

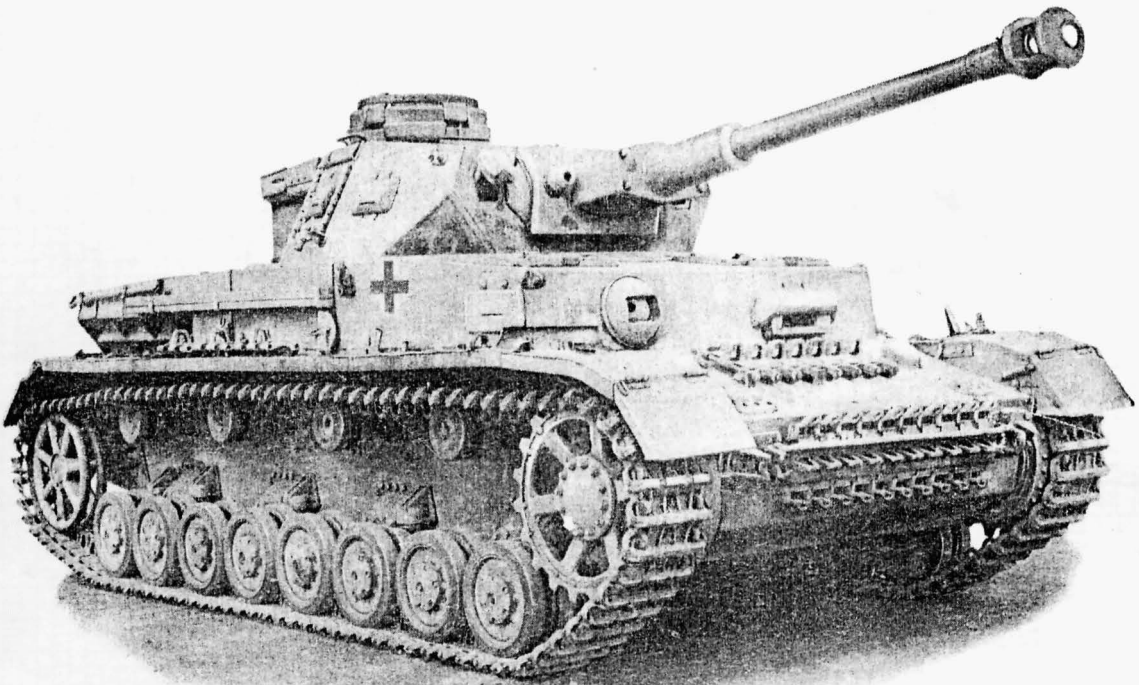
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PRELIMINARY REPORT N° 15

Pz Kw IV

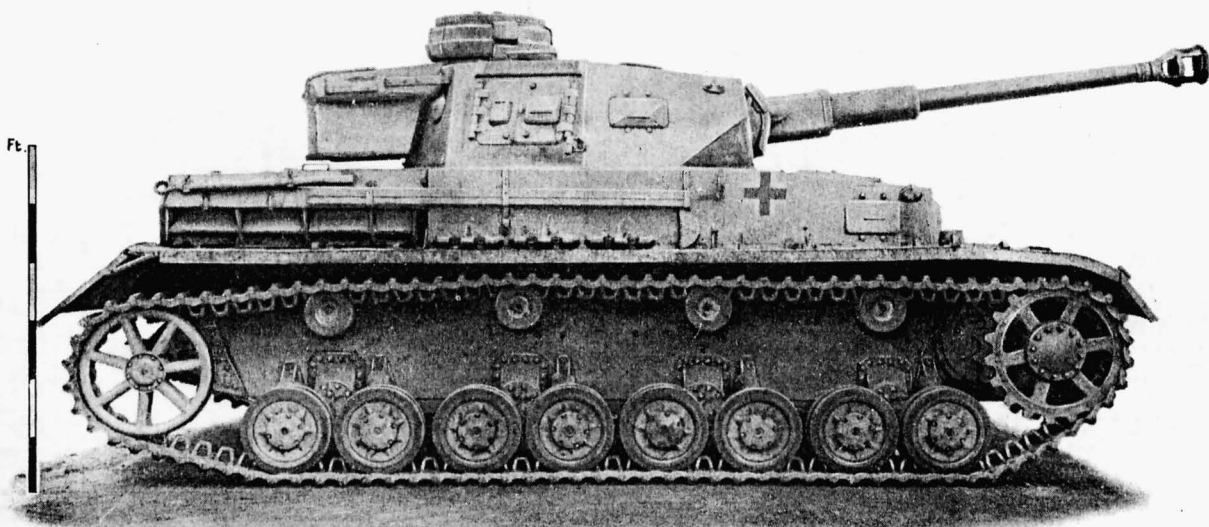
(Special)



Military College of Science
SCHOOL OF TANK TECHNOLOGY
Chobham Lane Chertsey



August 1943



FOREWORD

This vehicle which is a Model "G" is of particular interest since it is the first Pz.Kw.IV mounting the long-barrelled 7.5 cm. gun to be received in this country.

Otherwise in general construction the vehicle is similar to the earlier models examined except for the thickening up of the armour, the modification to the front vertical plate, and other detail changes outlined herein.

The progressive development of the welded fabrication of idler wheels on German tanks has always been a point of interest. An entirely new and novel tubular construction appears on this vehicle.

A slightly improved finish is observed in the internal fittings in the fighting compartment particularly as regards the operating mechanism of hatches, etc.

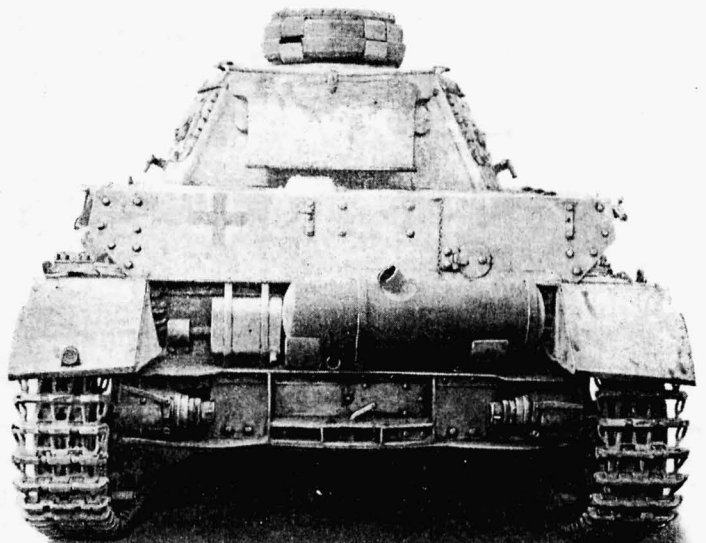
The tank is in a good state of repair mechanically and structurally both as regards the vehicle itself, the power traverse installation and electrical components.

Special attention is directed to the heat transfer system referred to in Para. 17 of this report. The system appears to be a modified version of that referred to in an article in Issue No. 195 of "Die Panzertruppen" dated November, 1942. It is considered that this installation is worthy of investigation as it would be of considerable value in the operation of vehicles under extreme climatic conditions.

The power traverse installation of the Pz.Kw.IV has, we understand, several commendable features of performance.

The installation on this latest tank, whilst of generally similar design, incorporates several modifications in construction. The earlier example examined by Messrs. Merz & McLellan gives the impression of having been made in limited quantities only, whereas the later installation has been considerably "cleaned up" and seems to be a production job.





PRELIMINARY REPORT

STT/8/2/7

Pz.Kw. IV (SPECIAL)

(Ex Middle East)

EXAMINED AT CHOEBHAM (D.T.D No. 3010) D.T.D. PROJECT NO. V.7029 August 1943.

EXAMINERS: MAJOR J.D.BARNES, R.T.R, MAJOR W. de L.M. MESSENGER, R.T.R. and
CAPTAIN N.F. BRAND, E.M.E.

1. TYPE

Pz.Kw.Iv (Model G)

Chassis No. 83072

2. GENERAL CONDITION

The vehicle is a runner. A superficial examination points to its being in excellent condition both structurally and mechanically. Apart from the breakage of the towing eyes on the nose plate, there is no apparent external damage. The total mileage recorded on the speedometer is 482 Km. (301 miles.)

3. WEIGHT

A painted marking in red on the offside of the superstructure shows the weight of the vehicle as 22,400 Kgs. (22 tons.) This figure is preceded by a red cross which presumably indicates the centre of gravity.

4. ARMAMENT

The vehicle is equipped with a 7.5 cm. Kw.K 40 (Long) gun and one 7.92 mm. M.G 34 (Tank pattern) coaxially mounted in the turret. A M.G. of similar pattern is mounted in the hull front vertical plate.

No smoke apparatus is fitted and there appears to be no stowage for a machine carbine although one is probably carried.

7.5 cm. KwK 40 (Long) The gun is serviceable and is scarcely worn.

Dimensions

These appear to conform to those of Gun No. R.3298 which is at present at Shoeburyness. A sketch is reproduced showing measurements by S. of E. Shoeburyness - Fig. 1.

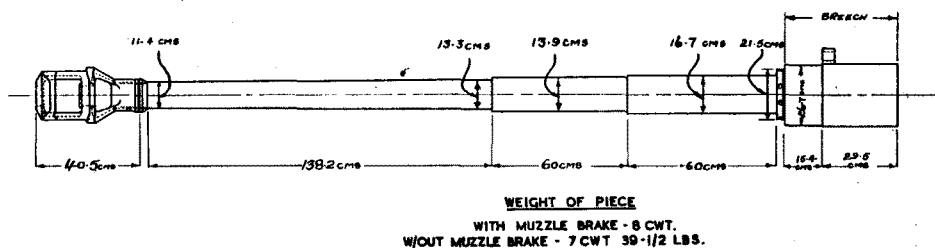


FIG. 1

The leading dimensions are approximately:

Length of Piece (less Muzzle Brake)	127 ins.
Length of rifling	97½ ins.
Length overall	139 ins.
Length of chamber	20⅙ ins.
Depth of breech opening	9½ ins.
Number of grooves	32

These dimensions indicate that it is a short-chambered gun, taking the 6339 cartridge case.

Construction

The construction of the weapon is monobloc. It has a detachable breech ring.

Mechanism

The standard type tank pattern breech mechanism is employed. This has a falling wedge breech block, electric primer firing and semi-automatic operation with the aid of clock springs. Separate springs are used for opening and closing. There are a number of differences between this gun and the 7.5 cm. KwK (Short) and very few parts are interchangeable. In the case of the long and short 5 cm. guns, only the barrels differ.

The principal differences are :

- (i) The operating cam for the mechanical safety switch is further forward on the breech ring.
- (ii) The pencil in the electric firing circuit is of lighter construction and has external insulating bushes.
- (iii) Two large holes are drilled through the lower portion of the breech block for lightness.

Muzzle Brake

The muzzle brake is of double baffle type, the rear baffle having a renewable insert. It is secured by a locking ring, lockwasher and setscrew.

Cradle

The cradle is of standard welded construction, similar to that in the Pz.Kw.III with the 5 cm. gun, but longer. The lefthand gun lug is provided with bronze shoes and runs in an anti-rotation guide inside the left side plate of the cradle.

The S.A gear is similar to that for the 5 cm. gun (Pz.Kw.III).

A deflector guard is provided which hinges downwards. It carries no balance weights, but has three fittings for the empty cartridge bag and an adjustable setscrew to operate the deflector guard contacts in the firing circuit.

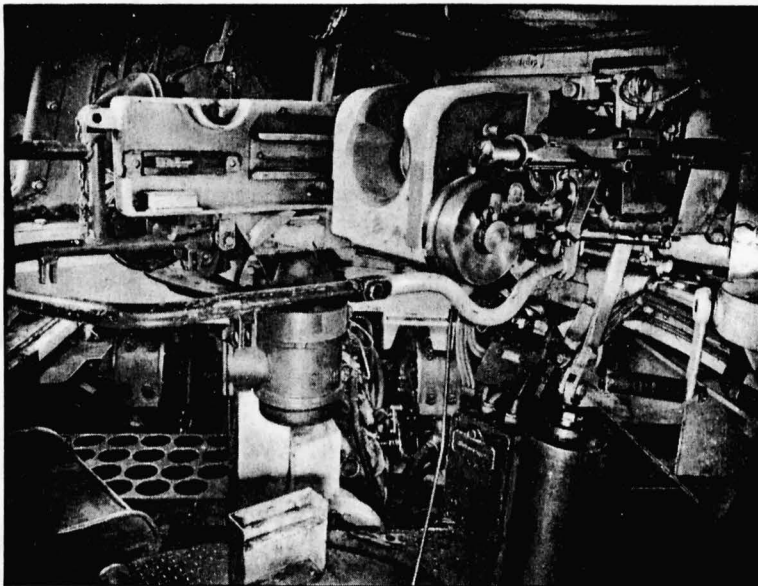


FIG. 2

Recoil System

The recoil system comprises a hydraulic buffer on the right and a hydro-pneumatic recuperator on the left. There is also a spring loaded hydraulic reservoir and safety switch for the buffer, slung below the cradle. It is similar to the 5 cm. recoil system externally, although it is known, from examination of a similar system that has been dismantled, that the packings are differently arranged and that a retarding valve is provided in the recuperator.

The piston rods are nutted to lugs formed on either side of the breech ring. A recoil indicator is provided inside the left cradle side plate and is graduated from 430 - 520 mm., (17 - 20 $\frac{1}{2}$ ins.) with the "FEUERPAUSE" (Stop) position at 505 mm. (19.9 ins.)

The recoil system appears to be in good order and serviceable.

Mounting

Maximum Elevation 20° 15'
Maximum Depression 8° 20'

The mounting is of the normal Pz.Kw.IV external mantlet type, except that the armoured jacket for the front of the recoil system is integral with it and that the gun port cover consists of a flat plate with an armoured tube welded to it to form the gun jacket. This follows Pz.Kw.III practice. Splash proofing is by sheet metal plates and appears adequate. Plain bearings are used for the trunnions. The trunnion bearings are supported from behind by internal reinforcing frames, which tie together the roof, front plate and base plate of the turret.

Balance

Since the piece is mounted very far forward, the mounting is considerably muzzle heavy. It is balanced by a heavy compression spring carried in a cylinder anchored to the forepart of the turntable floor to the right of the centre line. The spring is compressed by a piston and the piston rod is attached by a connecting rod to a short lever near the top of the mounting on the right. The leverage is relatively short. The distance from the turntable to the top of the piston rod varies approximately as follows:

At Maximum Elevation (+20° 15')	24 $\frac{1}{2}$ ins.
At Horizontal	28 ins.
At Maximum Depression (- 8° 20')	29 ins.

The compression of the spring is adjustable. As the tank was received the mounting was still slightly muzzle heavy. This was without the additional weights behind the trunnions, of the telescope, the round in the chamber, the empty cartridge bag, the machine gun, two belt bags and one 150 round belt. The front turntable support has been strengthened to take the compression of the balance gear.

Elevating Gear

The elevating gear is of sector and pinion type. The sector has internal teeth. It is driven from the elevating wheel, which is on a transverse axis, through two bevels and a worm and worm wheel. The handwheel is operated by the gunner's left hand its radius is 4 inches and $34\frac{1}{2}$ turns are required to cover the arc from $-8^{\circ} 20'$ to $+20^{\circ} 15'$ ($28^{\circ} 35'$). This represents a ratio of 0.8 degrees/turn.

The elevating lock consists of two flat strips with domes formed on their inner faces at each end. These two strips are

clamped together by two screw clamps. The upper pair of domes engages an eye on the turret roof and the lower pair an eye formed on the left side plate of the cradle. The length is such that the gun is clamped at $15^{\circ} 40'$ elevation. This lock appears to have been designed to prevent chatter. Judging by the flutter of the gun when the tank is moving it is clear that it must always be locked when travelling to avoid straining the mounting and elevating gear. For this reason it is considered that the tank cannot fire on the move.

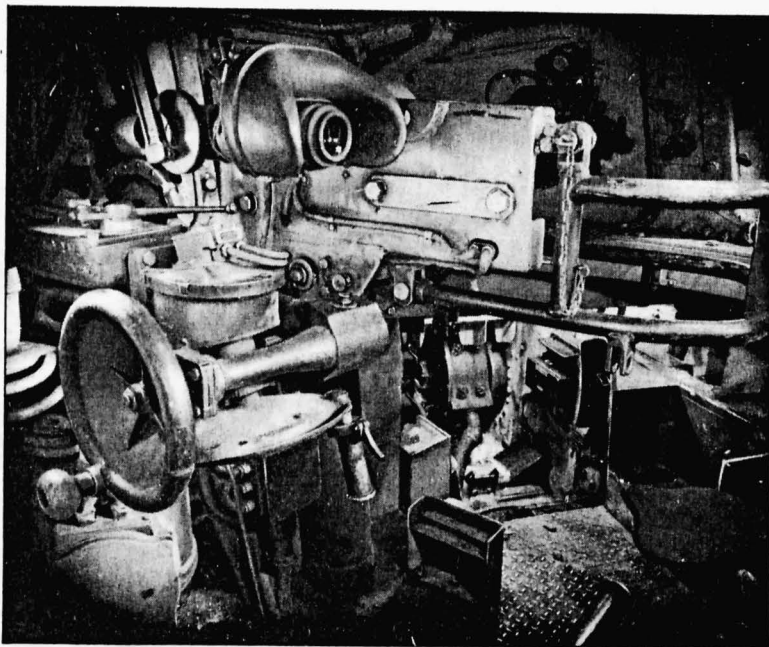


FIG. 3

Firing Gear

Standard electric primer system operated by trigger on traversing handle. Current taken from the battery (12 V) of the vehicle or from an emergency battery (9 V or $4\frac{1}{2}$ V).

Traversing Gear

Both hand and power gears are provided.

The power gear in general is similar to that in the earlier Pz.Kw.IV's. Certain modifications have however been effected and are referred to in Para. 16. It works on the Ward-Leonard principle. The maximum speed is relatively low, but the response is quick and the braking good.

The chief shortcomings are :

- (a) Accurate control with the handwheel is difficult.
- (b) The dead space is too wide.
- (c) The number of resistance steps is too small, with the result that the characteristic is noticeably stepped, making it impossible to follow moving targets accurately particularly at low angular speeds.

The auxiliary engine is reasonably quiet in spite of a leaking exhaust system.

The power gear can only be engaged when the traversing handle is at 12 o'clock.

The hand gear is operated by a $4\frac{1}{2}$ in. radius handwheel on an almost vertical axis. The gear ratio is 190 turns for 360° . The right hand is used for traversing.

An auxiliary hand gear is mounted on the right of the loader. This feature does not appear in the earlier models of the Pz.Kw.IV with short guns. The auxiliary traverse gear drives direct on to the traversing rack and is not cross-connected to the main traversing gear as in the Pz.Kw.III. The handle radius is 5 inches and the ratio 133 turns for 360°. It is not possible to traverse the turret with the auxiliary gear alone.

A plunger type traversing lock is provided on the turret base plate behind the gunner. The only locking position is at 12 o'clock.

The turret centre of gravity is well forward, although the actual "out of balance" was not measured.

It is surprising that, with such a long gun, no "Querabschalter" or "broad-side indicating system" is fitted. In earlier Pz.Kw.IV's and in Pz.Kw.III two lights are mounted in front of the driver to warn him when the gun is projecting over the side of the tank.

COAXIAL M.G. 34

Cradle

The machine gun cradle is similar to earlier Pz.Kw.IV's. It incorporates a spring buffer and will carry two belt bags (one full and one to collect empties). It also supports the firing linkage and belt guide with check pawl. Provision is made for swinging the body of the M.G clear when changing barrels and for both vertical and lateral zeroing adjustments.

Firing Gear

The firing gear is of rod and lever type operated by foot pedal on turntable.

AUXILIARY M.G.

Mounting

The gun is mounted on the right hand side of the front vertical plate. It has the standard type of ball mounting with hemispherical fixed external mantlet, the ball being inserted from the outside. The mounting is breech heavy, most of the weight being taken through a "head pan" on to the gunner's head. There is also a tension spring anchored to the hull roof, but this tends to pull the gun off the target sideways. A neat travelling lock is provided but it is difficult to engage, since the mounting in the travelling position fouls the wireless set.

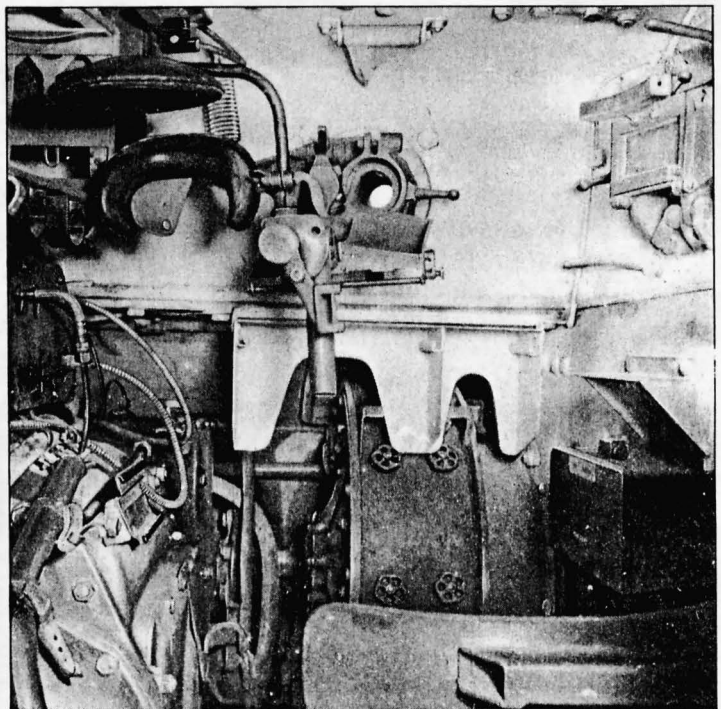


FIG. 4

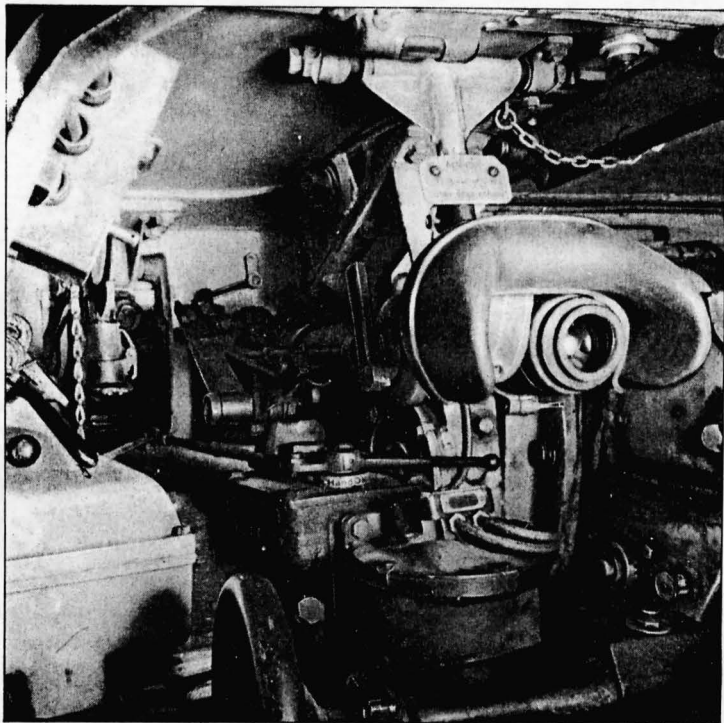
Sights

FIG. 5

The sighting of the turret guns is by telescope - T.Z.F. 5 f. Its construction is similar to that of other instruments of the T.Z.F.5 series. It incorporates all the latest modifications, including -

Lever control of elevation setting.

Zeroing adjustments operating in vertical and horizontal plane (not diagonal).
Additional spring loaded retaining hook on top of graticule box.

The optical surfaces appear to be "bloomed." As the only other German telescope in this country marked (U) also has bloomed surfaces, it is suggested that the (T) does in fact indicate that the instrument has been treated.

Range scales are provided as follows :-

- | | |
|---|-----------------|
| Gr 34 (H.E.) | 0 - 3300 metres |
| The zero is displaced so as to allow for negative jump. | |
| The M.G uses the same scale but its zero is displaced to allow for positive jump or to obtain approximate matching. | |
| Pzgr 39 (A.P.C.B.C) | 0 - 2500 metres |
| The zero is displaced to allow for negative jump. | |
| Pzgr 40 (A.P.40) | 0 - 1500 metres |
| The zero is displaced to allow for negative jump. | |

An open sight is provided, but only the case was found in the tank.
The hull machine gun sighting telescope is presumably the standard K.Z.F.2.

Fire Control

The standard stationary (with respect to hull) graduated target position indicator ring is provided inside the top of the cupola. It is graduated in clock hours and has 360 teeth.

The gunner has a more elaborate turret position indicator than usual, with two dials.

The left hand dial has two scales :
Clock hours and quarters, 12 per rev.
Mils in hundreds, 6400 per rev.

The right hand dial has one scale :
Mils in units, 100 per rev.

There is no clinometer as with the short 7.5 cm. KwK.

Communication between commander and gunner is by voice tube.

The commander has a small sighting vane in front of the cupola.

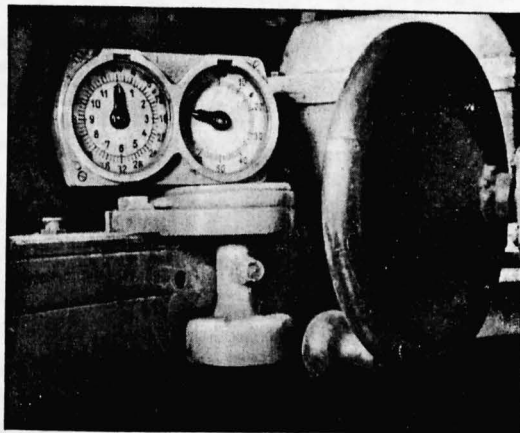


FIG. 6

6. AMMUNITION CARRIED

The total numbers of rounds carried is as follows :-

7.5 cm.	87 rounds
7.92 mm. (15 - 150 Round Belts*)	2250 "
Grenades (Egg-shaped)	6
Signal Cartridges	24

+ Includes one belt at each M.G.

The ammunition is disposed as under:

7.5 cm.

Along the right side of the hull below the panniers -

Stowed nose downwards in bins
with detachable sheet metal covers - 24 rounds.

Towards the rear -

Stowed in racks - 6 rounds.
In box inside racks 2 rounds.

On the left side of the hull in the pannier -

Stowed in racks - 18 rounds.

On the engine bulkhead -

Stowed in two boxes each holding
two cartridges - 4 rounds

In the driving compartment -

Stowed in four boxes each holding
two cartridges - 8 rounds.
Stowed nose downwards in
diaphragms in bins - 23 rounds.

Across the front of the turntable -

Stowed in box containing two
rounds - 2 rounds.
(This box is carried on raised
supports to enable the gunner
to operate the machine gun
firing pedal which is immediat-
ely below.

TOTAL - 87 rounds.

<u>7.92 mm.</u>	To the right rear of the turntable -	
	Stowed in carrier for two belt bags -	300 rounds
	In the fighting compartment -	
	Stowed on right side on ledges in panniers, forward, in eight belts of 150 rounds -	1200 rounds
	In hull gunner's compartment -	
	Stowed on ledges for three belt bags of 150 rounds -	450 rounds
	At guns - In two belts -	300 rounds
	<u>TOTAL -</u>	<u>2250 rounds</u>

In connection with the stowage of ammunition it is considered that the following points are worthy of special note:

- i. There is no armouring of the bins.
- ii. Rounds which are stowed vertically are nose downwards.
- iii. Some of the ammunition is protected against dust by canvas flaps only.
- iv. On casual observation the tank appears to carry only 71 rounds of 7.5 cm. ammunition but a closer examination reveals various additional brackets in which 16 further rounds are carried, making a total of 87 rounds. These additional rounds are in boxes of two, presumably those used for storage and transit. Measurements of the brackets show that these boxes must be $9\frac{1}{4}$ " wide and $4\frac{3}{4}$ " deep. They are of at least two lengths, $31\frac{1}{2}$ " and $28\frac{1}{4}$ " apparently to accommodate different lengths of cartridge, four types of which exist, i.e. A.P.C.B.C., A.P.40, H.E./A.T. and H.E.
- v. When the vertical rounds are stowed behind the driver, access between his compartment and the fighting compartment is difficult. When the four extra boxes are stowed above these rounds the driver is completely cut off and can only escape through his roof hatch. This hatch is masked by the stowage bin on the back of the turret when the gun is traversed to the rear.

7. TURRET

Whilst the dimensions of the turret and fighting compartments conform to those of the Pz.Kw.IV, Model F it is felt that the additional particulars tabulated hereunder will be of value. The measurements given are all approximate :

Height of turret roof above turret ring	1'	9."
Depth of turret ring		$4\frac{1}{2}$ "
Turntable floor below turret ring	2'	$7\frac{3}{4}$ "
Headroom in turret	4'	$8\frac{1}{4}$ "
Height of trunnions above ring		8"
" " " floor	3'	$8\frac{1}{4}$ "
Diameter of turret ring	5'	3"
" turntable floor	4'	$7\frac{1}{8}$ "
Distance from trunnions to rear of breech	2'	$0\frac{1}{2}$ "
" " rear of breech to rear of deflector	2'	1"
" " trunnions to rear of deflector	4'	$1\frac{1}{2}$ "
" " rear of deflector to turret ring	1'	5"
" " trunnions to centre of turret	2'	11"
Maximum safe recoil		20"

NOTE: The gun is on the centre line but the trunnions are offset to the right to accommodate the coaxial machine gun.

8. GENERAL CONSTRUCTION

A modification in the design of the front superstructure is effected by the fitting of a single, flat front vertical plate of 50 mm. thickness, (Fig.7.)



FIG. 7

9. ACCESS DOORS & ESCAPE HATCHES

Modification to the access doors in the glacis plate include the incorporation of an air intake aperture in each door protected by a cast cowl welded to the cover. A further new feature in respect of these hatches is the fitting of a heavy single hinge on each door in place of the two lighter hinges previously fitted. (Fig.8.)

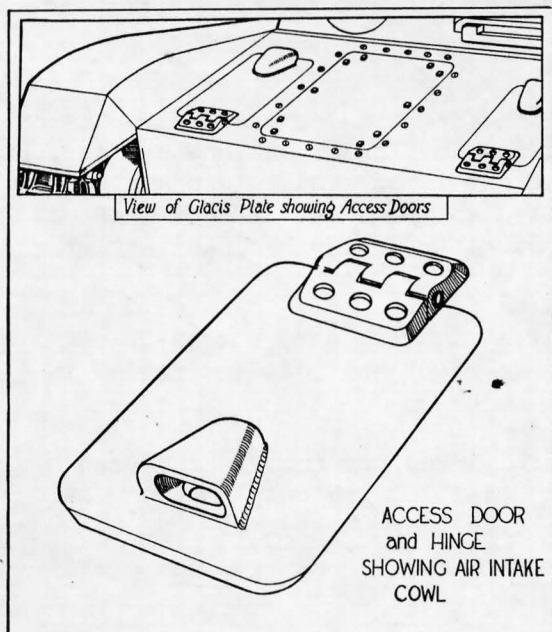


FIG. 8

previously investigated. The sliding B.P shutters have been superceded by hinged B.P flaps. (Fig.9.)

11. OBSERVATION

The vision devices conform to those already reported upon. The following further details are now available :

Driver's Episcopo

This instrument is formed by two KFF2 type periscopic telescopes. These are mounted in a standard sliding carrier with adjustable inter-ocular distance.

General

All glass blocks are laminated. There is an air gap in front of the innermost ply. Their overall thickness is 90 mm.

A spring loaded stay is fitted to the underside of the radiator cover plate by means of which the plate may be retained open approximately 6" for the admission of extra air.

A change has been effected in the access doors to the turret. The single door previously encountered has been superceded by double doors of similar pattern and dimensions to those fitted on the Pz.Kw.III. The forward door on each side incorporates a vision port with a B.P slitted cover and readily removable glass block. A revolver port is provided in each rear door.

10. REVOLVER PORTS

The revolver ports in the turret doors are of a different design to those

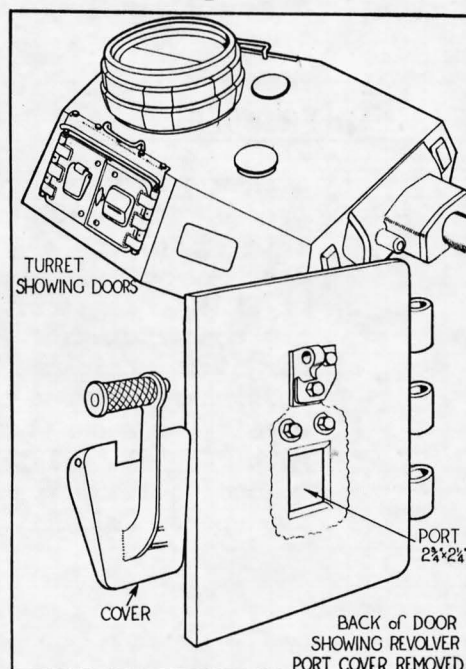


FIG. 9

12. SEATING

The seating for the crew in this vehicle is in good condition

COMMANDER

The seat is mounted on a single tubular standard secured to the turret ring at the top and to the rotating floor of the fighting compartment at the base. It is adjustable for height on the standard by the release of two clamping screws.

The seat itself is also adjustable to three positions. When completely folded a curved plate welded to the front of the seat forms a step to facilitate entry to the fighting compartment from the cupola. The first operation of unfolding provides a firm footplate from which the commander has open vision when cupola hatches are open.

In the third position the underside of the footplate is brought uppermost and a convenient seat is provided from which the commander may observe through cupola visors when the hatches are closed.

GUNNER AND LOADER

Two further seats are provided in the fighting compartment. One on the right of the commander's seat for the loader and one on the left for the gunner. The seat on the right is of saddle type and may be easily folded sideways and swivelled to the right or left when not in use, or to provide freedom of movement for the occupant whilst seated.

The gunner's seat on the left of the fighting compartment is of bucket type and may also be swung to right and left and folded to the side when not required.

When all seats are folded, reasonably free movement of the crew about the fighting compartment is possible, the only serious obstruction being the compensating device for the turret gun.

DRIVER AND HULL GUNNER

The usual seating accommodation is provided.

13. IDLER WHEELS

A change is noted in the type of idlers used on this vehicle.

They are of twin type and of 2' $\frac{3}{4}$ " diameter. They are constructed of 2 $\frac{1}{4}$ " diameter tube. The outer and inner sections of the wheels are secured together by flat plates welded to their respective spokes (Fig. 10.)

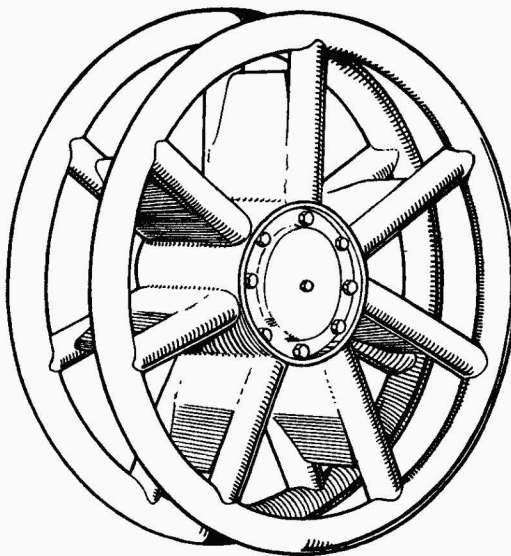


FIG. 10

14. ARMOUR

	<u>BASIC</u>	<u>EXTRA</u>	<u>ANGLE</u>
A. Cupola Top	9 mm.		90° (Hor)
B. " front and sides	50 - 95 mm.		Circular
C. Turret top front	10 mm.		84°
D. " " rear	10 mm.		90° (Hor)
E. " sides	30 mm.		26°
F. " rear	30 mm.		16°
G. " front	50 mm.		11°
H. Gun mantlet	50 mm.		Round
J. Front vertical plate	50 mm.		10°
K. Front glacis plate	25 mm.		73°
L. Front nose plate	50 mm.		12°
M. Front lower nose plate	Not measured		26°
N. Side superstructure	30 mm.		0° (Vertical)
P. Side hull plate	30 mm.		0° (Vertical)
Q. Top front plate	12 mm.		85°
R. Top rear plate	15 mm.		90° (Hor)
S. Top rear engine cover plate	10 mm.		87°
T. Observation cover plate	varying 20 - 25 mm.		
U. Belly plate	10 mm.		90° (Hor)
W. Tail plate (upper)	20 mm.		12°
" " (lower)	Not measured		9°
X. Skirting plates	Not fitted		

(The "Angle of Plate" given is the angle between the plate surface and the vertical, which is equal to the "Angle of Impact" for horizontal attack.)

Comparison with earlier models examined shows that in several places the armour has been thickened up.

The orthodox German unit assembly and all welded construction is used. The welding appears by surface appearance to be austenetic, although this need not be necessarily so throughout the full depth of the weld. The normal splash protection common to all German vehicles is applied to doors and ports. The turret ring is protected by the usual inverted angle welded to the superstructure top plate.

Some signs of weld failure have appeared in the joints between the turret front and side plates. Cracks have occurred in the heat affected zone alongside the weld.

Additional armour to the extent of 30 mm. thickness has been bolted to the leading faces of the final drive housings.

Examination of the armour by means of the "Poldi" Brinell testing equipment shows an increase in the use of face-hardened plates which are presumably treated by the flame-hardening process.

The following plates appear to be face-hardened :

L. Front nose plate	Outer surface	460 - 490	
J. Front vertical plate	" "	500 - 520	Inner surface 250-260
G. Turret front plate	" "	490 - 510	
N. Side superstructure	" "	500 - 520	" " 270-280
P. Side hull plate	" "	470 - 500	

The turret side plates (E) appear to be of homogenous armour of 340 - 360 Brinell which is the usual quality found on Pz.Kw.III's and IV's previously examined.

Inverted channels of 4 mm. thickness and of 4" x 8" section are bolted to each side of the belly plate between the projecting portions of the suspension mountings providing a smooth surface along the length of the belly.

15. STEERING

A modification to the steering brakes is found in the fitting of 25 steel lining plates, measuring 90 mm. x 50 mm. The plates are each secured by two rivets.

The bands on the previous models examined were lined with 10 larger plates each measuring 65 mm. x 124 mm., each plate being secured by four rivets.

16. ELECTRICAL EQUIPMENT

The general condition of the electrical system is good and follows normal German A.F.V practice. The only deviation from previous practice is the omission of the two headlights and the resistance switch in the "Notek" lamp circuit.

The system is negative earth return throughout.

CHARGING AND STARTING

Four 12 volt lead acid accumulators of approximately 120 A.H. capacity are situated under the right hand rear corner of the fighting compartment floor. They are charged by a 12 volt four pole generator driven by twin belts.

Voltage regulation is by vibrating contact type voltage regulator mounted to the rear of the right hand wall of the engine compartment.

The main positive and negative leads are taken to the battery master switch, mounted on the right hand side of the engine bulkhead in the fighting compartment.

The starter motor is a 24 volt axial pattern, mounted to the left rear of the engine.

The change-over of the accumulators from parallel to series for starting is effected by a solenoid operated series-parallel switch mounted on the underside of the pannier at the right rear corner of the fighting compartment. This switch is operated by the starter button on the driver's panel.

ELECTRICAL POWERED TRAVERSE

Until the generator assembly is removed from the vehicle, a detailed report on the installation cannot be made.

The obvious differences between this installation and earlier types lies in the ignition and starting systems. The ignition is now by a coil system fed from the vehicle accumulators. The coil is situated in the top of the flywheel housing mounted on the end of the generator carcass remote from the two cylinder engine. The coil assembly consists of two coils, each with a spring connection, mounted on a shell shaped core. Two sets of make and break points, are mounted in the centre of the same housing and the operating cam is carried on the end of the armature shaft.

No distributor is fitted but correct timing of the spark is obtained by the use of one coil and one set of points for each plug, together with a single lobed cam running at engine speed.

The theoretical wiring diagram of the system is given below

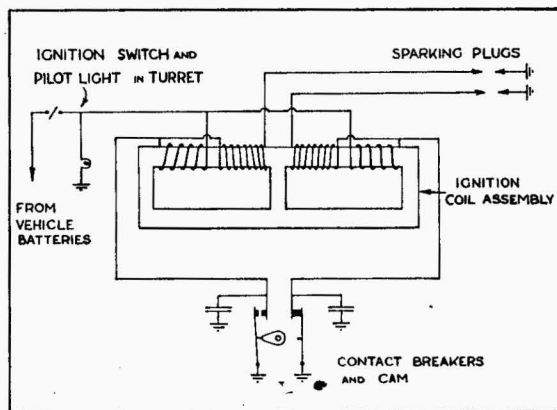


FIG. 11

The flywheel mounted on the armature shaft also forms the armature of the starter motor. The flywheel is about 10 ins. diameter and slots cut axially in the face carry the starter motor armature conductors.

Neither the poles nor the commutator can be seen through the access plate in the housing. The commutator is presumably carried on the armature shaft between the flywheel and the generator end plate, on which the brush gear may be mounted.

No poles or field windings could be seen, but the limited space would indicate that only two poles are fitted.

LIGHTING

The external lighting system is not complete but there is evidence that two normal type side lights and a tail light on the right track guard have been fitted.

A "Notek" screened head light and distance keeping tail light are also installed but the five-stage switch normally fitted with this installation is absent.

The control of the external lighting system is by means of the usual Bosch switch box on the panel, and two festoon lamps in the turret.

Gun position indicator lights for the driver are not fitted, but the mounting for them is fitted.

Eighteen fuses in three fuse boxes are mounted to the left of the driver, and the circuits protected are marked on a name plate alongside the fuses. Provision is made for the fitting of six extra fuses.

A red reflector is fitted at the rear of the right track guard.

WIRELESS AND INTERCOMMUNICATION

No wireless sets are in the vehicle but provision is made for carrying three sets in mountings to the left of the front gunner. The sets are presumably two receivers and one transmitter. Three power units, taking their low tension supply from the vehicle batteries are mounted behind the front gunner. A changeover switch marked "Bord" and "Funk und Bord" and an eight way fuse box are carried on the hull wall to the right of the front gunner. The switch box is the change over from intercommunication to wireless and intercommunication and the latter contains the power unit fuses together with spare fuses.

The aerial is the normal two metre copper rod, and is mounted at the front right hand corner of the fighting compartment. It is retractable by hand from inside the tank, and is pushed aside by the 7.5 cm. gun when the turret is traversed. An improved type of trough is fitted to house the wireless aerial when lowered. This incorporates an additional compartment for stowage of a spare antenna.

The position of the microphone and head-set connecting boxes shows that only the front gunner, the driver and the commander are on the intercommunication circuit.

TURRET CIRCUITS

The feeds to the turret are taken through the base junction which allows 360° traverse.

The turret circuits are :-

- (a) The electrical powered traverse.
- (b) The internal lighting consisting of two festoon lamps.
- (c) The electrical firing circuit.
- (d) The extractor fan circuit.
- (e) Speech circuit to commander.

The electrical powered traverse is, to all appearances, identical with the type normally fitted to the Pz.Kw.IV range.

The electrical firing circuit is also identical with the normal layout when this type of firing is used.

The fan is mounted in the turret roof, to the right of the 7.5 cm. gun, and is controlled by a switch mounted on the turret roof over the loader's head.

GYROSCOPIC DIRECTION INDICATOR

The mounting for the gyroscopic direction indicator is fitted but the instrument and the rotary convertor have been removed.

17. ENGINE COOLING SYSTEM

A system of valves is installed in the engine cooling of this vehicle for the purpose of introducing hot water.

In the rear return pipe from the cylinder blocks to the radiators are fitted a manual stop cock "B", Fig. 12, and a spring loaded non-return valve "A", Fig. 12. The latter valve consists of a hollow stem with a mushroom head under which are the valve ports. The stem is integral with the outer housing and closure of the ports is effected by a sliding body or piston which forms a seating for the valve head and is retained when closed by a strong coil spring. A protecting cap is provided for the valve when not in use.

The valve is opened manually when a hose connection is made to its housing. It is apparent from the construction of the sliding member that a seating flange is incorporated in the hose union which when the coupling is complete, depresses the sliding member and opens the ports. Similarly the valve automatically closes during the process of uncoupling by reason of the reaction of the coil spring.

The third valve used in the arrangement is a manually operated restrictor valve installed in the return pipe at the forward end of the engine, "C", Fig. 12. It differs from the stop valve in construction only as far as its plunger is concerned. This component is drilled so that when in the closed position a restricted flow of steam or water may still take place.

Systems for the transfer of coolant from one vehicle to another have been commented upon in the German semi-military publication "Die Panzertruppen." These systems would however appear to provide for a circulation of the coolant through the cooling systems of two vehicles, whereas the device referred to in this report permits only introduction of hot water, there being no return to the delivering system.

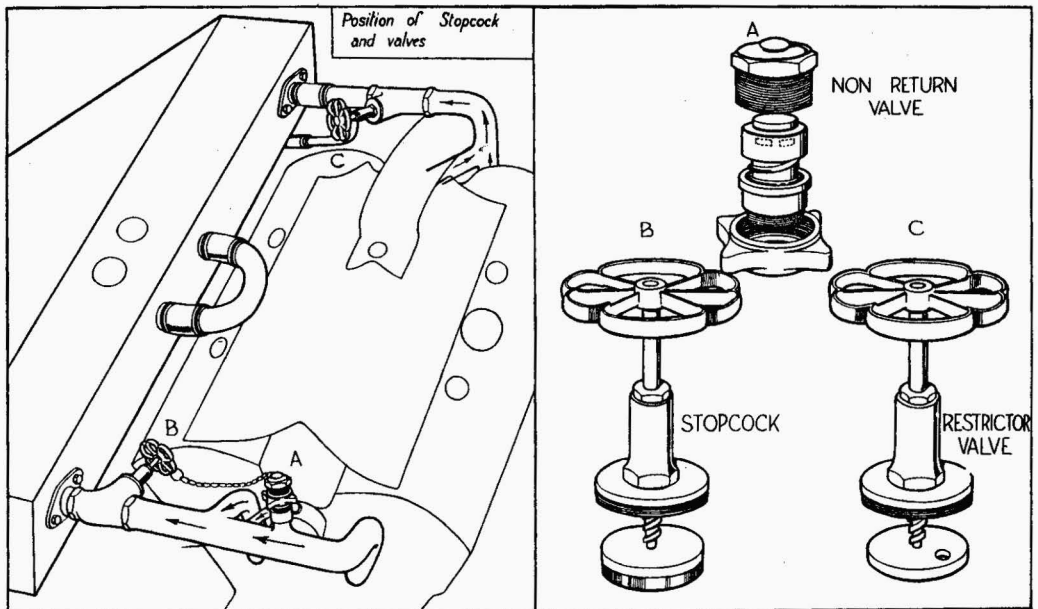
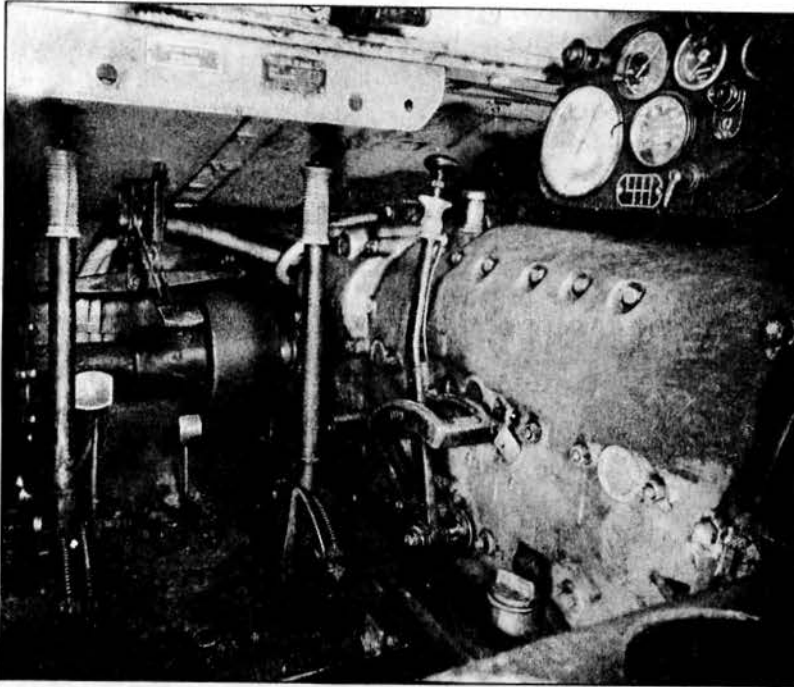


FIG. 12

18. INSTRUMENTS AND CONTROLS



An additional gauge is mounted on the instrument panel to register the oil pressure in the gear box lubrication system. The instrument is graduated 0 - 1 Kg/cm² (0 - 14 lb/sq.in.)

FIG. 13

19. STOWAGE

Whilst the stowage on this vehicle is not complete in many cases, it has been possible, by reason of the good condition of the fittings, to offer suggestions as to the nature of the items stowed in the various clips and brackets. Where such conjecture has been made the items are in parenthesis.

EXTERNAL

Front

- | | | |
|-------------------------|--|-----------------|
| 10 Track links and pins | | On nose plate |
| 7 " " " " | | On glacis plate |

Nearside

- | | | |
|-------------------------------------|-----------|--------------------------------|
| 1 Fire extinguisher | Deficient | On track guards |
| 2 (115 mm. S.E. Spanners) | Deficient | " " " |
| 1 (Pair wirecutters) | Deficient | " " " |
| 1 Set cleaning rods for 7.5 cm. gun | Deficient | On side of engine compartment. |
| 1 (Crowbar) | Deficient | On track guard |

Offside

- | | | |
|-------------------|-----------|-------|
| 1 Axe | Deficient | " " " |
| 1 Jack and handle | Deficient | " " " |
| 3 Track links | | " " " |

1 Shovel	Deficient	On track guard
1 Aerial protecting channel incorporating tube for spare aerial		" " "
1 Track adjusting tool		On right side of engine compartment

Rear

1 Equipment bin		On rear of turret
1 Tow rope	Deficient	On rear of fighting engine compartment

INTERNAL

Turret

2 Respirator extension tubes		On roof, left front
2 spare glass blocks for side ports	Deficient	On base plate, left front.
1 holder for memorandum of examination of gun and recoil system history sheet	Deficient	On right wall, front
1 compartment for Commander's headset microphone	Deficient	On rear base plate
1 Signal pistol	Deficient	On rear wall

Turntable

Electrical junction boxes and emergency firing batteries	Deficient	On front support
12 Signal cartridges	Deficient	In box on right rear support
2 Spare M.G. barrels	Deficient	" " " " "
12 Signal cartridges	Deficient	In box on left rear support.
Commander's and gunners respirators	Deficient	On left rear support
Open sight in case	Deficient	" " " "
2 Breech blocks, M.G.) 2 Spanners) 1 Oil can) 1 Spare parts box) 1 M.G ground mounting)	Deficient	Above the base junction
1 Entlader - "Unloader" 1 Loader's Respirator)	Deficient	At right rear
2 boxes M.G accessories	Deficient	At left rear

Fighting Compartment

2 tool boxes Deficient On floor at left

Engine Bulkhead

1 forward Area A.A. sight for M.G. Deficient On brackets

Driving Compartment

2 Spare glass blocks - driver's Deficient In holders

1 Gyro-direction indicator Deficient In front left corner

1 Driver's Respirator Deficient In rear corner

1 Magnetic inspection lamp } Deficient Beside seat
 1 Fire extinguisher }

1 Tool Box Deficient At rear

1 Spare KFF2 periscopic driving telescope Deficient On back of wireless cradle

1 Driver's headset and microphone Deficient In box at rear

Hull Gunner's Compartment

1 case for 2 spare M.G. barrels Deficient On right of gearbox

1 slide for Morse key Deficient " " " "

2 Wireless Receivers } Deficient In cradle slung from roof
 1 " Transmitter } above gearbox

6 Spare glass blocks Deficient Behind gearbox

1 Box (for M.G. tools, two breech blocks, two spanners and oil cans Deficient " "

1 Operator's headset and microphone Deficient " "

1 Oil can Deficient Under roof at rear

1 Operator's respirator Deficient Under roof at rear

20. RECOGNITION POINTS

The long barrel of the 7.5 cm. gun with its muzzle brake is, of course, the outstanding feature.

This vehicle may readily be distinguished from the earlier models by the flat front vertical plate, the air intake cowls on the glacis plate and by the tubular idler wheels.

21. IDENTIFICATION MARKINGS

<u>Chassis No.</u>	83072	<u>Turret No.</u>	82552
<u>External:</u>	The German cross is painted on each side and on the rear of the superstructure. A red St. George's Cross followed by 22400 Kg. is painted on the offside of the superstructure.		
<u>Armament:</u>	<u>On the Breech and Piece of 7.5 cm. Gun.</u> R.3652. Fl. 1099 eyd 1942 CXD BsK. Fl. 295 CXD Vr: Fl. 203. eyd WaA. 351 <u>On turret telescope.</u> beh T.Z.F. 5f. vorl. 13 (t)		
<u>Engine:</u>	<u>On plate on air intake manifold.</u> Motor No. 542345 - LEISTUNG. 300 P.S. <u>On rear engine bearer.</u> K.Z. - 004 <u>On rocker box cover.</u> NB <u>On radiators.</u> HANS WINDHOFF - BERLIN - SCHONENBURG Rearmost: Kuhl. Nr. 17171 Comp. Nr. 44125 Lfd. 88.41 Foremost: Kuhl. Nr. 17150 Comp. Nr. 44125 Lfd. 67.41		
<u>Gearbox:</u>	<u>On nearside of the casting.</u> deb. S.S.G. 76. Nr. 2074/1942		
<u>Idler Wheels:</u>	<u>On spokes.</u> 423 2 P		

22. REFERENCES

Where details of the vehicle are identical with those already reported they have not been included in this Report.
References to the particular units and components are given hereunder:

For details of -

DIMENSIONS	}	See S.T.T.Preliminary Report No. 7.
CREW		
OBSERVATION		
ACCESS DOORS		
TRACK ADJUSTMENT	}	See S.T.T.Preliminary Report No. 5.
TRACKS		
SUSPENSION	}	See Report by Messrs. Leyland Motors and S.T.T. Preliminary Report No. 7.
ENGINE & COMPONENTS		
GEARBOX & TRANSMISSION		
STEERING		

