TOTAL DETAIL

Sd Kfz 252, 253 & early 250

ARCHIVE Part 1

Martin Kögel

TOTAL DETAIL

Sd Kfz 252, 253 & 250 (Typ1)

Volume 3 - Part 1

ARCHIVE

Martin Kögel

INTRODUCTION

Whatever the heritage and limitations of the D7p based vehicles, the birth of the Sturmgeschuetz III and its support vehicles, gave the German Army and us today a technically complex and remarkable vehicle that saw service on every frontline until the end of the war.

Today with only one surviving 253, three 250 Typ 2s, with three more being restored and at least 8 Neus in existence, [with two more being restored], the 250 is now finally being given the recognition it deserves. Hopefully this initial series of 4 books will also do the same. There will eventually be, I hope, a third book in this archive series featuring photographs from 252s to 250 Neus, and from what I have seen of the technical book, the plans and restoration photographs will add the final layer of detail to the overall picture.

Martin Kögel

One

HISTORY

HISTORY

The *Leichter, Gepanzerter Munitionstransportwagen (Sd Kfz 252)* was always intended to be based upon the D11 3 (Sd Kfz 10) half-track chassis as per the recommendations of the *Oberbefehlshaber* in December 1936, and he insists that the *Leichter, Gepanzerter Beobachtsungskraftwagen (Sd Kfz 253)* (observation vehicle) should be developed using the Pz Kpfw. I.

They were required to be ready for testing in late 1937, but somewhere in the design process between the request and the first prototypes, the Panzer I was replaced by the same half-track chassis intended for the 252. In deciding to utilise the D11 3 chassis for the 252 they encountered poor performance figures when fully loaded that would have been avoided if they had stuck to their original plan. To alleviate the weight problem led to the shortening of the prototype chassis, which evolved into the Typ D7p armoured chassis used in the final design for both the 252 and 253 and led to the 250 series.

Bizarrely the original Sd Kfz 10 (D6) prototype had it's chassis lengthened to improve the cross-country performance to create the vehicle they then used to make the prototype 252 and 3 only to shorten it again. I imagine the engineers were somewhat embarrassed by this and the planners were pulling their hair out.

The brilliance of the original idea for the *Gepanzerter Selbstfahrlafette fur Sturmgeschuetz 7.5cm Kanone (Sd Kfz 142)* was not carried through to the command and supply vehicles that accompanied them. Both support vehicles were impractical to say the least and like any 'D7p chassis' based vehicle, were too small to be truly useful. To move around inside a 253 would necessitate being bent double all the time, plus the binoculars could not extend high enough, which surely would have affected the capabilities of the Zug-fuehrer and Batterie Chef to observe, direct and control their subordinate units. The biggest drawback was placing the commanders in such a thinly armoured vehicles and then expecting them to be up the sharp end of an infantry attack. On reflection and with the aid of hindsight the entire idea for the 252 and 3 does not contain a lot of common sense or forethought, something that was then proven in combat.

The need to upgrade the *Batterie Chef* (Battery Commander) from his 253 to something safer was highlighted during the Balkans campaign but this and the subsequent upgrading of the *Zug Fuehrers* (Platoon Commanders) transport had to wait until the StuG Ausf E in September 1941. As soon as practically possible 253s were pensioned out of the StuG units or at least demoted from front line command use. Many were transferred out to field artillery units already well equipped for their new, less hazardous and more suitable role. Of the two sets of 253 interior pictures in this book, the radio sets used indicate two different roles, where officially only one seems to have been documented.

The D672/5 manual included in this book is dated 8 - 8 – 40, (with a note 'unchanged re-print 1941') and in this a photograph of the prototype 250/1. So the designers had been planning the improved 250 series since May or June of 1940, not 3 months after the first production 253 was built, and almost at the same time as the introduction of the 252. With the unsuitability of the 253 in its intended role, production was cut short and the remaining stock of 253s were converted to 250 specifications with the roof removed and the new interior layout creating two distinct versions of the basic Sd Kfz 250 Alt series.

As there are no official documents noting the two versions of the 250 Alt and for the sake of clarity it was suggested to name them Typ 1 and 2. For this series of books, all Typ 1s are 253 based vehicles with the roof deleted and the Typ 2 (featured in 250 Archive - Part 2) covers what is normally considered the 'classic' Sd Kfz 250 Alt series based on the improved body design.

With the introduction of the *Fu. Spr. f* built for the Panzer Grenadiers and *Aufklarungs Abteilung* (Reconnaissance Battalion) allowed the wholesale re-equipping of the *Kradscheutzen* (Motorcycle) units began in April - May 1942. The Sd Kfz 250 finally came of age as the mainstay of the 2nd Company of most reconnaissance units and as a radio command centre throughout the German Army in it's 250/3 format, perhaps the two most important versions of all the 250 series variations built.

Towards the end of 1942, the designers started work on the replacement vehicle. In essence they simply laid a sheet of tracing paper over the original set of drawings and worked out how to encapsulate everything inside the replacement body for the 250 Alt without using so many parts. In the process they also made the interior slightly bigger and more practical to use.

The detachable nose plate was dropped, the front mudguards were now simple folded shapes and the track-guards were formed by the exterior lockers. The front visors were carried over, but the side visors were identical to the 251 Ausf D. Apart from re-designing the mounting brackets of certain stowed equipment to take into account the flat sides, the interior remained unchanged.

It is a safe bet that some of the early 'Neus' used the existing riveted chassis from the Alt. However the Neu chassis was now fully welded and a little less complicated to build. By October 1943 it is likely that no 250 Neu was built using the early semi-automatic gearbox, even though the vacuum cross-tube was retained in the chassis to keep it rigid. Ultimately, this feature was dropped in favour of a simple beam welded into the chassis to support the rear of the engine and the front of the differential / gearbox.

The Neu was perhaps the most successful reincarnation of the original idea, with greater space and the same performance however, if the war had continued, it was to be phased out by the summer of 1945 hampered as it had always been by it size.

First production Sd Kfz 250s - see page 203
Built June / July 1941
Using converted 253 bodies with all the latest upgrades from the 252 and 253 series production

Last production 250s based on 253 body - see page 226
Built July / August 1941
Rounded front wing edges
Tall width indicators set back on the front wings
Re-positioned tools
(Would have been late style 253s but I have not found photographs to show 253s with these detail changes)

First production 250 Typ 2 - *250 Archive Book Part 2 - Page 9*
Built August / September 1941
Still using semi-automatic gearbox.
Mid production vehicles adopted the manual gearbox
Mud and track guards, as per Typ 2 but no beaded edge

Total of 4,250 Alts (Typ 1 & 2) produced June 1941 - October 1943

First production 250 Neu - *250 Archive Book part 2 - Page 144*
Built from August 1943 in service September / Ocotber 1943
Manual gearbox fitted as standard
Possible run out of old rivetted chassis' used on early Neus.

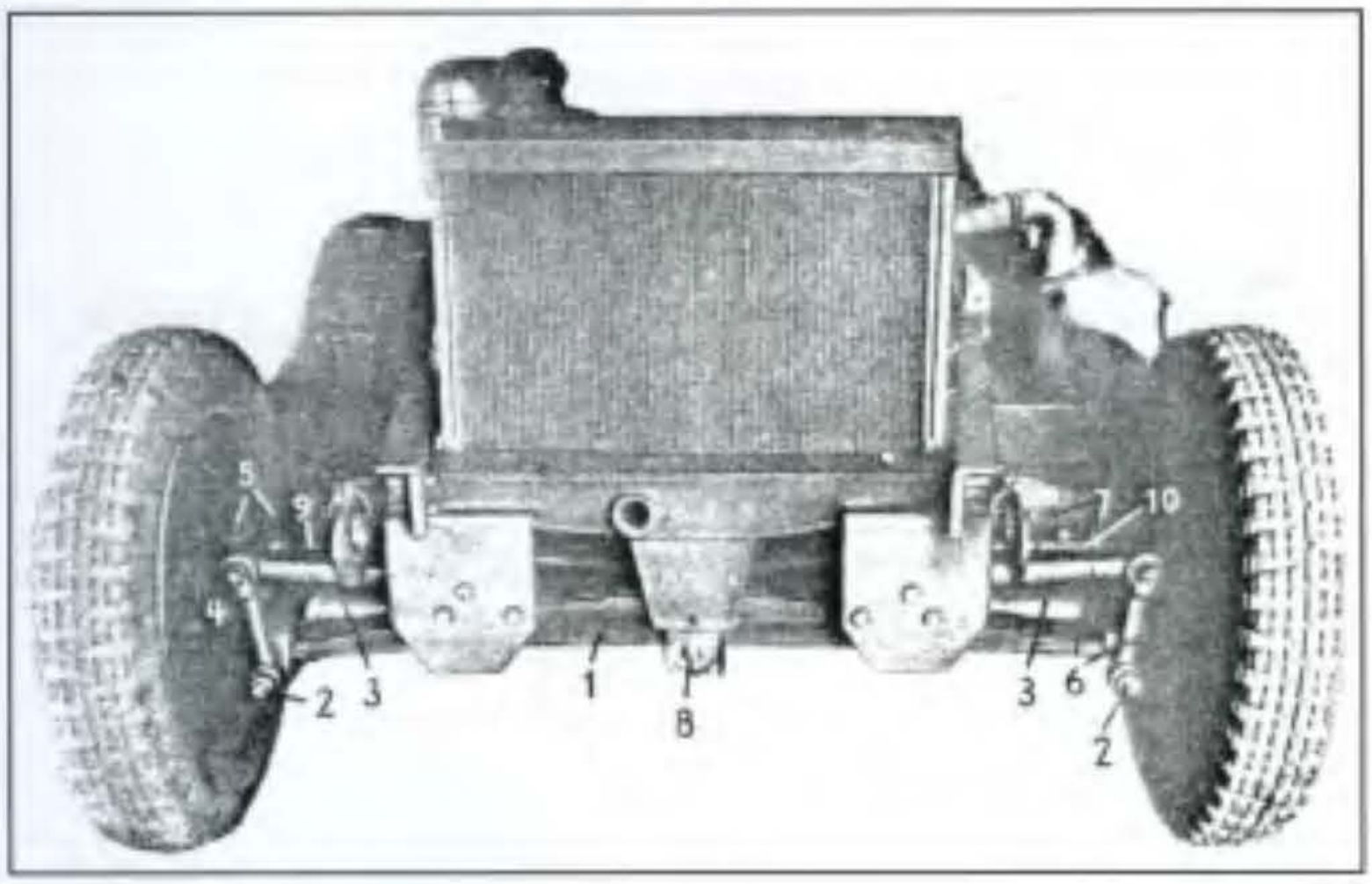
Mid production 250 Neu - *250 Archive Book part 2 - Page 170*
Built from late 1943 / early 1944 (?)
Running lights deleted
Addition of tool brackets for 250/1 Neus

Mid production 250 Neu - *250 Archive Book part 2 - Page 180*
Built from mid 1944 (?)
Addition of Bosch headlight
Very late chassis's deleted the vacuum tube and used a simple beam to locate the bellhousing and the differential casing.

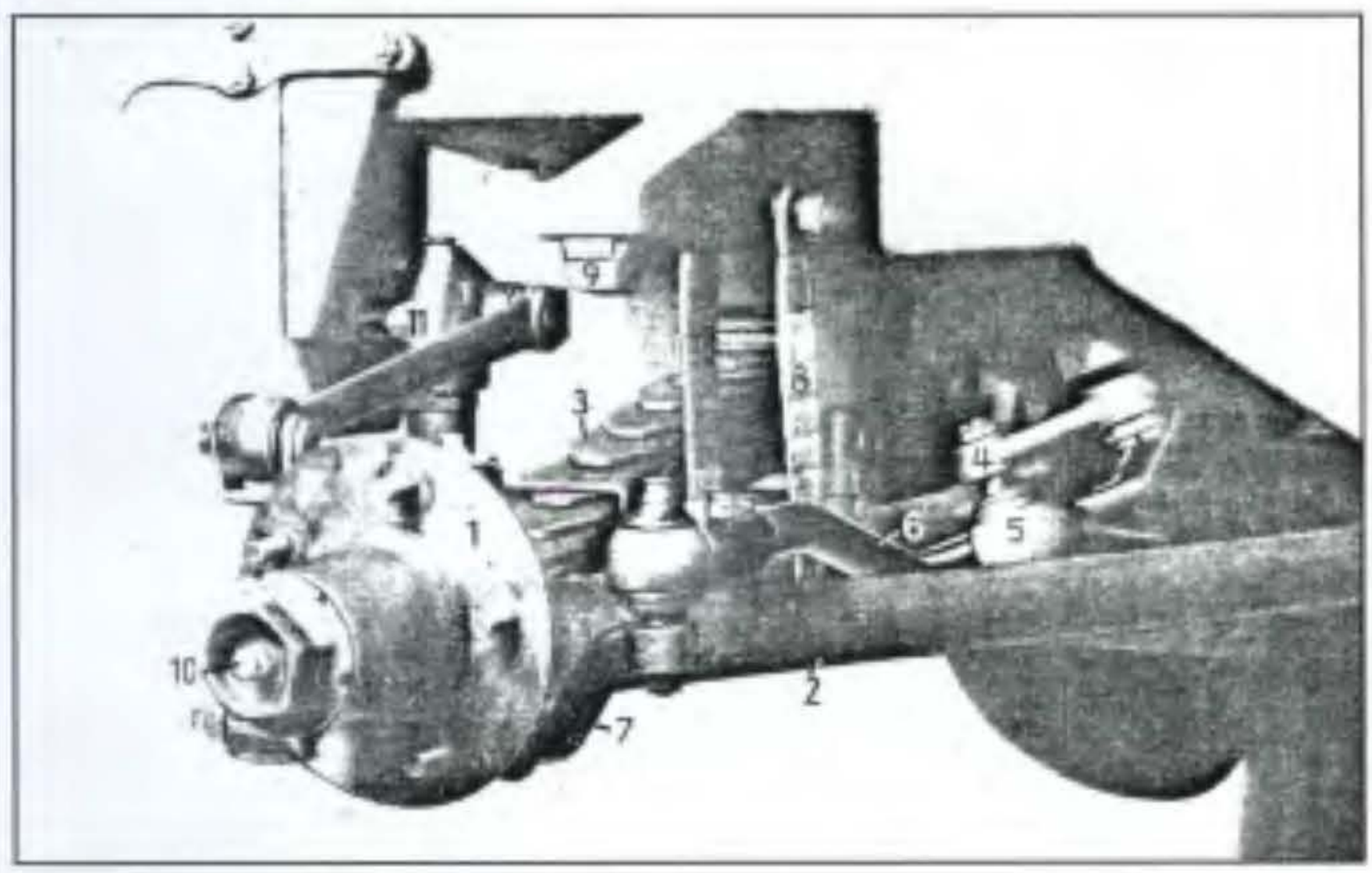
Total of 2,378 Neus produced September 1943 - May 1945

We could not locate better images at the time of printing)

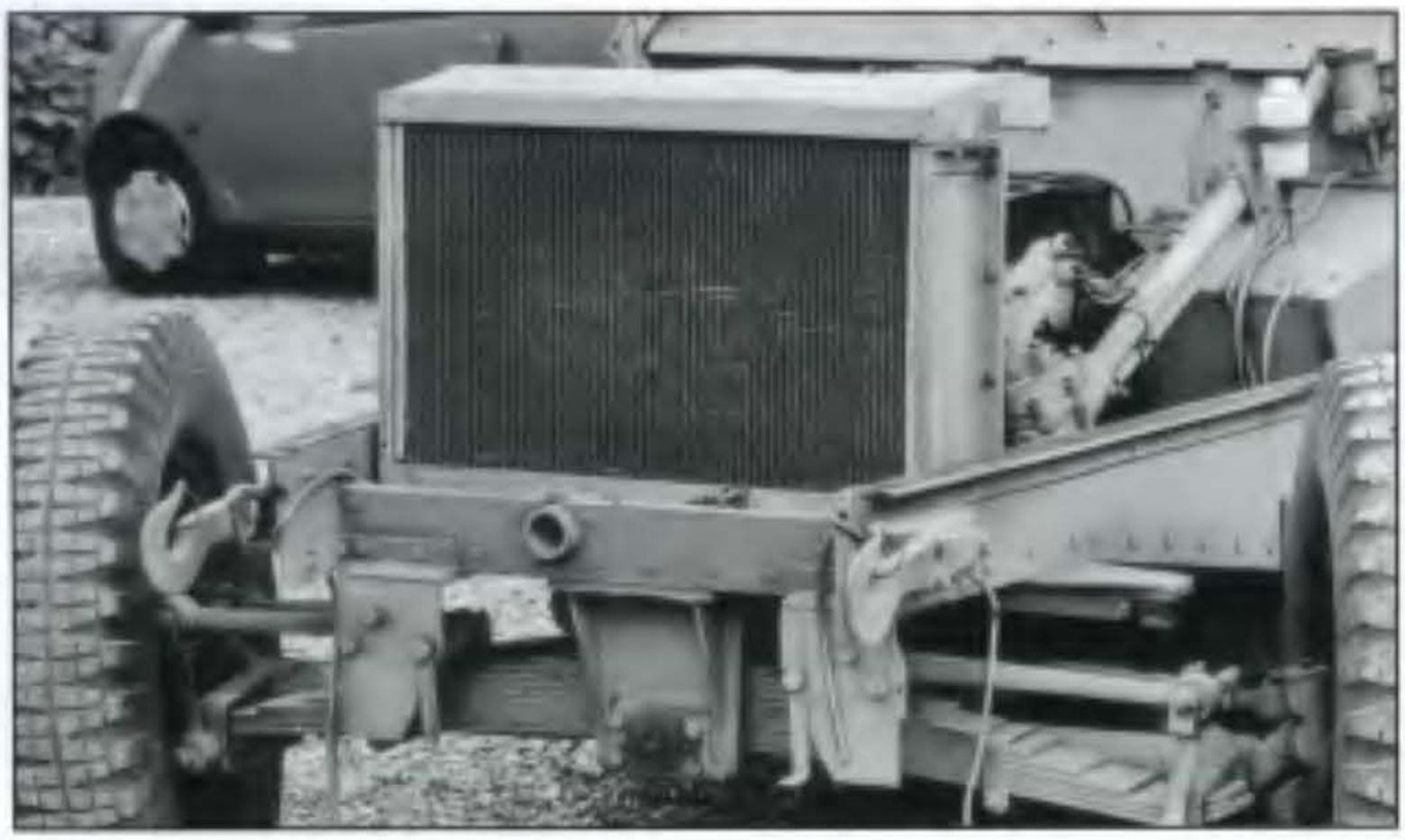
chapter, these two pictures below are the most interesting. Thi
is perhaps the original 1-ton Zugkraftwagen chassis converte
for field trials with the very first versio
of the armoured chassis before th
shortening of the chassis occurred.



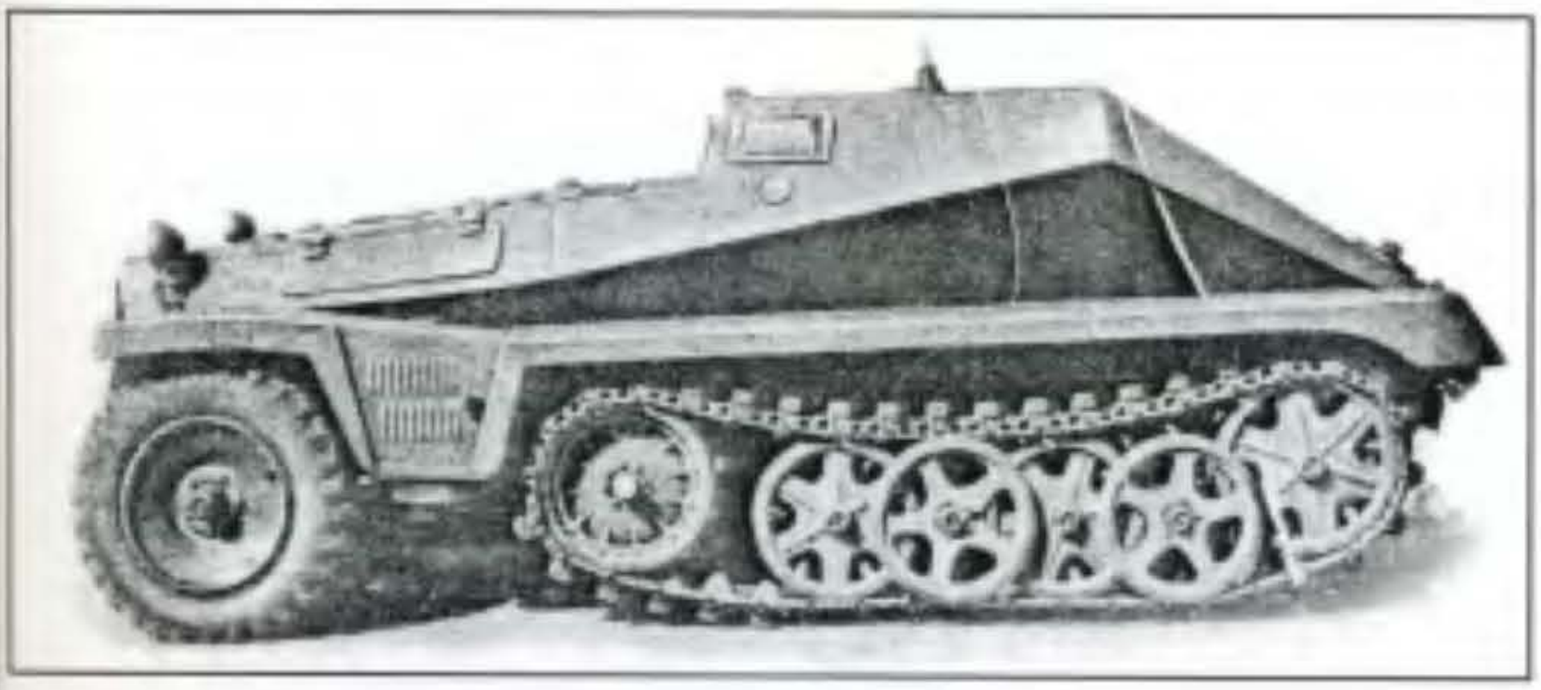
As seen in the photograph third fro
top on the opposite page it has th
same shallow chassis sidewalls at th
front under the radiator and a simila
arrangement for the shock absorbe
plates that protrude from the chassi
with a double 45 degree cut out on bot
lower edges. (See the bottom photograp
for a comparison). The air filter is th
1-ton Zugkraftwagen item and not th
standard 250 style version plus [and mos
importantly] the exhaust system matche
the photograph opposite top which wa
also modified by the prototype stage.



LEFT: The front end shape of the chassi
has borrowed some of the *1-to*
Zugkraftwagen design with a simila
stepped design along with the bum
stop with an angled upper edge t
accommodate the shallow depth of th
front of the chassis. For the productio
vehicles, the height of the bump stop wa
reduced by about two-thirds with the re
designed chassis depth and the squar
cornered feature also deleted and th
angle of the lower plate edge reduced
It is as if someone had a go at designin
this chassis in a hurry, but someon
else has come along afterwards with
fresh perspective and pointed out th
obvious complexity and both improve
and simplified the design. The first 253
used the front axle from the Sd Kfz 10
The leaf springs were thinner and mor
pliant leading to the saggy look of th
253 opposite page middle right that use
this chassis.

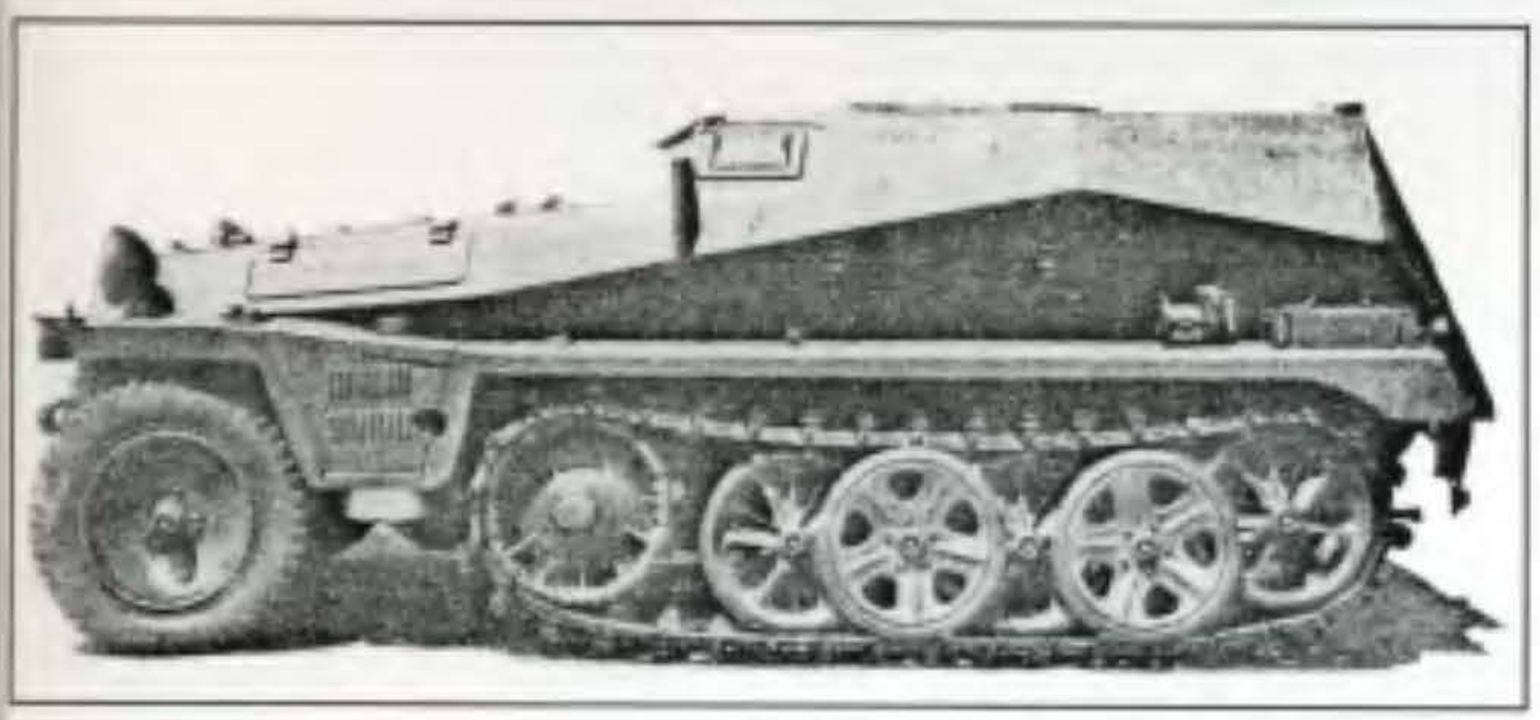


LEFT: Compare the details of the tw
pictures above to the classic 25
production chassis. See how the lowe
edge of the front side plates is on
continual line plus the greater overa
depth. Note the flat shape of the bum
stop arms, the difference in the shoc
absorber plates and the re-designe
central clamp/fulcrum point for the fro
axle.



LEFT: The original prototype on the shortened chassis for the 252 using the D6 - early D7 track wheels and drive sprocket, which were deemed too weak and were re-designed. Interestingly the earlier track wheels were only seen on the first 252 and not the 253, (see bottom photograph) and the headlamps are much smaller and front tyres are still the larger, original D6 items that certainly fouled the front wings badly. The wing shape is also different to the 253 below, with the top face set further back with a steeper angle adjacent to the exhaust cover and there is no cut-out to accomodate the exhaust pipe on the front portion of the trackguards.

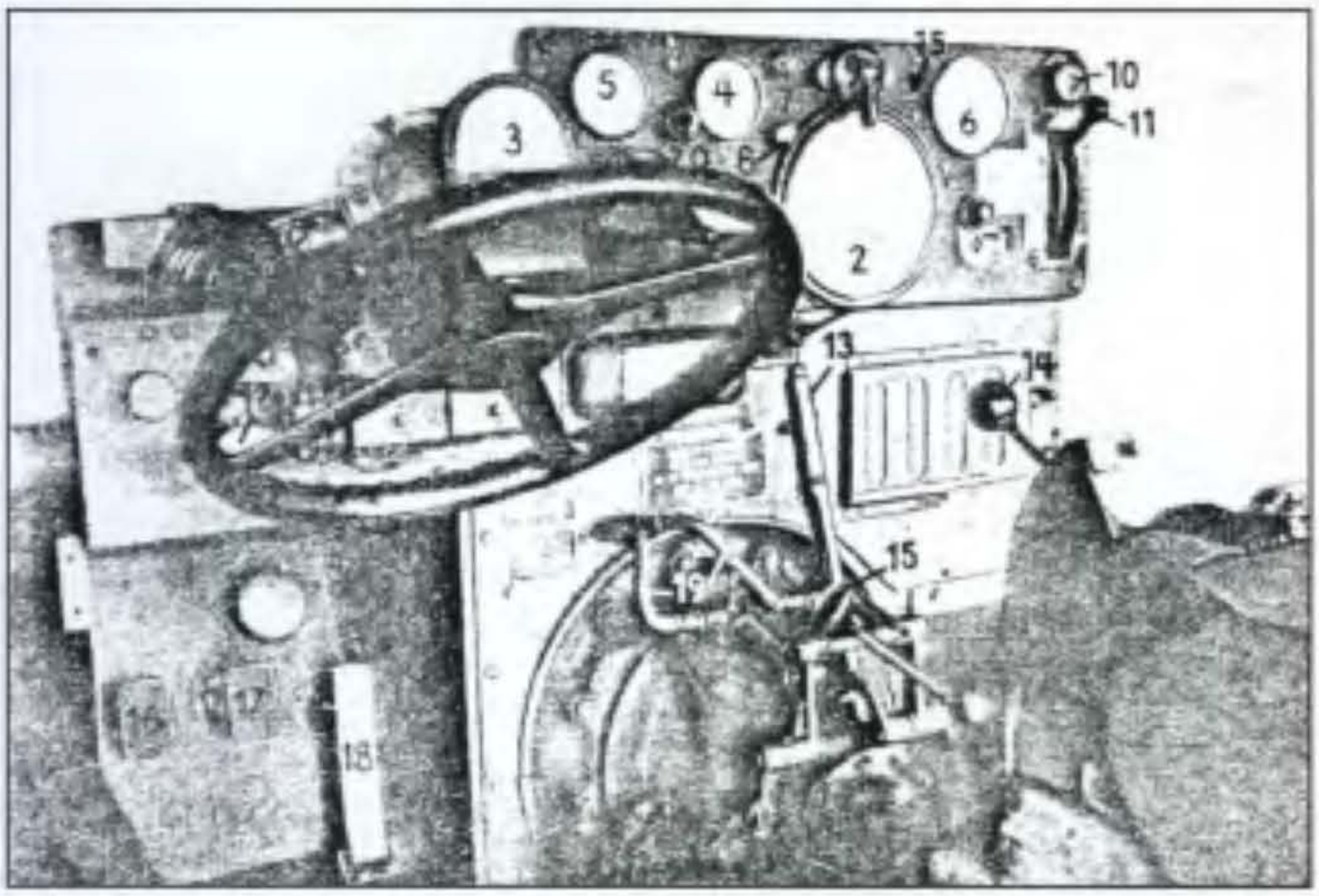
LEFT: This 253 has the chassis featured in the top two pictures opposite. With the angle of the upper edge of the bump stop and shallow chassis depth at the front carried over from the D6 / D7 chassis design. The fact that this vehicle (or one like it) is featured in the original manual, lends weight to the idea that this is one of the very first 253s built and one of the pre-production batch used for trials.



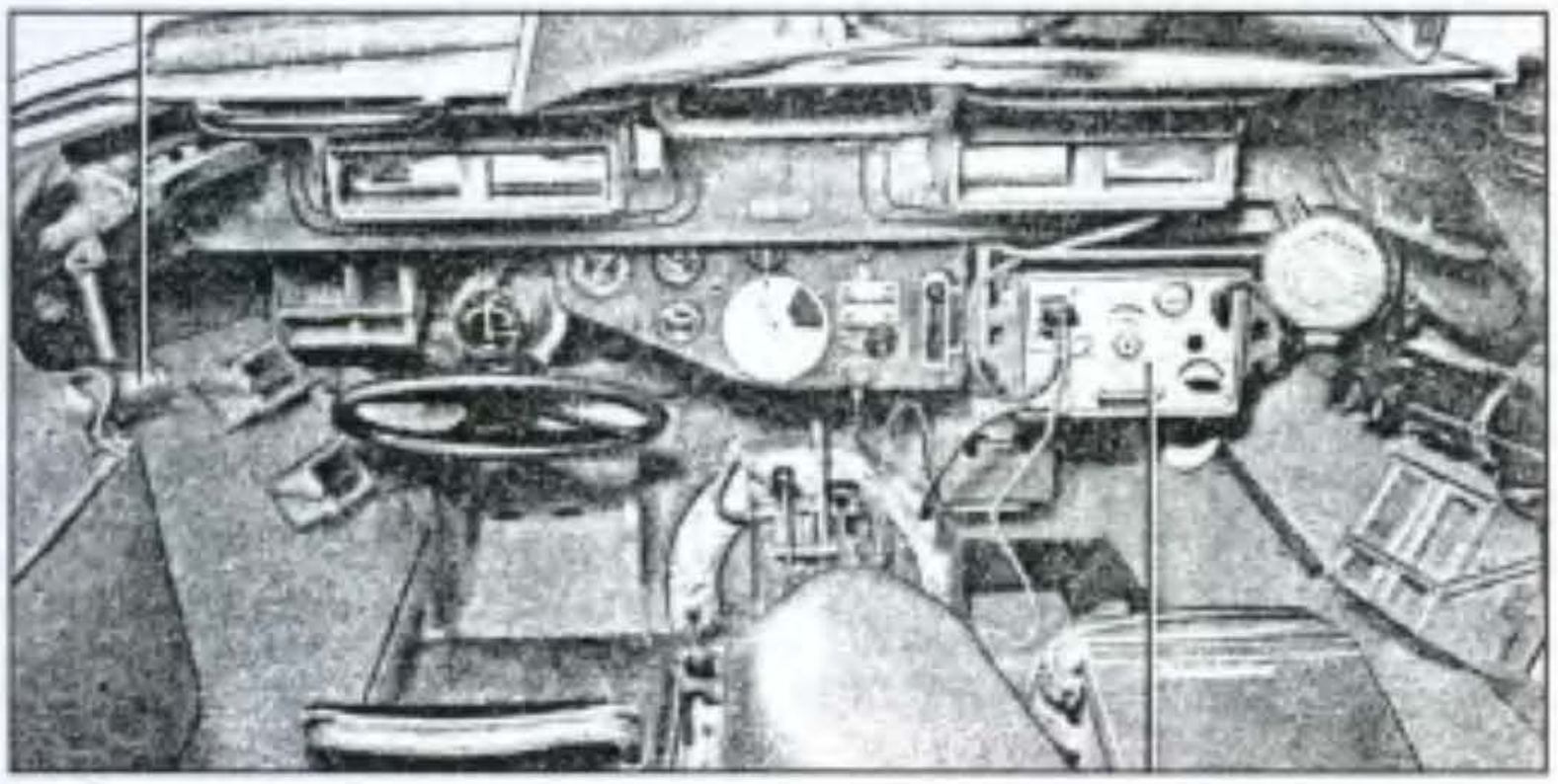
LEFT: This is one of the first production vehicles with a full D7 (p) armoured chassis.

(Our apologies for the quality of some of the pictues used. We could not locate better images at the time of printing)

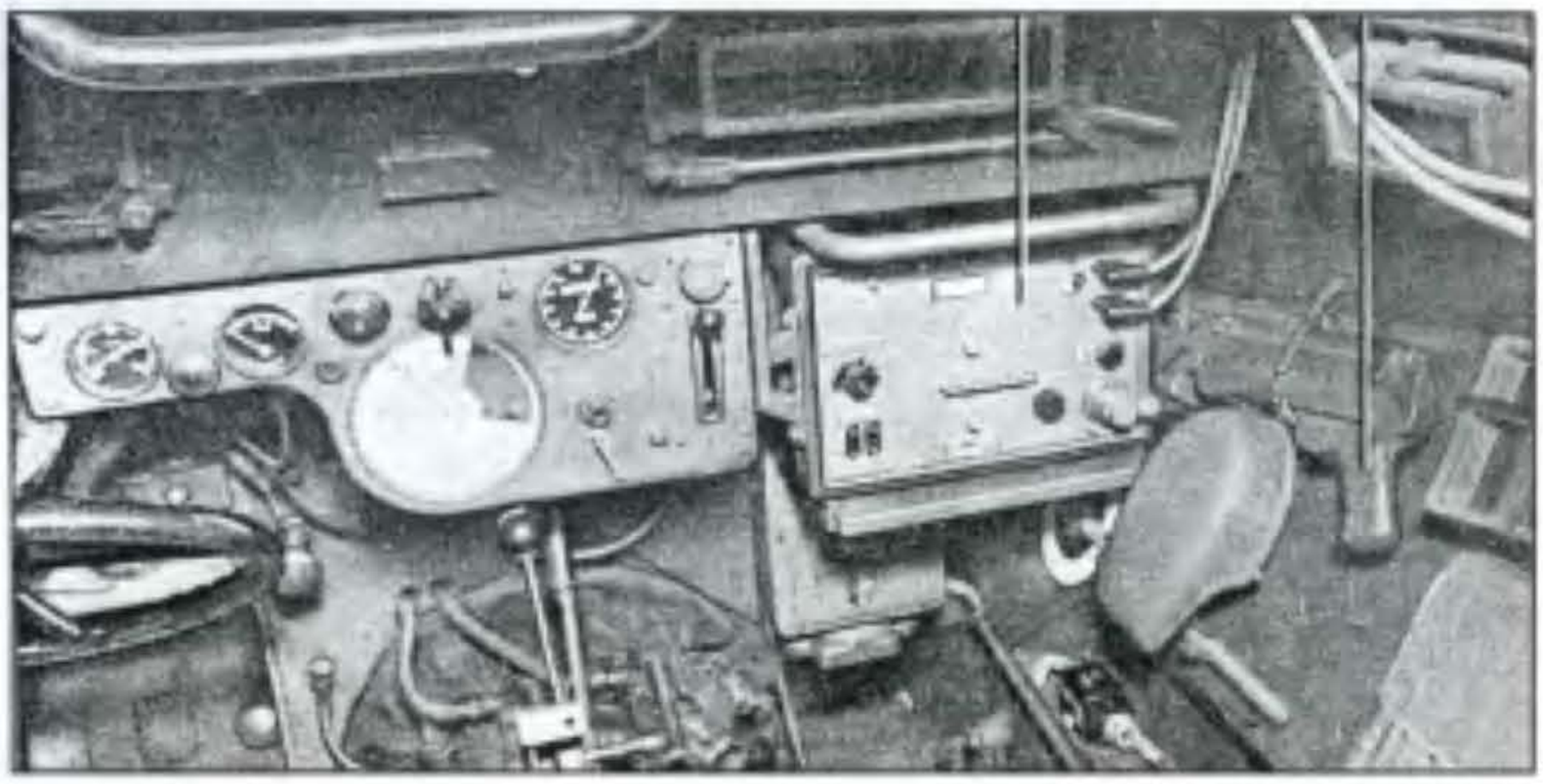
previous page. It borrows heavily from the 1-ton Zugkraftwagen design for the firewall, but now has a floating dash to be bolted to the underside of the top plate of the engine air vent decking. The steering head design is typically German and was used in the 222, 231 and 251 series, but re-engineered to accept the wheel direction indicator dial (3) and fit the 250. The design layout of the dash changed from the above to the example below, which is a (late) Typ 1. However a similar dash design appears in the Typ 2 in the bottom photograph.



The air vent grill was only seen when the *Fu. Spr.* radio set was not mounted in front of the co-driver. As seen below the *(SE) a* or *W (SE) p Umformer* tucked under and behind the radio takes up the space of the vent in this 250/3 Typ 2. The single handbrake lever is taken straight from the *1-ton Zugkraftwagen* (Sd Kfz 10) and was improved with the addition of the two extra turn levers sited either side of the main parking brake. When either was pulled back, it could turn the vehicle sharply and more quickly than simply turning the steering wheel.



LEFT: This is another production prototype 250 using a Typ 1 vehicle (note the Typ 1 armoured visors), and used to build the Typ 2 interior, including the radio position seen here and the later aerial arrangement just in shot in the top righthand corner. Note the small individual vision blocks in their holders on the left and right sidewalls used in the early vision block assemblies.



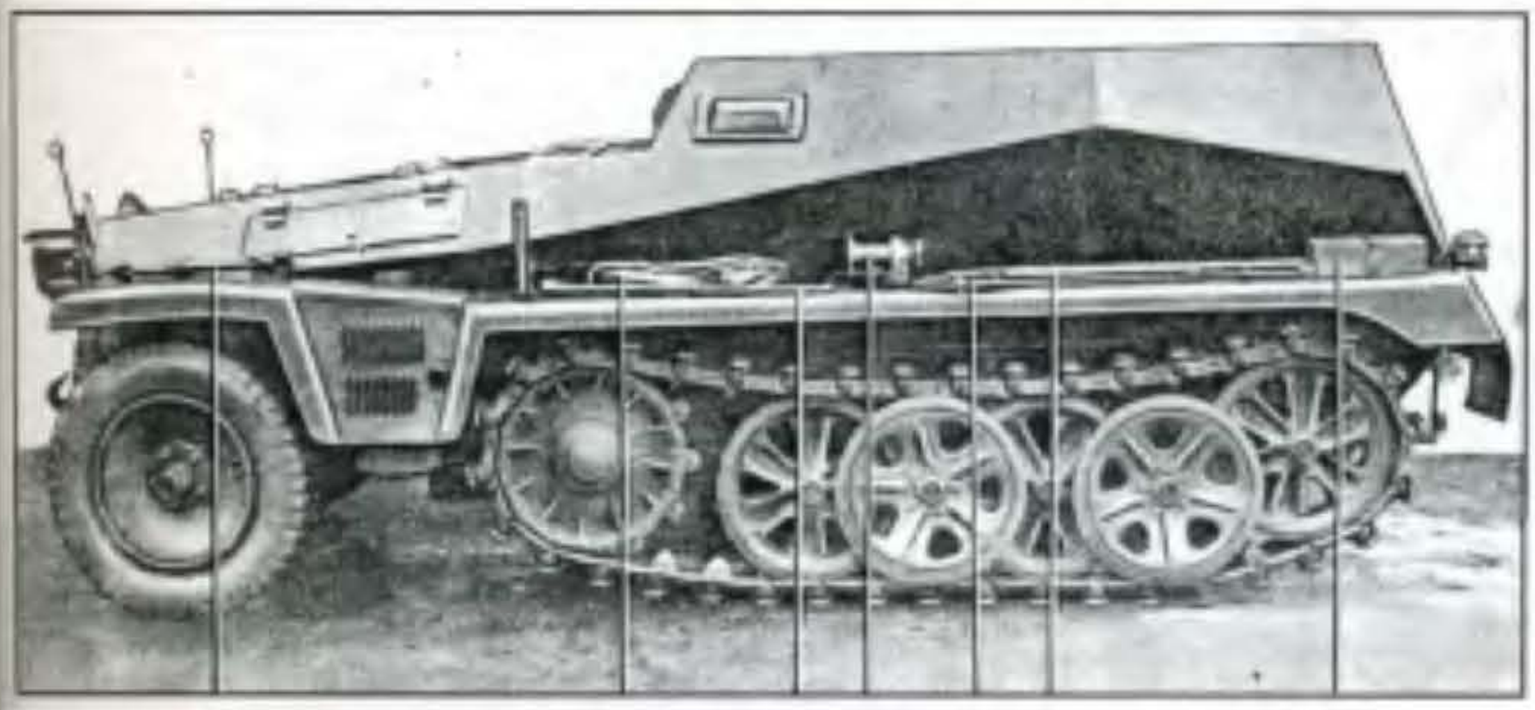
LEFT: Just to add a degree of confusion, this is a very similar dash design to the one in the top photograph, but this time in a 250 Typ 2.

Note: This is the interior of a 250/6 Typ 2 using a *Fu.16* radio set. The base plate for the *Umformer* is mounted in the same place as for the *Fu. Spr. f*, but in this photograph, only the base-plate is present and the metal conduit covering the cables adjacent to the base plate and at this height, is only seen on this version.

LEFT: This is the prototype of the 250/1 as built prior to August 1940 and listed with its new dimensions and weights for the 250 body. It was designed with a better angled front plate and a simplified rear plate and door arrangement. It has the last style of 253 mud and track guards, with the new 250 tool stowage arrangements, MG shield, tall width indicators, (but now set further forward), new headlamp mounts, and the single slot front visors. But look at the position of the front visors in the front plate. Someone thought that this would be a good idea, Perhaps he had never driven a 250 and did not understand that his head would be up against the cushion bolted to the roof all the times.

LEFT: The first Sd Kz 250s built but based on existing Sd Kfz 253s and converted to 250 series specifications. Thse ex-253s have all the detail improvements for the late version 252s as seen on the prototype 250 above.

LEFT: This an early 250 Typ 2 with all of the upgrades listed above but now with the Typ 2 mud and track guards. The early models did not have the beaded edge as seen in the picture below.



LEFT: This is another manual picture but taken from the *Beladeplane* showing a early to mid production 250 with the beaded edge on the fenders. Curiously, with headlamps now mounted further forwards on the Typ 2, the *Notek* light could not have been as effective unless the headlamps were removed from their spigots, as the headlamp bowl would have caused a large blind spot to the right of the vehicle.

	1939		1940												1941		
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
252 production	0	0	0	0	0	0	0	10	17	3	0	3	16	5	21	54	50
new unit requirement	3	0	3	0	0	3	6	0	6	18	0	18	18	0	0	**36**	18
compound difference	-3	-3	-6	-6	-6	-9	-15	-5	6	-9	-9	-24	-26	-21	0	18	50
253 production	0	0	0	0	1	9	10	5	0	10	0	31	19	0	50	40	40
new unit requirement	0	0	4	0	0	12	4	0	12	24	0	24	24	0	0	**48**	24
compound difference	0	0	-4	-4	-3	-6	0	5	-7	-21	-21	-14	-19	-19	31	23	39
StuG III production	0	0	1	3	6	10	10	12	12	10	29	35	35	21	44	30	30
new unit requirement	6	6	6	0	0	18	12	0	12	36	0	36	36	0	0	**72**	36
compound difference	-6	-12	-17	-14	-8	-16	-18	-6	-6	-32	-3	-4	-5	16	60	18	12

VEHICLE PRODUCTION VERSUS NEW STUG FORMATION VEHICLE REQUIREMENTS

With the limited information available it is difficult to ascertain exactly how StuG units evolved between April 1941 and November 1942 however there is some information available and a comparison of production numbers to new units formed is an interesting exercise even if in the process, more questions are raised than answered!

The table above is based on the production figures quoted in Sturmgeschuetz and it's Variants - Walter Spielberger and the introduction date or when formed date of both Heer and SS units in the period from November 1939 to December 1943 with the Heer units formed as listed by Jim Broshot on his excellent StuG units website: www.orbat.com. It is impossible to make an accurate chart, as there are scant details of combat losses for support vehicles within StuG units or replacement 252 and 3s sent to front line units, for which some latitude in accuracy has to be allowed.

I have treated units returning to re-fit as requiring all new StuGs, 252s and 253s for simplicity. It is known that when units returned to re-fit that some of their vehicles were passed on to other front line units to make up their losses and other units that were sent back to retrain for new units gave up all their vehicles to re-equip a neighbouring unit. So the chart is purely to compare the production requirements versus the need for vehicles in the newly formed StuG units and throw some extra light onto the why, how and when the new K.St.N. formations could have been introduced and needed to be introduced.

I have based the unit requirements upon the following:
The first six Batteries are set as K.St.N.445 using only 6 StuGs, 3 252s and 4 253s.

K.St.N.445 directive from July 1940 to create a full Abteilung or Battalion that included 3 x 6 StuGs, 3 x 3 252s and 3 x 4 253s up until November 1941 and made no allowance for possible deletion of 253s from the formation or new units being equipped with new the 446a formation. (As per StuG Battalion 197 as of March 1941 formed in October 1940)

This formation was then modified by K.St.N.446 to have 7 StuG, 3 252s and any of the original 253s still in service x 3 and I have introduced this into new units from September 1941 and the figure in brackets in October 1941 (67) is to add the seventh StuG to each battery already extant to bring them up to the current requirement.

There is also a suggestion that Platoon leaders received StuG III to replace the 253 but there is no exact date offered. SS units, which have been claimed to adhere to the specifications of the time, are listed as utilising 7 StuG in a battery up until October 1942. So did the Heer units follow suit or did they try and up gun a Battery to 10 StuGs before the official change over to K.St.N.446a in November 1942 which then recommended 10 StuGs per battery.

Looking at the possible dwindling stocks of 253 and the early cancellation allied to the introduction of the StuG III Ausf E, the need to start upgrading from 7 to 10 StuGs per battery was already required and possible from September 1941 and then made official by K.St.N.446a in November 1942 which also deleted the use of 252s or 250/6s. It is a safe bet that by November 1942 that all Heer StuG formation already conformed to K.St.N.466a and this upgrade was to delete support vehicles and not upgrade existing or new StuG Battalions.

This comparative chart does raise a few interesting questions and predicaments in the early months. Whilst some units in 1940 had sufficient time training and forming up to be able to wait for vehicles, how do you equip new units to the date specified with a shortfall for all three vehicles? If the Waffenamt were short of 6 252s, 4 253s and 12 StuGs in May 1940 perhaps it is no surprise that so few StuG units participated in the campaign in France. Only two batteries of 6 StuGs were ready from the very first day with two more batteries in the following two months even though 16.I.D/GD didn't have 253s and Stu.Bat.660 lacked the required 252s.

Of course there were never that amount of StuGs waiting to go out as shown in the bottom line, as combat losses for the most important vehicle would be replaced with some urgency whenever possible.

Sd Kfz 252 production

By November 1941, (if the production records are correct), there was a surfeit of 215 Sd Kfz 252s accepted by the Waffenamt (less replacement vehicles to combat losses) sitting

1941- continued									1942								
Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
44	35	30	44	52	29	0	0	0	0	0	0	0	0	0	0	0	0
0	9	21	9	9	12	9	0	9	**27**	9	**48**	**12**	0	0	**9**	0	**27**
94	120	129	164	207	224	215	215	206	197	188	140	122	122	122	113	113	92
30	39	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	12	28	12	12	12	0	0	0	0	0	0	0	0	0	0	0	0
69	96	69	57	45	33	33	33	33	33	33	33	33	33	33	33	33	33
47	48	56	34	50	38	71	46	46	45	45	3	36	79	70	60	80	70
0	18	42	18	18	28	**(70)**	0	30	**90**	21	**157**	**36**	0	0	**30**	0	**67**
59	89	103	119	151	161	162	208	233	188	212	58	58	137	207	237	317	320

Numbers highlighted in **bold** *include a full compliment of vehicles for a unit refit.*

in Army depots. If all the new Heer and SS Stug units formed before November 1942 received their full compliment of 252s and all the units brought back for re-fitting also received the stated requirement there is a maximum of 92 252s awaiting new units in September 1942. Of course this is the maximum, as replacement vehicles sent to front line units are not recorded. Nine or even 18 more could have gone to training Abteilung so the actual amount of vehicles in Army Depots in September 1942 is probably half the figure shown or even less.

The diary of Unteroffizier Skodell of 1/Stu.Bat.197* makes note that by 1st August 1941 the battery had lost all three 252s since 22nd June and were later receiving supplies from the 3rd battery vehicles. Whether they were simply unluckier than most or this was a regular occurrence in all Stug units is difficult to know but does suggest a high attrition rate to justify the amount of 252s built. However StuG Battalion 667 when it was re-fitted with StuG III Ausf Fs in March/April 1942, 7 months after 252 production had ceased (See page 174) received modified trailers to take the longer ammunition. The conversion does not look like a 'field-fix' which points to the work being done by the manufacturers before issuing to StuG Battalions and suggests that they had a significant stock of remaining vehicles and trailers to justify the expense, time and trouble to do this.

What is odd is that both the 252 production finished before the new K.St.N.446 directive was officially adopted in November 1941 but in the same month K.St.N.190 for the formation of StuG units within Infantry Divisions was issued (but not implemented until later) included the yet to be built 250/6. So Army planners must have known the delay of implementing this new formation and also knew that by the time they did instigate K.St.N.190 the remaining stocks would have gone. The need for the 250/6 had been planned for sometime in August / September 1941.

It is possible that in Sept 1942 the newly formed StuG Battalion 202 and the re-fitted StuG Battalion 203 and 184 in October 1942 did not receive 252s but 250/6s instead, if the stock of spare vehicles had been used up previously. It is also possible that any spare 252s from the summer of 1942 could have been re-directed to other units to use in less exposed positions given that it shared the same vulnerability of the 253 and yet its successor, the 250/6 was even less useful due to its open superstructure.

Having spent the best part of a year from Nov 1941 – 1942 to re-equip platoon commanders with a StuG III of their own to finally eliminate the weakest link in the unit, the next problem to address was the limited carrying capacity of the either the 252 or 250/6 tasked with supplying 10 ammo hungry StuGs. K.St. N446a dated November 1942 officially states that all new StuG formations should now have 10 StuGs and states the use of two cross-country trucks per battery included in the formation. Of course the StuG units were not obliged to relinquish their existing 252s but with the change to soft skin trucks the supply troops would have been even less cavalier in their desire to get too close to the action and a modified strategy for re-supplying ammunition must have been created. Perhaps this is also a contributory factor to StuG crews removing one ammunition bin and stacking shells on the floor to stock up as much as possible as trucks would not be seen in the front line?

What I don't know is whether new 252s were diverted to other units before the 446a update straight from the Army depots or that the StuG units discarded their 252s as soon as possible. As seen on page 182, 252s did find new homes with various Pz.Jgr. units as a towing vehicle for PaK 38s and 40s. Inf. Div. GD's diagrammatic OOB for April 1942 shows only Sd Kfz 10s to tow their PaK guns in the Pz.Jgr.Regiment yet there are photographs showing a 252 belonging to the regiment in November 42 but even in this role it had drawbacks. It could tow the gun and store the ammo but it couldn't house the crew who either sat on the roof or had to walk along side. For those used to sitting in the back of an Sd Kfz 10, a 252 must have been seen as a retrograde step in their opinion. However, apart from one photograph of a 252 in a propaganda unit, there are few photographs showing further use of 252s and few photographs of 252s beyond mid 1943.

**Combat History of Schwere Panzerjager Abteilung 653 - Karl Heinz Munch published by J.J. Fedorowicz Publishing Inc*

	1939		1940												1941		
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
252 production	0	0	0	0	0	0	0	10	17	3	0	3	16	5	21	54	50
new unit requirement	3	0	3	0	0	3	6	0	6	18	0	18	18	0	0	**36**	18
compound difference	-3	-3	-6	-6	-6	-9	-15	-5	6	-9	-9	-24	-26	-21	0	18	50
253 production	0	0	0	0	1	9	10	5	0	10	0	31	19	0	50	40	40
new unit requirement	0	0	4	0	0	12	4	0	12	24	0	24	24	0	0	**48**	24
compound difference	0	0	-4	-4	-3	-6	0	5	-7	-21	-21	-14	-19	-19	31	23	39
StuG III production	0	0	1	3	6	10	10	12	12	10	29	35	35	21	44	30	30
new unit requirement	6	6	6	0	0	18	12	0	12	36	0	36	36	0	0	**72**	36
compound difference	-6	-12	-17	-14	-8	-16	-18	-6	-6	-32	-3	-4	-5	16	60	18	12

Sd Kfz 253 production

Operation Marita delayed Operation Barbarossa and whilst they cleared up the distraction that was the Balkans and Greece they had a somewhat rude awakening as to the fallibility of the StuG battery and platoon commander's vehicles. Having spent all of 1940 trying to fulfill the requirement to supply vehicles for the new StuG units and failing, they then found out on the eve of the great offensive east, just how poor the original idea behind the 253 was. German Army training always placed great emphasis on leadership and communications that spawned the idea of the 253, so correcting such a weak link within StuG units would have been of some importance if combat efficacy were to be maintained. However, by June 1941 every StuG unit possessed their full compliment of 253s, whether they wanted them, wanted to use them or whether the Army command wanted to have their troops in them.

Looking at the available 253 stock in June, the planned StuG units in July and August and the combat experience in Greece, the StuG III Ausf E must have been given top priority. The task then was to build enough of them to begin upgrading the existing units still using the 253.

Once the introduction date for the Ausf E was known the decision to stop producing the 253 was made in June 1941. If 253s were only issued to StuG units until 22 June 1941 there were at most 69 spare 253s in Army depots in the summer of 1941. If you remove replacement vehicles to make good combat losses and the need for 253s to be used at training facilities the figure is probably down to around 55(?) still in the Army Depots at the end of June 1941.

With Stu.Abt.189 in July, Stu.Abt.177 in August and possibly Stu.Abt.202 the following month being the last Abteilung to receive 4 253's per battery there could have been around 19 253s remaining or 23 if Stu.Abt.202 was the first to receive 4 extra StuGs per battery. Even if they kept issuing 3 253s per battery the stock of 253s would have been exhausted by the end of December 1941.

Looking at the photographs taken in the early months of Barbarossa there are already 253s in service with field artillery units before September 1941. It implies that most new units from September onwards could not have received 253s, so must have received StuGs for the Battery and Platoon Commanders. From the production figures there were sufficient built to provide all existing battery commanders with a StuG III Ausf E by October 1941if it actually happened, (see the figure in brackets that includes 46 extra StuGs issued for that purpose), and begin to upgrade the existing platoon commanders by early 1942 either through StuGs being sent to front line units or through units coming back to refit. Once the new StuG Ausf E's were delivered it would be a fairly easy procedure for the artillery High Command to withdraw unwanted or spare 253s to other field artillery units over time. Photographic evidence shows more and more 253s seen in field artillery units by the spring of 1942, and few photographs of 253s in service with StuG units in Russia at the same time

Given the equipment carried for directing artillery fire the remaining 253s were easily re-deployed once re-equipped to carry alternative radio equipment and even some Panzer Pionier Kompanie equipped with the Sd Kfz 251/1 mit Wurfahmen 40 also acquired 253s as command vehicles. Some StuG units did hold on to their 253s even after the November 1942 update but quite what role they fulfilled, is at best a guess. Perhaps they were used by the Stabs formation as a runabout.

Sd Kfz 250 Typ1 and 2s

I have made no attempt to produce 250 series production figures. With more than one factory producing them, records are so incomplete that any attempt would be a complete guess and worthless.

As mentioned, Sd Kfz 253 production was intended to be higher than the 285 actually completed. If we take the figure of 285 as correct, there were at least another 29 and at most 105 more made but converted into 250s. (See page 226). Perhaps the total production run for the 253 was initially set somewhere around 360? 285 were built plus another 75(?) converted to 250s because by June 1941 when the last 253 was built they knew they were both obsolete and impractical.

These converted 253s were the first batch of 250s built in June 1941 and either converted from finished 253s or the roof was omitted from the build process on the production line to create the 250. This decision explains why there are no official mention of the two versions of the 250 Alt and why

1941 - continued									1942								
Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
44	35	30	44	52	29	0	0	0	0	0	0	0	0	0	0	0	0
0	9	21	9	9	12	9	0	9	**27**	9	**48**	**12**	0	0	**9**	0	**27**
94	120	129	164	207	224	215	215	206	197	188	140	122	122	122	113	113	92
30	39	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	12	28	12	12	12	0	0	0	0	0	0	0	0	0	0	0	0
69	96	69	57	45	33	33	33	33	33	33	33	33	33	33	33	33	33
47	48	56	34	50	38	71	46	46	45	45	3	36	79	70	60	80	70
0	18	42	18	18	28	**(70)**	0	30	**90**	21	**157**	**36**	0	0	**30**	0	**67**
59	89	103	119	151	161	162	208	233	188	212	58	58	137	207	237	317	320

Numbers highlighted in **bold** *include a full compliment of vehicles for a unit refit.*

the dimensions in the manual dated August 1940 are for the shorter 250 series, (See page 00) and not the converted 253. It also explains why the 250 Alt (Typ 2) inherited the angled plate on the inside of the body sides that secured the roof in place on the 253s

The conversion to 250 specifications was the most practical option they could make, but they must have been very confident about the supply date of the forthcoming StuG III Ausf E to take this decision 2 months in advance of it's arrival. They must have made a decision not to supply new 253s to field artillery units and relied on 253s becoming available with every upgrade for the StuG unit commanders to provide vehicles elsewhere.

So from a somewhat inglorious start with two flawed ideas the Army planners finally found the right idea, the Sd Kfz 250 Alt series.

The Sd Kfz 250 base vehicle was produced with all the bolt holes on the inner wall panels to accept the basic /1 interior but was only fitted to order and not a default production process. Fourteen official versions including the 250/1 (but not including different radio versions, prototypes or unofficial field-fixes) were developed from the basic layout. It is this built-in flexibility that the 252 and 253 lacked that was the chief reason for the 250 series being as successful and as long lived as it was and also a contributory factor in the demise of its predecessors.

The 250/6 Alt superseded the 252 and the 250/5 in both Alt and Neu guises replaced the field artillery version of the 253. The original 253 (for StuGs units) had a proposed replacement in the 250/4 Alt but their is no documentation I have found to prove whether they saw service in StuG units even though they were listed as carrying the same Fu.15 and 16 radio equipment. The loading plan (in the second part to his book, page 219) dated January 1943, does not provide details for a 250/4.

Possibly the idea of an open topped successor to the 253 was merely an idea made in the early planning stages for the 250 series before the Balkans campaign and then deleted. An Sd Kfz 250/4 Alt light anti-aircraft prototype was built and saw limited service in Russia 1941 but didn't advance to full production. (See page 38 - 250 Archive part 2). However the 250/4 Neu, equipped with the Fu.8 radio combination did see service within Nebelwerfer units.

On the following pages is a chronological roll out of Heer StuG formations between November 1939 and December 1943.

A black background indicates a unit that does not as yet exist, or has been disbanded or destroyed.

A Grey background shows when a unit was being formed, out of the frontline for a refit or away from the front line.

StuG unit	1939		1940												1941											
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Stu. Bat. 640	Formed at Art.-Lehr-Rgmt Juterbog		I.D.GD					Becomes 16. [Sturmgeschuetz] Komponie/Infanterie Regiment GD										Yugo.							
Stu. Bat. 659	Formed					Served with XII Corps in France									Refitting at Juterbog					16.Army/Army Group Nord					
Stu. Bat. 660	Zinna		Transferred to France												East Prussia					16.Army/Army Group Nord					
Stu. Bat. 665	Juterbog		Fra.			Transferred to Mons. Belgium												East Prussia		16.Army/Army Grp Nord				Arm. Grp Mitte	
Stu. Bat. 666	Zinna					Transferred to Ghent. Belgium									Transfer to East Prussia					16.Army/Army Group Nord					
Stu. Bat. 600	Juterbog - transferred to France to Army Group C																	Transfer east		16.Army/A.G.Nord			Army Group Mitte		
Stu. Bat. 667	Juterbog - transferred to France										Doberitz							Transfer east		16.Army/Army Group Nord					
Stu. Abt. 184	Zinna		France										Kolmar then Austria					Yugo.	Polnd.	9.Army/Army Grp Mitte				Refit Juterbog	
Stu. Abt. 185	Juterbog					Braunsberg - Heiligenbeil. East Prussia														18.Army/Army Group Nord					
Stu. Abt. 190	Juterbog		Fra.										Transfer to Romania		Greece					Bucharest then 11.Army/Army Group Sud					
Stu. Abt. 191															Bulgaira/Greece					1st Pz.Grp/Army Grp Sud				Army GrpMitte	
Stu. Abt. 192	WK III / Transfer to Poland														4.Army/A.G.Mitte					2.Pz.Grp/A.G.M				2.Army/A.G.Mitte	
Stu. Abt. 197	WK III		Silesia then WK VIII															Austria		A.G.M then 6.Army/A.Grp. Sud				11.Army	
Stu. Abt. 203	Juterbog																			Army Group Mitte			Refit	A. Grp. Mitte	
Stu. Abt. 204	Redesignated Stu.-Ersatz-Abt. 200																								
Stu. Abt. 226	Juterbog																	Warsaw		Army Group Mitte (various deployments)					
Stu. Abt. 210	Juterbog																			Army Group Mitte (various deployments)					
Stu. Abt. 201	Juterbog																			Army Group Mitte (various deployments)					
Stu. Abt. 243	WK III		Army Grp Mitte																	Army Grp. Mitte					
Stu. Abt. 244	WK III		Army Group Sud																						
Stu. Abt. 245	WK III		Army Group Sud																						
Stu. Abt. 189	WK III		Army Group Mitte																						
Stu. Abt. 177	WK III		Army Group Mitte																						
Stu. Abt. 202	WK III		Arm.Grp.Mitte																						
Stu. Abt. 209																									
Stu. Abt. 249																									
Stu. Abt. 287																									
Stu. Abt. 288																									
Stu. Abt. 393																									
Stu. Abt. 270																									
Stu. Abt. 232																									
Stu. Abt. 242																									
Stu. Abt. 90																									
Stu. Abt. 228																									
Stu. Abt. 741																									
Stu. Abt. 742																									
Stu. Abt. 909																									
Stu. Abt. 911																									
Stu. Abt. 912																									
Stu. Abt. 247																									

StuG unit	1941	1942												1943										
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Stu. Bat. 640	16.(StuG) Ko./Inf.Rgt. GD	With Stu.Abt.192 became Inf.Div.(mot)Pz.Gren.Div.GD																						
Stu. Bat. 659		Refit	16.Army/Army Group Nord						Disbanded to form Stug.Bat. 287															
Stu. Bat. 660		A.G.Mitte	Disbanded to form Stu.Bat.600																					
Stu. Bat. 665	Army Group Mitte	Disbanded to form Stu.Bat.600																						
Stu. Bat. 666	A.G.N	Refit	A.G.Nord		Demyansk Pocket									Disbanded - personnel used for Stu.Abt.912										
Stu. Bat. 600	A.G.N		Stu.Abt.600		Army Group Mitte											Rebuilt at Juterbog					Army Group Mitte reserve				
Stu. Bat. 667	Amry Group Nord		Zinna now Stu.Batln .667		Rzhev	Army Group Mitte (various deployments)															Batterie withdrawn			
Stu. Abt. 184	A.G.M	Army Group North			Demyansk Pocket									evacuated in March		Refit-Estonia			Army Group Nord					
Stu. Abt. 185	Army Group Nord							StuH 42/Army Group Mitte								Refit at Mogilev				Army Group Mitte				
Stu. Abt. 190	Army Group Sud						Army Group B										With inf.Div.168			Eastern Front Army Group Mitte (Reserve)				
Stu. Abt. 191	Army Group Mitte		Refit	Army Group Sud (various deployments)														Refit at Kertsch			Army Group A (Don Front)			
Stu. Abt. 192	Army Grou Mitte	de-activated and consolidated with Stu.Bat.640 to formStu.Abt.GD																						
Stu. Abt. 197	11.Army / Sevastopol								Army Group Sud					Disbanded and equipment handed over to Stu.Abt. 270										
Stu. Abt. 203	Army Group Mitte			Refit at Kostriza			Army Group Sud																	
Stu. Abt. 204																								
Stu. Abt. 226	Army Group Mitte					Voronezh		Refit/France	Army Group Nord															
Stu. Abt. 210	Army Group Mitte			Refit to Minsk area			Army Group South																	
Stu. Abt. 201	Army Group Mitte		Refit at Borisov			Army Group Sud										Disbanded		Reformed		Greece				
Stu. Abt. 243	Army Group Mitte				A.G.Weisch		Army Group B							Destroyed at Stalingrad / rebuilt						6.Army/Army Group Sud				
Stu. Abt. 244	Army Group Sud													Destroyed at Stalingrad/rebuilt-Juterbog						Army Group Mitte				
Stu. Abt. 245	Army Group Sud													Destroyed at Stalingrad/rebuilt Juterbog						Army Group Mitte				
Stu. Abt. 189	Army Group Mitte							Rzhev with Army Group Mitte																
Stu. Abt. 177	Army Group Mitte		Refit				Army Group Sud							Destroyed/Juterbog		Orel area				Army Group Mitte				
Stu. Abt. 202	Army Group Mitte (various deployments)										Rzhev		Kharkov								Kiev			
Stu. Abt. 209	Juterbog		Army Group Mitte					Rouen			Rzhev Army Grp B			Army Group Sud										
Stu. Abt. 249		WKIII	Crimea / Army Group Sud																					
Stu. Bat. 287							S.Vbd.287		Caucasus			Dennewitz (WK III)			Transferred to Rhodes									
Stu. Abt. 288			S.Vbd.288/90th Light.Div. DAK																					
Stu. Abt. 393								Formed as 345 but renamed 393			Army Group Sud													
Stu. Abt. 270									WKVIII	Army Group Mitte														
Stu. Abt. 232									WK III	Army Group Sud										Refit		France		
Stu. Abt. 242										WK III	Ost Front		Refit for tropical duty		Italy									
Stu. Abt. 90											Tunisa DAK			Destroyed										
Stu. Abt. 228											WK III						Army Group Sud					Refit/France		
Stu. Abt. 741														Finland/Germany		Juterbog then transferred to Finland						Danzig		
Stu. Abt. 742														Finland/Germany		Juterbog then transferred to Finland						Danzig		
Stu. Abt. 909														WK VIII		Kursk area			XLVI Pz.Kps/9th Army Army Group Mitte					
Stu. Abt. 911															WK VIII	Kharkov			4th Pz.Army/Army Group Sud					
Stu. Abt. 912																WK XIII/WK III	Leningrad		18th Army/Army Group Nord					
Stu. Abt. 247																	Juterbog/Italian mainland then Sardinia			Corsica		France		

Two

D 672/5

Leichter gepanzerter Mannschaftskraftwagen (Sd. Kfz. 250)

— l. gp. Mannsch. Kw. (Sd. Kfz. 250) —

Leichter gepanzerter Munitionstransportkraftwagen (Sd. Kfz. 252)

— l. gp. Mun. Trsp. Kw. (Sd. Kfz. 252) —

Leichter gepanzerter Beobachtungskraftwagen (Sd. Kfz. 253)

— l. gp. Beob. Kw. (Sd. Kfz. 253) —

Gerätebeschreibung und Bedienungsanweisung zum Fahrgestell

Vom 8. 8. 40

Berlin 1941

Gedruckt in der Preußischen Zentraldruckerei

D672/5 MANUAL

The original manual included in the following chapter was written in German Gothic typeface. Even though I was keen to reproduce

C. Operating Instructions

D. Maintenance And Overhaul Information

E. Service (Care) and Lubrication

F. Index of Directions

G. Pictures

PRELIMINARY REMARKS

The light armoured troop carrying vehicle (Sd Kfz 250), the light armoured observation vehicle (Sd Kfz.253) and the light armoured ammunition carrying vehicle (Sd Kfz 252) are half-track vehicles with front wheels and track drive system. The chassis (1 ton, Type D7p) is steered by turning the front wheels and acting on the tracks. 2 in front situated drive wheels propel the tracks

A. Technical Data

		Sd Kfz 250	Sd Kfz 252	Sd Kfz 253
Performance				
Towing Weight	kg	1000	1000	1000
Max speed on the road	km/h	65	65	65
Average speed on the road	km/h	45	45	45
Range with 1 fill up (Fuel)	km	320	320	320
Climbing angle on sand (without trailer)		24°	24°	24°
Fuel consumption on the road	l	40/100 km	40/100 km	40/100 km
Weights				
Ex works weight	kg	5000	4730	5010
Loading capacity (including crew)	kg	800	1000	690
Max gross weight	kg	5800	5730	5700
Weight on front wheels (loaded)	kg	1150		
Weight on tracks (loaded)	kg	4650		
	kg/cm²			
	kg/cm²			

		Sd Kfz 250	Sd Kfz 252	Sd Kfz 253
Dimensions				
Overall length	mm	4560	4700	4700
Overall width	mm	1945	1950	1950
Overall height	mm	1660	1800	1800
Track width (front wheels)	mm	1630	1630	1630
Toe in (front wheels)	mm	12	12	12
Front wheels camber	°	3°	3°	3°
Track width of track chain	mm	1580	1580	1580
Turning circle (from the centre of vehicle)	mm	9000	9000	9000
Ground clearance	mm	285	285	285
Wading (water) capability	mm	700	700	700
Engine				
Type "Maybach"		HL 42 TRKM	HL 42 TRKM	HL 42 TRKM
Cylinder Bore	mm	90	90	90
Piston Lift	mm	110	110	110
Number of pistons		6	6	6
Cylinder capacity	Total	4170	4170	4170
Revolutions per min	RPM	2800	2800	2800
Power output at 2800 rpm	HP	100	100	100
Suppressed to group		1	1	1
Track (Chain)		SPW	SPW	SPW
Type		51/240/160	51/240/160	51/240/160
Width	mm	240	240	240
Spacing	mm	160	160	160
Number of links		38	38	38
Length of track	m	6.08	6.08	6.08
Starting length of chain	mm	1020	1020	1020
Front Wheels				
Tyre sizes (Luko)		6.00 x 20	6.00 x 20	6.00 x 20
Tyre pressure	BAR	2	2	2
Capacities				
Fuel (1 Tank)	ltr	140	140	140
Oil: Sump capacity (engine)	ltr	12	12	12
Capacity of gearbox	ltr	6	6	6
Capacity of steering gearbox	ltr	3.5	3.5	3.5
Capacity of final drive	ltr	Each 0.75	0.75	0.75
Capacity of air filter	ltr	2	2	2
Grease: Capacity of grease chamber per link	c.c.	90	90	90
Water: Capacity of cooling system	ltr	18	18	18

B. DESCRIPTION

1. ENGINE (Picture 4 & 5)

a) Engine Housing

The engine housing consists of 3 main parts: cylinder head, housing upper section and housing lower section. The housing upper section contains the replaceable cylinder liners that are surrounded by cooling water sealed off with rubber rings from the cooling water areas. The engine is supported on rubber mountings at three points. Earth connection is via a strong cable from engine to chassis.

b) Drive System

The crankshaft is in the lower housing, borne by 8 bearings. The 8 journals on the crankshaft are specially hardened and balanced by forged-on counterweights. On the front end a swing damper is fitted and the connecting rods have exchangeable bearing-shells.

The light metal piston has three pistons and one oil control ring.

The gudgeon pin is floating and side play is controlled by two circlips.

c) Valve Gear

The angled hanging valves are controlled by the seven bearing camshaft via rocker arms in the cylinder head. For adjustment of the valve timing, the rocker arms are mounted on eccentric bushes. The camshaft also drives the oil pump, rev counter and Magneto igniter.

d) Cooling System

A centrifugal pump propels the cooling water through the engine and radiator. The drive is by V-belt, which simultaneously drives the dynamo (generator) and fan. A remote thermometer indicates the engine water temperature. The extent of cooling of the radiator can be controlled by a louvered partition (in front of radiator) from the driver's seat. The water drain valve is located at the oil cooler, the lowest point of water circulation.

e) Lubrication

In consideration of the diverse angles the vehicle could be operating, the oil content is contained in special tanks. From the centre of the camshaft, via spiral gearwheels, the two oil pumps (situated in the oil sump) are driven.

Oil Ducts:

The oil pump lubricates all the bearing points of the crankshaft, camshaft, piston rod and swing lever. The lubrication of piston and cylinder friction areas is by oil spray. During badly contaminated filter conditions, a bypass valve at the oil pump serves the protection of the whole lubrication system. A pressure valve, accessible from outside, allows the regulation of over-excessive use resulting in low pressure, to revert to normal pressures.

The oil is cooled in the oil cooler, situated behind the water radiator. Should the resistance in the oil cooler be too great (cold oil), a bypass valve will bypass the water radiator.

Oil Filter:

The oil filter is built into the main flow of the lubrication system, in order to clean all oils.

f) Fuel Pump

The engine mounted fuel pump delivers fuel from tank to carburettor. The pump incorporates a fuel filter. A cam between the timing gears activates the pump via a swing lever.

g) Air Filter

The air sucked in by the engine is filter cleaned before entering the induction manifold. A certain amount of oil is present in the lower half of the light metal housing, covering (splashing) the filter element with oil.

h) Carburettor

The vehicle is equipped with a two-stage carburettor using two floats. Exhaust gases that are diverted from the exhaust by branch pipes pre - heat the suction pipe of the carburettor.

A code number identifies the main jet. The first number states the diameter of the lower opening in 1/100mm. The second is the manufacturing number relating to the diameter of the side holes and jet type.

The carburettor has a starting facility controlled from the driver's seat.

i] Electrical Equipment on the Engine

A 300-watt dynamo is driven by a V-belt on the swing damper side with 1.2 times engine revs. [Some vehicles are equipped with 130/600-watt dynamos].

The engine has a magneto with automatic timing adjustment driven by timing shaft.

The spark plugs, Bosch 225 with 14mm thread and 22mm spanner width, are situated in the cylinder head and accessible from the carburettor side.

The plugs, including cables [leads], are covered to outside by a metal cover, preventing dirt entry and interference to the radio system.

The starter is attached to the engine housing. Further information regarding the magneto ignition can be found under the "Bosch" information for vehicle equipment.

2. Clutch (Picture 20)

The clutch type: Mecano PF220K is a 2-plate clutch and flange fitted to the engine. From here follows the power transfer via universal joint shaft to the changing gears.

3. Gearbox (Pictures 6, 7 and 8)

(Type: VG 102 128H)

The gearbox is a semi-automatic "Maybach" change-regulator gearbox.

The individual gears are a pre-selected with a small lever. Depressing the clutch pedal actuates gear changes.

The box has 7 gears for forward motion. Reverse can only be used from 1st to 3rd gear. Gear change system – see Picture 10.

The ratios and relevant vehicle speeds are:

Gear	Ratio	Speed Km/hr		At Revs Per Min
		Forwards	Reverse	
1	1:8.2	5.5	5.5	
2	1:5.4	9	9	
3	1:3.53	13	13	
4	1:2.28	20		
5	1:1.49	31		2800
6	1:1.02	48		
7	156:1	65		2400

Between the second and third gears, the pre-selector lever has a barrier (Picture 8/1), as the 3rd gear is usually OK to move away in. Should 1st or 2nd be required, the lever must be pushed to the left slightly to engage.

The 7th gear (Picture 8/2) is to be considered as the "fast" or overdrive gear. The gears are selected to match any given terrain. The fact that during changing various gears repeatedly means that several gear bushes are moving about together, results in the gears not always being selectable when stationary. First gear is, however, always selectable. The neutral gear is selected with the "direction" lever (Picture 8/3), which is on the gearbox housing and is used for "forward" and "reverse" selection. Neutral is in between the two above positions (Picture 8/4).

The gear system (Picture 8) consists of:

The actual toothed gears with clutch brake and changing cylinders (Picture 8/6).

The gear change box (Picture 8/7) with pre-selection lever.

The valve (Picture 8/9), (non-return valve) (Picture 8/8).

The low-pressure tank with relief valve (Picture 8/10).

In the gearbox all the cogs are in mesh. Bushes transfer the power flow to the required paired cogs for a certain gear ratio. The changing cylinders are activated by low pressure (vacuum), moving the bushes during changes. The changing box distributes the vacuum to the parts to be moved via selection by pre-select lever, which frees ducts for vacuum operation.

The clutch brake (Picture 8/5) operates on a rubber membrane (Picture 8/10) slowing down the rotating parts to the required rpm of the gear to be chosen.

The relief valve (Picture 8/9) is connected to the foot-clutch lever by linkage rods (Picture 8/13). It releases the vacuum from the changing box.

Connections for vacuum containers are sometimes on the inside transverse member of the chassis. The container (tank) is connected to the suction line behind the choke by intermediate switching with non-return valve (Picture 8/10).

Operation of the selection claw:During gear changing, the claws of the change collar (Picture 8/11) must engage with the required cog.

Depending on the rpm of the previous gear, the rpm may have to be increased or reduced, i.e.: brought into line with the required gear, has the collar (muff) to be retarded, open clutch (depress pedal) called "brake change". If it is to be speeded up, leave clutch engaged and accelerate, called "gas change".

During different gear changes, more collars (muffs) have to be moved. The changing box arranges that the "brake changes" (with open clutch) take place first and the "gas changes" complete the procedure when the main clutch is engaged (closed).

4. Steering Gearbox (Picture 9)

A pair of bevel wheels "a" and "b" drive the steering gearbox. The large bevel wheel is connected to the rotating differential housing "c". In this housing three pairs of differential wheels are located "d" which are under each other and in pairs lock with the shaft on the drive wheels (i) located spur gears "e". Also built in are two brake drums "h" each housing a "Perrot" brake.

When operating the steering wheel, only the front wheels respond, so that at minor curves, the wheel steering acts as a normal wheeled vehicle by turning the front wheels only. When turning the steering wheel further, a cam in a primary cylinder firmly fixed to the steering column, actuates an oil pressure, which is transferred to a secondary cylinder "k" via a pipeline. Depending on the direction of the steering wheel being turned, the left or right piston in the cylinder "k" is being activated and the left or right steering brake is pulled on by lever or cable "o", whereby a certain curve is induced in the vehicle travel. Reduction wheels (cogs) reduce the speed of one drive shaft, whilst increasing the other drive shaft speed. By fully using one brake drum, the turning circle (from vehicle centre) is 9m.

5. Drive Wheels (Pictures 11 & 12)

From the steering box, the in the front situated drive wheels are driven by spur gearing system (picture 9/1). The drive wheels carry the 12 drive wheel rollers (Picture 11/2), which grip the track chain.

The running bands of the drive wheels are fitted with rubber segments. Incorporated in the drive wheels are brake drums for the ATE oil pressure driving brake (Picture 12)

6. Running System

Drive and guide wheels do not run on the runway, but each guide wheel is mounted on a cranked spindle (Pictures 13 and 14). A screw spindle holds the transverse arm of the crank. Tension nuts can change the opposition of the guide wheel, thereby regulating the track tension. Should the track tension become too great, the shear bolt will give (Picture 14/2), releasing all tension on the track. The shear bolt will have to be replaced and the track tensioned before driving on. The "stop" block for the guide wheel swinger has a rubber pad.

The idlers (running wheels) (Picture 12) are suspended on turn-rod springs, positioned between transverse bearers and sprung. They overlap and are alternately arranged (inside and outside). They are exchangeable steel metal wheels with rubber "tyres". Drive wheels, guide wheels and idlers drive the drive teeth of the track chain from the side. The hubs of all idlers and guide wheels run on roller bearings.

7. Shock Absorbers

For the damping of the vehicle movement, the front axle is equipped with two hydraulic dampers of the firm: Boge & Son (Picture 16/11)

8. Track Chains (Picture 17)

Each of the two tracks, type: ZPW.51/240/160 consists of 38 links that are connected by bolts (pins). The bolts are fixed in the outer "eye" of the link and on needle bearings with hardened bushes on the inner "eye".

In front of the needle bearings are sealing rings to avoid entry of dirt etc. The bearings inside bush grips with a "hosing" the security disc which lies between the inner and outer link "eye" to prevent the turning of the bush on the bolt (pin). The drive "teeth" of the links are equipped with grease-chambers and locking screws. Each track link bears fitted rubber pad held with four bolts.

9. Front Axle and Wheels (Pictures 15 & 16)

The front axle is arranged as a swinging axle braced against the lower vehicle hull by leaf spring. The turning extent is determined by the "stop blocks" on the vehicle hull.

The tubular axle is also braced to the hull centre employing a triangular frame, turntable, to accept the thrust force implied. Any axle wobble is prevented by 2 hydraulic dampers.

The front wheels are disc shaped. Arrester straps secure the axle from dropping too low (on rough terrain)

10. Steering (Picture 16)

The steering power from the steering wheel is transferred to the steering column lever and a double cam, via the worm drive. The column lever is connected to the right hand steering lever by a steer rod. From there a spur rod is connected to the left hand steering lever, which interconnects both wheels. Each cam activates an hydraulic brake cylinder to work the brake, gear steering and during excess turning of the front wheels, one of the steering brakes retards the speed of the (inside curve) track, at the same time increasing the speed of the outer one.

11. Lower Vehicle Hull (Sump) (Picture 14)

The hull is of armour plate material with riveted cross-sections. The main transverse member carrying the track propulsion, is used to act as axle and is bolted to the hull base.

12. Braking System

The vehicle has 2 independently acting brakes, i.e.: driving brakes (|drive wheel brakes) and steering brakes. The driving brakes are of the ATE type inside shoes, oil pressure brakes, which act on the drive wheels via foot pedal pressure.

The steering brakes are used singly through the steering wheel. They are also connected to the hand brake lever (via equalizer rod) (Picture 9), and can therefore be applied together, as the brake effect between the 2 drums (left and right) can be different, should the brake not be used as driving brakes but parking brake only.

13. Hand and Foot Lever System (Picture 18)

The position of the different levers is as follows:

to the right of the driver's seat is the parking (hand) brake, behind on the gearbox is the lever for the forward and reverse gears and above those, the pre-select lever for gears. In front of the driver's seat are 3 foot pedals, from left to right: clutch pedal, pedal for driving brake, and accelerator pedal.

14. Fuel System

The chassis (Type D7p) for the Sd Kfz 250, 252 and 253 is equipped with a fuel tank of 140lt capacity. This tank is fitted in the rear of the hull. The fuel is pumped to the carburettor by a pump fitted to the engine. There is a 3-way valve (stopcock) fitted into the fuel line, giving "Main" "Reserve" and "Closed" (off) positions.

15. Instrument / Switchboard

The switchboard bears the instruments and switches and instruction notices for the running and surveillance of the engine. The arrangement is as seen in Picture 18.

16. Electrical System (Picture 21)

The vehicle is equipped with a 12 volt lighting and starting system (see Bosch description for vehicle equipment).

Connected to this system are: starter, headlights, indicators, panel light, horn, stop and rear lights and sockets for hand lamp and trailer.

For ignition "Magneto" is used. The headlights use "Bilux-lamps" with close, far and parking lights. A hand lamp with long cable can be connected to a socket on the dashboard. For the stop and rear light of the trailer, a socket is fitted at the rear of vehicle for a 3-pin plug. Also fitted is a night travel system (see Switch Plan, Picture 21)

17. Trailer Coupling

Fitted to the lower hull is a sprung trailer coupling whose coupling hook is moveable to the side and will turn to 360o

18. Superstructure/Body (Pictures 1, 2 and 3)

The body on the chassis of vehicle type D7p is constructed of armour plate and protect all life-important parts of the body/chassis/loading areas, against heavy MG and canon fire. The superstructure and fittings are described in more detail under: (53-55 "D" Instructions)

19. Stowing (for tools, accessories, luggage)

Fitted on the right hand wing is a toolbox. An index and diagram of the loading order for tools, accessories and equipment is fitted to the inside of the lid. On the inside of the armoured shell (body) a pocket is fitted for the stowage of driver documents and paper works.

Underneath the middle shelf (removable) the anti-skid chains are kept between the transverse bearers. The towrope and "S" hook are attached to the rear wall. In the rear of the vehicle, further accessories are stowed such as 4 reserve track links, rubber track pads, light dipping flaps, vehicle brush etc.

C. Operating Instructions

20. Operation

a) Preparation for driving:

Before starting a journey, the following tasks are to be carried out:
Check fuel levels, check water level in radiator, check engine oil lever with dipstick.
Check track tension – the track is to be tight enough to allow the top of the track to rest on the centre idlers. However, does not touch the first running wheel.

b) Starting Engine

Before starting, the following is to be observed:
Move gear lever into neutral position.
Open fuel valve, switch on ignition
Push starter button
Having pulled out choke lever, without using hand or foot accelerators, push in clutch pedal during starting. If operating starter more than once, only press start button when engine is not turning. When engine starts, release start button at once. Lightly accelerate and return chake lever.

c) Operating instructions before and during driving

Before starting off, let engine idle for a few minutes until cooling water has reached a temperature of 50o. Check cooling water temperature. When engine is hot, open radiator louvers. If cold, close it. The temperature should be between 80o-85oC.

Check oil pressure gauge. The pressure during running should not drop below 1.5 ATU (bar). Should pressure drop below, or be zero, the cause must be found and resolved before driving on.

During daily use, make sure that the filter element is turned in its casing, using special fitted knob. When driving, observe the rev counter. The engine revs should not exceed 2800rpm.

d) Stopping Engine and Vehicle

The engine is stopped by switching off the ignition and closing fuel valve. After every journey, rubber pads, bolts and securing rings of track to be tested for faults and rectified if required,

If no anti-freeze is present in cooling water, drain radiator during frosty conditions.

21. Directions

a) General

Drive downhill in the same gears and at the same speed as you would drive up hill.

Do not change gear on the steep hill (up or downward) but before the steep gradient (up or down), as otherwise, when de-clutching (to change gear), the vehicle will stop (up hill) or speed up (when down hill) so fast that you cannot get into gear again. The vehicle will then depend solely on the brakes. On long descents, it is advisable to use the engine as a brake.

b) Using the clutch

When de-clutching, the clutch pedal must be depressed fully, release the pedal after a short pause and the brake change has taken place. When changing in the lower gears and skipping a gear, use clutch carefully, accelerating as clutch pedal is released to avoid jerky gear change.

c) Gear Change (Picture 10)

To start off, depress clutch pedal fully and choose drive direction with hand lever. Normally 3rd gear is used for starting. Should 3rd gear not engage, start in 1st gear, after which the other gears will engage easily.

To change up, select required gear and use clutch afterwards. Single gears can be skipped by going to a higher gear. The pause between pre-selecting and using clutch to activate can be variable, and a different gear may be chosen in between if required, because of traffic situations or similar. It is wrong to pre-select a new gear while the actual change is in progress. It is also wrong to de-clutch and then use the pre-select lever to choose a gear.

Before changing down, the speed of the vehicle must be reduced to an engine rpm of 1500-2000 rpm maximum. Only then should the change be carried out by pre-selecting a clutch action. Accelerate, when releasing clutch. To reduce the speed, the driving brake can be used simultaneously. Should the rpm drop too much in spite of using full throttle when ascending a steep incline, the next lower gear must be changed into at no less than 2000rpm.

Stopping the vehicle

The vehicle must not be stopped whilst in gears 4 - 7. Before stopping, select 3rd gear and actuate the clutch. Should for any reason starting difficulties be expected, calling for tow-starting, stopping should be carried out in 7th gear and no pre-selection made after. Overall, the position of the pre-select lever has no significance whilst stationary. Should reversing be required, select 1st, 2nd or 3rd gear and place direction lever to "reverse". **The direction lever may only be used whilst stationary and never engage "Neutral" during travel.**

d) Emergency Changes

In order to enable you to start or be towed during changing defect, remove cover lid on left hand side of gearbox, where fork levers can, without down pressure, be used to engage gears 1, 4 or 7. For towing basically use Gear 7.

To enable the vehicle with jammed gears to be towed, move bushes on side shafts by releasing circlips, whereby the track drive is disconnected from the steering gears.

e) Brakes

The handbrake acts on the steering brakes via the brake linkages and rods, and hence via the steering gears onto the tracks of the vehicle. Any abuse of the handbrake during travel can seriously damage the steering gears, quite apart from diverting the vehicle from the chosen course.

The handbrake therefore, is only to be used as a parking brake and applied only after stopping, by pulling on slowly but strongly.

The driver of the vehicle should be fully aware of the method of action of this

brake, to prevent him from applying the brake during sudden unexpected incidents during driving the vehicle.

f) Road Driving

Drive carefully through built up villages, across bridges, slippery roads and bends.

In order to have better control and to avoid sharp braking, reduce acceleration before entering dangerous conditions, also change down. During convoy travel, the distance between vehicles must be in meters as km in speed terms.

g) Off Road Driving

Avoid driving across (laterally) steep slopes, and if possible avoid steering movements.

On the apex of a hill, balance and catch the vehicle, to avoid fierce dropping down (tipping) and possible damage to front axle.

Ditches and trenches are to be crossed at an angle (diagonally). On rough terrain, take special note of the engine rpm in order to spare the engine. When reversing in soft areas, debris and rubbish can build up between track and drive wheel causing the track to ride up on the drive wheel. If this is the case, do not drive on, but move forward until the track re-settles onto the wheel, otherwise excess track tension will cause torn track. It is advisable to have the co-driver watch the track, when reversing.

h) Anti-Skid Protection

On icy or snowed up roads, anti skid chains are to be fitted to every 3rd or 4th track link (Picture 19). The chain has to be fitted in such a way that the chains are crossing over the rubber pads on the top section of chain. The closed section of shoe must point in the direction of travel. The chain shoes are to be secured by split pins.

i) Cooling System

During the cold season, the water temperature whilst travelling must not drop below 70° C. The built in flap (louvres) partition must be closed, according to dropping water temperature.

D. MAINTENANCE / SERVICING

22. General Information

For the overhaul or maintenance of the various build sections, the following qualifications are to be observed:

The required replacement parts are to be ordered according to D/672/6. With every parts order, it is to be stated that it concerns a "Type D7p". The parts lists for the chassis (D672/6) and for the engine are enclosed with every vehicle.

23. Removal of Armoured Superstructure

To remove the complete armoured body or its main sections, follow the outlined rotation of removal of individual sections.

a) Armour Shield of bow section:
Loosen fixing bolts lift off armoured shield.
Time required: 2 men approx 10-15 minutes

b) Bow Section (Armoured)
Remove wings (mudguards) and exhaust pipe with manifold bend. Disconnect headlight cable. Loosen/remove fixing bolts at rear armoured section and frame (chassis) fixings. Lift this armoured section (with 4 men or crane)
Time required: 2 men approx 2 1/2 hours)

c) Rear Armoured Section
Remove trackguards, remove party wall to engine, disconnect all leads etc., to switchboard, indication instruments and cables to rear lights. Remove fixings between bow-armoured section, rear armoured section and armoured body shell. Remove with crane.
Time required: 2 men approx 5 hours

24. Re-fitting Armoured Superstructure

The body is re-fitted in reverse order to removal. Fit strawboard between all joints of main sections of armoured structure, especially joints between box and rear armoured sections and armoured shell

25. Engine

a. Removal of Engine

Before engine removal, bow armour with armoured shield and radiator must be removed.

Disconnect the oil pressure lines to steering, the fuel line, linkages, the Bowden cables and electrical cables.

Remove air filter and the support for and with suppression equipment, the engine fixing bolts and release the bolts to the universal joint shaft.
Lift engine out with crane.

Time required: 2 men – 2 1/2 – 3 hours (including removal of bow armour, armoured shield and radiator): 7 hours.

b) Removal of Cylinder Head

The cylinder head can be removed without the removal of superstructure, through the 2-part hatch cover at the bow section.
The cylinder head must be lifted with a bracket fitted to the valve assembly by cylinder head bolts.

c) Valves

The adjustment of valves can be carried out after removal of the rocker cover.
Turn the engine (crank shaft) with handle, until a valve i.e.: the exhaust valve is at top, the opposite inlet valve of the cylinder is now in closed position, and can be adjusted by the eccentric screw (after releasing same).
The valves are to be set at 0.25mm play. When changing valve springs, position piston of the relevant cylinder to "top dead centre". After compressing valve plate, the collets can be withdrawn with flat-nose pliers.
The circlip safety feature in the valve plate prevents destruction of valve and piston in the event of a broken valve spring.
To grind-in the valves, drain water from engine, remove hoses to radiator, remove plug leads, end flange of manifold from cylinder head, and remove head. Take care not to damage the cylinder head gasket.

d) Cleaning of Pistons

To remove carbon from the piston head, locate piston to "top dead centre". Also scrape off all carbon from valves and cylinder head carefully.

e) Re-fitting cylinder head

Before re-fitting cylinder head, assure that gasket is in first class condition. (Slightest damage calls for renewal). The cylinder head nuts are to be tightened (from centre outwards) repeatedly until tight.

After replacement, re-set valve play to 0.25mm. Allow engine to idle and repeat tightening of head nuts. Before the final tightening, check the "lift" of the first and last inlet valves. The lift gap must be 4.5mm.

f) Carburettor

To clean or exchange jets, remove air supply pipe from air filter and the upper cover by removing 6 square headed screws. The fuel jets are now visible from above. Fit jets according to directions on the jet diagram.
Should new jets be required, the exchange must follow these instructed sizes only.

The jets must never be enlarged, reduced or tampered with in any way.
Less than full closure of the starting system (choke) can result in engine damage.

Carburettor malfunction can happen through:
Blocked jets, blocked filters, leaking float valve and water in the carburettor. Leaking floats must be replaced.

g) Fuel Pump

Insufficient fuel delivery is pointing toward a leakage in the delivery line between pump and tank. Tighten all joints, test seal on glass dome of pump and seal of threeway fuel valve for possible cure.
Apart from that, the following faults can happen:

1. Fuel leaking out of vent hole at rear of diaphragm housing indicates punctured diaphragm (membrane). Renew.
2. If instead of fuel, oil exudes from vent hole, causes are either: lubrication of piston from crank housing is too fierce, or the piston or piston-guide is badly worn (after long use). Renew the parts.
3. Should the delivery of fuel be reduced after prolonged use, worn valve seats can be the cause. In that case, renew valve housing.

h. Removal of Radiator

Before removal of radiator, remove bow section with armoured shield. Remove all radiator fixings and claddings and lift out radiator.

Time required: 2 men 1 1/2 hours (including bow section removal: 4 hours)

26. Running Tolerances

During the warranty time, the prescribed tests are to be carried out by the personnel or the private workshops.

Engines requiring overhaul are to be sent to the "Maybach" Factory for attention.

For lesser work by the troop, the following tolerances are given:

a) The piston play is 6/100th – 7/100th, measured across, opposite the gudgeon pin, with a steel band measure. Pre-requisite for the play is a cylinder liner with no more than 2/100th out of round. For the piston play measure just below ring section.

b) The cylinder liner is to be tested and if required re-bored, before fitting new pistons. If an appropriate workshop is available, otherwise replace with new. In that case, make sure that the 2 rubber rings are also replaced.

c) The piston rings should have a gap of 0.3mm and groove play of 2/100-3/100th mm and be generously oiled before fitting into grooves.
The passing over the piston is carried out, using the special tool provided.

d) The seating of the gudgeon pin in the bore must allow the pin to be pushed into the bore by hand (at 20° C)

e) e. The play of the gudgeon pin in the bore should be such that when heating up the con rod with gudgeon pin fitted to 190° C (with hot steam cylinder oil) for 20 - 30 minutes, no tightening of the gudgeon pin in the connecting rod eye should occur.

f) When fitting new pistons line up with con rod by using a square at the same time making sure that piston tapers are slightly toward top. To adjust con rod, only use special tool to avoid marking con rod shaft.

g) The play or the con rod bearing should, in its tightening condition on the gudgeon pin, be 6/100th – 7/100th. This bearing shell should be turned to this play specification (by diamond) in its tightened position

Try to avoid scraping. Check play by measuring pin and shell with micrometer. The housing bearings should be finished off with a special rubbing tool to a play of 7/100th mm.

h) After fitting new pistons run engine slowly for 5 - hours, gradually rising to 1800rpm (preferably on stationary vehicle).
When driving, take care to run newly overhauled vehicles sparingly. Stress may only be applied with a warm engine. Using the upper cylinder lubricant assists the running in of new pistons.

27. Clutch (Picture 20)

Removal of the clutch is only possible after removal of engine or gearbox. The clutch is adjusted to make measurement "A" (picture 20) approx 41mm. The dead travel of foot pedal must not be less than 2cm. Make sure that foot pedal is adjusted in good time. The clutch itself is not adjustable. The linings can be used until "A" amounts to approx 53cm.

When fitting the clutch, make sure that the clutch-hub slides easily on the splined shaft. To ease fitting, use a splined mandril (shaft) which; fits the spine of the hub. The shaft must be machined to allow the follower discs to be slid backwards onto the shaft. Fit flywheel, then 1st follower disc, intermediate ring, and 2nd follower disc.

28. Gearbox

Defects in change or steering gearboxes are only to be attended to by skilled technicians. Especially the steering gears are not to be dismantled or re-assembled by unskilled personnel.

a. Removal of switch and steering gearboxes:

Remove battery, claddings, (intermediate shaft, side drive shafts, floor cladding and seating). Detach control (Bowden) cables to steering brakes. Remove gearbox fixings, fixings for side drive shafts and universal joint shaft. Lift out gearbox by crane. (The work requires 5 - hours).

b) Dismantling (Change) Gearbox:

Drain oil.
Unscrew change box and change cylinder cover.

Remove change cylinder, remove pins from change levers, unscrew steering gearbox, and remove front and rear cover/lids.
Dismantle housing, lift cogs and lift out whole.
Remove fork lever and reverse wheel.
Clean and examine all parts.

When taking apart, take care not to allow dust etc., to contaminate pressure relief channels and change gears. Do not, leave uncovered.

c) Re-Assembly:

Check oil ducts for continuity and oil pump.
Fit fork lever with glide segments and sealing rings.

Re-insert full wheel assembly (cogs) with clutch rings into the glide segments of the fork lever and swing into the bearing points.

Check ball and roller bearings for perfect seating and check clutch ways. Axial play of cogs on each shaft should not exceed 0.3-0.4mm.

Coat all butting joint surfaces of housing with jointing paste.
Bolt together housing and fit and secure rocker arm springs.
Connect front cover/lid with hand change lever and check changing gate.
Apply sealing paste to flange side of rear cover/lid, bit bolts and secure.
Fit levers I and III, change cylinder and gate section, fix lever II.
Fit diaphragm for gear brake and check for ease of use.
Screw on change cylinder cover with cork gasket and fit changing box.

29. Drive Mechanism

Guide and running wheels with damaged rubber bands are to be exchanged for new ones.

a) Removal of running and guide wheels:

After removal of the hub cover, remove the hexagon nut. The wheel can now be withdrawn, using a withdrawal tool. To remove the inner running and guide wheels, it is necessary to unscrew the outer running wheel discs from the hubs and turn the hubs to correspond.

When removing the running wheels, avoid mixing up the distance discs behind the ball bearing with other wheels and re-fit as positioned before. Any change will affect the line up of wheels.

b) Removal and Re-fitting of drive wheels:

After removal of cap and bolts, the drive wheel can easily be withdrawn from the splined-shaft. When re-fitting wheel, avoid knocking the wheel against the drive axle, proceed with utmost care. Before re-fitting wheel, check brake linings for oil contamination.

c) Lining up drive mechanism:

The lining up can be carried out with certain aids as follows:
The drive, running and guide wheels are to be tested for side deviations. This is to be carried out at ground level with removed track and loaded vehicle. The drive and guide wheels are to be checked with a "straight edge" or similar. Pinch a metal block into the gap of the drive and guide wheels. Mark the centre line and make a slot into the outer edges of both wheels, to take a thin wire, which is to be tightened by turning both wheels slightly, until wire is taught, after which the inner and outer running wheels can be lined up. Any deviation must be corrected with shims (washers) on the swing arms.

30. Shock Absorbers

Should a shock absorber have to be removed from the notched axle, it has to be noted that the notch in the top of the damper axle lines up with the lever centre line. Any other position will destroy the shock absorber (damper).

a) Track Tension:

Excessive track tension, through over-riding or collecting debris, results in the fracture of the safety shear bolt on the guide wheel-tensioning device. To insert a new shear bolt, tension bolt nut and back nuts must be released. After replacing shear bolt, re-tension track. The track must be tensioned enough to have the top track section resting on the centre running wheels (idlers), but does not touch the first one.

b) Fitting Track:

Lay out tracks on ground, with the "drive tooth" in direction of drive seated at front of track links. The last but one track link is to be blocked up. Push the vehicle backward onto one track. Place the track end over the drive wheel and continue reversing as far as the guide wheel. The two track ends can then be joined on the guide wheel, (which must be fully slackened off), tighten track by turning drive wheel. The vehicle can be driven slowly on one track to lie on the second track.

31. Track Links (Picture 17)

a) Exchange of a track link:

The exchange of a damaged link is to be carried out in the following rotation:

1 Slacken off track
2 Remove split pins on both link bolts
3 Knock out both track pins with punch bolt
4 Pull apart, track links in direction of safety pins and discs
5 Fit the new link with both pegs of the safety discs fitted into the determined openings. If required, turn discs to fit.
6 Drive in track pins with drift. If necessary, insert another pin to line up the eyes. Pull out pins and replace with track pins. The nosing on the track pin must engage in the groove of the link.
7 Block up link before last and pull track together. If required, reverse vehicle slightly.
8 Join track ends, inserting pegs of safety discs into the opening to opposing link. Turn disc if required.
9 Insert track pins with drift as in 6.
10 Insert split pins, and open and bend ends of pins
11 Tension track

b) Removal of track link inner sections:

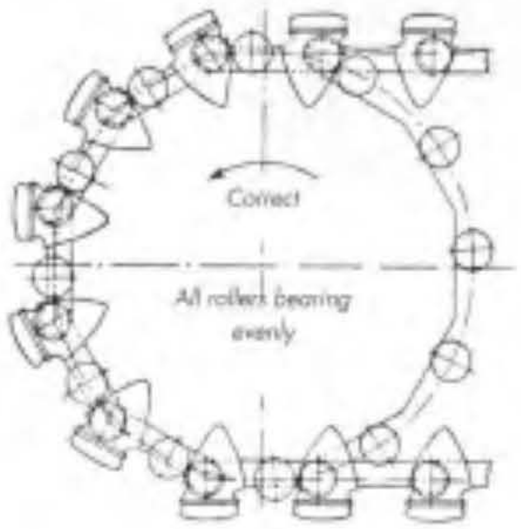
1 Remove safety disc
2 Withdraw needle bearing bushes and seals with drawing tool, (thereby inserting tool to rear of bush)
3 Remove damaged seals from bearing inner bushes
4 Remove needles from bearing outer rings
5 Remove bearing outer rings and inner bush only if damaged
6 Clean all useable parts.

c) Fitting track link inner sections:

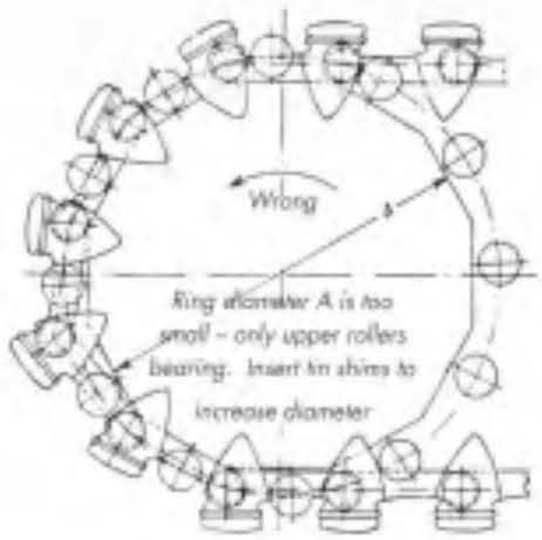
1 Clean track link
2 Replace needles bedded in grease into bearing outer ring
3 Knock in bearing outer ring with needles using drift
4 Insert inner bush
5 Insert other bearing outer ring with drift
6 Position track link with one bearing inner bush onto drift for bearing outer ring to hold against, tap together with light hammer blows
7 Position cone, inner bush and guide ring on large link-eye grease glide seals, and with hollow tool knock into opening on both sides
8 Knock in sealing discs with special tool.

32. Fitting the track chain onto drive wheel

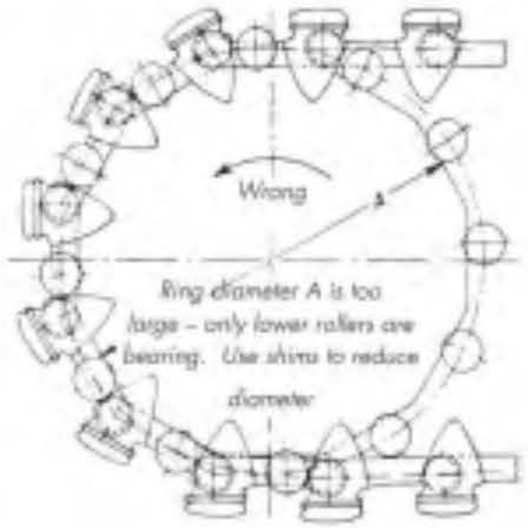
A quiet run of the track chain, between chain and drive wheel can only be achieved by synchronising the segments between the chains and drive wheel. This will be achieved when all "drive rollers" are bearing evenly (see Sketch 1). Wear in the inner ring of drive wheel will result in only the upper rollers bearing the track (Sketch 2). By fitting the supplied shims under the drive wheel blocks, the required result can be made. Should the shims be too thick, the lower rollers will be bearing only (Sketch 3).



1



2



3

33. Rubber Pads (Pictures 17/8)

Damaged or lost rubber pads must be replaced by new ones. The fitting of new pads is very simple. After positioning the pads, screw in bolts with spring washers to fix the pads. Only the proper bolts are to be used. After every stoop, the pads are to be checked for solid seating.

Adjust new pads in height (next to used ones) by trimming to right level.

34. Steering

When exchanging steering, take care not to use force. On fitting of steering, the fixings fir the steering column must be free from tightness on the column. After fitting, test free travel by turning wheel in both directions.

35. Braking System, including steering brakes

The steering brakes are to be set to begin to act after approximately 3/4 turn of the wheel in either direction.

The adjustment of the steering brakes follows the tightening of the "brake pulls", ie: tightening the nuts, which are accessible from the driver's seat. The wear on the steering brakes is minimal and a renewal of linings is rarely necessary.
New linings are to be adjusted and run in during driving.
After completely cooling off, repeat brake and steering operations.

36. Electrical Equipment

Battery, Magneto ignition, light and signalling equipment are to be cared for as described in special service descriptions. Before starting work on starter system, dynamo, Magneto etc., disconnect the earth cable from the battery. Because of short circuit danger, no tools must be laid on the battery.

Blown fuses must be replaced with new ones, after having repaired the fault that caused the failure.

E. DIRECTIONS FOR MAINTENANCE

37. General Information

A careful care and constant tests for service-suitability and running safety will ensure instant readiness for use of the vehicle.

For lubrication, only lubricants approved by the OKH (High Command of the Army) must be used. The lubrication plan for each vehicle must be followed exactly. As an appendix to the Driver's Handbook (HDV 471) follows a short lube and service instruction.

38. Engine

When checking engine oil levels, the vehicle must stand level. The minimum and maximum levels allowed are indicated by an upper and lower mark on the dipstick. The usable amount of oil between the 2 marks is approximately 4 litres. Oil changes are only carried out with warm engine and the following KM readings:

Km reading: 500
1200
2500
and 2500 afterwards.

Grease the water pump filler pot and the throttle-linkages every 1000Km.
Fill the grease nipple of the starter motor every 2500Km.

39. Gearbox and Clutch

Check oil level in change and steering gearboxes every 1000Km and replenish if required. The gear oil is to be changed at the same intervals as the engine oil. The oil is drained separately from change and steering gearboxes.
After tightening of the 2 drain plugs, refill with gear oil, but only into the change gearbox filler (Picture 6/7). The change and steering gears are connected by internal ducts. Fill with oil, until the oil level reaches the edge of the filler hole (in change gear box).

The membrane of the clutch broke is to be renewed after at least 10,000Km. Check ventilation filter, fitted to the change box, fit new felt disc after 10 – 20,000Km, depending on dust content in the air.

Keep clutch pressure bearing and the bearing of the clutch lever well greased.

To lubricate the track-side drive, find filler spigot (at upper edge A) check screw in centre and at the base of housing the drain plug.

40. Carburettor

To clean, or exchange jets, remove suction spigot and upper cover. The fuel jet is then accessible from above. The starting device (choke) is to be tested occasionally, for complete closure of flap, by releasing choke pull. If starter device does not close completely, fuel consumption will increase and engine damage can occur.

41. Fuel Filter

The fuel pump filter and the fine mesh strainer have to be cleaned at regular intervals. The fuel pump is accessible after removal of the right hand foot box. Tighten knurled nut tightly under glass bowl.

42. Air Filter

Clean air filter every time fuel is taken on. Remove filter element and filter insert, wash with petrol or paraffin and re-fill with engine oil to marked level. A badly cleaned filter reduces engine performance, increases fuel consumption and damages the engine.

43. Oil Filter

The sludge bowl of the oil filter is to be removed and cleaned once every week. The filter segments should only be cleaned with compressed air. Re-tighten seal with nut. Check that spindle is still turnable by hand. Damaged seals are to be replaced. The oil filter is accessible after removal of left hand foot box (driver's seat).

44. Cooling System

Fill radiator with clean water. Do not remove sieve from filler spigot, when filling. If anti-freeze is used in radiator, drain this when frost danger is over. Flush radiator thoroughly with water and re-fill with clean water. When losing water, check all hose connections as well as the grease cap on the pump. Replace or tighten.

The radiator has to be cleaned outside and inside under certain circumstances. Should the radiator boil easily, add 1/4kg of "P3" to the cooling water (after dissolving). After completed journey, drain the hot water and re-fill with water after cooling radiator. In Spring and Autumn flush out radiator with a solution of "P3" ie: dissolve 2-3 spoons of "P3" in a bucket of water, empty into radiator and top up with fresh water. Drain all after a few days and re-fill radiator with clean water. In dusty conditions, blow through radiator with compressed air from both sides. Check fan belt for correct tension. The tension bands of the generator must be tensioned tightly to obtain a secure bearing of the water pump spindle.

45. Steering

Check the oil level of the steering after every 5000Km and if required, top up with gear oil, Check steering regularly for ease of turning. Lubricate linkages frequently.

46. Shock Absorbers (Dampers)

Check oil levels of dampers on front axle every 2000Km. To re-fill, use only special oil as specified.

47. Track Chains

After every trip (lengthy) check to make sure that all safety clips on the track pins are still in place and the rubber pads are in perfect condition. The grease chambers of the track must be checked and filled where necessary.

48. Braking System

The hydraulic ATE brake has to be serviced as specified in the special instruction sheet included in every vehicle.

49. Electrical System

Check sparking plug gap every 2000Km. The gap must be 0.4mm.

Plugs are to renewed or insulated if required. Check cable connections and joints for tight fit. Keep battery terminals clean and lightly greased. The water level in the battery cells is to be tested and replenished with distilled water if low. Fuses and bulbs in the spares locker to be checked and replenished as required. The teeth of the starter Bendix (cog) and the flywheel are to be kept clean and greased.

50. Duties on Stood-Down Vehicles

By rectifying small defects, serious damage can be avoided, therefore, test all nuts, safety devices etc., on the chassis and body for firm seating. Changes in the valve system and electrical faults are to be rectified at once. Check clutch frequently.

The clutch pedal must have its prescribed free travel. After thorough cleaning of the vehicle, all "bright" metal parts, hinges and joints etc., are to be greased. Areas that are painted must only be treated with oil or grease soaked rags (cloths). The red painted parts (to be greased by hand), must be renewed if required.

All linkages and rods are to be checked for free movement and lightly oiled with a few drops. On low pressure tyre systems, remove tyres and inner tube protector at least once a year, de-rust rims and paint with anti-rust paint. On vehicles with "Luka" tyre systems, the above works are to be omitted. Change faulty tyres. Uneven wear to tyres indicates faulty track adjustment (front tyres).

The hood (canopy) on stored vehicles is to be tilted upwards. All leather straps are to be greased with leather oil or grease. Equipment and supply items should be checked and serviced regularly.
Replace or replenish damaged items.

Berlin, on the 8.8.1940

High Command of the Army
Army Ordnance Dept
Army Group for Development and Testing

By Order of
John

F. SPECIFICATIONS

52. For chassis of Sd Kfz 250, 252 and 253 the following specifications apply:

a. D = Specifications:

D 672/5 equipment description and service instructions for chassis
D 672/6 spares for chassis

b. Manufacturer's Descriptions (Guidelines)

Description and Treatment Specification for engine
Spares list for Maybach engine
Jets list 6VF 2164
Treatment specification for ATE brake
Treatment specification for Perrot Brake
Treatment and service specification for Kardan prop shaft
Treatment and service specification for Vogel-Central Pressure lubrication

53. For superstructure (body) of Sd Kfz 250

D672/7 Equipment description and service instructions to body with base vehicle
D672/8 Spares list for body with basic and additional items
D672/9 Loading Plan

54. For superstructure (body) of Sd Kfz 252

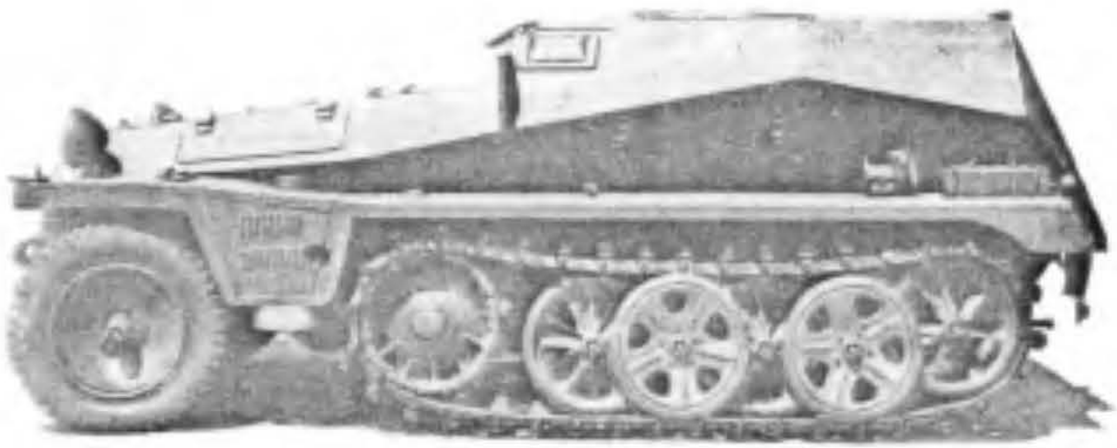
D672/14 Equipment description and service instructions (for body)
D672/15 Spares List for body
D672/16 Loading Plan

55. For superstructure (body) of Sd Kfz 253

D672/17 Equipment description and service instructions
D672/18 Spares List for body
D672/19 Loading Plan

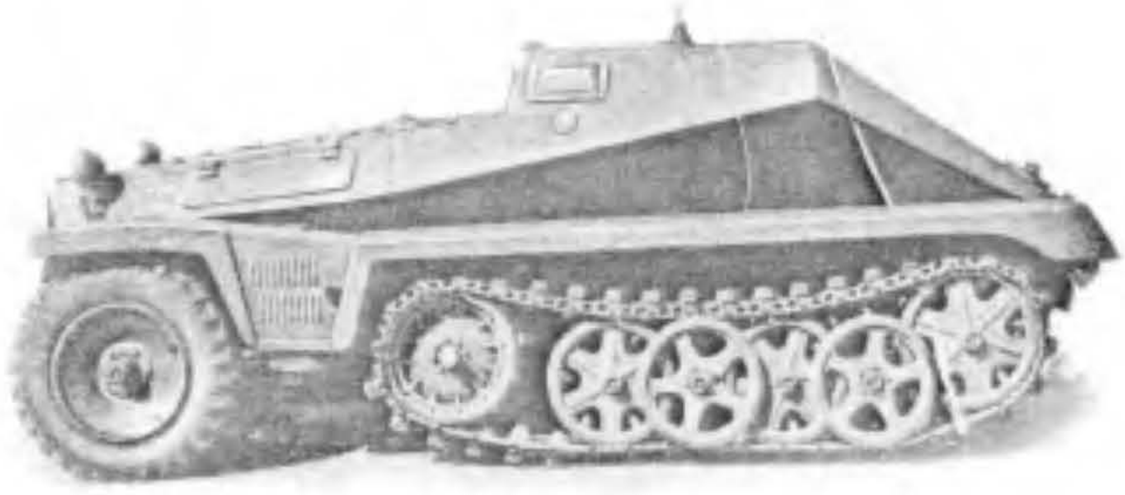
G. PICTURES

Bild 1



Light armoured troop carrier vehicle (Sd Kfz 250)

Bild 2

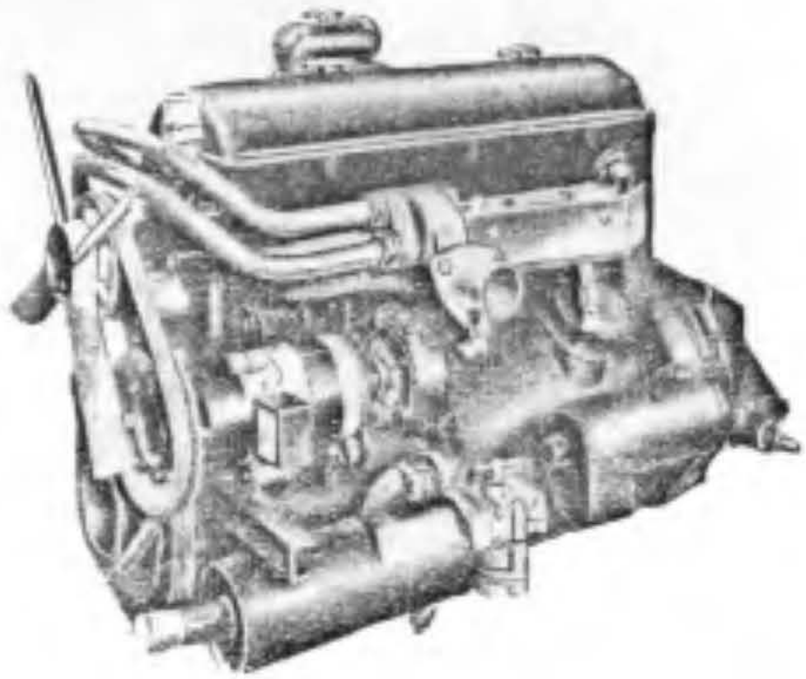


Light armoured Observation vehicle (Sd Kfz 253)

Bild 3

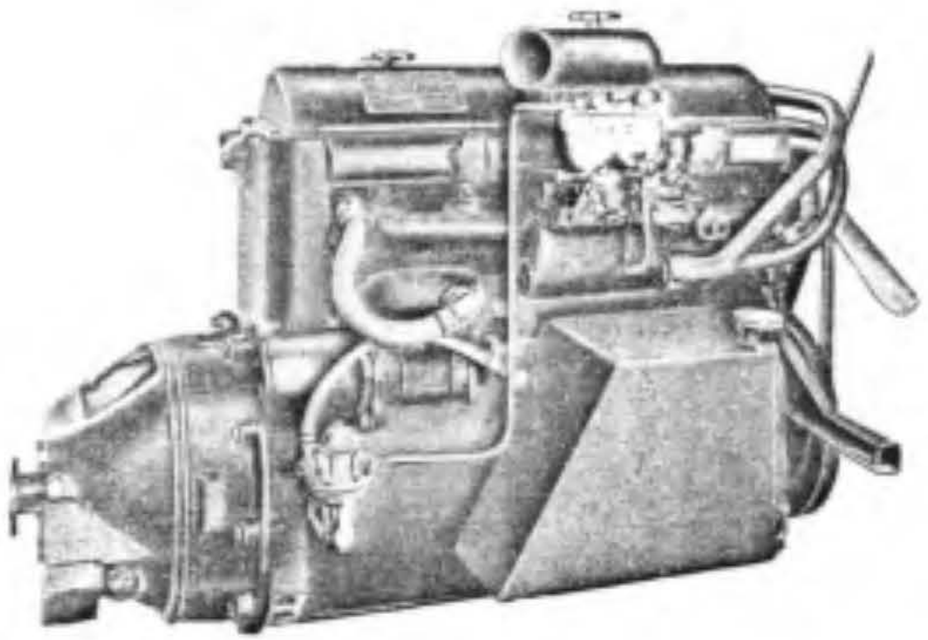
Light armoured Ammunition Transport vehicle (Sd Kfz 252)

Bild 4



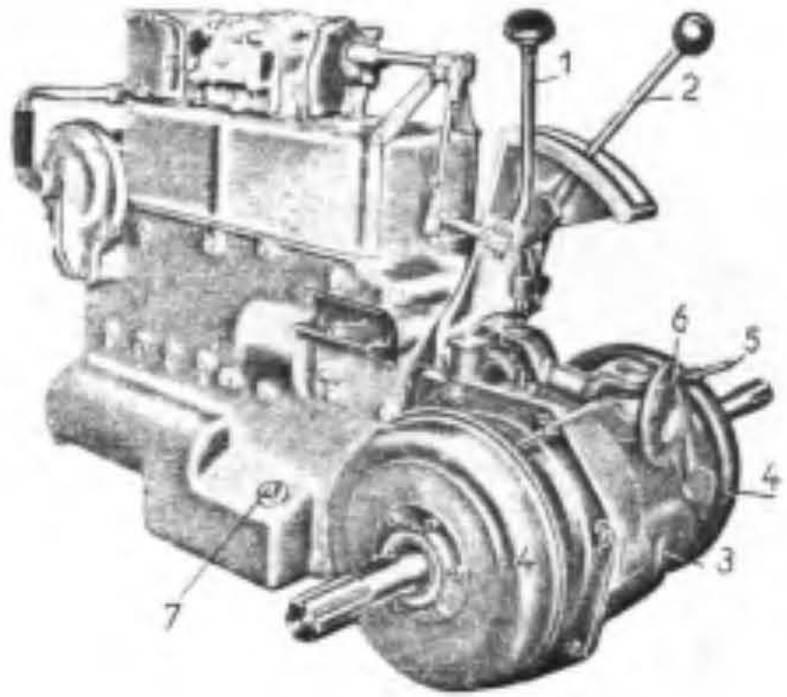
Engine (exhaust side)

Bild 5



Engine (carburettor side)

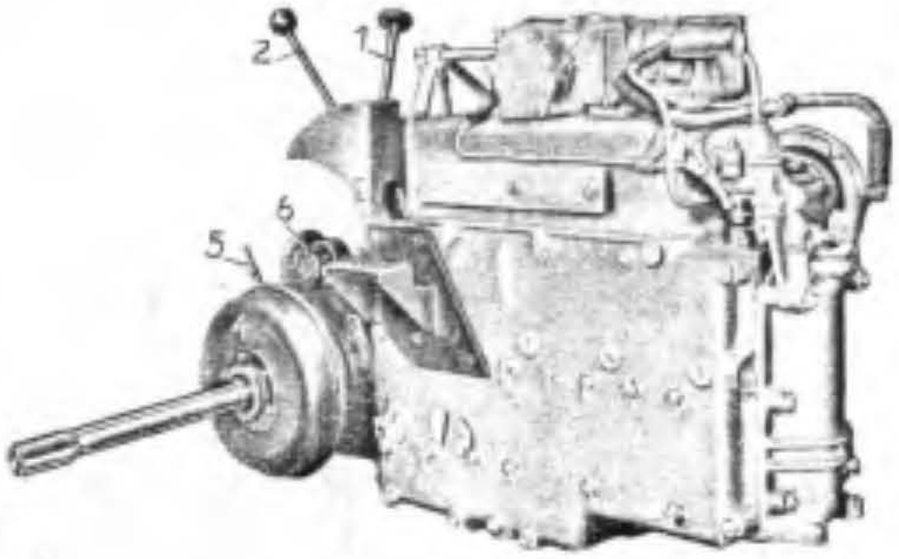
Bild 6



Switch (change) regulator and steering gear box from rear:

1 Direction Lever (Forward & Reverse)
2 Pre-select Lever
3 Steering Gearbox
4 Brake Drum
5 Bowden Cable (Pull)
6 Kardan Joint Shaft
7 Oil Filler Plug for switch and steering gearbox

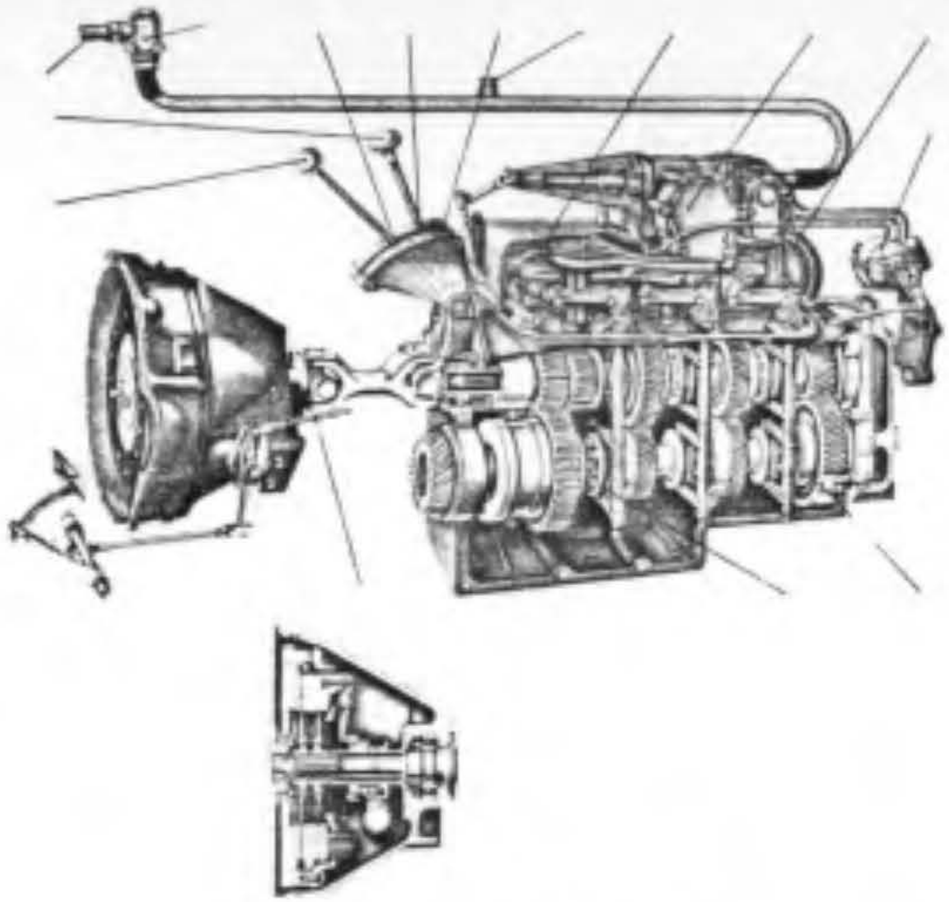
Bild 7



Switch (Change) Regulator and steering Gearbox (from front)

1 Direction lever for forward and reverse gears
2 Pre-select lever
3 Steering gearbox
4 Brake drum
5 Bowden Cable
6 Kardan joint shaft connection

Bild 8

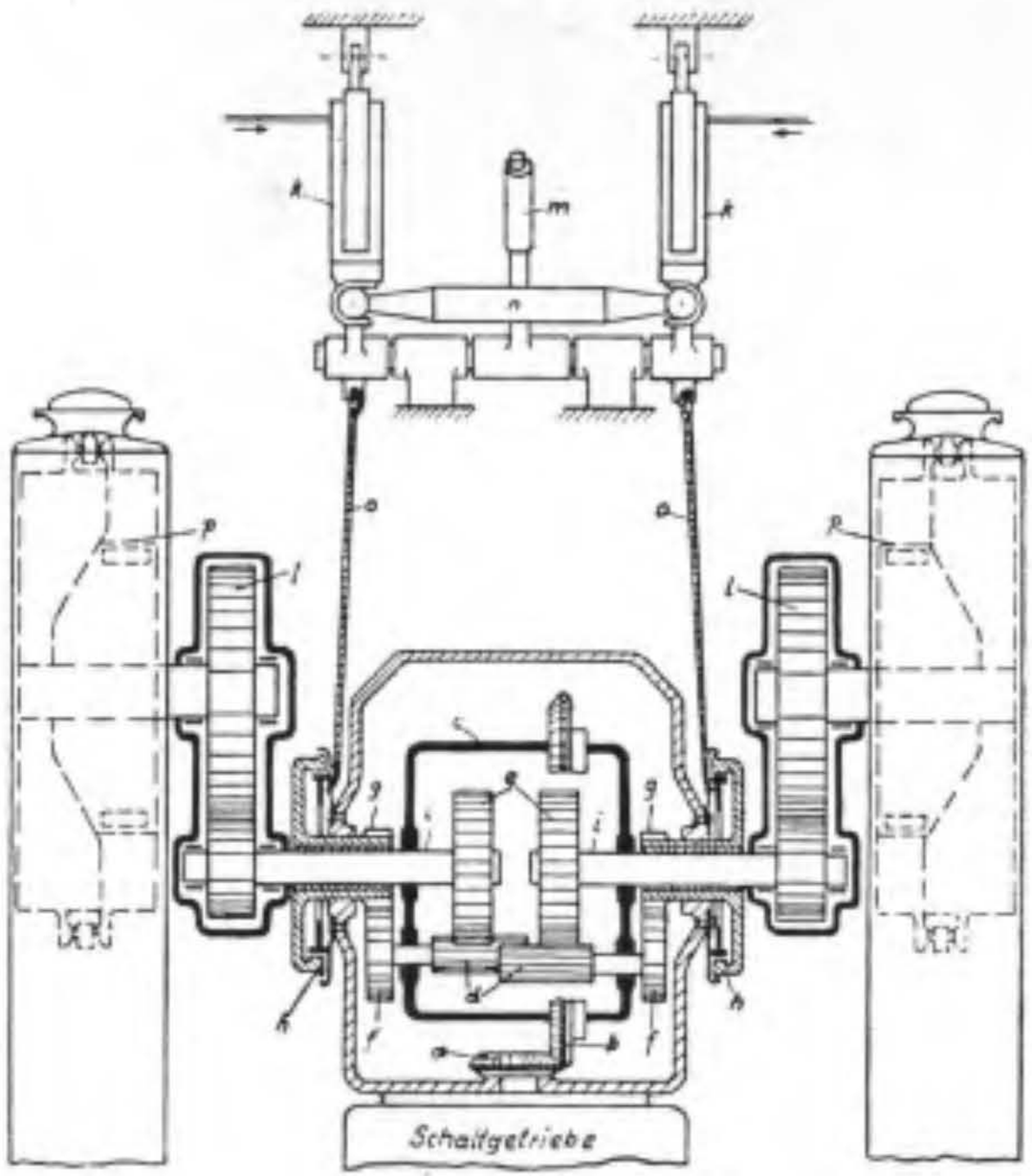


Switch (Change) Regulator Gears

(cross-section Variorex Gearbox 102128H)

1 Position for 3rtd gear
2 Position for 7th gear
3 Direction lever
4 Centre position for direction lever
5 Clutch brake
6 One of the 3 change cylinders
7 Switch (change) box
8 Change lever
9 Relief valve
10 Non-return valve
11 One of the different switch - bushes
12 Rubber membrane to activate clutch brake
13 Linkage for release valve
14 Pipeline to vacuum tank in transverse chassis member
15 Suction pipe to engine

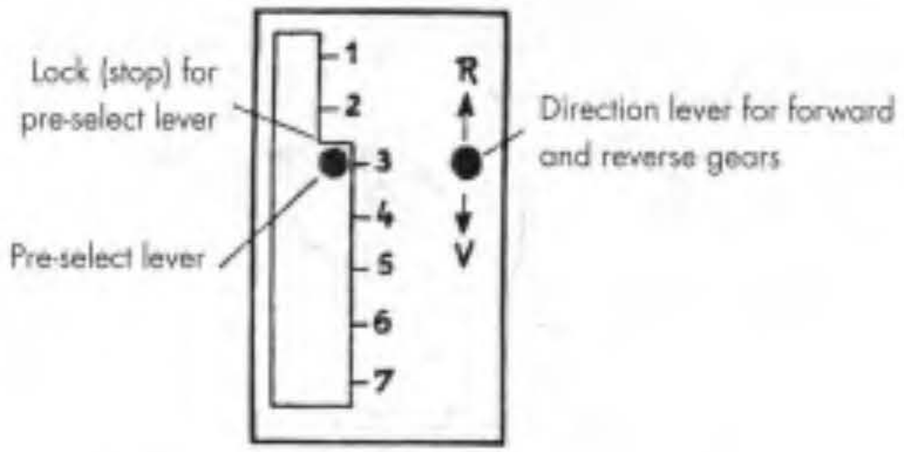
Bild 9



Steering Gearbox

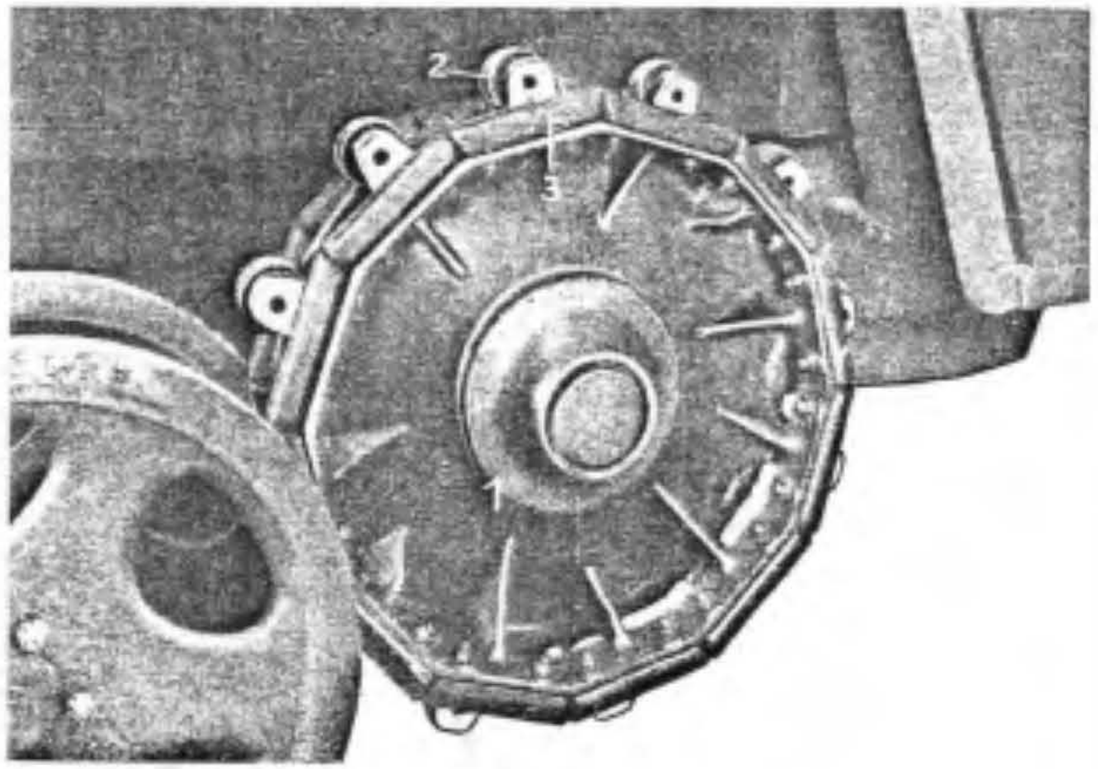
a
b Bevel Drive (pair)
c Differential gear housing
d Differential wheels (cogs)
e
f Spur gears
g Tooth wheels and spur gears (outside diff gear housing)
h Brake drums
i Drive Wheels
k Brake cylinders
l Reduction gears for track drive
m Hand lever
n Compensator rod
o Brake line
p Drive wheel brake

Bild 10



Switch (change) Diagram

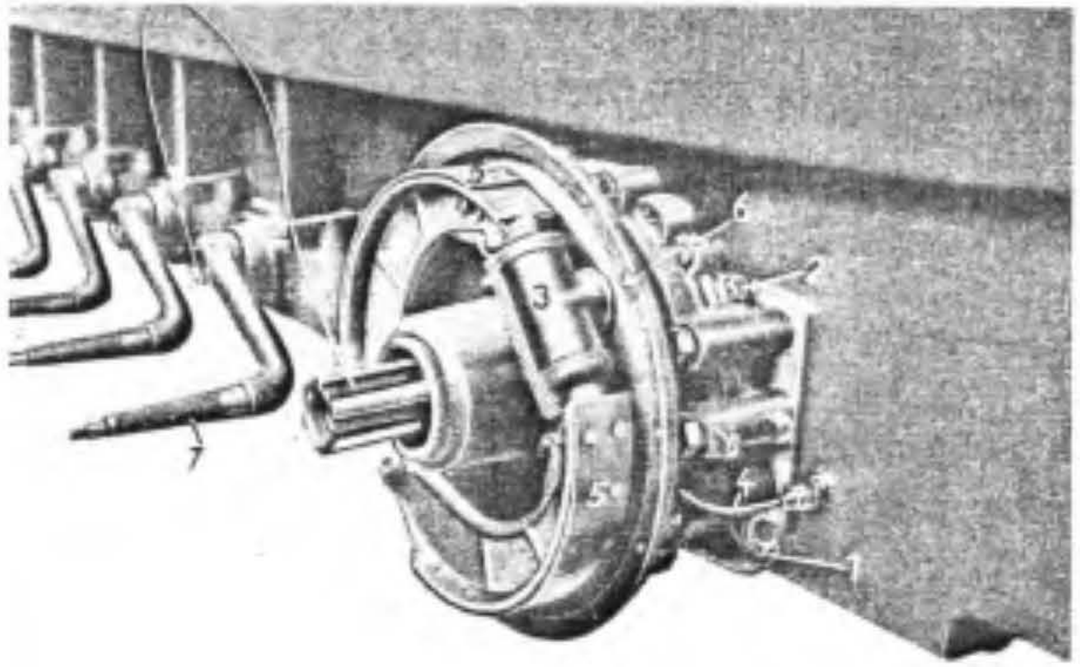
Bild 11



Drive Wheel

1 Drive Wheel
2 Drive Wheel Rollers
3 Rubber segments

Bild 12



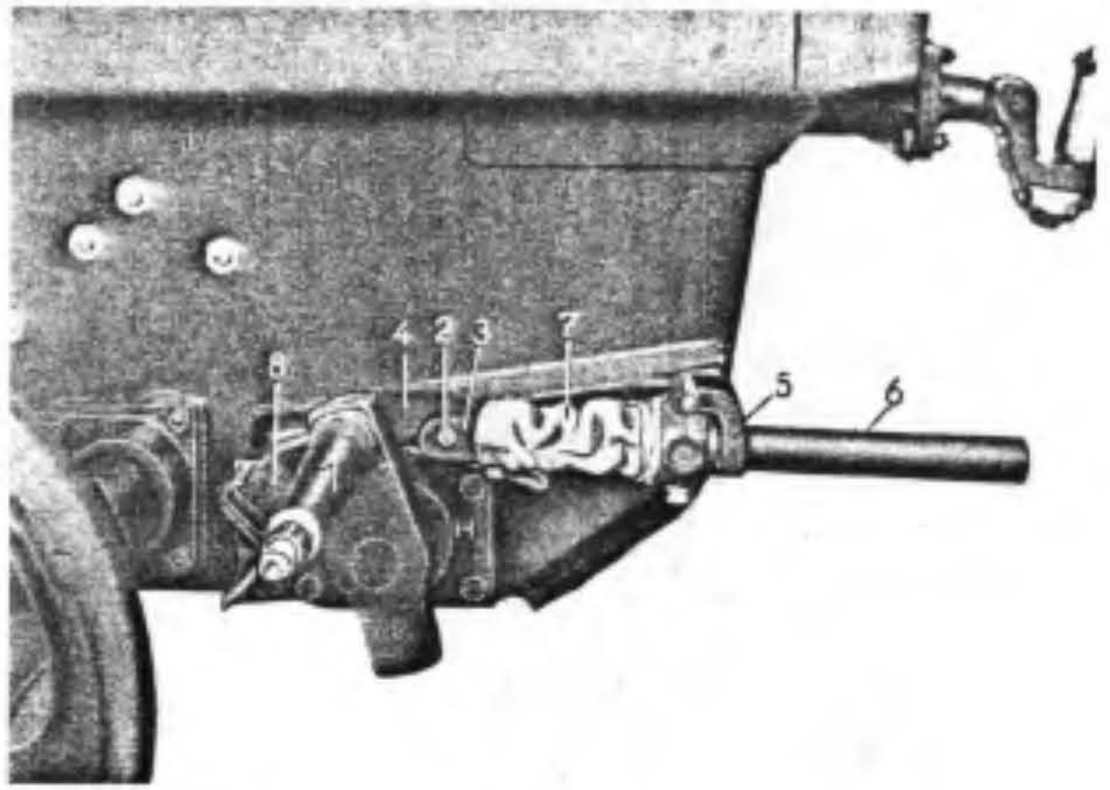
Drive Wheel with brake

1 Oil Lever plug
2 Oil Filter spigot
3 Brake cylinders
4 Brake fluid line to cylinder
5 Brake shoes
6 Vent for brake fluid line
7 Running wheel cranks

Bild 13

Unfortunately picture 13 is missing from the original manual and at the time of going to print a second manual had not been found to obtain this image.

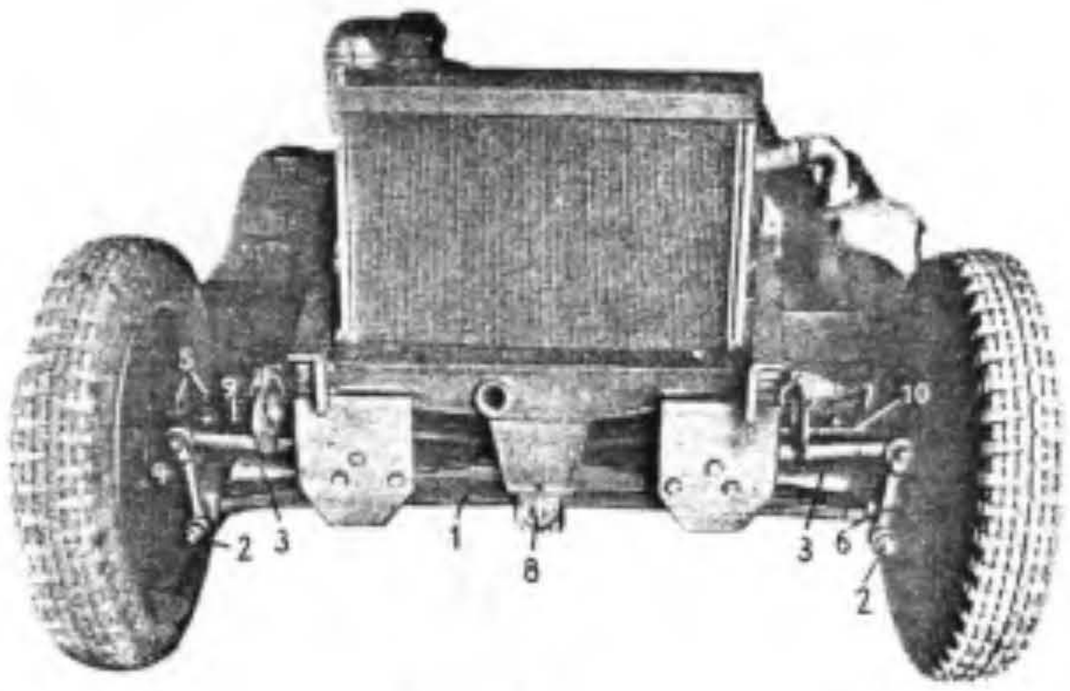
Bild 14



Guide Wheel Mounting

1 Guide Wheel cranked stub axle
2 Shear bolt
3 Track-tensioner
4 Connecting hook
5 Drop guide
6 Protection Cap
7 Leather Gaiter
8 Crank Stop (axle)

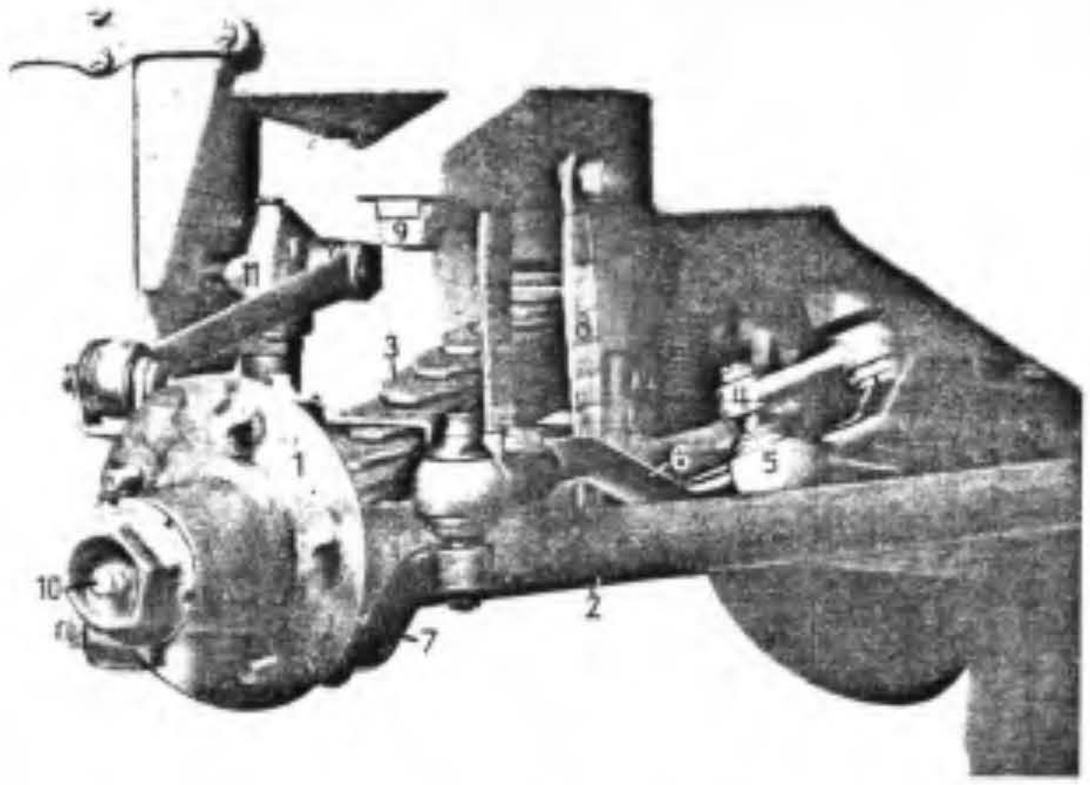
Bild 15



Front Axle with Wheels:

1 Leaf-springs
2 Spring bolts
3 Tube Axle
4 Axle Cheek
5 Grease Nipple
6 Lever to damper
7 Stop (Restrictor) for front axle
8 Grease nipple for spring band bearing
9 Steering column
10 Track Rod

Bild 16



Front-axle with Steering:

1 Front Wheel Hub
2 Axle and bracing frame
3 Leaf Spring
4 Steering Linkage
5 Steering Link Bar
6 Track Rod
7 Steering Lever
8 Arrestor Strap
9 Axle Stop
10 Pressure Grease Pot
11 Shock Absorber

Bild 17

Track Link

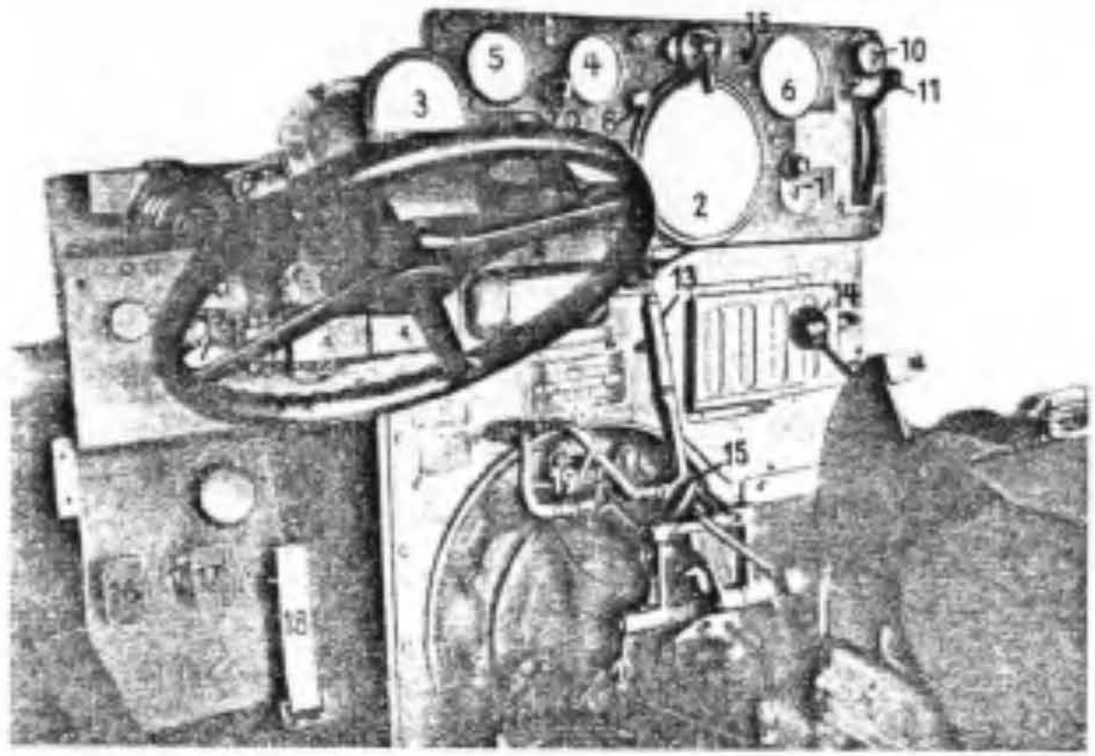
1 Complete Track Link
2 Link without inner sections
3 Safety Clip
4 Rubber Seal
5 Needle Bearing
6 Intermediate Bush
7 Rings
8 Rubber Pad
9 Tab Washers for fixing screws
10 Fixing bolts for rubber pads
11 Track Pins
12 Grease pot closing screw
13 Snow chain

Tools

a Drift
b Puller device [1]
c Drift for outer bearing ring [1]
d Cone for bearing outer ring [1]
e Guide ring [1]
f Bell [1]
g Box spanner
h Grease adaptor

[1] Omitted with later models

Bild 18



Switchboard with operating lever:

1 Ignition switch with starter button
2 RPM counter
3 Steering Wheel indicator
4 Cooling water thermometer
5 Oil pressure gauge
6 Kilometre gauge
7 Red control lamp
8 Blue Control lamp
9 Indicator switch
10 Socket for hand lamp (extension [1])
11 Lever for hand gas (throttle)
12 Plunger for central greasing
13 Hand brake lever
14 Pre-select lever
15 Direction lever for forward and reverse gears
16 Clutch Pedal
17 Brake Pedal
18 Accelerator
19 Oil Pressure line to steering brake
20 Signal button

Bild 19

Fitting Anti-Skid Chains

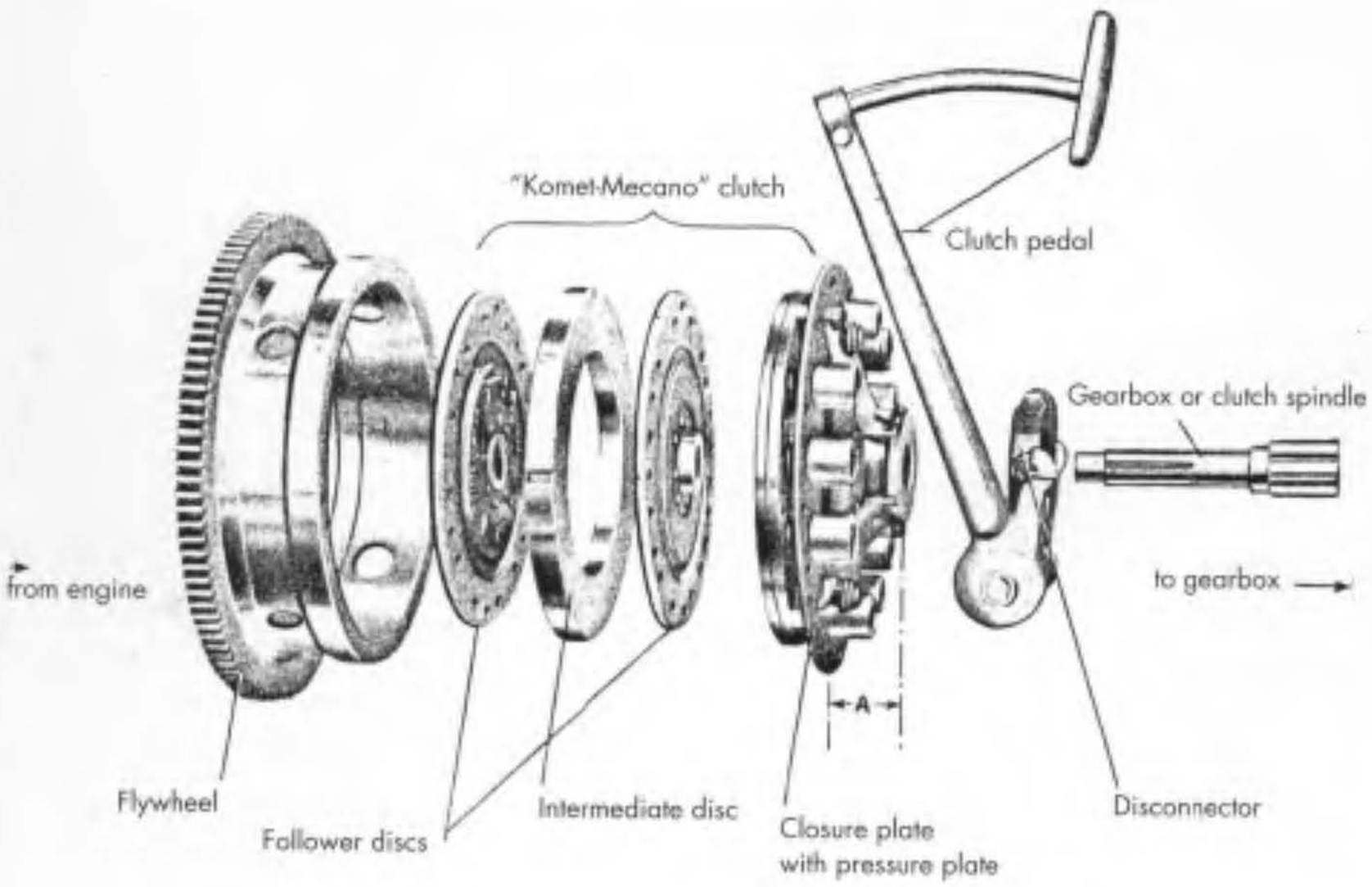


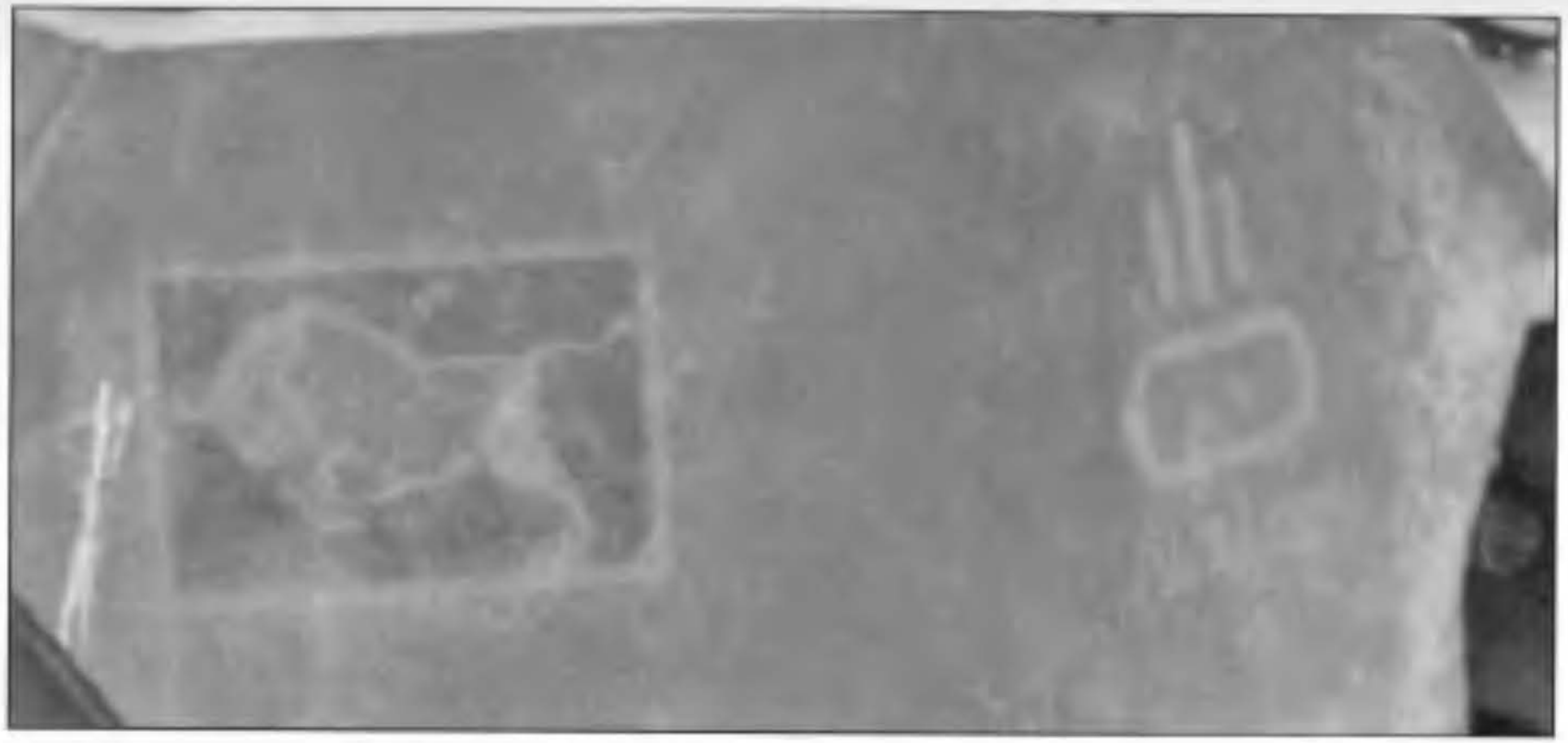
Bild 20

Three

BALKANS
1941

Out of sight of the photgrapher in front of, and under the StuG III Ausf B, troops have dug a shallow trench to show how best to sleep outside of the StuG. Quite what a pair of Italian Officers have to say to the German troops in attendance is anybody's guess, but I would think that the German units had enough collective experience to know how to provide sleeping arrangements at night for tank crews. Note in the distance the pair of Sd Kfz 252s and trailers. Although there are no definitive shots of insignia on the vehicles of uniforms, these are probably troops of SturmAbteilung 191.


232



Units of the 191st Sturmabteilung (the 'Buffalo battalion') in a Bulgarian town en-route to the Greek border at the end of March 1941. This is an early 253 with the very square edged mud guards and low height width indicators; note the difference between the bump stop of this example compared to the 253 on page 81. The starter crank cap on the nose plate is also of a different design from both the prototypes and the later production models. For some reason the two hooks on the front have both been removed along with the front number plate. This is one of only a few 253s to be seen with an MG shield. The shield itself is fairly impressive, being curved in profile which certainly suits the vehicle, but quite how the MG is mounted is impossible to say. Even though this pre-dates the start of the 250 series production, the first batch of 250s were not equipped with a shield, yet here the crew or workshop company have come up with the obvious and practical solution.

The 'II' between the front visors probably denotes the Commander of the second battery of 6 guns. Because of the nature and terrain of the attack on the Metaxa's Line the vulnerability of any commander, be it of the battery or a platoon led the Army planners to re-appraise the use of such poorly protected vehicles. Is it a simple coincidence that the Balkan Campaign started on the 6th April using the K. St. N 445 configuration, dated 1st February 1941 and within 11 weeks it was amended to include an extra StuG for the battery commander and delete all four Sd Kfz 253s. It looks like a knee-jerk reaction to an unforseen problem, leaving only one command vehicle instead of four to control and direct the battery of six StuGs. It is probably the lack of command support in the amended plan that led to many units retaining their 253s even after extra StuGs became available.

Note how well turned out the German officers are in comparison to the locals. It is no wonder that for the most part during the early stages of the war they gave an air of invincibility wherever they went. The officer on the left wears a standard 1938 tunic (note the depth of the scalloped pocket flaps) and trousers with an officer grade *Feldmuetze*. Compare the quality of this unit emblem with that of the photograph on page 53.

An almost perfect example of a fully stowed 253, missing only the medical box (Verbandkasten) on the rear door. These were often removed because it was all too easy to catch a leg or hip on the box edge on the way in or out. The box itself was held in place with a buckled canvas strap. On the later 250, the Verbandkasten was contained in a full cage that impeded ingress even further!

The uniforms exhibit some unusual details. The familiar 'death's head' lapel insignia has been replaced with what appears to be a 'rampant lion'. This can also been seen on some of the field caps. These are unique amongst known photographs of German troops, and quite what they denote is unclear. They could be partially explained if these men were part of StuG. Abt. 190, a unit that used a Lion as its emblem, but this photograph is one of a set taken around a 253 bearing the 'Buffalo' of the 191st (look carefully to the left of the tow rope). One possibility is that these men are foreign (Dutch/Flemish?) volunteers on attachment or that the troops were drawn from a particular region and have adopted the regional icon for their uniforms?

Either way, this is a most rare sight. More conventional details can also be seen. The shoulder straps on the Leutnant to the left appear to bear the metallic numerals 191, while the NCO (right rear) has the cloth 'slip on' versions. Note the two different types of radio operator's patches being worn on the arms.

Clearly marked as the 1st Batterie of Sturmgeschuetz Abteilung 191 it is also the battery commander's vehicle as denoted by the 'Ch' for Chef or chief. However the soldier standing in the hatch is not the 'chef'.

This 253 has a two-piece engine deck and it just possible to see the join line in front of the engine bay doors. It is a hybrid vehicle with this early feature, but also has the late position for the semaphore indicators on the trackguards. Notice the leather covers for the headlamps. Compare these to the canvas version on page 153.

The two-piece engine deck was later dropped and never appeared on the 250 series. Apart from the wire-cutters missing on the front right wing, this 253 carries a full set of tools. In the centre photograph the crew have adopted a 'hull down' position and placed the dust /rain covers onto the binoculars. Note the angle of the aerial when deployed.


2. Z.

Notice the detailed painting of the unit's bull insignia - no wonder the soldier is taking so much pride in cleaning it! The bull and outline to the rectangle are painted in red and the shape of the bull and the detail on it are in black. Clearly the tactical symbol in Gelb (RAL 1006) is for the 1st battery (1 / Stu Art Abt. 191) and '2.Z.' would indicate it is the 252 and trailer combination specifically for the 3rd and 4th StuGs in the 1st battery. The use of Stu. Art. Abt. is interesting. Most books quote the unit's original name as SturmArtillerie-Abteilung 191 and was subsequently re-designated Sturmgeschuetz-Abteilung on 7th February 1941. However these photographs were taken after February but this order has not yet resulted in changes to the tactical symbol.

The lines of rivets hold the intermediate plates inside the trailer for the ammo. (For a photograph of the interior details, see page 113). Interestingly and because it still wears its original factory coat of paint, the manufacturers plates also remain in their original black and silver condition. He is wearing a *M34 'Schiffchen'* (little ship) side cap with the same haraldic lion badge and his dark blue *Arbeitanzug* (work uniform). Given the differing tones perhaps the trousers are in blue and the jacket could be the earlier black version.

The wooden stick resting on top of the canvas to the right is the handle of the traffic wand that would relay driving commands back down the convoy of vehicles. Dressed for the chill of the spring weather, the *Unteroffizier* (Lance-sergeant) on our left sports a pair of goggles over his Feldmuetze. Both are wearing slip-on shoulder straps but on close inspection there seems to be no visible numbers. Could they be turned inside out for security or are they simply covering up a previous unit number with their greatcoat shoulder straps?

Here (and the following page), a crewman takes advantage of a lull and tucks into his cold rations. Dressed in the M40 woollen uniform, he has lined his neck with a civilian garment to protect against the chill mountain air. His embroidered '191' woollen 'slip on' shoulder straps, national emblem and collar patches are seen in detail. Theoretically, his branch of service colour should be 'artillery red' and it is possible that '191' is stitched in this colour.

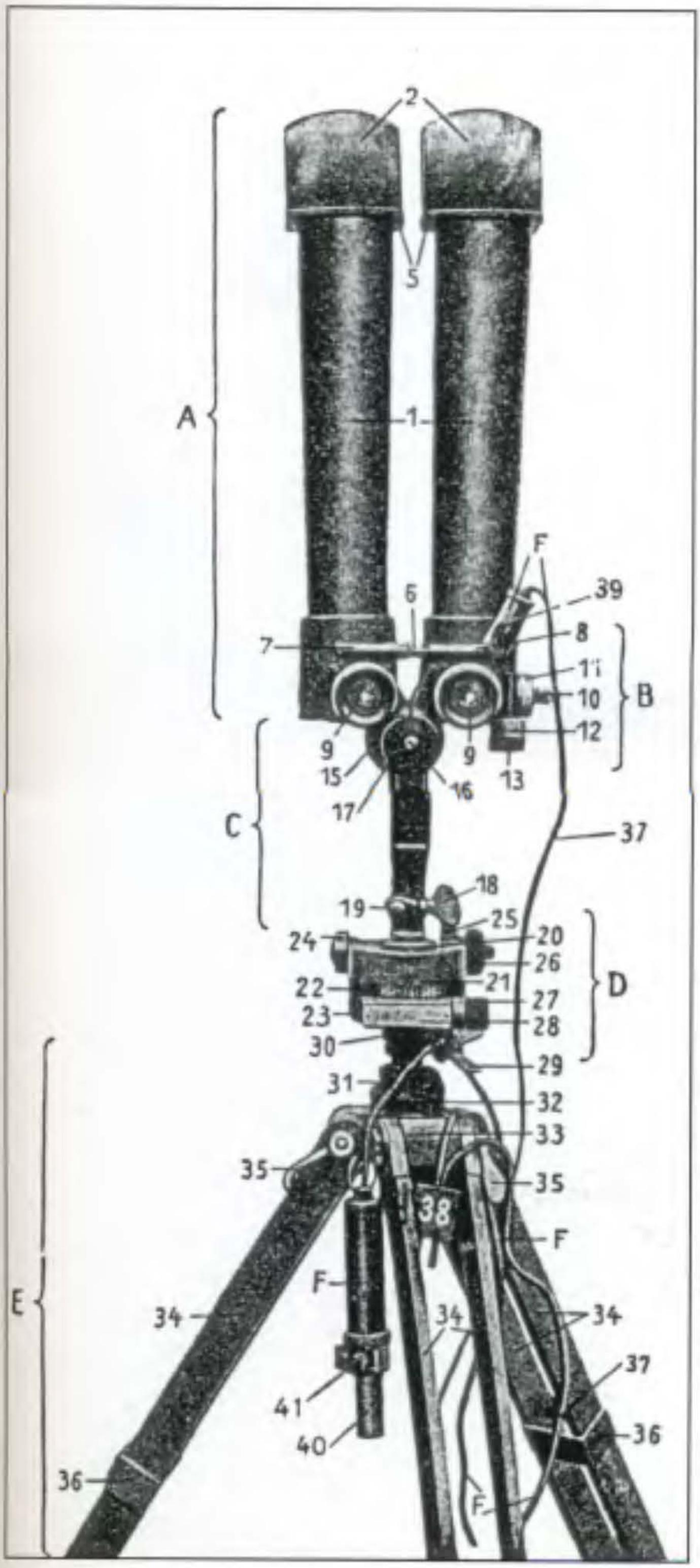
He is cutting the bread with an example of the popular 'Black cat', a nickname for the 'Mercator' k55k pocket knife. Manufactured by Heinrich Kaufmann & Sohne of Solingen, this model was first produced in the 1800's and is still mode today. Readily available on the civilian market, despite some claims to the contrary this was not an issue item.

All available space seems to have something crammed into it. To his left, notice the M31 clothing bag, civilian suitcase and the 3-filter flashlight hanging above. To his right hang two of the crew's helmets with a perfect silver and white *'Wehrmachtadler'* on a black background, a couple of M24 stick grenades and at least one gas mask tin. (Overleaf, note the dispatch case by his right boot.)

With early vehicles, the small interior details are usually of a high quality. Unlike later 250 Typ 2s that used simple rubber strips for the edges, this 253 has leather pads on both roof openings. To our lower left are three (and possibly one extra) coloured signal flags sitting in their three holders below the row of hand grenades. This 253 contains the Fu 15 and Fu 16 radio sets, both of which have the covers in place. (For an interior photograph of the artillery version see page 133). The lower clamp assembly for the binoculars includes the small tray to hold the battery box to power the sight illumination.

SCHERENFERNROHR **14 Z**EISS **(S.F. 14 Z.)**

(Scissor telescope, binocular twin periscope)



GENERAL SECTIONS

A Binocular Twin Periscope
B Terrain Angle Measuring Mechanism
C Periscope Rest
D Measuring ring
E Stand for S.F.14 Z
F Illumination Mechanism for S.F.14 Z

A. BINOCULAR TWIN PERISCOPE

1 Periscope arms
2 Viewer prism housing
3 Viewer
4 Extension for rain protector pipes
5 Leather buffeters
6 Between - pipe for eye adjustment
7 Adjuster for eye width
8 Adjuster guide for the above
9 Eye pieces for viewing

B. TERRAIN ANGLE MEASUREMENT MECHANISM

10 Terrain angle level indicator
11 Division ring with coarse division
12 Division drum with fine division
13 Dial plate

C. PERISCOPE REST

14 Joint securing handle
15 Drive disc for tilt gear
16 Stop end screw for joint adjustment spindle nut
17 Nut for joint spindle
18 Securing screw
19 Sprung bolt

D. MEASURING RING

20 Level indicator
21 Upper section
22 Division ring, coarse division
23 Lower section
24 Division drum, fine division
25 Cut-out for worm drive
26 Drive disc for worm drive of upper section
27 Drive disc for worm drive of lower section
28 Writing tablet
29 Clamp screw with nut and security pin
30 Sprung bolt to sleeve

E. FRAME FOR S.F. 14 Z.

31 Leather collar for ball joint
32 Bell for leather cover for ball joint
33 Frame head
34 Frame leg top section
35 Pinch lever
36 Upper stiffening band for leg frame

F. ILLUMINATION OF S.F. 14 Z.

37 Cable
38 Plug
39 Lamp to illuminate calibration plate
40 Hand lantern
41 Press button

doorplate and held by four castellated nuts, (with conical bolts on the exterior). The glass block holder is hinged at the lower corners and held in place with cotter pins. The glass block sits inside the box and is held by a locking arm (A) on the top face. To change blocks, release the arm, pull down and remove / replace the block. This particular arrangement was also used on the co-driver's side visor.

The door lock design was carried over into both the Typ 1 and 2 Sd Kfz 250 series and like most German items, it is clever in design but impractical to make. Eventually in the last few months of the 250 Typ 2 production, this lock assembly was changed to the design used in all 250 Neu's. (See Sd kfz 250 - Volume 2 - 250 Alt Technical for more information).

As mentioned previously, the *Verbandkasten* would normally be found held in place in the frame on the rear door by two webbing straps and a buckle assembly. (The shorter right hand strap is still in place). For a lot of crews, the box proved to be more of a nuisance and was removed from the door and stowed inside the vehicle, as it was all too easy to catch the box edge, or snag equipment on it whilst climbing in and out. Judging by the missing bolts at the top, it would appear that someone has tried to remove the complete frame. The rear door is held fast by plain nuts and a locking shim with it's edge folded back but, the visor assembly is secured with castellated nuts and split pins.

The inside face of the door is, like the exterior, painted grey, even though the strong sunshine makes it look paler. The interior and most of the fittings that are directly bolted to the interior walls are painted white. (Note the flare cartridge box to the left of the soldiers head). The dashboard and firewall remained in the base grey of the original exterior colour, the seat frames were either grey, (a darker grey than the exterior) or black and in this case have a wooden back to the seat cushion.

With a complete crew of four, it must have been very claustrophobic sitting inside the vehicle. With such a low roofline the crew must have cursed the designers for such a vehicle like this to live and work in. It is little wonder that a lot of crews had extra footsteps welded to the rear of the vehicle and preferred to use the roof hatches to gain access, especially for the driver and co-driver.

For operation Marita, *Sturmgeschuetz - Abteilung 191* were part of the XVIII Mountain Corps that included the 72nd Inf.Div, 2nd Pz. Division and the 5th and 6th Gebergs Division. The speed of the German advance took many by surprise. The units that were encamped south of Bucharest travelled by road to the border and then through Greece, via Komotini, Kavala, Saloniki [Thesaloniki], south via Katerini, Larissa ending in Thermopolis. This was approximately 950 kms and took from the 6th April to mid May 1941. Quite an achievement for the mechanics of the workshop company, the StuG, 252 and 253 crews alike and for the soldiers of the 6th Gebergs Division seen here. It's hardly surprising that the 191st were given a complete re-fit in Olmutz after the campaign.

The *Mittlerer gelander Einheits - Personkraftwagen (4 x 4)* Kfz 15 Horch was powered by a 3.5 litre V8 of 80 PS (Range of 420 kms by road, 300 kms cross-country) and was common transport for either Regimental or Divisional Commanders.


ΜΗΤΡΟΠΟΛΙΣ
"ΑΝΑΤΟΛΗ"

Just above the 253 driver's visor it is possible to see the ammunition trailer, whilst the Sd Kfz 252 is completely hidden. Note the difference between the tired and hot mountain troops and the relaxed and somewhat smug manner of the 253 crew.

ABOVE & OPPOSITE: The Workshop Company of Sturmgeschuetz Abteilung 190 bringing back a 252 in need of repairs. The crew has adjusted the flat bed sections to create the ramp up onto the gooseneck of the trailer. The Sd Kfz 9 (Famo) 18-ton prime mover is towing an Sd Anh 115 trailer, (overall length of trailer is 9.68 metres with a maximum all up weight capacity of 15,000 Kgs). Designed to take Pz Kpfw. Is and IIs, with a detachable rear axle to facilitate loading. Note the solo motorbike in front of the 252, the amount of wood loaded into the rear of the Famo, the fuel drums and spare StuG III track wheels.

RIGHT: A close up detail picture of the tailboard of the Sd Kfz 9 showing the unit emblem of a white lion and edge on a red background. The unidentified saloon car also appears to wear the unit emblem on the right mud guard.

A StuG III and Sd Kfz 253 (complete with a British helmet as a souvenir) from the 190th entraining to move out from Saloniki and return to Bucharest to rest and re-fit before leaving for the Ukraine. All the vehicles are loaded with new supplies in boxes and the vehicles have been cleaned. The wooden wedges on the roof of the 253 are to secure the vehicle once loaded. The vertical side posts lying on the platform will be placed in position on the rail car once the 253 is loaded. According to another StuG book, the 190th, (the Lion Battaery), joined XI Army as part of Army Group South. The 1st Batterie was attached to the XXX Army-Korps the 3rd to the 22nd Infantry Division and the 2nd to the 76th Infantry Division.

From left to right, the overseeing Officer wears a combinatio of Sturmartillerie jacket with Officers riding breeches ar riding boots. A Reiter wears a mouse grey shirt and wo denims. Two Unteroffiziers wear standard tunics, couple with work denim trousers and standard Army boots. Th soldier directing the driver appears to be wearing a tropic version of the standard tunic.

Four

EASTERN FRONT
1941

The skull and cross bones unit motif is created by spraying a square patch of black and then using a stencil over-spraying a second coat of yellow or ochre on the rear of the armoured smoke candle rack. Unfortunately I have been unable to find out what the bolted plate is to the left of the starter crank cover. The automobile is a Ford V8 convertible used by commanders. When built the rear wheels were enclosed with wheel spats. The secondary edge inside the wheel arch to hold the cover in place is just visible. Instead of starting with the usual 'WH' it begins with 'A' that indicates that the car is registered to the department area of Anhalt - Wittemburg which lies south west of Berlin, south east of Magdeburg and north of Leipzig.

Apart from 'Z1' just forward of the aerial mount this 253 carries no other visible unit identification

5.

7.

This 253 is one of the pre-production batch, or one of the first production vehicles, and as such has some unique features that identify its heritage, that match the detail pictures in the introduction to the D672/5 manual

1. The front of the chassis on this 253 is less deep and the top and bottom edges are parallel. The standard chassis was deeper at the front and the lower edge sloped gently down towards the rear. Note how steep the angle change is behind the bump stop arm.

2. Because of the chassis shape, the shock absorber bump stop mount is much deeper. It is far more like the shape of the 1ton Zugmachine chassis from which it was developed.

3. For very early versions, the width indicators were made of a flat piece of metal twisted through 90 degrees with the disc painted white.

4. The front mudguards have a square edge (as seen from the front) and were less curved in the side profile and were lower compared to later versions.

5. The semaphore indicators are mounted on the armour plate on the early versions and subsequently moved to the track guards.

6. The front tow hooks and mounting plates are a different pattern.

7. Just out of shot is an early pattern front *Notek* light.

8. The front mudguard support is wider. The block welded to the armour plate to which the support is attached is to prevent drilling through and compromising the armour plate itself.

9. All 252s, 253s, and Typ 1 250s front axles were built using the D7 designed leaf springs with the trimmed corners. The thickness of each leaf was the same as the un-armoured D7 and caused the front end of the chassis to noticebly sag. This is perhaps why so many of the photographs of these half-tracks (up until the advent of the 250 Typ 2) have damaged front mud guards, caused by the wheel hitting them from underneath. Notice how many vehicles have mud guards that have pushed upwards throughout this book.

10. The shock absorber arm mounting plate is wider and extends beyond the chassis edge. For production vehicles this was flush with the outer edge.

Parked next to the Luftwaffe transport column, a Le.gl.Einh.Pkw. (4x4) (Light cross-country standard personnel car = four-wheel drive) from a signals platoon of an Infantry unit squeezes by. The Luftwaffe drivers are probably seeing the Sd Kfz 253 for the very first time, hence the large amount of interest it is receiving.

This is the same Luftwaffe convoy parked up for a break or stopped to allow the progress of the Sturmgeschuetzs. The lorry is a Mercedes-Benz Typ LG 3000 m.gl.Lkw. (m. = Mittlerer (medium), gl. = gelandegangiger (cross country) and Lkw. = Lastkraftwagen (load carrier or lorry) built between 1935-38. The StuG is an Ausf B model, 300 of which Alkett built from June 1940 to March 1941.

At the start of Operation Barbarossa there were a total of 19 units, the 184th, 185th, 190th, 191st, 192nd, 197th, 201st, 203rd, 210th, 226th 640th (GD), 659th, 660th, 665th, 666th, 667th and Lehr 900 serving in Wehrmacht units, plus Sturmgeschuetz Batterie belonging to LSSAH and Das Reich all deployed on the eastern front in June 1941. These were augmented by two more in July (244th and 245th), one in August (189th) and the 177th and 202nd Abteilung in September. Wiking and Totenkopf established batteries in June and September respectively and were also transported to the Russian front in 1941. For a view of the rear of these StuGs see the following page.

Apart from the Sd Kfz 253 mid-right in the photograph that belon to an unidentified artillery unit, no other Divisional signs can seen on any vehicle, maybe because of the censor.

Behind the 253 (centre right), the 251 is equipped with a map tab over the driver's cab and what looks like a bench seat from a tru fastened to the top plate over the rear doors to provide grandsta seating, with two more parked on our far right behind the bushe The approaching convoy includes Sd Kfz 10s, 251s (all Ausf or Bs), plus a Pz Kpfw IV in the distance. This photgraph has a in common with the start of Barbarossa, with the casualness of concerned, and the extra supplies and fuel carried in many vehicle Just above the Sd Kfz 10 on the left is a Sd Kfz 251/10 Ausf B a to its left (our right) is a second Sd Kfz 253.

ABOVE: Instead of the often seen multi-can rack, the workshop company have built individual holders and gone to a fair amount of trouble as each holder is of a different design. The door-mounted rack is of a standard design where the can sits in the cage, but a full jerry can would have only hindered the use of the rear door. It would have required a hefty shove to open and close attention when closing to avoid trapping fingers in the door. The pair to the right were designed together, with the vertical metal strips bent and welded to form both the upper and lower racks. The retaining spar on the lower rack utilises a quick release bar welded to the strip that can be pulled over the lower arm to secure the can in place. It is not clear how the jerry can above is secured or removed. In this shot, the complicated set of panels of the 253-based 250s can be seen but deleted from the Typ 2 design from 1942 onwards. Note that the single spar rear reflector arm is hinged and stuck in the folded position.

ABOVE: Already the German Army is using Hiwi's (*Hilfsfreiwillige* - Russian prisoners of war / "volunteer helpers") to do the manual labour for the troops. Here they pass a 253 and 252 of the 192nd as they wait for possible bridge repairs. The extra brackets welded to the track guard hold the cut branches and the plank(s) of wood.

OPPOSITE TOP: The advance of the infantry has been halted and a bottleneck is fast developing behind them. Parked to the left of the rail track is a *Mercedes-Benz Kuebelsitzwagen Type 320*, 1,764 of which were produced between 1938 and 1940, and in front of this a *StuG* III Ausf B is stationed, facing the rail line. Only the leading edge of the mud guard has been painted white.

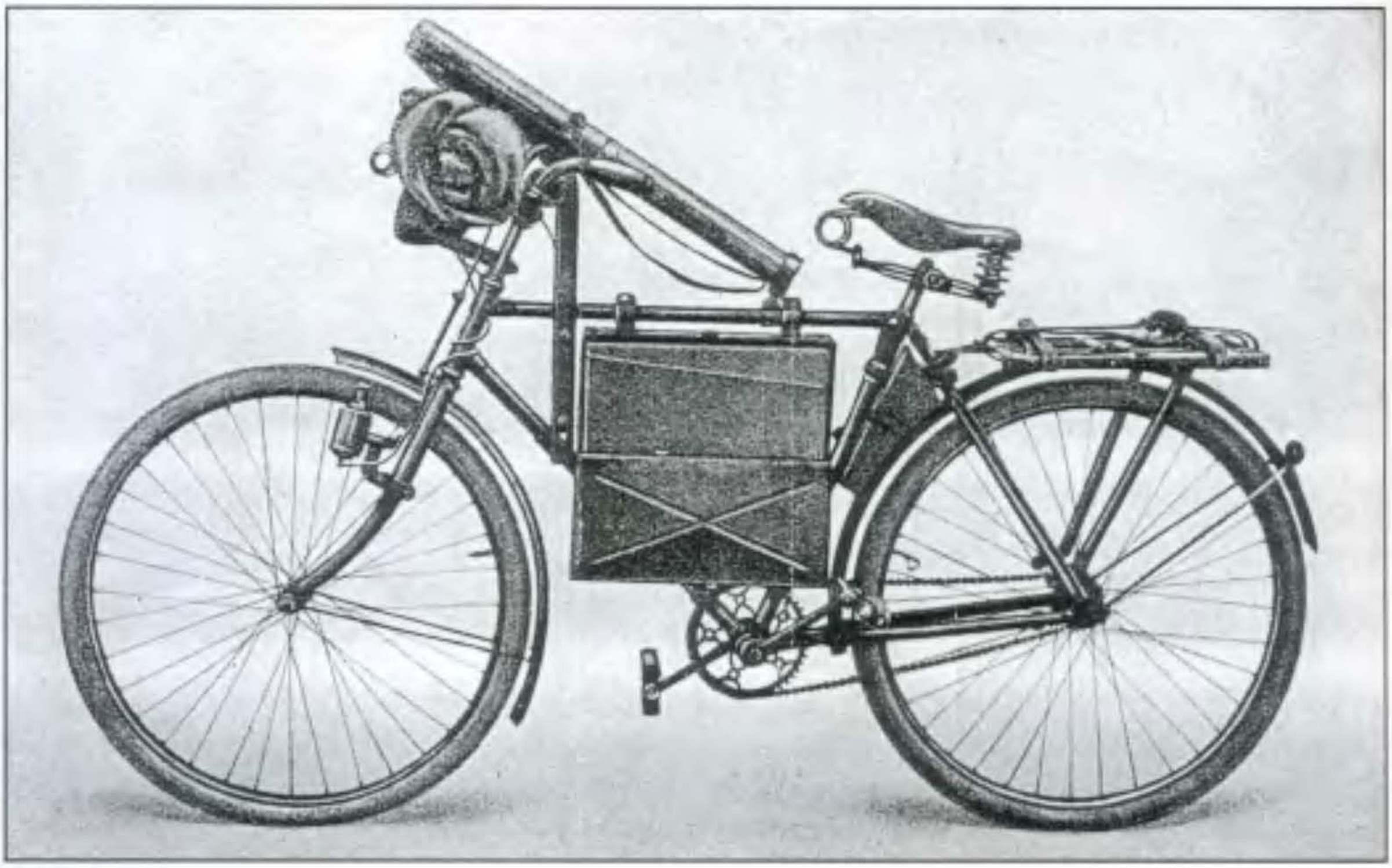
OPPOSITE PAGE: Here, more vehicles of the 192nd wait for the bridge repairs to be finished. The group of infantrymen and pioneers are perhaps trying to avoid being roped into the repair work. The use of a sizeable white circle on the rear of the 253 is interesting, but unfortunately we cannot be sure that 253 number 9 shares the same unit idnetifying symbol as number 8. Both are mint examples with full tool stowage and as yet no visible damage. Perhaps the driver of number 9 is ready and waiting with the engine running with the lefthand side door open to help keep the temperature in check as they wait?

ABOVE: A Sd Kfz 252 of the 192nd has just replenished the StuGs which are now moving out to take up new positions. Notice the large un-ditching beams on both of the StuGs, perhaps the circumstances of how they acquired them is obvious overleaf.


235

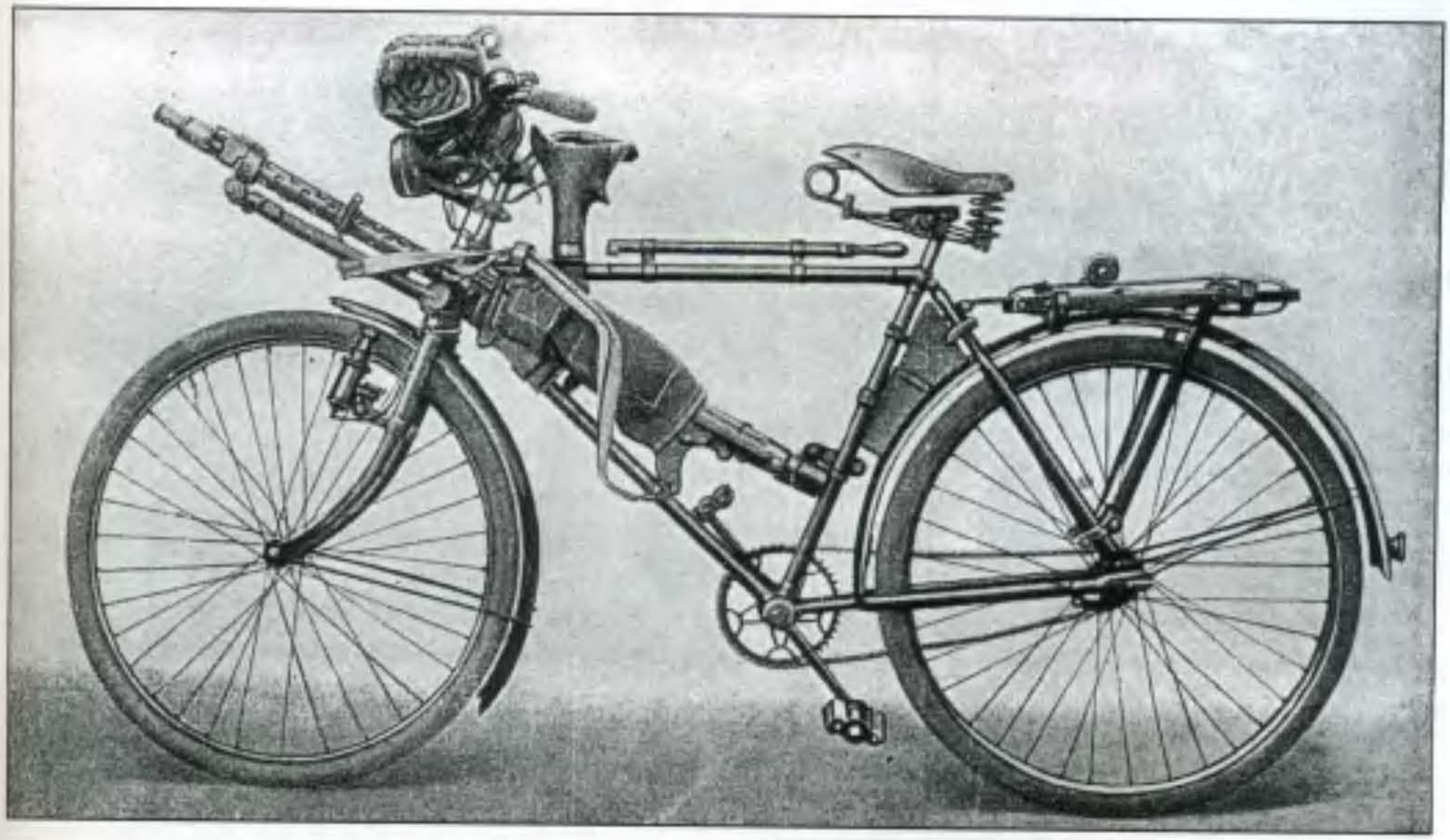
Are the cyclists looking on with interest because the 253 was relatively new, or are they looking on with envy, lamenting their own mode of transport? Quite why the two lead cyclists hold another bike is a bit of a mystery. Both soldiers wear the *Gebirgsjaeger* (Mountain troops) arm badge on their upper right tunic sleeve. Although obviously qualified, it does not mean that they are serving with a mountain troop unit.

The closest bicycle has the mounting brackets for the *Dreibein 34* (anti-aircraft tripod for the *MG34*). The lower bracket is adjacent to the hand grenade and the top mount is just below and to the left of the cyclists right hand. The next pair consists of a standard bicycle to the right of the standing soldier and to his left and a ammunition carrying version. For all four variants of the bicycles used for an *MG34* unit, see the following pages.



TOP: Truppenfahrrad mit Behalter fur Patronenlaften fur MG

BOTTOM: Truppenfahrrad mit Lauffchusser 34



TOP: Truppenfahrrad mit Dreibein 34

BOTTOM: Truppenfahrrad mit MG34 als le. MG


236

OPPOSITE PAGE: One of Army Group North's initial targets was the capture of Riga, the capital of Latvia some 250 kms away, and speed was of the essence. The 185th Sturmgeschuetz Abteilung was seconded to the 1st Armee Corps/18th Army to operate with 1st, 11th and 23rd Infantry Divisions. This evocative photograph taken during the early days of the advance through the Baltic States, shows the 253 commander shouting orders and pointing forwards to the crew of gun E or F in the Batterie. The notion of cycling to war seems at odds with the latest support weapon for the infantry however, with a lack of motorised infantry cycling was the next quickest option for the foot soldiers. In the end it took them only a week to fulfill their initial objective.

There were 4 Sd Kfz 253s in each Batterie, one for the commander and one each for immediate subordinates to control the 6 StuG IIIs plus three Sd Kfz 252s. Here the 3rd 253 of the batterie would be in charge of guns E and F (or 5 - 6 depending on how they were classified within a unit).

THIS PAGE TOP: The 3rd Batterie of the 185th was famous for being part of a mixed force that stormed the railway bridge into the city of Riga on the 29th of June 1941, only to have it blown up behind them leaving them to defend their positions until the main force could find another way across to help them out. This is the Zug Kommander's 253 denoted by the number one on the side and he and his crew feature on the following two pages.

ABOVE: Both the rear step and rear reflector are missing, but the *Batterie Werkstatt Kompanie* has re-positioned (or made new) a foot step plus grab rails to assist the crew in climbing into the vehicle via the roof hatches and one over the rear door to allow the crew to swing their way in feet first. Note the faint yellow tactical sign for motorised artillery on the rear door.


237

The *Oberleutnant* (Lieutenant) denoted by his shoulder boards with the single pip on a silver Russian braid base, also wears decorations for the Iron Cross 2nd Class on his lapel, plus the Iron Cross 1st Class and the infantry assault badge in silver on his tunic. Both he and the *Unteroffizier* (Lance-Sergeant) wear the *M36* Steel helmet.

ABOVE: Even though the vehicle is relatively new, the same old scenario of a dented dust shield and at least one dented front mudguard has already messed up the appearance. Even the righthand front tow hook has been bent out of alignment. However, some understanding and sympathy for the driver should be given; with the visor open, vision forwards is not good but with it closed it can be more luck than judgement to avoid a collision.

A pair of StuG III Ausf Bs (guns A and C) from Sturmgeschuetz Abteilung 185, both wearing the wider track (Typ 6100/120) and the re-designed front sprocket wheel to accomodate the increased 20mm width of the new 400 mm track links. Note the re-positioned first return roller which was moved closer to the drive sprocket to lessen the chance of throwing a track under heavy acceleration and braking which was a modification made to Ausf Bs during the production run.

Even though this photograph was taken early on in Barbarossa, the crew have alread decided that extra track links are required to up-armour the StuG in response to th Russian T 34 and KV Is encountered that were quite a shock to both StuG and Panz crews alike. The 252 wears the same square Batterie symbol as the StuGs. Note th basic colour variation of the M36 Service tunics of the troops resting by the roadsid and none of them are wearing 'Y' straps. The Obergefreiter holding the stick grenade also wearing a pair of medical pouches.

An almost mint example (except for the rear two stowage boxes) of an Sd Kfz 251/6 Ausf A complete with deployed aerial mast at the right rear corner. Note the extra front protection for the MG34 which is now on a raised mount, plus the use of a second shield at the rear. Just above and to the left of the Panzer Officer sitting alongside the 251 is what appears to be the divisional symbol for the 11th Pz. Division. The group of officers have settled down for what seems to be a relaxing few hours of lunch, whilst at least one Sd Kfz 250 crew member (above) grabs a few hours sleep amongst the sheaves of oats. The front of the Sd Kfz 251 shown opposite is just in shot to the right.

TOP: The 253 looks like the same vehicle as shown on page 80 - 81. It is one of the pre-production examples with the early 'shallow' front chassis design. The original leaf-springs (from the Sd Kfz 10) on the A-frame front axle were found to be too weak for the weight of the armoured vehicle. Consequently with the A-frame fully articulated over rough terrain, the wheels would hit the mudguards. The front axle has already sagged and either there is a torsion bar problem causing the track wheels to sink or the rear idler requires attention to re-tension the tracks.

TOP: Wearing the 1st Panzer Divisions divisional sign of an inverted 'Y' introduced for Barbarossa, this 253 from the 1st Battalion (Mot.) / 73rd Art. Regiment passes infantry at high speed. It is one of the later production models with both the mid height width indicators and the semaphores mounted on the track guards. The Balkenkreuz is unusual both in its size and position on the nose plate however as a non-frontline unit this would not present a target practice cross to the enemy. It is easy to understand why the separate number plates were deleted and painted directly on the nose plate from the Typ 2 250s onwards. Like most other photogrpahs in the book, the number has already been damaged and eventually lost. Note that the tyres are not the typical standard issue items.

TOP: A Battery Commanders 253 from the 78th Art. Regiment / 7th Pz. Division parked next to the Pz Kpfw II marked as the 1st vehicle, 1st platoon of the 4th Light Panzer Company from either 1/, 2/, or 3 / 25th Pz. Regiment / 7th Pz. Division. The Pz Kpfw II Ausf C is retro-fitted with additional armour plates to the superstructure (originally it had a round nose) and a new commander's cupola with 8 vision blocks.

ABOVE: Pz Kpfw 38ts from the 3rd and 4th Companies 25th Pz. Regiment / 7th Pz. Division are forming up for an attack. For Barbarossa the 7th Pz Division was equipped with 167 Pz Kpfw 38ts plus 7 Pz. Bef. 38ts in 9 Light Panzer Companies (the 3rd, 4th and 5th) within each of the three battalions of the Regiment. By the end of the attack on Moscow the 7th Pz. Division were reported to have only 84 operational vehicles with a further 202 in the repair shops. Although out-gunned at the beginning of Barbarossa Pz Kpfw 38ts were manufactured until July 1942. The second from left in the foreground is an Ausf C; others are a mixture of Ausf Bs, Cs and Ds.

The infantry were forever having to play 'catch up' with the fast moving armoured units in the 1941 campaign. Once having pierced enemy lines, the Panzer regiments were encouraged to rampage through their opponents rear areas, sowing chaos and confusion before racing for their next objective. The infantry would move into the vacuum created by these armoured thrusts, mopping up any final nests of resistance and securing the ground.

This was inevitably a slow process, as the foot bound infantry were only capable of marching around 5km per hour, and only then when the road network (and weather conditions) allowed. As the armoured spearheads disappeared over the horizon, the infantry would literally follow the tracks, often to be farmed out to fill one of the yawning gaps that inevitably appeared on one of the flanks.

The open flank 'problem' stemmed from the armoured spearheads eventually punching into thin air in the vastness of Russia. Once the enemy's defensive crust had been breached and they were through to 'open country', the spearheads were in grave danger of being counterattacked, encircled and ultimately, if the following infantry were beaten back, destroyed. This problem did not really exist for the Germans in 1941/2, as the Red Army was too busy trying to save itself. Any attempt to fight back was immediately pounced upon by a German counterattack, the Generals only too aware what it would mean if the enemy succeeded.

However, before any tanks could be let loose, the backs of the many enemy positions had to be broken, a task to be handled by the long suffering infantry and their StuG mounted companions. The photographs here perfectly capture the twin arms either moving up to their jump off positions or following up an armoured attack.

TOP: The StuG III Ausf D belongs to StuG-Abt.189 and identifiable by the Notek and sidelight protection hoops on the front trackguards, and the StuG and the Sd Kfz 252 sport the same underlined capital letter. They were formed in July 1941 and moved east in August to join IX Corps/9th Army/ Armee Gruppe Mitte and were subsequently transferred to XXXX Corps/9th Armee later in the same month and then to Pz.Gruppe.3. all within Armee Gruppe Mitte. Looking at the condition of the vehicles these photographs were either taken during training exercises or not long after they entered service on the Eastern Front.

OPPOSITE: Note the contrast between the weather-beaten dirty exterior colour and the original colour inside the ammunition box. Each shell line is cushioned with a strip of coarse felt and each door is sealed with the same material. The doors appear to be lined with plywood. This and the felt, are attached to the metal skin with aluminium rivets.

OVERLEAF: The Landser move forward in columns, a favoured tactic when moving about a battlefield as it presented less of a target to enemy fire. Only when effective fire was received would the column develop into an attack formation. The close proximity to each other here suggests that they are free of any immediate danger. These men are part of a heavy machine gun sub-unit, and as such would have set up to support the infantry by bringing long range, sustained fire on enemy positions. Equipped with the MG34, note the folded tripods being carried in the right hand column and the profusion of (heavy!) 300 round 7.9mm ammunition boxes. Although not part of a MG group's inventory, the shouldered long handled spade rapidly became an essential item acquired from varying sources.

Officers of the 1st Pz. Division gather to discuss a forthcoming mission. The tactical sign (lower left) with '6' belongs to the 73rd Art. Batallion and it is just possible to see the divisional symbol of an inverted 'Y' below the number 10 on the nose plate of the 253. The 1st Pz. Division was part of XXXXI Pz. Corps and was stationed around Memel before the start of Barbarossa, charged with the capture of Leningrad.

Major Dr. Eckinger (pointing) was the commander of the 113th Scheutzen Regiment / 1st Pz. Division. He is wearing what appears to be a pair of specially made boots. At first glance they look like tropical issue items but the upper section is made of leather and not canvas and the maker has taken the Army style with eyelets extending the full length and added leather straps at the tops like the Luftwaffe issued tropical item. Major Eckinger was apparently killed in his Sd Kfz 251/10 on the 17th October 1941 near Polustovo by a direct hit from a KVI, so the 251 in the background could be his

own personal transport. However without any identifying symbols, it is impossible to know for sure. The crew have removed the top half of the gun shield to lower the overall height and visibility of the vehicle.

The *Hauptmann* (?) wears an almost copybook black panzer uniform except for the roll-neck jumper, whilst the final officer sports a leather greatcoat and a fine example of an Officers *Schirmmutze* (Uniform cap).

BELOW: As they pull up to park, a unit of what could be the 86th Flak Battalion of the 7th Pz. Division approach from the other direction headed by an Sd Kfz 10/3 armed with a Flak 38. Generally the 10/3 can be distinguished from the later 10/4 model by the open rifle racks on the front wings and the ramps for loading and un-loading the gun. Note how effective the white width markers are in such murky conditions. There were three flak companies in the 86th Flak Battalion each of 10 Sd Kfz 10/3s plus a signals platoon, and the Krupp Protze probably belongs to the light supply column of the battalion.

THIS PAGE: For the invasion of Russia the 7th Panzer Division was part of the XXXIX Motorized Army on the northern end of Army Group Centre. They advanced from East Prussia on the 22nd June and in only two days units of the division reached Vilnius the capitol of Lithuania. From Vilnius the Division turned south east to encircle Smolensk via Witebsk.

The photographer stood at this crossroads and took a series of pictures as a column headed by this Sd Kfz 253 (featured in both photographs and overleaf) from the 78th Mot.Art.Rgt pull up and wait. For Barbarossa the 7th had adopted a new divisional sign a "Y" replacing the earlier inverted "Y"with 3 dots and the tactical signs were framed in a white rectangle.

OPPOSITE PAGE: This is an impressively well equipped artillery regiment with what appears to be the best of everything. Even though the photograph is rather murky, the line of vehicles stretching into the distance are Sd kfz 251/4s and towing 10.5 le FH howitzers, (the outline of the gun shield is just visible behind the leading 251), and were an extravagance when used as an towing vehicle for field artillery. There are pair of field cars and the battery commander has been issued an Sd Kfz 253. It is difficult to know whether this is Witebsk or Smolensk but this must be one of the earliest 253s to be used in a field artillery unit and given that they do have the best of everything, a newly available 253 for the commander was perhaps the ulitimate addition and the icing on the cake.

ABOVE: The slow shutter speed caused by the overcast conditions has given this picture a ghostly and ethereal quality to the Russian prisoners trudging into captivity. Note the soldiers in the middle of the road watching the scene before them as they (perhaps) wait for other vehicles of their unit to arrive. Perhaps it is their Mercedes-Benz Typ 340 Kfz 15 in the background.

To the right of the Funkmeister is a third set of radios mounted on top of the existing frame. Given the space restrictions inside a 250, it would have been impractical to mount the extra set on the left side of the main carrying frame, so either the workshop has fabricated a new set of end supports, or this is an official variant that hasn't been listed. It is probably carrying the Fu 5, Fu 4 and Fu8 radio sets.

With the nose plate removed, it is possible to see the early radiator shutters used for cold starting / engine warming, very similar in design to the Sd Kfz 251, with vertical slats operated by a lever and arm from the driver's position inside the 253. (It was the same for the 252). On later versions this complicated design was dropped in favour of a simple, single horizontal flap assembly that hinged open and shut behind the base of the nose plate just ahead of the front chassis plate, along with the driver controlled left-hand engine door that was opened from the driver's position. It hasn't taken long for the condition of these vehicles to deteriorate by the end of 1941.

One of the problems of rain on unmade roads: just how to recover a 6-ton lorry and trailer up to its axles in mud? The ironic point is that, given the conditions of the roads, the workshop vehicle is probably required elsewhere to repair gearboxes and burnt out clutches of other vehicles in the same predicament. Possibly, having tried with just the 253, a 252 has returned to assist. If the mud is too deep, even the half-tracked vehicles would eventually bottom out with the chassis plate resting on the ground and the tracks turning and achieving nothing.

The lorry is a Henschel 33D1 Werkstattkraftwagen (Workshop truck) Kfz 79 m.gl.Lkw(O) (Mittlerer gelandegangiger Lastkraftwagen) (Medium cross-country load carrier) towing Sd. Anh.24 (Special trailer 24).

Henschel truck produced between 1933 - 42. A 6-cylinder petrol engine of 10.857 litres developing 100 PS at 1.600 rpm powered the original model 33D1. The G1 model introduced in 1937 utilised a diesel engine of 9.1 litres producing the same 100 PS at a slightly lower 1.500 rpm. Henschel built the two models concurrently. Magirus built the G! from 1938-40 under licence, and then swapped to the 33H model using the same diesel engine, but de-tuned to produce 100PS. The 114-litre tank gave the Henschel 33 D1 a range of 250 Kms on the road and a cross-country range of 190 Kms. The diesel-powered versions could manage 380 and 250 Kms respectively. The trailer contained an A-Type heavy generator of 220/380 Volts, 12 Kilowatts, 25 Amperes. Used by the signal corps to power radio equipment, or in this case, machinery used by the workshop companies of Sturmartillerie Abteilung 190. The truck also shares the same 'Gothic' vehicle unit numbering system as the armoured vehicles.

It has been suggested that possibly '48' denotes the 8th vehicle of the 4th company but, it doesn't explain any of the vehicles from 1 to 9 and who they would belong to. If they did represent each company within the Abteilung, all of the vehicles would have at least a two-digit numbering system. It is possible that '48' represents simply the 48th vehicle in the units inventory.

A half platoon of StuGs with a pair of Sd Kfz 252s preparing to advance having re-armed. The first StuG is either an Ausf C or D followed by an Ausf B, recognisable by the superstucture roof and repositioned front return roller, and the third is probably another Ausf C or D. Both half-tracks are 252s.

The German High Command realised from early on that power had no real value without control. To provide the necessary control, they understood that radio communications would be the governing factor in the outcome of any combat, and set about developing arguably the best radio equipment of any nation in WW II. Concurrently they also developed specialised vehicles to provide commanders with the ability to stay close to the front line and remain well protected. In 1935 the first post Reichswehr generation of *Panzerbefehlswagen* were built on the Pz Kpfw I chassis (186 of which were built for the Panzer truppen from 1935-37) and were phased in from 1940 to become available to Headquarters units of artillery regiments.

From their inception, StuG units were provided with the 253 for the commanders, but it became apparent through combat experience that the 253 had various shortcomings. As soon as production allowed, commanders were given their own StuG III Ausf E starting from September 1941. As the 253 was gradually replaced, more and more were transferred out to the Artillery Regiments.

The large set in the lower rack is a 20 W.S.c (20 Watt Sender Typ c) Lorenz (fur Telphonie und Telegraphe, which provided a range of 6 kms by telephone and 4 - 8kms by telegraph) and used in conjunction with a Ukw.E.e (Ultrakurzwellen - Empfanger e / Ultra short frequency receiver Typ e) to make the Fu 6 combination for command vehicles. The third radio set is an Fu 2 which is a single Ukw.E.e. It would have formed the link between the Artillery and Panzer Regiments.

LEFT: The tactical symbol is for a towed artillery unit and features arrow flight motifs at its base. The 'B' could be for the second Batterie / 73rd Art. Regiment / 1st Pz. Division that were equipped with 10.5 leFH guns. As a non-frontline unit, the size and propensity of Balkenkreuz had not been considered a problem.

OPPOSITE PAGE: In the earlier vehicles, the front visors and the assembly to hold the glass blocks were separate. The recesses for the front visors were bolted to the armour plate from the inside. The pair of arms that supported the visor itself bolted onto and through the recess plate and the armour plate. To have a completely clear view out once the driver had raised the exterior visor, he would have had to open the block holder down like this. Once again, it is possible to see both the ingenuity and short-sightedness of some German designers.

The first version of the large front vision port accepted two standard sized glass vision blocks like the two wrapped in paper to protect them behind the driver, (there were two more stored in front of the driver on the upper armoured portion of what forms the firewall. It is because the front visors contained two glass blocks that the early armoured cover had two vision slits. Perhaps it was through combat reports filtering back to the High Command that explained how limited the forward vision was with the armoured cover closed. With the introduction of the Typ 2, the front visors were re-designed using a lengthened side visor assembly with a single large glass vision block and a continuous vision slit. It also allowed the glass block holder to move out and up with the armoured cover to provide an uninterupted view out of the vehicle.

The head cushions in 253s were bigger and deeper than 250s and the driver and co-driver share a handrail to help him pull themselves in and out of their seats. (Note the drivers handbook wedged between the cushion and the roof). The gas mask holder (to the left of the side visor) is empty, but note the leather blocks rivetted through the curved sheet metal to help hold the cannister in place without it rattling around. The quick release catch is fastened to a leather belt and buckle strap that was later changed for canvas webbing. The container below the spare vision blocks is marked *'Teilkreis'* (measuring ring) and like all German vehicle interior fitment design, has a folded return to form a safety edge.

The black and silver name plate in between the front visors would proudly bear the manufacturers details, the chassis number and production date, complete with *Waffenamt* stamps. On later name plates, the manufacturers name was dropped in favour of the 3-letter code to keep the manufacturers name secret.

See the difference between sides where the left hand mudguard is broken and the right is still intact and the subsequent results of what the German soldiers ironically called 'Russian Asphalt' mud.

StuGAbteilung 192 spent the summer of 1940 in France, the late spring of 1941 in Greece and the summer advancing through Russia, only to face a winter that caught the entire Eastern Front units ill prepared and ill equipped for -40 degree temperatures. Unlike the T34s, and until the advent of the Tiger tank, all German tracked vehicles suffered the same error in design as did the British and American tracked vehicles.

THIS PAGE: Here is one way to avoid towing a trailer but, it is more likely that this arrangement was chosen for entrainment to occupy less space on the rail car. Despite the winter camouflage it is possible to see the feint outline of the white shield on the nose of the 252 that matches the divisional sign on the trailer. Sturmgeschuetz Abteilung 209 was transferred into the southern sector of the Eastern front in December 1942 and narrowly escaped being decimated in the encirclement of Stalingrad. This is a late production 252 with higher width indicators.

OPPOSITE PAGE: It would appear the the crew of the 250 have removed the long padded seat back from the left side interior stowage box and placed it over the exit air vents of the engine compartment in an effort to keep the engine temperature high. Unfortunately, the symbol in the square box on the nose plate is illegible. Note the early radio antenna position on the rear righthand corner carried over from the Sd Kfz 253s.

Five

EASTERN FRONT
1942/43

This rather tired looking Sd Kfz 252 has definitely seen better days. It is parked on the turning wash from a StuG III - note how widely the ground has been disturbed as the StuG has pivotted round. It has the almost obligatory bent front mud guards but interestingly, the rear pair of doors has the lock on the left side door, unlike the other 252s in this book. (See page 173). It also seems to be devoid of tools - apart from the spade, the three tool drawers are missing, it has lost its drive sprocket hub caps and has no unit markings, just plain white Balkenkreuz. The origin of the tow cable is uncertain, but it is thought that it is too long to be considered original equipment for the 252 and the vehicle only has one rear number plate.

Okay, so they aren't 250s, but we thought it worthy of inclusion anyway. Sd Kfz 251 Ausf Cs of the 126th or 128th Scheutzen Regiment / 23rd Pz. Division (recognisable by the Eiffel Tower motif, chosen to commemorate the Division's formation in France) queue up to pass over a bridge. The bridge sign certainly indicates that vehicles should pass over slowly (langsammer), and possibly in the middle for safety.

The last vehicle is a Sd KFz 251/1 Stuka Zu fus Ausf C, and is behind a 251/1 Ausf C that has extra side bins at the rear of the top side armour. The tactical sign for Motorised Infantry has what appears to be a 4 adjacent to it on the rear, indicating the 4th Company, with 43 on the rear door, (the third vehicle in the fourth company).

Note that all the motorcycle and sidecar combinations of the *23rd Kradscheutzen Battalion* carry '88' ammo boxes on the sidecars, and the soldier walking back towards the 251s looks as though he is buttoning up his trousers having answered the call of nature. In 7 months time they would find themselves surrounded at Stalingrad.

ABOVE: The 23rd Pz. Division was formed in September 1941 and took part on Operation Fall Blau alongside the 3rd Pz. Div, the 29th and 36th Inf. Divisions and the 100th light Infantry Division that formed the 40th Motorised Corps in the 6th Army/Army Group South. This 250 Typ 1 belongs to the128th Panzerjaeger Battalion /26th Pz. Div. as noted by the unit symbols in the nose plate. These are an interesting pair of soldiers uniforms for what is a towed anti-tank unit, if in fact they both belong to the 128th Pzjgr. Btn. The officer on the left wears full regulation Sturmgeschuetz uniform right down to the shirt and tie complete with totenkopf badges on his lapels, where as the soldier on the right appears to be a casually dressed panzer crewman. Quite who belongs to what is anyones guess!

The basic *Dunkelgrau* appears to have, at some point in the past, recieved dabs of a lighter colour with the use of a rag. See how the MG shield has fairly regular cloud like patterns as does the nose.

TOP: Sd Kfz 250/1 Typ 1 built from existing Sd Kfz 253 bodies but minus the roof, and used as part of the Aufklarungs Abteilungs (Reconnaissance Batallion). From photographic evidence, nearly all of the Typ 1 250s were incorporated the heavy mount for vehicles, similar in design to the top half of the MG34 lafette. It looks as though this crew have been parked up watching enemy troop movements judging by the heavy camouflage. Note the white width markers painted onto the armoured body.

ABOVE: Another standard Sd Kfz 250/1 Typ 1 equipped in the same manner, but it is unusual to see the rear *MG34* hanging loose and not secured in its travel clamp. In the distance is an abandoned T34 and on the far right and partially hidden by the truck is parked a Pz Kpfw IV Ausf F2.

ABOVE & RIGHT: It is just possible to see the divisional symbol of a knight on horseback with a star in the top right corner of an heraldic shield that denotes Sturmgeschuetz Brigade 243. Note that the tactical symbol on the nose plate also includes the numbers "243" placed underneath and not inside the sign like other units *(StuG. Abt. 667)*. This is the classic late production Sd Kfz 252 and trailer combination with the final design of tall width indicators and larger starter crank cap on the nose plate. The number plate has been dulled, probably with mud.

THIS PAGE AND OVERLEAF: Because of the oil and mud paste covering the tactical and divisional signs it is not obvious to which division they belong.

On close inspection they are from the 3rd Batterie / 119th Art. Regiment / 11th Pz. Division watch for the fall of the shells on the horizon. With dispatch riders motorbikes parked ready to take orders, this is the prelude to 'Operation Blue' in 1942 on the southern front in Russia. The *Panzerbefehlswagen I* (Sd Kfz 265) parked behind the 253 could well be the Battalion or Battery Commander's personal vehicle. He is seen on the right, on top of the 253 wearing the Model 38 side cap. The 3rd Company commander certainly cuts a dash with his cavalry breeches and boots.


WH-679999

ABOVE: The jumping horse symbol for the 24th Panzer Division can be seen on the side armour (forward of the driver's glacis plate) of the lead 250. They were formed between January and March 1942 some five to six months after the initial batch of 253 based 250s were built yet all of the 250s in this photograph are the 253 based 250 Typ 1 equipped with the *MG34* 'heavy mount' for vehicles. So how did a newly formed unit receive vehicles that were built so long ago?

All of the vehicles have stowed the front Notek light inside the vehicle to the right of the co-driver and the majority have an extra stowage box behind the factory fitted supplementary toolbox on the right track guard. This is a training exercise but whether this is Northern France before their transfer to the Kursk area in reserve for the 4th Panzer Army from June 1942 is impossible to know.

BELOW: It looks like a peaceful day out on exercise if it wasn't for the tram in the distance on the left and the style of architecture. The Officer Korps has requisitioned a house to use as their temporary base and have set about making themselves as comfortable as possible in the balmy evening sunshine. In these heady days, the life of the headquarters units was easy compared to the trials and tribulations going on at the front. As always, and like most Armies of the day, there was a gulf between the life of a Stabs Offizier and that of a front line Offizier. This is a *Stabs Kompanie* of one of the Regiments of the 24th Pz. Division. As the officers discuss the events of the day, others are organising a table behind, and the crew of the 250/3 Typ 1 rest up behind their vehicle on the bank. (As the photograph numbers are so close together, it is highly likely that these two 250/3s on these two pages are the same vehicle.)

ABOVE: Pz Kpfw III *(5cm KwK L/42) Ausf H (Sd Kfz 141) Panz Regiment 24 / 24th Pz. Division* accompanied by an Sd Kfz 250, of the Stabskompanie. The 24th Pz. Division was formed from the Kavalrie Division on the 1st November 1941.

This is another previously seen photograph, but more than worthy of inclusion in a bigger format to show the detail. The 250/1 on the left is one of the first to be fitted with the shield, but instead of a factory fit, it is probably borrowed from an Sd Kfz 251 Ausf B or C, which were all equipped with a shield from day one. This is the beginning of the dash to Voronezh (and the drive to the Don) and now the vehicles mount the front Notek light, and all the tools including extra jerry cans for water (denoted by the white cross) on both the front right mudguard and right track guard. The soldier standing in the back facing backwards, camera in hand is taking pictures of the following Pz Kpfw IIIs. Curiously, despite its good condition, the front number plate is missing.

The 250/1 on the right is notable for the lack of any forward facing armament or the post to mount the MG shield, and belongs to the 89th Art. Regiment / 24th Pz. Division. The divisional symbol was designed to retain the heritage of the original cavalry formation. These are forward observation troops ready to call in artillery strikes against any stubborn Soviet defences? For the troops it was a great adventure on the endless steppes of the Ukraine with victory after victory since 1939. The soldiers have a look of undeniable confidence on their faces, only to face encirclement and annihilation 7 months later at Stalingrad. The lucky ones who did survive would not see Germany again for another 10 to 14 years and even then, with the partitioning of Germany, it was possible that some would never see their hometown ever again.

The Sd KFz 251/1 Ausf C belongs to either the 21st or 26th Schuetzen Regiment / 24th Pz Division.

In 1942 the *Fu.Spr.f* radio was available to *Panzer Grenadier* units and this particular 250 Typ1 now has a pair of aerials. With the introduction of the *Fu.Spr.f* a new rack support was designed and the radio could now be fitted in front of the co-driver and the *SEUa 1 umformer* was mounted on the firewall above the co-driver's feet. On the top edge of the front right panel of the armour, the new *Antennenzuleitung* with a *1.4 meter Stabantenne* can be seen along with the original aerial mount on the rear of the 250 possibly for a *Torn E.b*. The 250 is notable for having an MG shield.

Here, more units of the 21st or 26th Scheutzen Regiment stretch out to the horizon as they push on to Morozovsk and Tatsinskaya. However the panzer grey stood out against the dusty beige / green landscape of the steppe. The dust thrown up dulled the dark grey paint, but in an attempt to lower the profile further, crews resorted to painting their vehicles with a water and mud paste which when dry was a perfect match to the landscape. Possibly due to the constant lack of water the mud paste was applied only in stripes rather than a full coat, which would have been far more effective.

All of the Sd KFz 251's are the Ausf C version, delivered when the division was formed in November 1941, but the Sd KFz 250/3 is one of the original Typ 1 bodied vehicles. Interestingly, apart from the early frame aerial, it also carries a pair of supplementary 2-metre aerials.

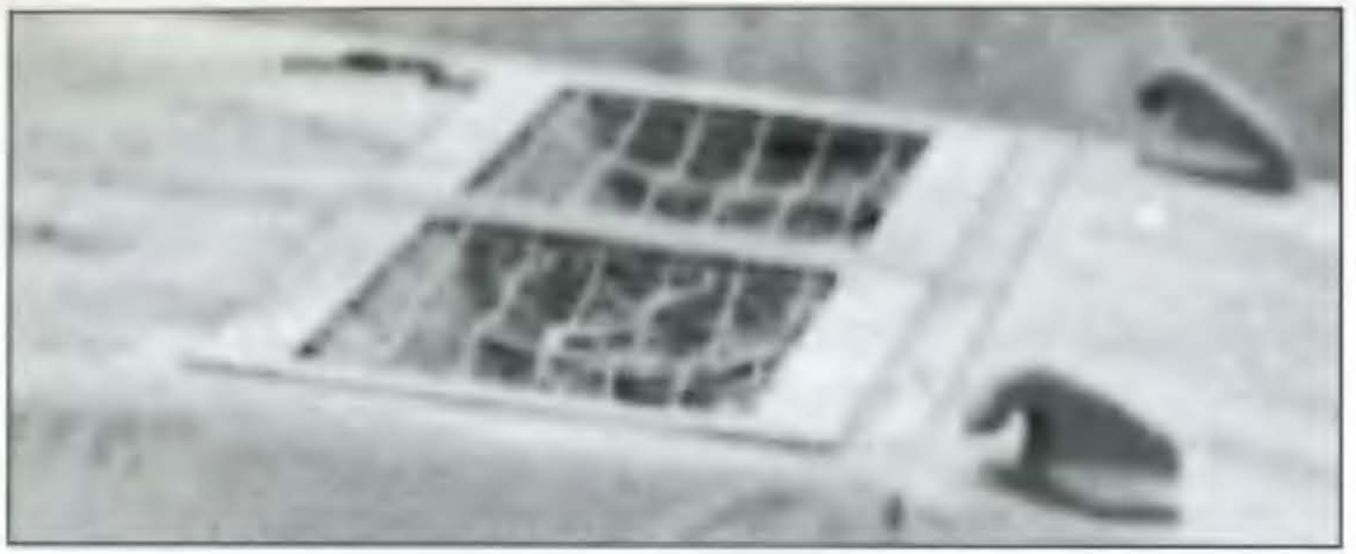
ABOVE: With two Typ 1 250/3s parked, it appears that someone is receiving medical attention from the crews. The closest vehicle carries a name painted on the side plate of the engine cover (below the left hand front visor) and a Roman numeral 'I' behind the side visor. Note the different position of the Balkenkreuz on each vehicle and the white tabs painted only on the front face of the mudguards of the closest vehicle. At the rear of the nearest 250 it is just possible to see the last of the tarpaulin hoops fixed in place below the canvas cover stretched across the frame aerial to protect their radios from the searing heat. This is the same 250/3 seen in the other photograph on this page plus the following page, but the interesting point is the stowage of the extra track wheels on the top of the turret of the Pz Kpfw IV Ausf F, numbered '422'.

Even though it is an enlargement of the vehicles in the distance and therefore somewhat fuzzy, there is an interesting group of 250s parked up around the lead tank. The 250 on the far left is a 250/3 Typ 2 with the later Sternantenne D and parked to the right of it, is the same 250/1 or 3 featured in 250 Archive Part 2 page 55 with the hinged mesh cover that could belong to the commander of the headquarters unit of the Pz. Division. Behind this is the early Typ I 250/3 with the bucket, jerry can and grenade case hung from the rear armour featured opposite bottom, and on the following 2 pages. On the far right is a 250/3 Typ 2 but with the earlier frame aerial.

For all their advanced radio communications equipment, it would appear that on this occasion the old-fashioned method of shouting is proving best or that radio silence is being observed. It is impossible to see the three digit number on the lead Pz Kpfw III, however the second and third are numbered '162' and '373' respectively. All the tanks have the typical large rear stowage box of 24th Pz. Division and are laden with extra equipment to make them as self sufficient as possible given the distances they are set to cover. Note how carefully the crew have avoided the Balkenkreuz and divisional symbol on the rear of the closest Pz Kpfw III Ausf J.

There are at least nine 251/1s stretching out into the distance before the dust cloud shrouds the lead vehicles, with vehicle commanders watching their right flank with some interest. The rear step on the 250/3 is now missing along with the lower half of the rear reflector arm on the left rear mudguard, and like the 253 it retains the tow cable bracket on the rear plate. There is a jerry can rack added to the right of the door. However it would appear that whoever made it did not get the depth quite right and the can will not fit in the rack.

The Sd KFz 251/9 Ausf C (seen opposite) was a relatively new piece of equipment to the heavy companies of the Grenadier Divisions. It took Bussing-Nag only 10 or 11 weeks to develop the prototypes using the now redundant 7.5cm KwK (L/24) from Pz Kpfw IVs and two vehicles were sent for field trials on the eastern front before the 251/9 entered full production in June 1942.



This fantastic photograph shows the texture of the mud paste applied to the basic grey base coat of this 250/3. The painter obviously did not feel the need to avoid all the original markings and has covered the name over (to the left of the stowage box) plus the three-digit number '130' below the side visors and the Balkenkreuz. It is probable that the mudguard is damaged and the small axe has now been pushed safely behind the wooden pole. Note that the padlock chain is contained in a canvas sleeve and the grill vents on the engine deck are in a poor condition. This 250 has the blanking plate over the aerial mount of what was originally intended to be a 253 and because it is a Typ 1, notice how far back the bullet proof glass block holder assembly is sited compared to the exterior armoured visor. The *Leutnant* is wearing a despatch riders coat and a M35 steel helmet.

In this photograph and those on the following two pages, troops of Sturmgeschuetz Abteilung 249 assist the crew of the 252 to re-load with HE shells for 7.5cm StuK L/24 for another trip forward to the StuGs. The metal ammunition cases are marked Patr. 7.5cm KwK u Stu G 7.5cm.

Note how the petrol and/or oil has seeped past the rivet heads on the rear of the chassis, the wiring from under the rear mudguard out to the stoplight and the triangular support for the rear reflector. Interestingly this 252 also has the door lock on the right-hand side. With the exception of the ammunition box, the rear doors and roof hatches (and like the 253s), the dash and firewall, the basic interior is painted white. Only small details such as the handle to lock the side visor are in *dunkel grau* The glass vision blocks are painted in a pale-grey silver (like galvanized metal). They are made of three sheets of white glass contained in a two-piece silver soldered case that pushes into the visor assembly box and are locked in place behind the armoured visor plate.

Clearly this is some way back from the front line as no one has a rifle or side-arm nor are they wearing their combat equipment and only two still wear their 'Y' straps and belts with the ammunition pouches in place. The soldiers are wearing a mixture of standard tunics and trousers, Sturmartillerie tunics, dusty black panzer trousers and herringbone fatigue tunics and trousers.

In the 2nd photograph of this set a medical orderly is checking a fellow soldiers head, as an *Offizier* on the far right looks on. The orderly is recognisable by the *Sanitatsunterpersonel* badge, (a snake wrapped around a pole), on the right forearm of his M36 tunic (note the metal hooks to support his belt when worn and also note the two lines of silver braid on his *Feldmutz*). The Gefreiter to his left sporting the map case has full slip on covers over his shoulder boards.

The Sturmgeschuetz Batterie 667 was formed in the summer of 1940 and was the last of the six independent units. They were earmarked to take part in Operation Sea Lion. Having spent the rest of the year in France training, they returned to Germany by the end of the year. In preparation for Operation Barbarossa, the Battery moved into East Prussia, crossed the border in the early hours of 22nd June 1941, and spent the end of the year on the outskirts of Leningrad. By March 1942, with the battery badly depleted, they returned to Zinna to be re-fitted and re-named Sturmgeschuetz Abteilung 667.

They received the new StuG III Ausf F with the 7.5 cm Sturmkanone 40 L/43 or L/48 main armament. The Ausf F was built from March to September 1942 and was basically an up-gunned Ausf E with the new L/43 armament with modifications to extend the traverse of the new gun mount, new ammunition bins and the addition of a fume extractor on the roof. This is one of the later models built after May 1942 without the armoured smoke candle rack on the rear. By the end of 1942 most L/24 armed StuGs had been superseded by this version. From the end of July 42 they served with Army Group Centre being shuttled around the front line between 39th Pz. Corps and the 28th Army Corps ending up around Rzhev at the end of the year. Judging by the condition of the vehicles in this photograph it cannot be more than a couple of months after their arrival on the Eastern front.

It isn't clear if the lead StuG crews have painted over the white bars on the rear bo or that the two bars are painted possibly red, blue, yellow or green.

The two StuG Ausf Fs are followed by a fully equipped Sd Kfz 252 and trail combination. Note the difference in height of the trailer box in comparison to the earli box (see page 113) to accommodate the longer ammunition. The 252 continued be listed as part of the formation given for *Sturmgeschuetz Batterie (7 Gesch.) (Mo K. St. N.446.* after the introduction of the Ausf E. The Sd Kfz 252 is one of the lat production vehicles with the taller width indicators. Even though production of t 252 ended after the 253, it appears that no 252s were ever built with the semapho indicator housings mounted down on the track guards. On the rear of the trailer with the tactical sign for a self-propelled artillery unit can be seen the numbers 667.

THIS PAGE TOP & RIGHT: StuG III Ausf F mit Sturmkanone L/48 of the Sturmabteilung 667 about to receive further ammunition. The 252 has lost its dust shield and semaphore indicators, but it does have one taller width indicator left. Note that the interior of the two doors remain in the original *dunkelgrau (RAL 7021)* colour. Look how battered the pair of vehicles have become compared to the previous page. I wonder just how quickly the snow has thawed to leave the vehicles still in their winter camouflage?

Of the two officers with their backs to the photographer, *Hauptmann* (Captain) Lutzow is standing on the right wearing the complete field-grey uniform with officer grade *EinheitsFeldmuetze*, the *Oberwachtmeister* (Squadron Sergeant - Major) wears his standard *Sturmartillerie* tunic over reversible white/grey winter trousers.

(For another picture see page 165 of German Army Uniforms and insignia 1933 - 45 - Brian Davis - published by Arms and Armour.)

OPPOSITE PAGE: This *Feldwebel* wears the standard issue Sturmartillerie tunic with plain cloth collar tabs, but with what appears to be either red piping (or thread in red) to denote the arm of service. The righthand collar tab has the remains of sewing thread where possibly a totenkopf badge was once sewn. The shoulder boards are the standard black backed slip-on and button design with silver Russian braid and silver pip for a *Feldwebel*. The rather tired looking *M38 Feldmuetze* includes a worn *Reichscockade* without a soutache and national emblem.

ABOVE: The left front wing is missing, as is the small axe, the wire cutters, front number plate and nose cap for the starter crank, but oddly, not the front dust shield. It has the second version intermediate height width indicators and the Fu. sprech. f aerial is mounted on the right of the bodywork and not quite enough ice-cleats to place them in every third track plate. Generally lacking exterior stowage, this could be a rear echelon vehicle or headquarters vehicle and has either "A C F" or "A O F" on the nose above the front number plate.

OPPOSITE TOP & ABOVE: This late model 250/3 (or 5?) Typ 1 is providing a lift to a group of Romanian soldiers. All but one of the German soldiers are wearing the two-piece mouse grey and white reversible uniforms first issued in the winter of 1942-43. Just visible on the nose plate is the tactical sign for an infantry division and the number '8' but without a unit sign, it is impossible to know to which unit they belong within Army Group South.

ABOVE: You can just see the roof mounted aerial base particular to the 252 series above the driver's front visor. It is unusual to see a 252 being used away from its intended role with the StuGs (unlike the 253s that did have a second life afterwards). Without any visible markings it is impossible to say for sure, but it does look like a dedicated panzerjaeger unit using an Sd Kfz 252 to tow a PaK 38 and use the internal stowage for anti-tank ammo. The only drawback is that the rest of the gun crew have to walk alongside the vehicle. Perhaps they did or do have an Sd Kfz 10 and it is currently out of commission, or this is an experiment to see how practical this arrangement could be or simply a case of needs must and this is the best they could find at the time. Typical of hard use both front mudguards have been pushed upwards by the tyres and the registration plate has been lost.

OPPOSITE PAGE: In an effort to speed up StuG production, M.A.N. built 142 Pz Kpfw III Ausf M "8. /Z.W" chassis between January and October 1943, complete with the deep wading exhaust system seen here on this StuG III Ausf G. Given that this is sometime in1943, both the survival of this 253 and its continued use by a StuG unit is remarkable and has seen a lot of action judging by the repairs. The front mud guard has been fabricated by the field workshop and lacks the curve of the original and is missing the original tool brackets and Notek front light mount. The exhaust side cover has also been replaced but lacks the cooling slots of the original design and the semaphore indicator housing is missing from the support bracket.

Coming down the road towards the photographer is a Mercedes - Benz Typ L 3000 A 3 ton truck with the radiator blind covering half of the grill to help keep the engine temperature higher.

The exact camouflage scheme is open to a lot of debate and we have included a high contrast photograph above to reveal the differences.

The original stencilled loading plate in white is still visible over the original field grey paint but has been partly over-sprayed with a secondary colour as has the body. The Balkenkreuz has been re-painted. The drive sprocket is caked in dry mud, the front wheel rim is also covered in mud but the darker patch is simply where the wheel has passed through a puddle and the chassis tub behind the track wheels is also coated in dried mud, but what other colours are we seeing?

Around this time units that were ear-marked for North Africa were re-deployed elsewhere when the fate of the DAK became inevitable, many ending up on the Eastern front, sporting a combination of *Feldgrau* (RAL 6006) or *Braun* (RAL 8020) and *Grau* (RAL 7027). It is possible that this 253 and accompanying StuG III were a pair of such vehicles re-routed east. The lightest colour sprayed in thin stripes on the nose and forward of the side visor could be Dunkelgelb. To add to the confusion there appears to be either patches of winter white or dried mud highlighted by the sun left on the trackguards and exhaust cover.

However we could also be seeing the remnants of a *Dunkelgrau* (RAL 7021) / *Grun* (RAL 6007) camouflage scheme from the previous year and a further patchy over-spray of *Grau* (RAL 7027) plus the remains of the winter whitewash as the absolute highlight colour. The publishers did try and produce a colour version of the above but they couldn't find a rendition that looked plausible. What is certain, is that there are many possible combinations and all of them, judging by the photograph, will look a mess.

Six

AFRIKA KORPS

LEFT: This DAK 253 crew certainly have as many creature comforts as possible given their location and have been very successful in adding to their personal inventory. They have two catering size cans that either are or were full of what appear to be figs. The large tin is marked as "Spezial Delikatesse Frischgebaken", (Special delicacy freshly baked / or cooked). The soldier using one as a seat, has a table comprising of two ammo boxes on which; he has placed his shaving kit and is holding a mirror as he has a shave. The tent poles stays are secured with Panzer I trackwheels and there appears to be a leather motorcycle pannier hanging off the rear of the 253.

The crew wear a mixture of first pattern tropical tunics, (both wearing shorts), plus the soldier standing on the roof, whilst the other two wear the second pattern without the pocket pleats. All of them have opted for ankle boots rather than the tropical issue lace up boots. The Officer on the left appears to be wearing his original grey *Feldmuetze* and the soldier having a shave wears a pair of darker khaki or khaki green tropical trousers.

TOP: The original large plain white Balkenkreuz on the side have been carefully avoided with the new coat of paint as has the one on the rear door, however this cross is of a later size and style with a black centre and applied at some point between the original markings and the new desert camouflage.

ABOVE: The same vehicle but now re-painted complete with the later style cross. The painter must have got confused and lined the cross up with the lower edge of the armour, yet on the following page he seems to have a slightly better job of trying to get it straight.

The front wheel centre seems to have been overlooked in the painting process compared to how clean the trackwheels now appear.

Given the various field modifications to radio vehicles, perhaps the German planners underestimated the expansive nature of desert warfare. In the case of this particular 250/1, perhaps the requested 250/3 has been lost en route across the Mediterranean Sea and consequently the workshop company has created this field fix out of whatever was available at the time? The mounting post for the front MG shield is still in place, so perhaps it is stowed within the vehicle. However if the shield was in place, firing the MG34 would take some care and attention to avoid destroying the frame aerial as it dips into the line of sight.

ABOVE: The frame aerial has been inverted and the front now angles upwards in comparison to the aerial on the opposite page. The stowage box is a bit of mystery. Close up photographs show it marked "not be stood upon", so it is not made of armour plate but sheet metal with a lockable door on the top surface. Quite why it is this shape and what exactly went in it is a bit of mystery. Perhaps it is the Sd Kfz 250/12 Light Survey version, (shown on page 239 of Sd Kfz 250 Archive Part 2) but with this extra stowage box for their specialist equipment.

OPPOSITE PAGE: This is yet another variation on a theme. This 253 has acquired the complete frame aerial assembly from a 250/3 or 5 to increase the range and is consequently a far better resolved modification than those on the previous pages. It is clearly marked from an artillery unit but has a white air recognition stripe across the bonnet. There are clearly two layers of desert paint over the top of the orginal grey.


RESERVED FOR
No PARKING
WITHIN 500 YDS.

This photograph typifies the ebb and flow of the desert war. Gambut is situated between Bardia and Tobruk in Cyrenaica (Libya) and changed hands 5 times during the war. It was captured by the Allies from the Italians in January 1941, then lost in Rommel's first attack on the 10th/11th April 1941, it was re-taken in early January 1942, captured again by the DAK in June 1942 and finally re-taken for good in the second week of November 1942. Whilst the allied signals troops were protecting their parking rights they perhaps forgot to think they would or could temporarily lose them for a while.

Underneath the inscription 'No parking within 500 yds' is an older sign stating 'All ambulances stop here'. Quite how the camouflage paint could reduce the profile of the building I don't know, perhaps it was thought of as a good idea at the time. Even if the British painted it in the same 3-colour scheme as their vehicles lessening the profile of 20 feet tall building would take some doing!

Note the difference between the paint finish on the 250 and the vehicles in the background. The 250 is a first generation Afrika Korps vehicle with a heavily weathered mud coating, whereas the other two have been delivered later and have received a comprehensive coat of *Gelbbraun (RAL 8000)*.

increased in comparison to the frame aerial. In this case only two of the three 1.25 metre metal poles are being used. If the aerial were to have been used at a 5-metre height it would provide a range of 25Kms for the 30 W.S.a. On top of the two pole sections sits the porcelain isolator and spigot that holds the antennae array itself. Notice how the cable for the frame aerial has been extended up to the mast and is deliberately held away from the metal poles by a mini spar to avoid any interference if the cable touched the poles.

Inside the rear door it is possible to see the Fu Spr.a or d radio set mounted under the right side of the main radio frame. This was only a feature of early 250/3s or 5s and only ever used in the Typ 1 versions of the 250 series. The loading plan manual produced in January 1943 shows only Typ 2 250/3s and 5s and the space where this is sited in this vehicle was used for a lockable cupboard and the radio has now moved in front of the co-driver, which was common to all Typ 2 interior layouts using the Fuspr.a, d or f.

Note the single spar rear reflector arm and the rear track guard that is split along the weld line. Looking at the height of the track links above the track wheels, this particular 250 is heavily loaded. The standard tarpaulin hoops have been put in place and further covers and blankets have been draped over the vehicle to avoid the searing heat of the day.

Notice the state of the hood on the Horch Kfz 15 and the contrast of the sand and grey paint in the interior.

Seven

KLEEMANN'S 250/1

General Major von Kleemann became the commander of the newly renamed 90th Light Infantry Division
29th April 1942 a month before the battle for Gazala commenced. He wears a first pattern tropical tu
(identifiable by the pleated pockets) and the standard details for his rank with an officer grade field c
(*Tropen einheitsFeldmuetze)*. Note how much darker his uniform is, especially the cap, in comparison to t
rest of the crew - perhaps because it is newly issued on his promotion or transfer to the division.

The Sd Kfz 222 was developed after the 223 and designed to equip the first *schwadron* of the *Aufklarungs Abteilung*. With fully independent suspension, four wheel drive, four wheel steering and 3.5 or 3.8 litre V8 Horch engine, it proved to be a highly mobile and effective vehicle armed with a 20mm *KwK30* or *38 L/38 Kanone* and co-axial *MG34* with a range of 300 kms. A total of 989 were produced between 1936 - 43. This is the early version with the 3.5 litre engine and non-hydraulic brakes.

The canvas covers are in place on the turret cage in an attempt to shroud the interior from the heat. It is interesting that the crews of both the 222 and 223 have not deployed the aerials for the *Fu.Spr.a* radios. Perhaps with such a close knit group centering around the commander, and the need to maintain the minimum radio traffic, orders were shouted between the vehicles here and only tactical messages were received and sent out by the 223? He has left his Horch Kfz 15 staff car for something more suitable before moving up closer to the front line.

Sd Kfz 223 *(Leichter Panzerspahwagen Fu)* was designed to provide long-range communications to armoured car squadrons o the Reconnaissance Battalions. In this case the 223 is an integral part of the Commanders communications network, because hi 250 can only have a single set in the back. Without the 223, he would be unable to receive or send long distance information required to make critical decisions. Note that the 223 lacks the armoured hub plate protectors, but does have the ring protector for the tyre valves. Despite the fact that the tyres are the bullet proof variety, it still has a small inflatable tube to assist in keeping the tyre from slipping on the wheel rim. In total 550 were produced between 1935 - 44. In this guise it carried the *Fu12* in conjunction with the frame aerial, to provide a range of 75 square kms, plus a *Fuspr.a* using the 1.4 or 2-metre aerial, which is mounted on the *antennenfuss 1* seen on the rear of the turret. The aerial can be seen stowed horizontally along the top of the superstructure behind the lead arm of the frame aerial.

FuG 12 = 80 W.S.a (80 Watt - Sender - Gerat A)
Torn E.b. (Tornister - Empfanger B)
or Mw.E.c (Mittelwellen - Empfanger c.)
Fu. Spr.a = Funk Sprech Gerat a (Fu Spr a) (Radio speaker a).

The *Fu.Spr.a* (introduced in 1940) was designed for use within vehicles and the series of 3 (a, d, and f) were considered some of the best and most compact radio sets used in WW II.

The Commander observes developments of the battle for Gazala whilst the crew of the Sd Kfz 10/4 (note the metal covers for the K98's on the front wings) from the 613th Light Flak Battalion wait without apparent threat of aerial attack. The 250 wears a worn coat of *saharagelb* (sahara yellow) over the original dunkelgrau with further applications of a slightly more pale colour. Instead of the MG shield or MG34 'heavy mount' for armoured vehicles, they have simply utilised the MG bracket and support from a Kubelwagen for the MG34.


1004

If it wasn't for the 'one-off' aerial base, this 250 would raise all sorts of questions about interior fittings for early 250s. They can only be using a single radio set given their proximity to each other, the only viable set would be the Torn E.b general receiver radio set that covered virtually every other frequency used by the different arms of service in the Wehrmacht. The first version of the Afrika Korps cuff title as worn here was instituted on 18th July 1941. Note the driver has turned his cap around 'hip-hop' style.

Even though the 250 is painted in *Gelbbraun* (RAL 8000) it would appear that it was applied in a fairly thin layer with the original *Dunkelgrau* (RAL 7021) showing through. Note how subtle the changes can be when comparing the dusty steel helmet in *Dunkelgelb* to the faded *Gelbbraun*. However the crew have at some point decided to add a a layer of mud paste to lighten the tone. Over time it has either worn off or has been subsequently rubbed or washed off leaving patches in the recesses and streaks on the lower panels.

The circular plate that reveals this 250 Typ 1's heritage is clearly visible in the photograph, as is the placement of the aerials which copied the orginal format from the 253. The spring assembly is designed to hold the base in place on the frame without the need for bolts to interfere with the improvised mounting and the isolator.


WH
679 984

After the battle for Gazala, the 90th Light Division which also included *Sonderverband 288*, attacked Mersa Matruh on the 28th June 1942. Having surrounded the town they then had to repel determined break out attempts but, without sufficient strength, the allied Divisions managed to retreat east. Here, von Kleemann has pulled up alongside one of two *S.v.b 288* StuG III's to discuss matters with a very dishevelled looking *Oberfeldwebel* wearing one-piece coveralls. Coveralls were first issued in in 1941, the early versions had no national insignia or provision for shoulder straps which was later redressed as seen here. In this photograph he has added his shoulderboards to allow him to be identified

but look at the size of the rip in the rear at the top of the leg. Also note that these are tw
different soldiers both wearing coveralls and not two pictures featuring the same perso
Look at the way they have differed in how they wear the trouser over their boots. Th
250/1 has two number plates, but these follow the outline of the rear of the track gua
instead of the individual symmetrical design seen elsewhere and a single spar for re
reflector. Notice the difference in design of the Typ 1 rear panel making the bottom
the door higher necessitating the rear footstep.

One of the Afrika Korps biggest problems was the re-supplying from Italy to Tripoli. It wasn't until April 1942 that Kesselring's 2nd Air fleet began bombing Malta, finally allowing sufficient supplies and new vehicles to find safe or somewhat safer passage from the RAF based on the Island. This StuG III Ausf D belongs to 5th Panzer-jager Kompanie / Sonderverband 288 and was one of three from the original shipment of 6 StuG III Ausf Ds that arrived in April 1942. It has also been suggested that of the the three that did arrive, one fell into the sea upon unloading at the port, the second was captured leaving only one to see action as part S.vb 288. If this account is correct, perhaps this is the only StuG in North Africa until the arrival of 4 F/8s in November 1942. Note the purpose made rack for jerry cans on the rear.

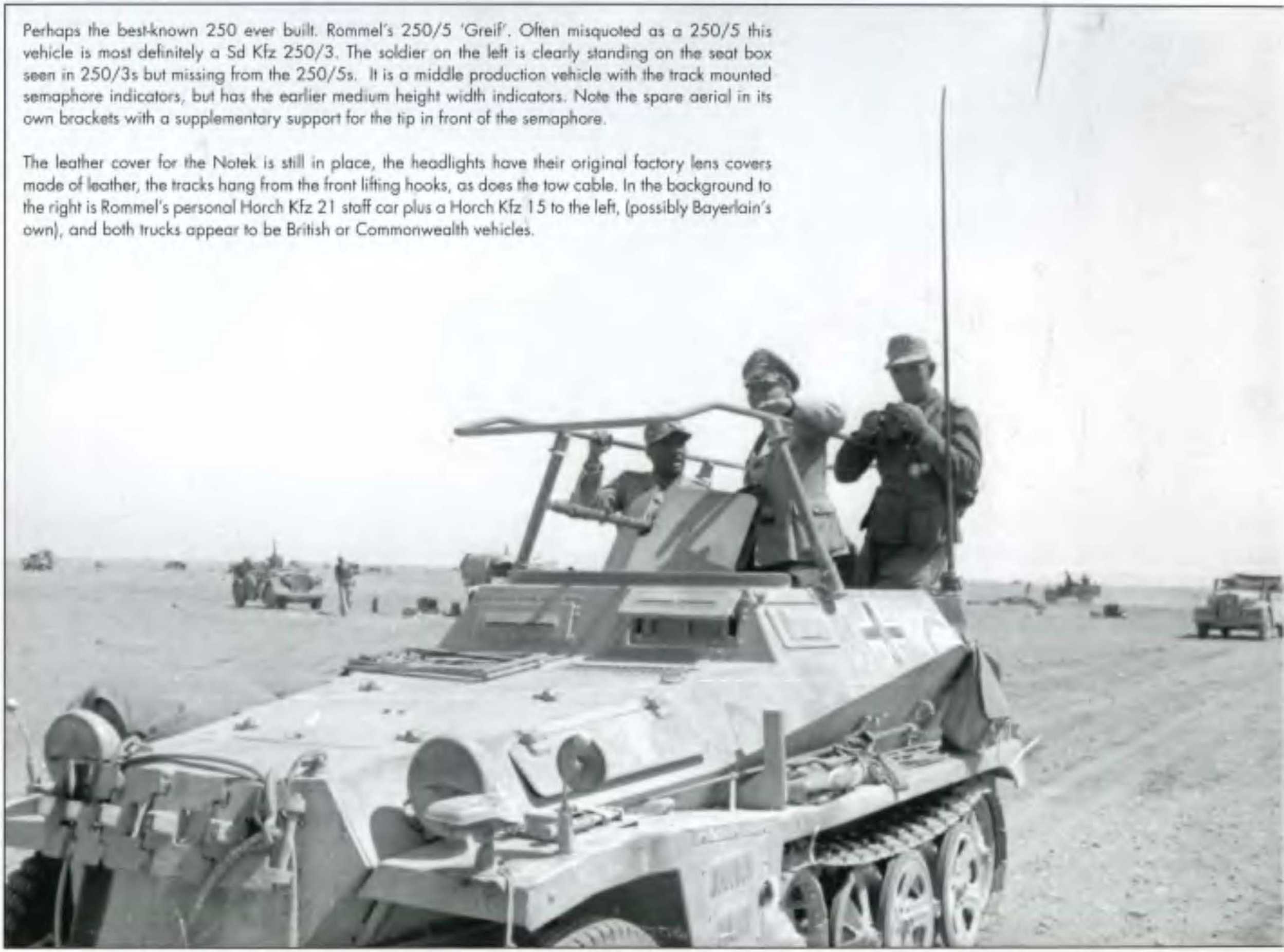
The jerry cans on the nose of the 250 have covered up the tactical signs but it still has its number plate and the leather cap for the Notek light spigot. Note the low height width indicators for an early middle production vehicle and that the mud and track guards are still in good condition. Also note how the glass remains in the vertical position even with the visor open on the Typ 1, plus the different tread pattern on the front tyre.

Eight

ROMMEL'S 250/3

Perhaps the best-known 250 ever built. Rommel's 250/5 'Greif'. Often misquoted as a 250/5 this vehicle is most definitely a Sd Kfz 250/3. The soldier on the left is clearly standing on the seat box seen in 250/3s but missing from the 250/5s. It is a middle production vehicle with the track mounted semaphore indicators, but has the earlier medium height width indicators. Note the spare aerial in its own brackets with a supplementary support for the tip in front of the semaphore.

The leather cover for the Notek is still in place, the headlights have their original factory lens covers made of leather, the tracks hang from the front lifting hooks, as does the tow cable. In the background to the right is Rommel's personal Horch Kfz 21 staff car plus a Horch Kfz 15 to the left, (possibly Bayerlain's own), and both trucks appear to be British or Commonwealth vehicles.



The 'GREIF' motif on the right was only an outline in white, whereas the left hand side was infilled with red. The post sited at the rear of the track guard in front of the rear light is for the sternantenne A to be fixed in place. This is one of the later Typ 1 250s with a complete top right side panel without the plated over mounting point left over from the 253.

It is certain that Rommel's troops, or even Rommel himself would appreciate a text-book painted command vehicle. The instructions were a combination of Gelbbraun and Graugrun to cover the Dunkelgrau. This has been done, but once again the paint does appear to have been applied thinly and has easily worn away in high use areas such as the top edge of the fighting compartment. The vehicle has also received a secondary coat of mud paste that makes me wonder if the new directives to replace the Dunkelgrau were still too dark and the crews have decided to "knock back" the colour depth with the addition of the paler mud paste.

It is widely accepted that German radio design and technology and the use of radios to control and direct battles was the best in WW II. Here there are two levels of command in operation and as the attack goes in, all eyes are on the horizon. Rommel's 250/3 has parked behind a Panzerbefehlswagen Ausf E. Officially it was designated as a 3 serie gr Pz Bef Wg. built from November 1940 to January 1942. This is an upgraded or overhauled Pz Kpfw III Ausf E with the wider track, new drive sprocket, re-positioned front return roller, modified idler wheel and the later style armoured smoke candle rack at the rear.

Pz Bef Wgn served only with the regimental and company headquarters units with a specialist communications crew from the *Nachtrichtungstruppen*. There were three specific versions of the Pz bef Wgn numbered Sd Kfz 266 - 268 using any chassis from Pz III to VI only differing in the type of radio equipment carried for their intended roles. For Panzer III versions the differences were as follows:

(Sd Kfz 266) Company headquarters - Nachtrichtungszug - FuG 6 = 20 W.S.c + Ukw.E.e and Fu 2 = Ukw.E.e
(Sd Kfz 267) Regimental headquarters - Nachtrichtungszug - FuG 6 = 20 W.S.c + Ukw.E.e and Fu 8 = 30 W.S.a + Mw.E.c
(Sd Kfz 268) Verbindungs - FuG 6 = 20 W.S.c + Ukw.E.e and + Fu 7 = 20 W.S.d + Ukw.E.d1

To the rear of the Pz Kpfw III another crewmember is operating a *Torn.Fu.b1 (Tornister Funkgerat b1* - Portable radio set b1) precariously balanced on top of the power and accessories box, which formed the complete set. The Torn.Fu.b1 was a general set used by the infantry with a range of 12 miles when using the Morse key or 6 miles verbally.

Note the crewmember peering out of the turret to see who has arrived behind them, and that the observer on the Pz Kpfw III has a set of long-range binoculars. With the enemy on the horizon line and perhaps unsure as to whether it is allied armour, Rommel's driver has positioned the 250 behind the tank for protection.

As the battle unfolds on the horizon, a Luftwaffe Officer is in conference with Bayerlain as Rommel listens in. Hopefully this photograph will inspire a scale model replica builder to try and replicate the multi-layered coats of paint, mud paste, drips and runs along with the wear and tear. Notice how the top edge of the side armour is wearing away through the various layers back to the original dunkelgrau, and perhaps to the undercoat primer of red-oxide.

The frame aerial posts are bound with what appears to be cloth. The posts look a little thin in comparison to the metal 'cup' base. Could it be that the wooden posts have shrunk with the heat? With the headlamp in position and the shorter version of the width indicator, the rear view mirror is next to useless. Note the extra bracket on the track guard to prevent the sternatenne D with its base carefully wrapped in canvas from falling off and the spare 2-metre aerial held in it's own clasp. (The tip can be seen above the exhaust cover)

Literally the 'fruits of success' as Rommel and his crew tuck into liberated allied cans of Empire 'Selected Fruits'. The box on the engine deck comes from Durban, South Africa and was once the property of the 6th South African Army Corps. Rommel's Horch Kfz 21 staff car is parked in the distance.

Armed with a MP38/40, a war weary Unteroffizier leads 'his boys' past their commander. Untrained for desert warfare, the Soldiers of the Afrika Korps soon earned themselves a reputation as a tough, uncompromising opponent, swift in advance and resolute in defence. Such laurels were not easily won, and the strain of it all clearly shows on these men's faces. Note the 'sand tyres' on the Typ 82 'Kuebelwagen'.

Notice how rough the signwriting of 'GREIF' actually is. Apart from the base grey and desert yellow plus the addition of the name, it is also covered in a mud / sand paste on the rear panels. The aerial cable cover hangs over the top edge of the armoured side and the cable is fastened to the pole. The cable is in two parts and is joined where the two piece U-clamp is bolted to the upright in order to allow the frame aerial to be removed easily. Bayerlein listens as Rommel converses with General Der Panzertuppe Walter Nehring. As with so many German Generals, Nehring was wounded in August 1942, to be temporarily replaced by Bayerlein.

Apart from being a base feld grau 250, it received a second paint colour of sand but has also received various coats of mud paste. See how the paint layers are revealed on the front mudguard and how the paint has been worn away.


WH-937 026

Nine

TRANSITION


310413E K.


A
WH-126013

With the proposed 250 range along the lines of the 251 variants, plans were put in place to increase the manufacturing base and concurrently simplify the design to speed up production and improve both the frontal protection and forward vision for the driver and a host of other minor modifications to improve the 252/253 series design.

As mentioned in the history chapter, at least the first 29 Sd Kfz 250s were converted from existing 253s. If the 253 had proved to be a better idea than it was, perhaps no 253s would have been converted in this way and 250 production would have started at a later date than it did. By August 1940 the size and shape of the Sd Kfz 250 had been set for the new shorter design but, no mention is made of these 253-based interim vehicles in any official manual I have found so far. If there were only 29 conversions carried out it is possible that for once the Army decided not to produce a manual for this hybrid vehicle.

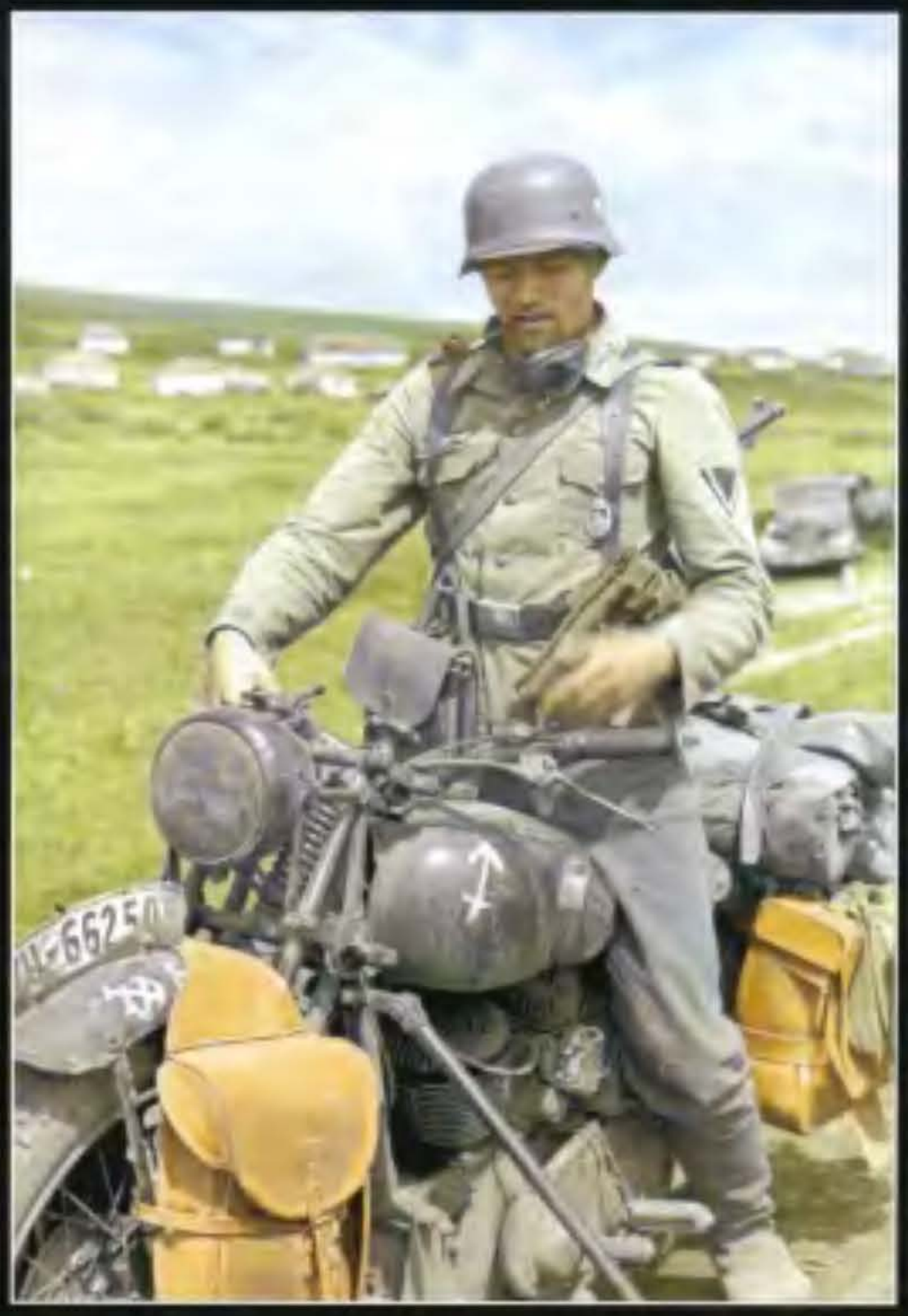
OPPOSITE BOTTOM: The last 253 built would have been chassis number 310285. The 253-based 250 (second closest to the camera) is marked up 310314 some 29 chassis's after the end of 253 production. The Typ 2 nearest the camera carries chassis number 310390. This indicates that at some point between the 314th and 390th Buessing-NAG produced chassis, a switch has been made to the official Alt version using the shortened 250 series superstructure. Just how many more conversions were created is impossible to say but at most it can only be 105 going by the chassis numbers shown in this photograph.

Note how the curved shield under the nose armour is set back from the bottom edge and two brackets hold the registration plate just proud of the nose. Sensibly, with the advent of the Typ 2, the number plate is now painted on the nose plate. The driver's visor is half open but the co-driver's visor is unlocked. The top of the cover is set away from the body because of a spring on each supporting arm. If it did not do this, the top edge would not clear the immediate bodywork in order to open. There is only provision to clamp a small axe on the right front wing and note the different mounting position and angle of the width indicators compared to the Typ 2 closest to the photographer.

In the chapter 1942 in this book and the second part to this series of archive books for the 250, there are many sets of photographs taken to mark the arrival of these new units within regiments in the Pz. Divisions. Before this, the 250 was used primarily as a radio vehicle for zug, kompanie and divisional communications in its 250/3 or 5 guise.

For further details of the official Sd Kfz 250 Alt see Sd Kfz 250 Alt - Neu Archive Part 2.

Ten



CAMOUFLAGE COLOURS

INTRODUCTION

The question of paint colours and camouflage schemes on German vehicles provokes much discussion amongst enthusiasts. All have their respective views on 'what is right', largely based upon wartime photographs (and most of these are black and white), museum pieces (few of which retain their original finishes) and primary source documents that help 'carbon date' changes in colour requirements.

Of some importance is the 'RAL number', an almost mythical designation that is much quoted but often poorly understood. In the 1920's, the German business community co-joined with the then government to tackle the lack of consistency in production and manufacturing standards. A 'Reich committee for terms and conditions of sale' (Reichsausschuss fuer Lieferbedingungen or RAL) was established to initiate an accepted norm across the various industries. RAL colour swatches were to be the 'last word' in defining the various shades of the primary colours, and as such were referred to by the likes of the print trade through to the automotive industry.

By mid 1940, the Wehrmacht were able to specify exactly the colour they required from the manufacturers of their vehicles and equipment, a dark grey finish recorded as 'Dunkelgrau' - RAL 46 (this was later designated RAL 7021 [or RAL 7027, dependent on source]). As a general rule, vehicles throughout the period 1941- 42 retained the dark grey finish, but there is some evidence that supports the use in Russia of various other greens, browns or yellows being utilised to paint on camouflage patterns.

For obvious reasons, vehicles in North Africa were initially over sprayed with a base coat of yellow-brown (RAL 8000) and a camouflage pattern of grey-green (RAL 7008). In early 1942, a change was ordered to reflect the more temperate climate of Tunisia. A dark sand base colour ('Braun' RAL 8020) was to be applied with mottled patches of the 'Dunkelgrau'. Also seen in other areas of the Mediterranean, including Sicily and Italy, it was not unknown for vehicles with this scheme to end up on the eastern front, particularly to the south where conditions were considered more 'tropical'.

The radically different nature of the landscape on the eastern front had prompted a re-think in the use of the dark grey base coat. As mentioned, some effort was made by crews during the 1941-42 period to paint on camouflage patterns to reflect the wide scope of terrain they found themselves in. This need to be able to 'blend in' resulted in the formal adoption of a dark yellow ('Dunkelgelb' RAL 7028) base coat in February 1943 with two official supplementary colours that allowed units further flexibility in deciding how their vehicles were to be finished. Tins of olive green (RAL 6003) and red brown (RAL 8017) were manufactured in the form of a paste and, diluted with water or petrol; crews would apply these according to local conditions or unit regulations. The final effect was very much dependent on the skill and artistic leanings of the individuals wielding the paintbrush or spray gun.

And so it remains today. Whether vehicle modeller or restorer, the quest for authentic colours and schemes can be seen in numerous publications and military shows. Some have quite obviously not made any effort at all, others have gone to great lengths to 'get it right', but most concur that there is no such thing as an 'official' colour. One has only to wander around a military collectors fair or museum to recognise that there is a wide range of shades applied to original items. To be fair, some examples show their age and can be largely discounted as evidence, but even the mint examples of dunkelgelb seen by the author vary widely in tone.

It must be remembered that the RAL colour swatches were something a hard-pressed wartime economy could only aspire to. The paint manufacturers were not exempt from shortages in raw materials and would have been forced to search for alternatives to match the official colours ordered by the military. In turn, paint producers, by the very nature of their trade, recognise that no two batches are alike anyway, a fact testified to even with today's 'superior' techniques. (It is common knowledge that when decorating a wall requiring more than one tin of paint that it is advisable to use tins with the same batch number. How much harder would it have been for a bomb-ravaged infrastructure largely kept going by enforced labour to conform to official requirements?)

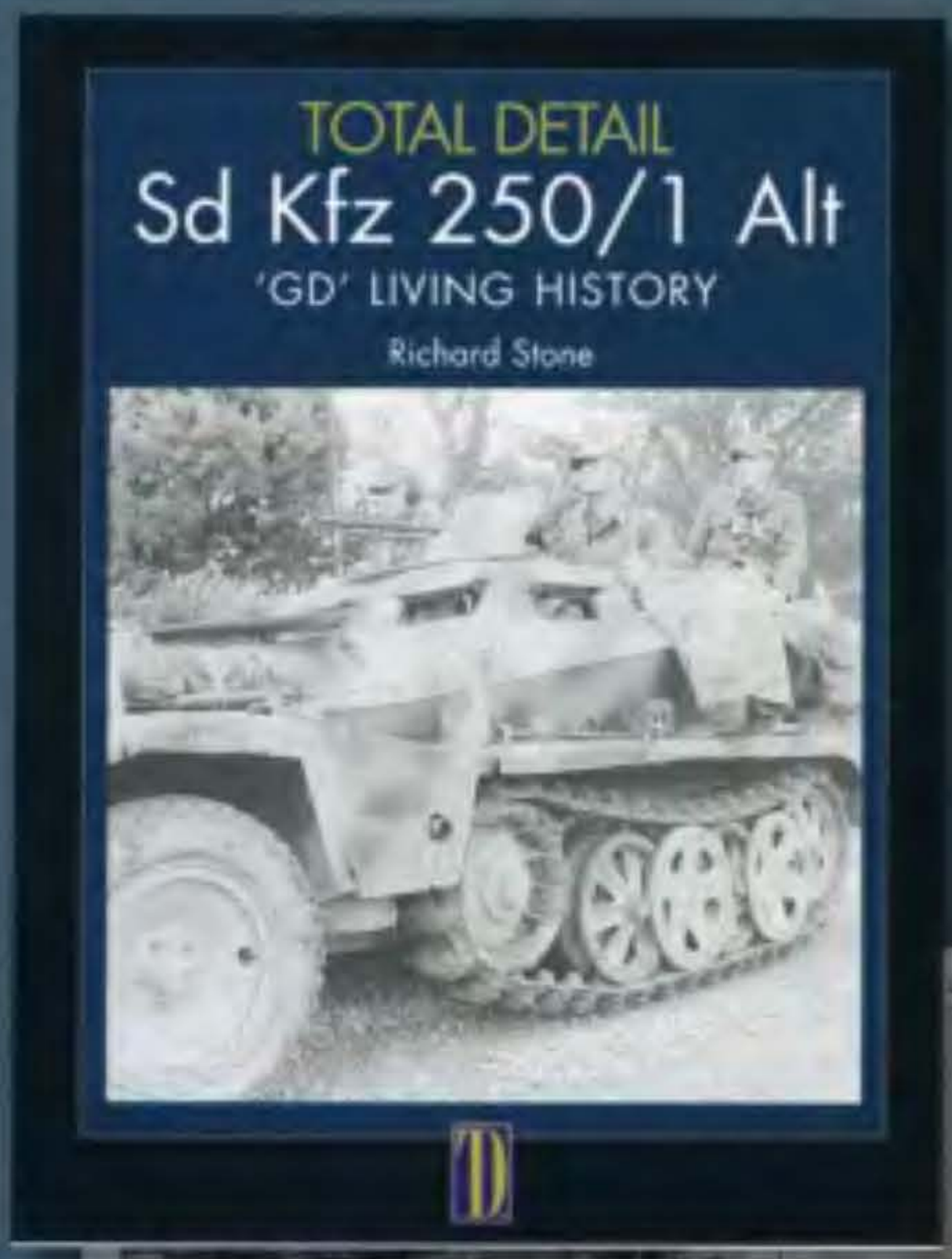
Added to this are the various methods of applying colours at the front. The final shade of the olive green and red brown pastes were very much dependent on what was used to dilute them. Clean water was probably at a premium most of the time; therefore all manner of liquids would have been used as thinners. This, combined with base colours that could only 'look like' the official swatches meant that in reality nearly any shade of one particular colour could be justified on original German equipment.

Hand colouring photographs had been extant since the invention of the camera and came to prominence with the rise in popularity of postcard collecting from the 1890's onwards. Those wartime photographs that are from genuine colour film, most do not represent the actual hues as early film simply did not have the colour soak performance of modern films and for the most part, had to be improved for use on magazine front covers.

Instead of providing an artist's renditions of camouflaged schemes, Total Detail Publications have decided to digitally colour a selection of some of the more interesting examples found in this book. Modern technology makes it possible to alter the contrast and brightness of any picture and find the hidden detail in colour contrasts and the shape of the patterns created by the original painter. With tones based on mint original examples from private collections around the world and Thomas Chory's excellent book Wehrmacht Heer Camouflage Colours 1939 - 45, it is compelling to see original photographs coloured in this way. However subjective the idea may be, these renditions give a new sense to 'how it looked' and they continue a long tradition of hand tinting and colouring.


WH-768 609


1004



VOLUME ONE - Sd Kfz 250/1 Alt.
'GD' Living History

ISBN 1-904900-00-3

Everything that you could ever want for total detail for the Sd Kfz 250/1 Alt is in this book. Far from being just a living history book, this is an integral volume in this four volume set. This book was created purely because it is not possible to find this level of detail in any archive picture and has been done with such care for accuracy that it is fast becoming an accepted reference book for Sd Kfz 250 Alt, the crew, the weapons and personal kit used and stowed in and around the vehicle.

VOLUME THREE Archive - Part 2

ISBN 1-904900-01-1

Following on from Archive Part 1 this volume deals with the 'classic' 250 Alt and Neu versions.

Highlights include:

- Oversize A4 - 240 pages.
- 199 pages of archive photographs
- 14 pages of hand coloured archive pictures
- Fully translated original Beladeplane for the 250

CONTACT YOUR LOCAL RETAILER OR TO SEE MORE AND BUY ONLINE VISIT:

This book brings you the archive photographs to add to our trilogy of books about the Sd Kfz 250.

Full of interesting facts and observations about the vehicles, the campaigns and rare uniform variants worn by the crews and backed up with some of the best hand coloured wartime pictures created to this day to reveal the camouflage schemes, uniforms and what the landscape really did look like in WW II.

Highlights include:

- 251 pages in total
- 200 pages of archive photographs
- Hand coloured archive pictures to show the camouflage schemes
- Highlighted information for rare and unusual uniform variations
- Campaign details

www.totaldetail.com

ISBN 1-904900-02-X

9 781904 900023 >