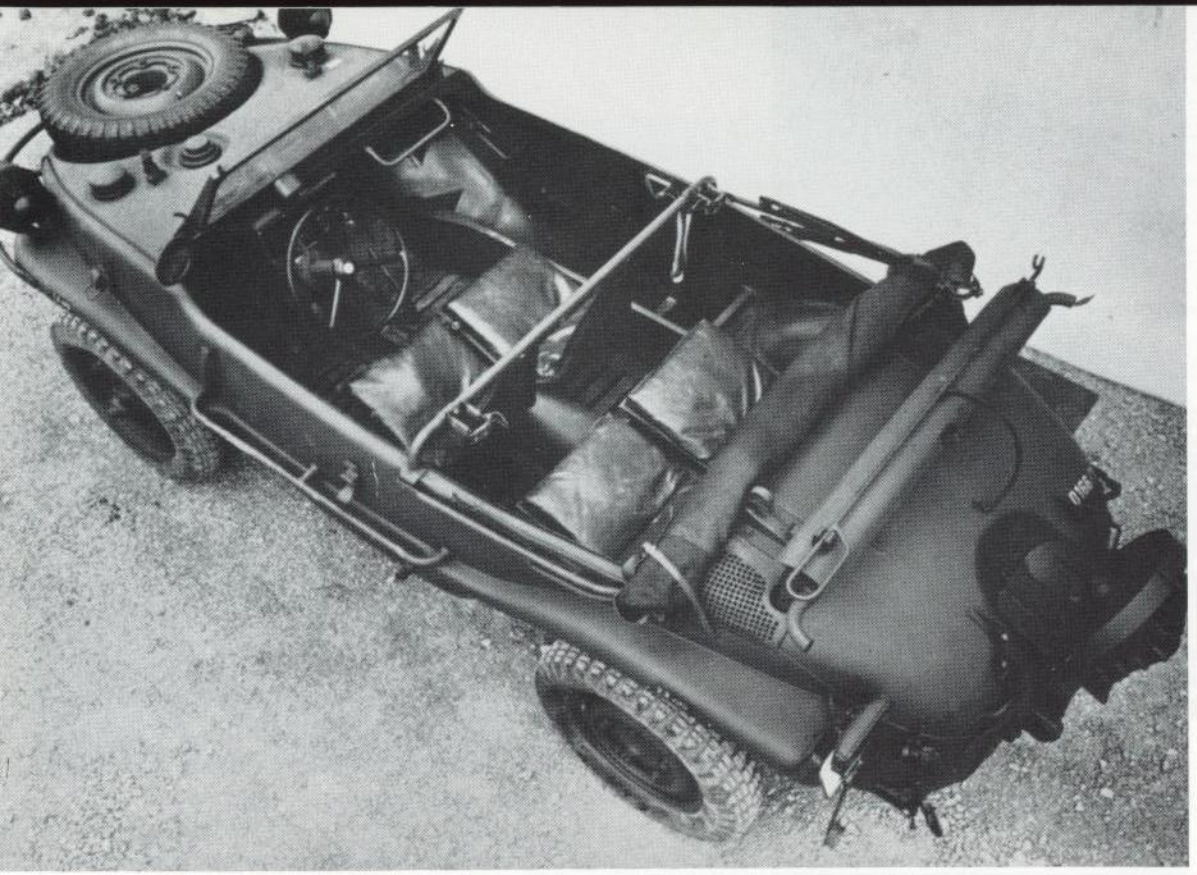
Type 166 during off-road testing in the Alps.

Schwimmwagen Type 166, photographed on April 27, 1942.



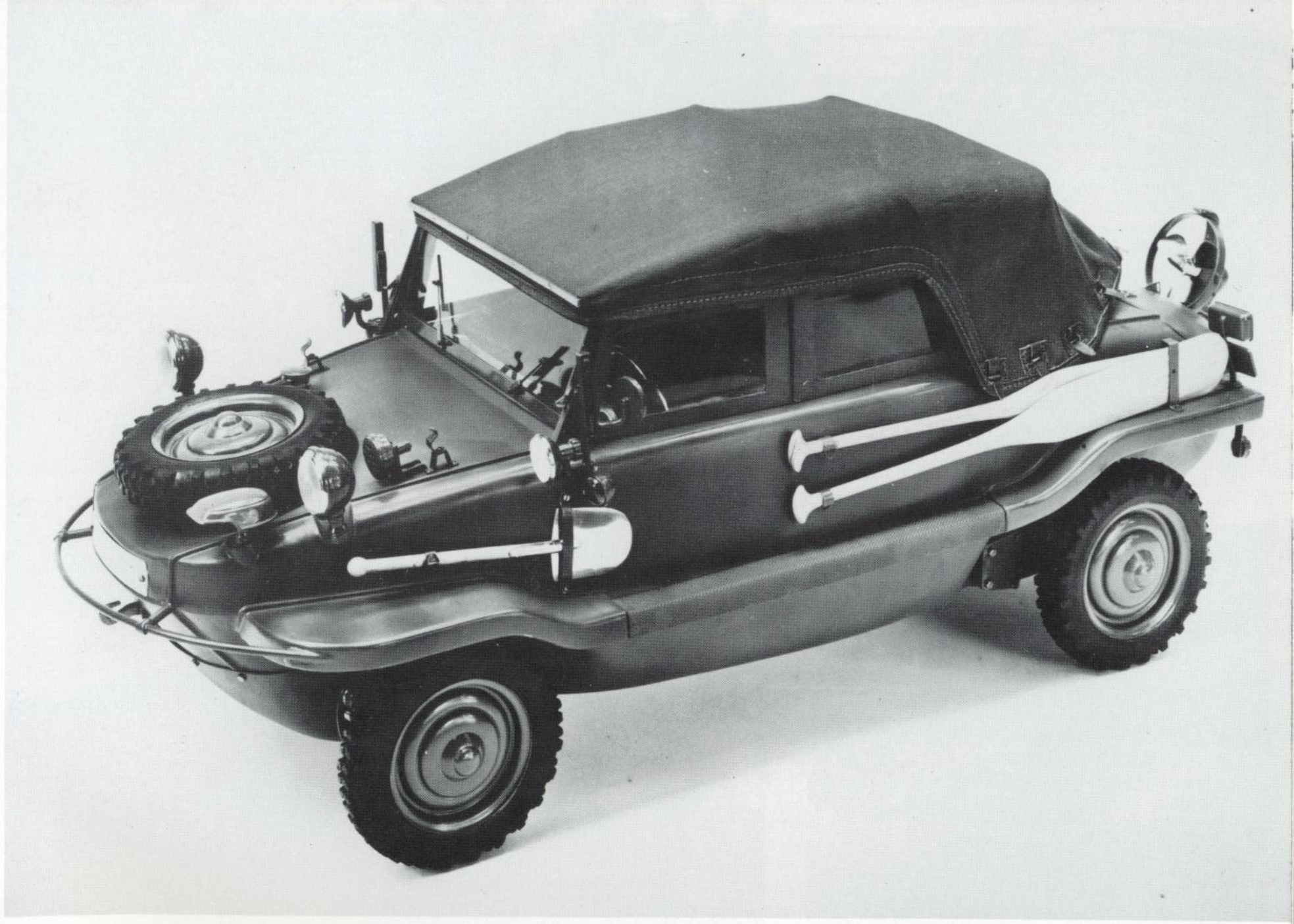






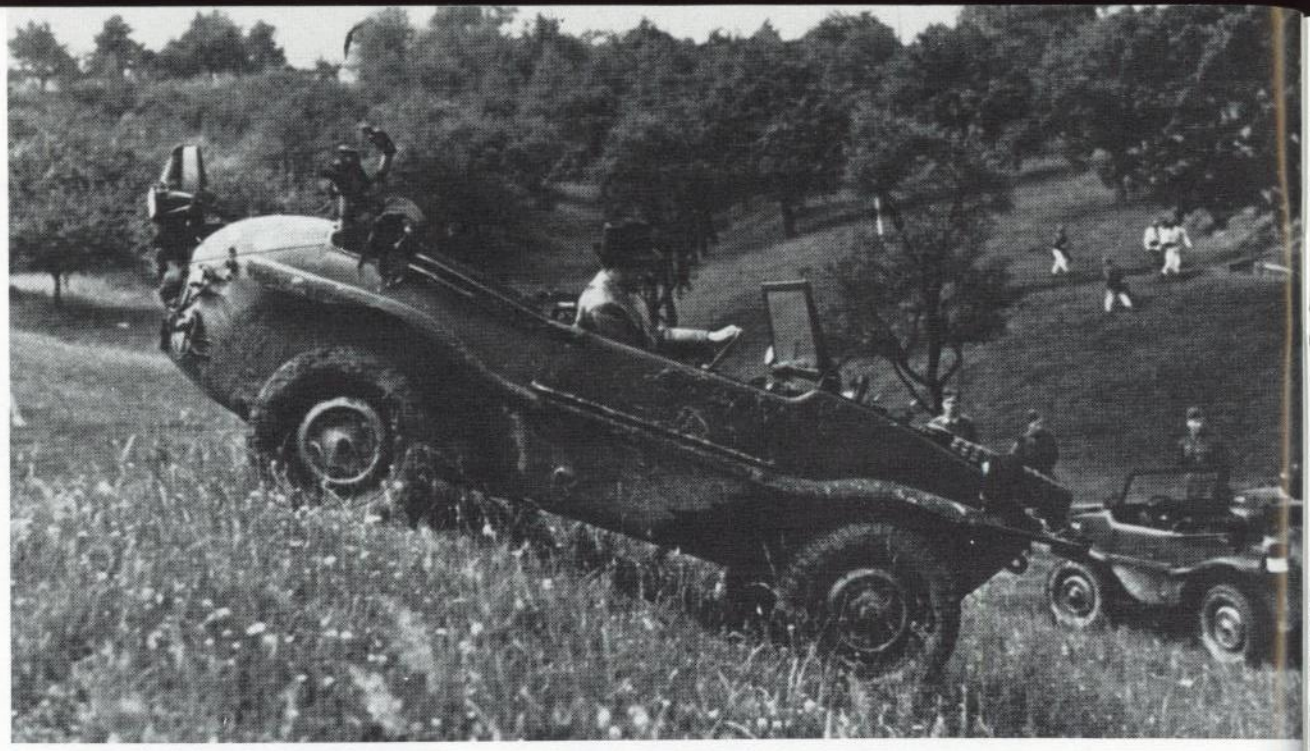
The two upper photos were also taken on April 27, 1942.

Left: Troops (part of a motorcycle rifle battalion) during amphibious training.

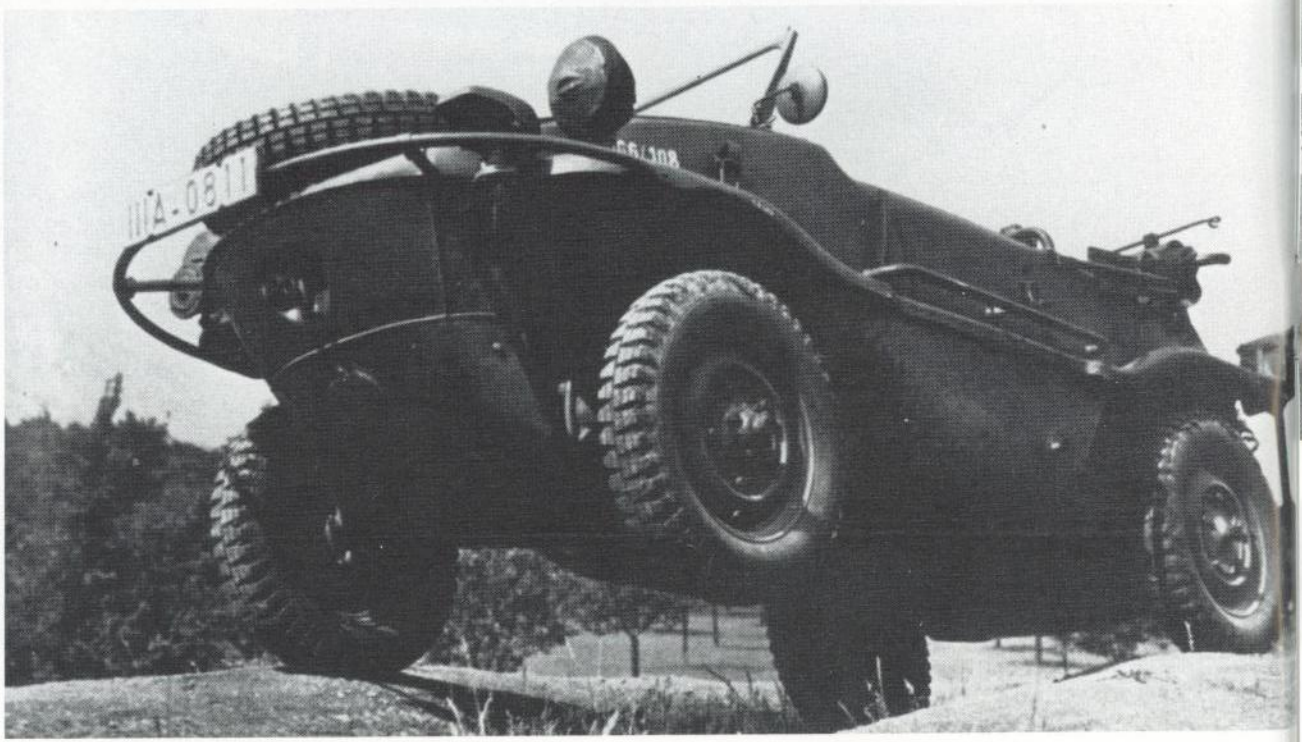


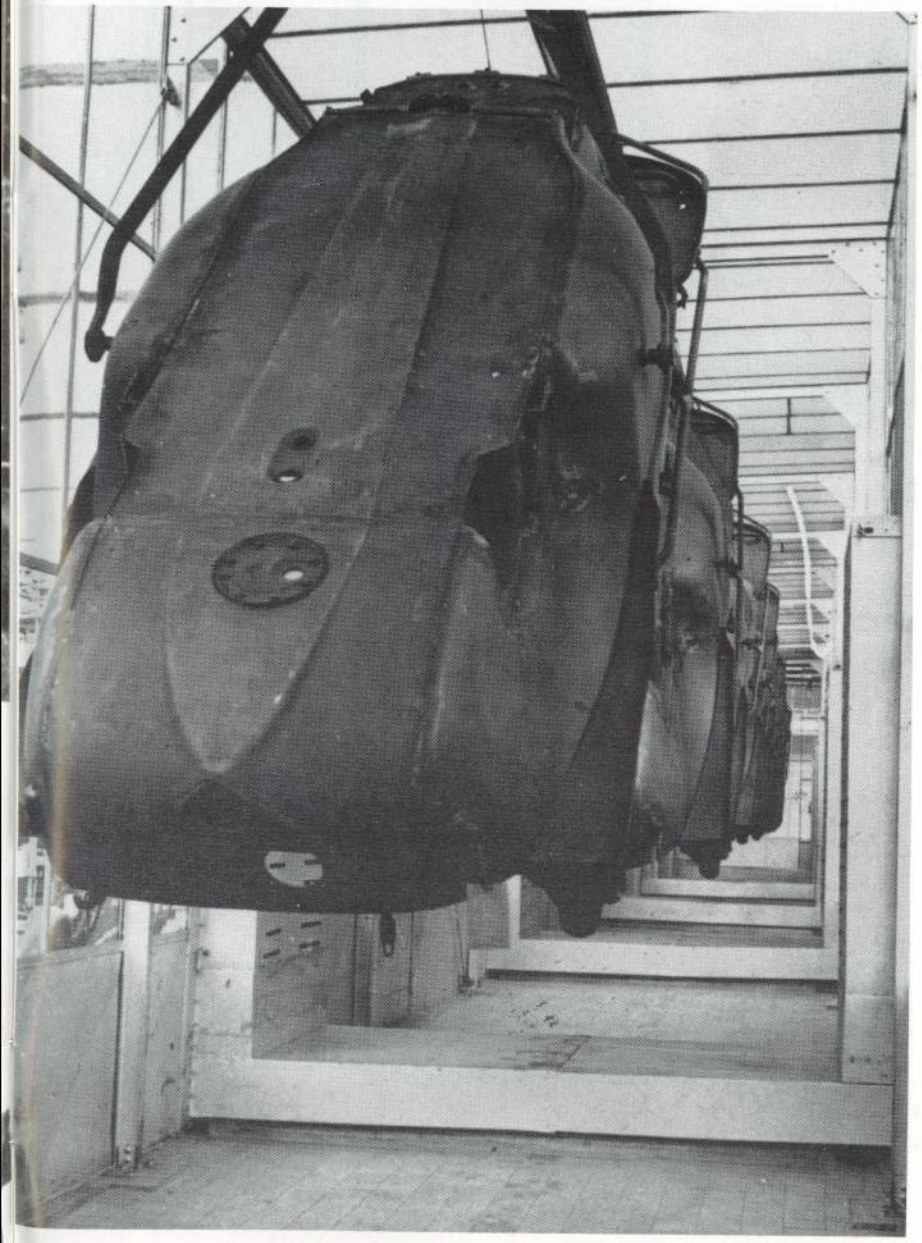
On June 25 the 166/2 car was reviewed by *General* Ritter von Epp and his staff. The vehicle's off-road and mountain capabilities were demonstrated at the Oberwiesenfeld. The military came to the conclusion that the Schwimmwagen was the best off-road vehicle of its time. The car also confirmed this impression during the subsequent run on the Ammersee.

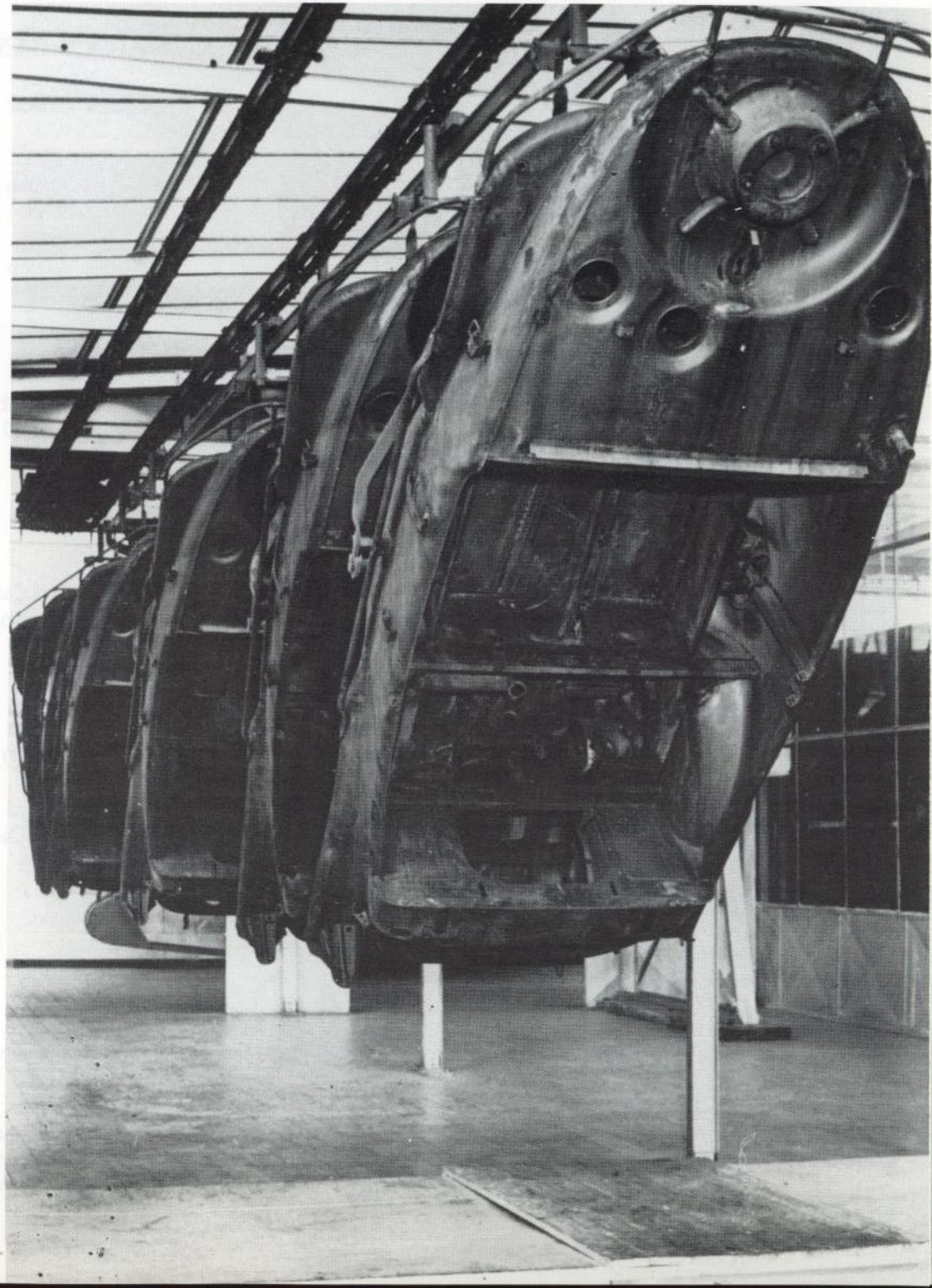
While testing was continued, especially in Wünsdorf, the series production began at the Volkswagen works, and individual army units were steadily supplied with the Type 166 Schwimmwagen as of the end of 1942. By the end of World War II, 14,276 Schwimmwagen had been built.



The Army accepts the Type 166.







Schwimmwagen production at the Volkswagen works. The bodies delivered by Ambi-Budd hang on the assembly line awaiting completion.

VOLKSWAGEN FAMILY TREE

1st Version
VW 3

2nd Version
VW 30

3rd Version
VW 38

KdF Car

Sedan Type 60 | Convertible Type 60 | Open Car Type 60 | Right-hand Drive Type 66 | Ambulance Type 67 | Delivery Van Type 68 | Sports Car Type 64 | Off-Road Car Type 62

Off-Road Car with KdF Body Type 92 | Off-Road Car Type 82

Off-Road Car
Tropic Version
Type 82

4-seat Personnel Car | 4-seat Survey Car | 3-seat Radio Car | 3-seat Intelligence Car | 2-seat Barrel Car | 2-seat Tank (decoy) | 2-seat Siren Car | 2-seat Ambulance (1-2 patients) | 2-seat Pickup Truck | 2-seat Box Van

4-seat 4wd
Off-Road Car
Type 86

4-seat 4wd Off-Road Car with KdF body Type 92 SS | 4-seat 4wd Off-Road Car Type 87

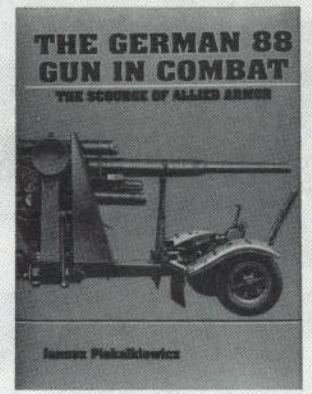
4-seat 4wd
Schwimmwagen
Type 128

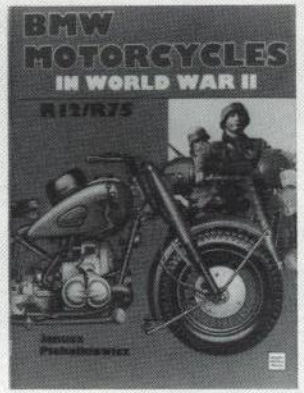
4-seat 4wd Schwimmwagen
Type 166, to replace
motorcycle rifle vehicle.

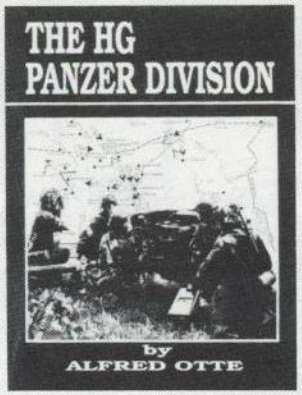
From 1940 to 1945, more than 65,000 VW (Kübelwagen and Schwimmwagen) vehicles saw service on all war fronts.

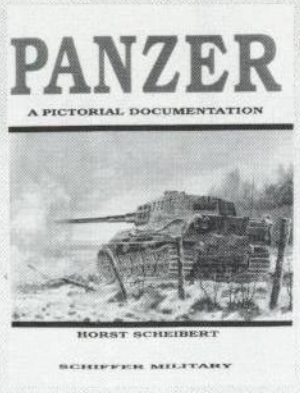
Also available from Schiffer Military History

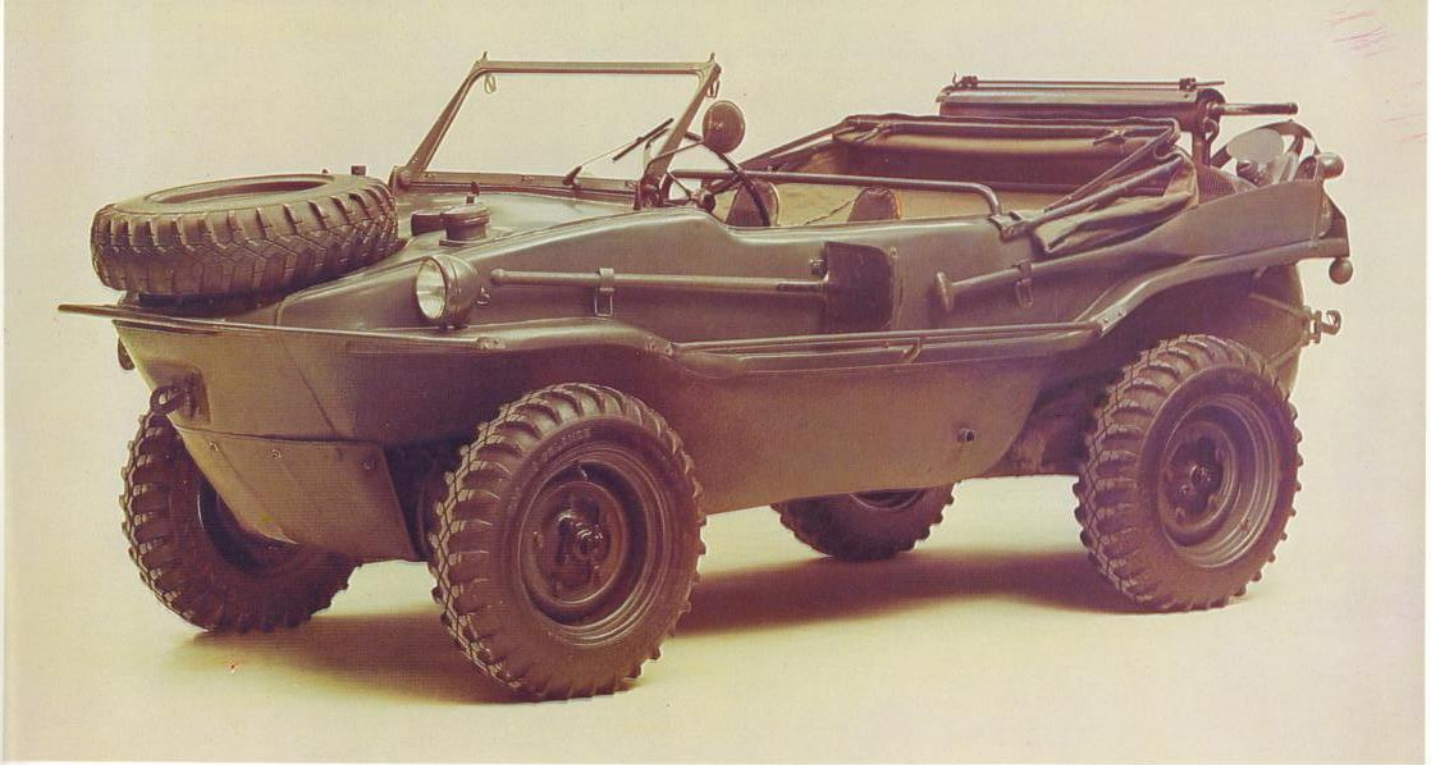
OPERATION BARBAROSSA
OSTFRONT 1944
ROMMEL IN THE DESERT
PANZERKORPS GROßDEUTSCHLAND
THE HEAVY FLAK GUNS
THE WAFFEN SS
THE 1st PANZER DIVISION
THE GERMAN INFANTRY HANDBOOK



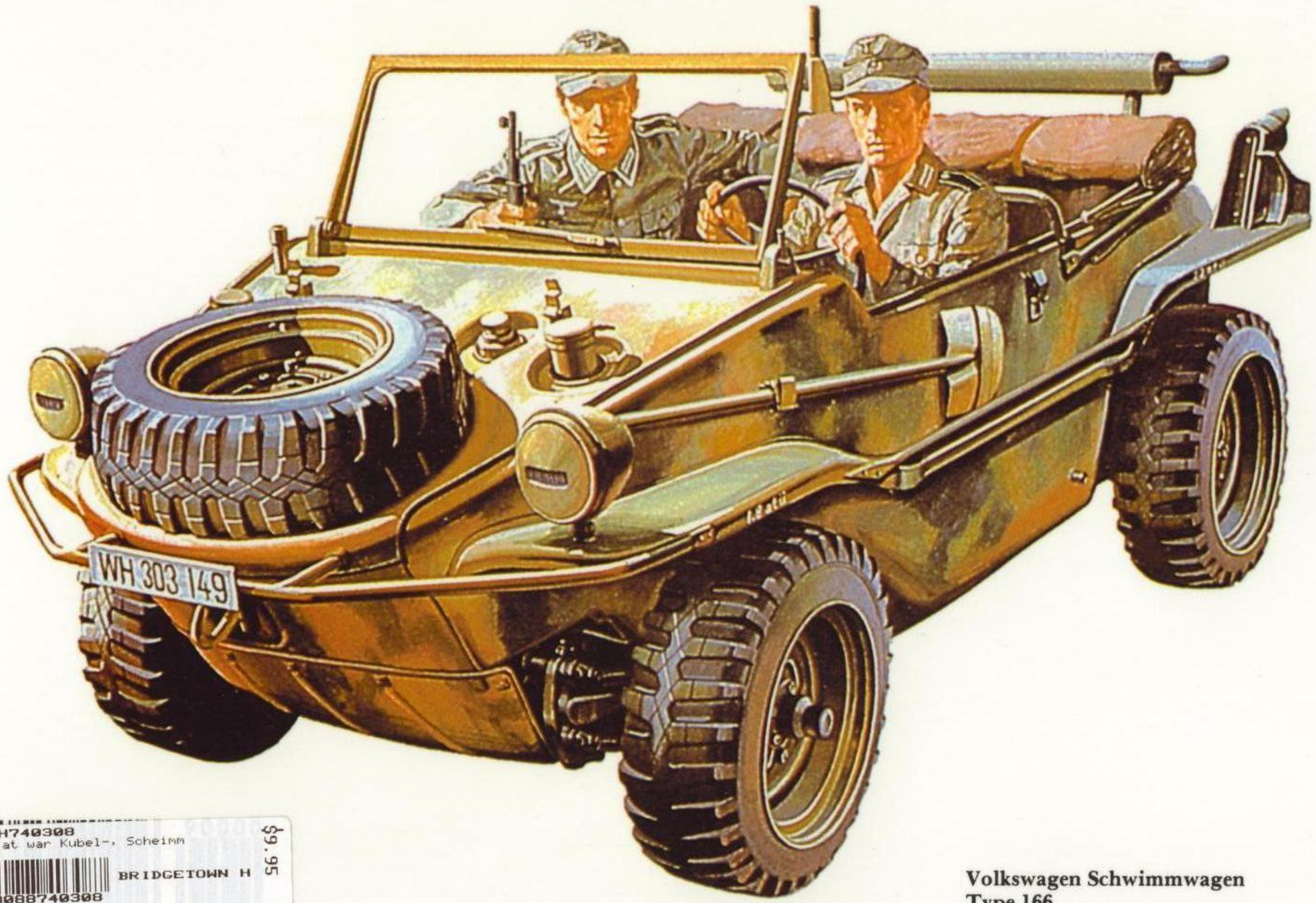








Typen Schwimmwagen Type 166, museum vehicle of the Volkswagen AG — chassis number 7-013,534, built in 1944.



Volkswagen Schwimmwagen
Type 166

KÜBELWAGEN & SCHWIMMWAGEN BOOK II

Schiffer

ISBN: 0-88740-401-4